NATIONAL ACADEMIES Sciences Engineering Medicine

TRB TRANSPORTATION RESEARCH BOARD

TRB Webinar: Container Port Landside Congestion Experiences and Solutions

February 5, 2024

12:00 – 1:30 PM

PDH Certification Information

1.5 Professional Development Hours (PDH) – see follow-up email

You must attend the entire webinar.

Questions? Contact Andie Pitchford at TRBwebinar@nas.edu

The Transportation Research Board has met the standards and requirements of the Registered Continuing Education Program. Credit earned on completion of this program will be reported to RCEP at RCEP.net. A certificate of completion will be issued to each participant. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the RCEP.

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Purpose Statement

This webinar will reflect on how stakeholders handled landside congestion and the solutions that could be implemented in the future. Presenters will discuss recent experiences and the infrastructure and technological approaches that have and can be implemented.

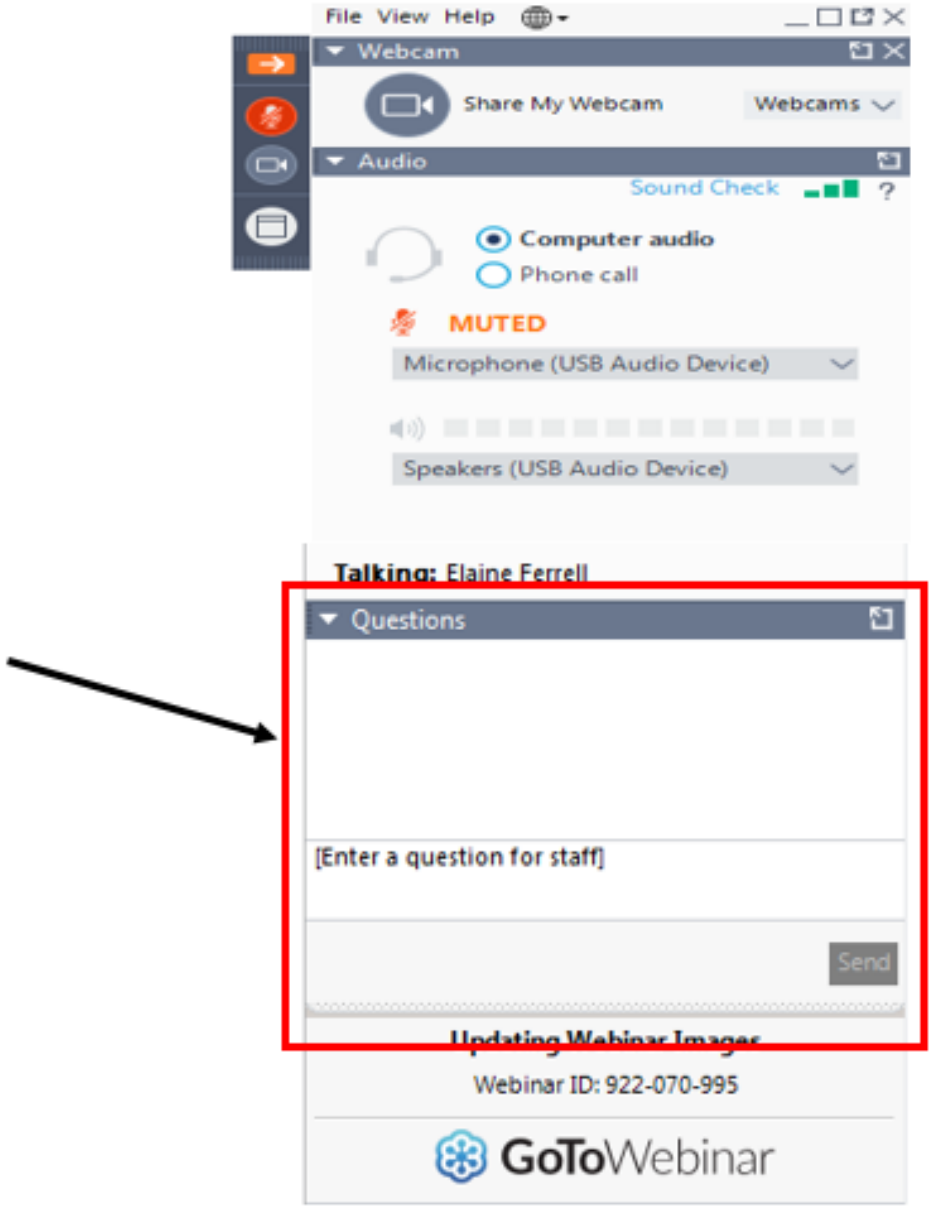
Learning Objectives

At the end of this webinar, you will be able to:

- Utilize best practices from industry stakeholders and potential solutions from recent research
- Identify tools and practices to maintain efficient landside cargo flow at container ports

Questions and Answers

- Please type your questions into your webinar control panel
- We will read your questions out loud, and answer as many as time allows



Today's presenters

Shannon McLeod
smcleod@aapa-ports.org
American Association of Port Authorities

Matt Schrap
matt@harbortruckers.org
Harbor Trucking Association

Thomas Phelan
tphelan@gfnet.com
Gannett Fleming, Inc.

Ryan Mariacher
rmariacher@porthouston.com
Port Houston

Container Port Landside Congestion: Experiences and Solutions

ITS MARAD Truck Staging Study

February 5, 2024

TRB
TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

Project Background

Challenges & Issues

- Marine terminal congestion is an ongoing challenge in the U.S.
- Economic growth driving cargo volume growth.
- Exacerbated by larger container ships, infrastructure improvements – channel deepening, air draft clearance projects, Panama Canal expansion
- Chronic shortage of drivers in the trucking industry
- *Maritime Administration Strategic Plan (2017-2021)* … Strategic Goal #5: Maritime Innovation.

ITS JPO Initiatives

- Intelligent Transportation Systems Joint Program Office (ITS JPO) Mission Statement:

  "Conduct research, development, and education activities to facilitate the adoption of information and communication technology to enable society to move more safely and efficiently."

- *ITS Strategic Plan (2015-2019)* … One of two key strategic priorities:

  ***"Advancing Automation:** Shapes the ITS Program around the research, development, and adoption of automation-related technologies as they emerge."*

Technology Research: 2017-2019

- Automation technology for “outside-the-gate” operations at marine terminals was analyzed in detail:

  Project Objective: *“To determine the state of the practice regarding truck staging, including access, queuing, and parking, at maritime ports and to identify port operators’ and trucking industry needs; and to perform an economic feasibility study of automated truck queuing as a technology solution.”*

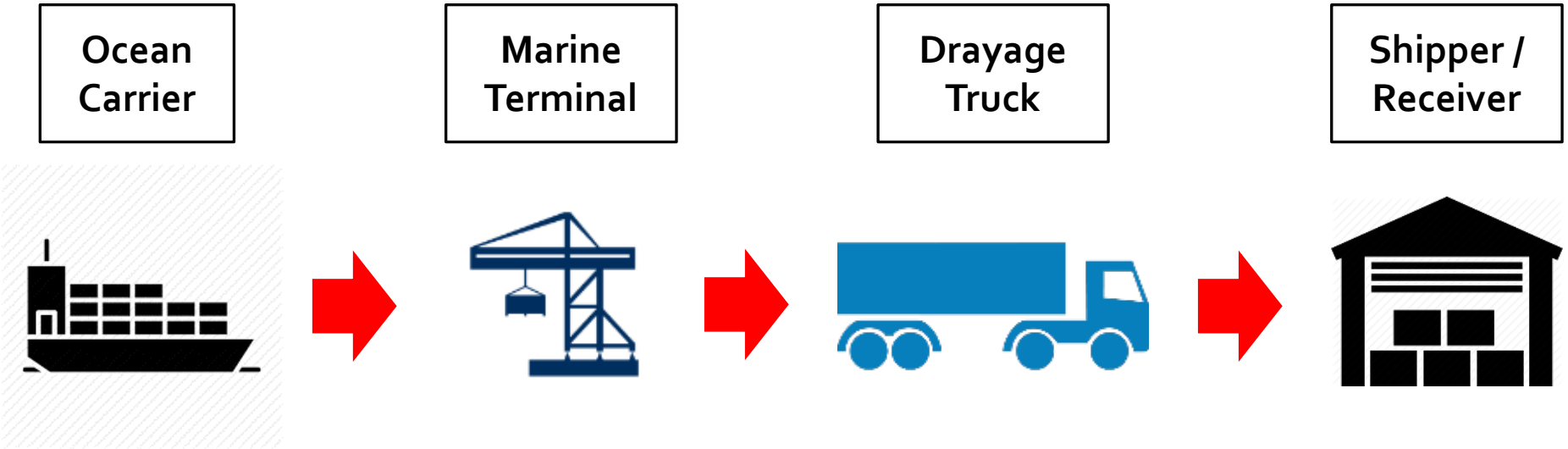
Can Truck Automation Play a Role in Addressing Terminal Gate Queues?

Map data © Google (2019)

Port Operation Overview

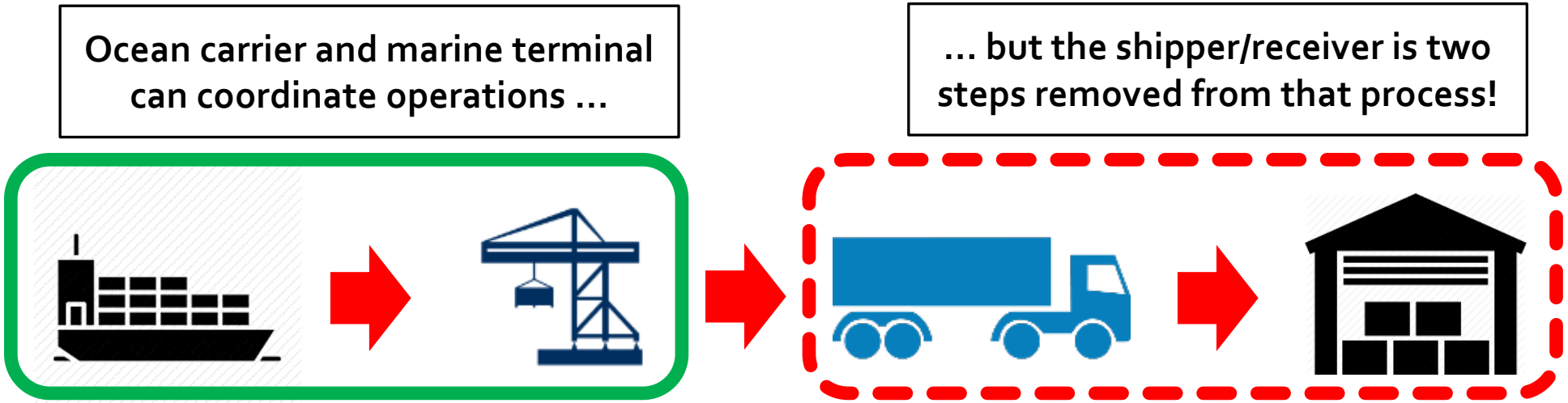
Port Terminal/Drayage Operations

- Port terminal and drayage operations involve a complex series of steps carried out by multiple industries.



Inefficiency of Multiple Processes

- Individual steps may operate relatively efficiently, but the supply chain from start to finish is prone to be highly inefficient. For example …



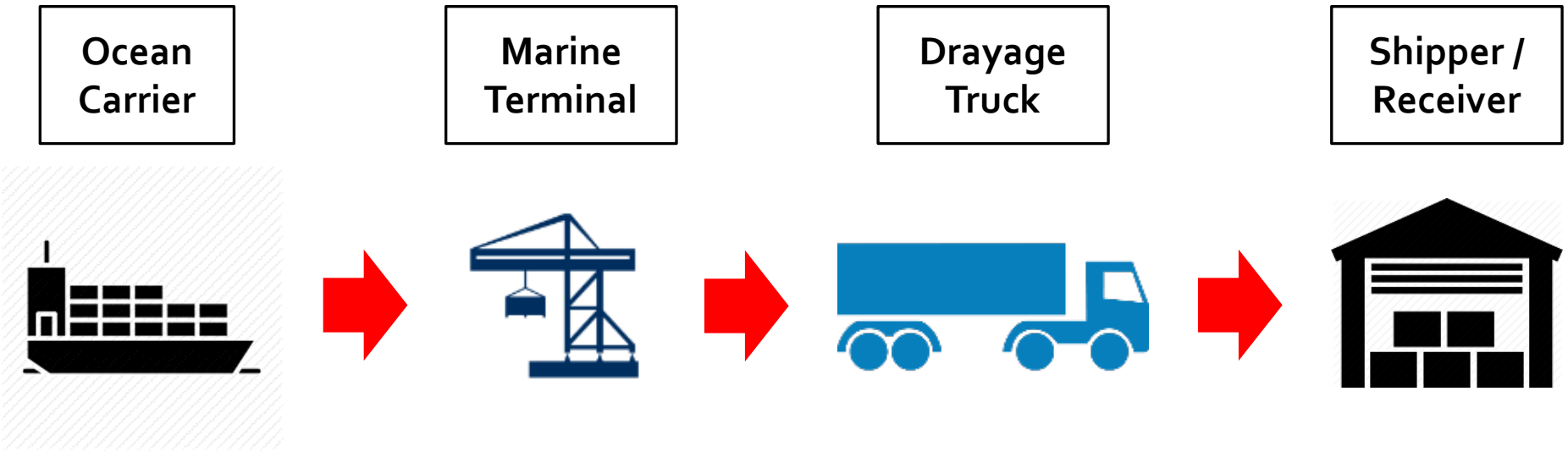
Equipment Complications

- The container and the chassis often have different owners and different contractual terms for the terminal operator, trucking firm, and shipper/receiver.
- Extra charges for extended use of this equipment (demurrage and per diem) may vary widely!

Photo credit: https://commons.wikimedia.org/wiki/File:APLcontainer.jpg (CartleR255)

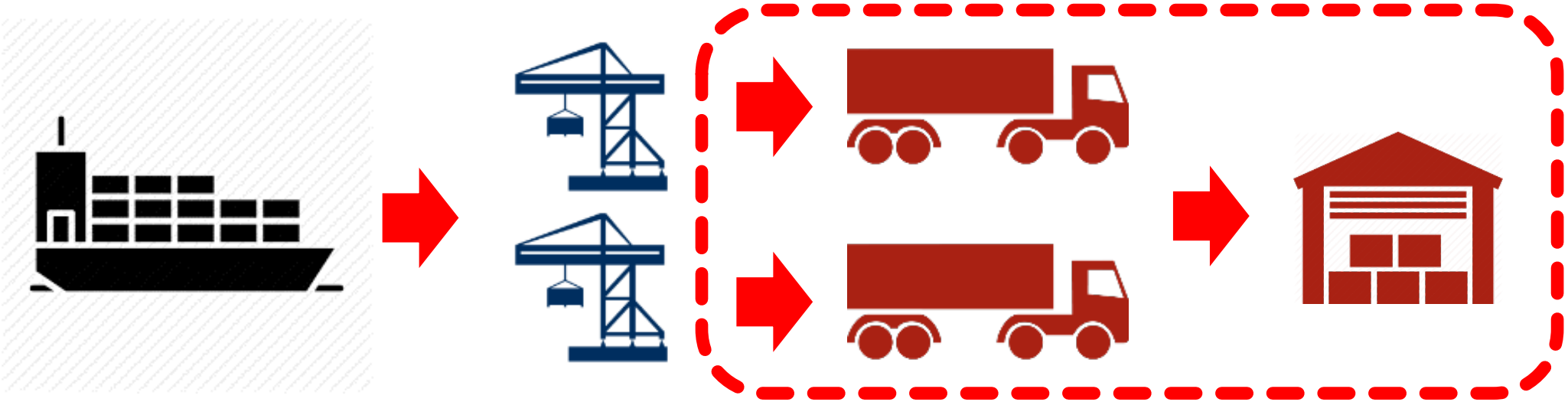
Maximizing Efficiency of Handling

- Terminal operations can be described as a “conveyor belt” model – which has advantages and disadvantages!



Responding to Volume Growth

- The transition from terminal to drayage trucking firm to customer is often the weakest link when cargo volumes grow.



Ships get larger …

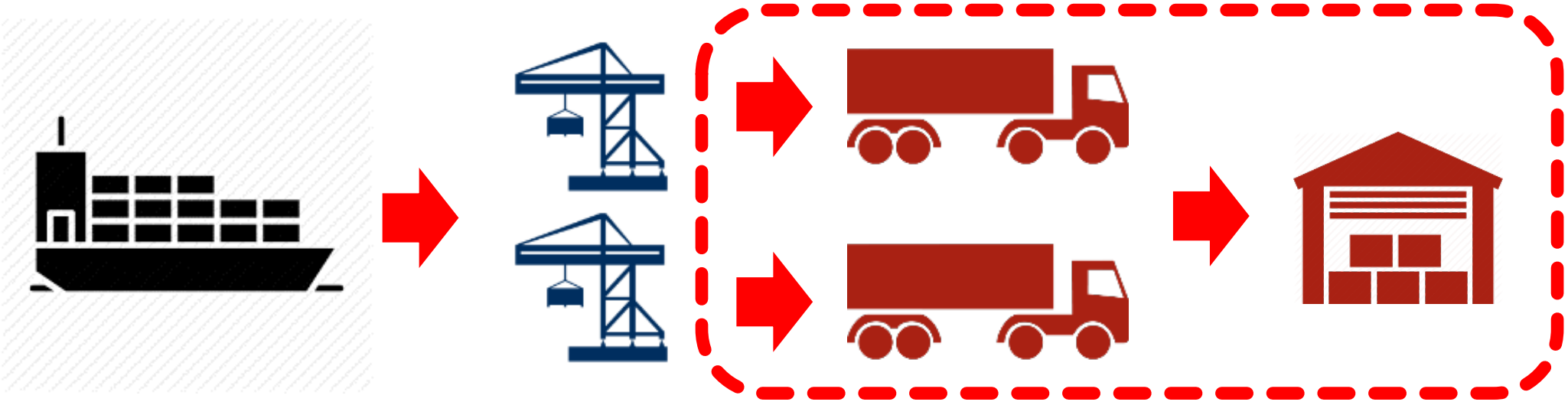
… so terminal capacity expands

Is there sufficient trucking capacity?

Does the customer change?

Responding to Volume Growth

- The transition from terminal to drayage trucking firm to customer is often the weakest link when cargo volumes grow.



The terminal gate transition was the focus of this study

Port Stakeholder Outreach

Outreach Process: Interviews

- Industry stakeholder interviews conducted in six port regions:
  - New York / New Jersey
  - Savannah
  - Houston
  - Los Angeles & Long Beach
  - Seattle & Tacoma
  - Columbus, OH (Inland Port)

Summary of Findings

Potential Solutions

- **Group A:** Port Staging Technologies and Practices at Marine Terminals using Conventional Trucks
- **Group B:** Automated Truck Technologies

A – Staging Technologies/Practices

- Expanded gate hours
- Appointment system
- Off-site staging/parking
- Appointment system + off-site staging/parking
- Off-site staging/parking with a “virtual gate”
- “Gray box” container system
- Modified chassis pool operations
- Other technology applications

A – Screened Solutions

- Expanded gate hours
- Appointment system
- **Off-site staging/parking**
- **Appointment system + off-site staging/parking**
- **Off-site staging/parking with a “virtual gate”**
- “Gray box” container system
- Modified chassis pool operations
- Other technology applications

B – Automated Truck Technologies

- Automated truck (Level 4) in queue
- Automated truck (Level 4) in queue + off-site staging
- Alternative transport mode to/from off-site staging

Photo courtesy of Georgia Ports Authority

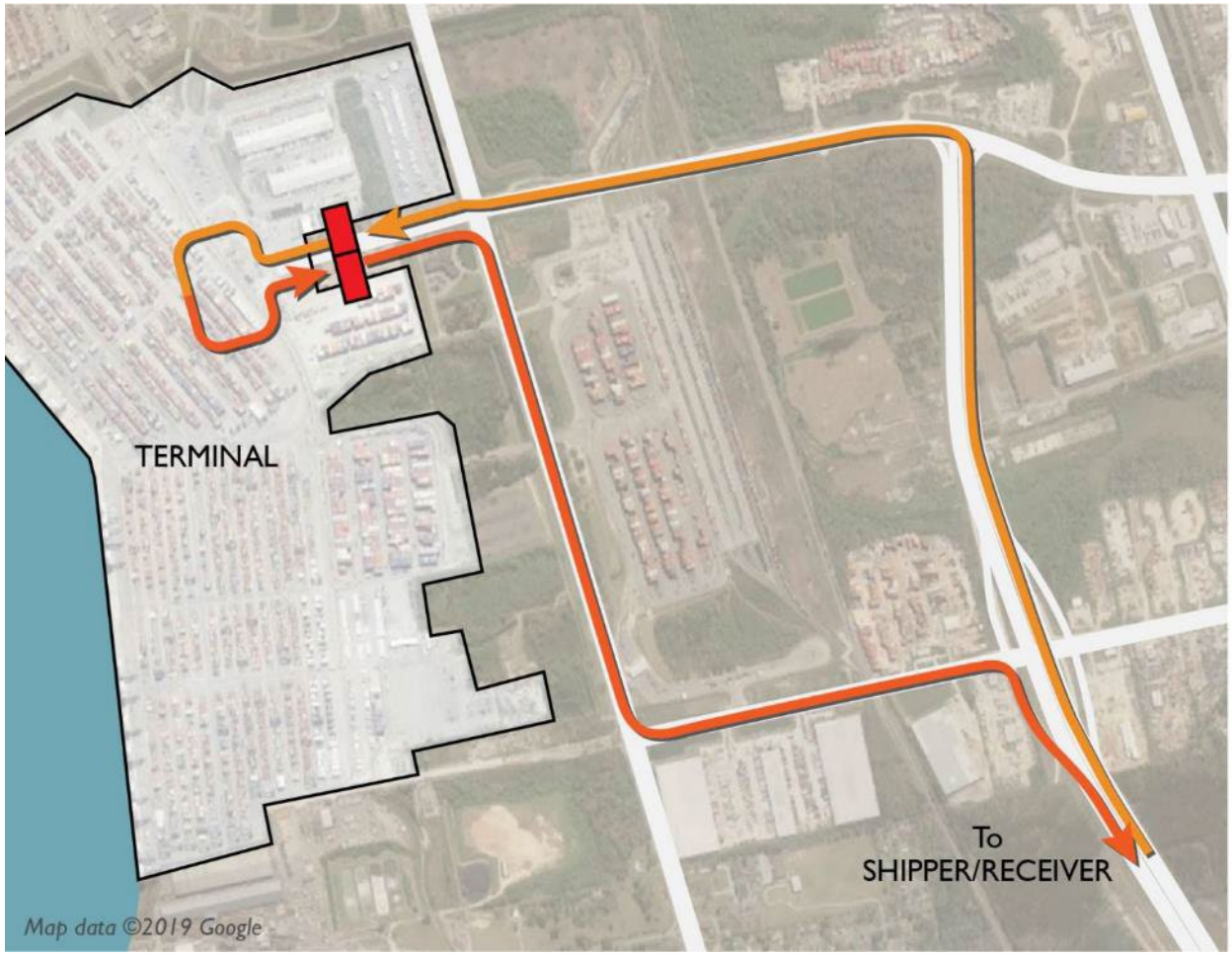
B – Screened Solutions

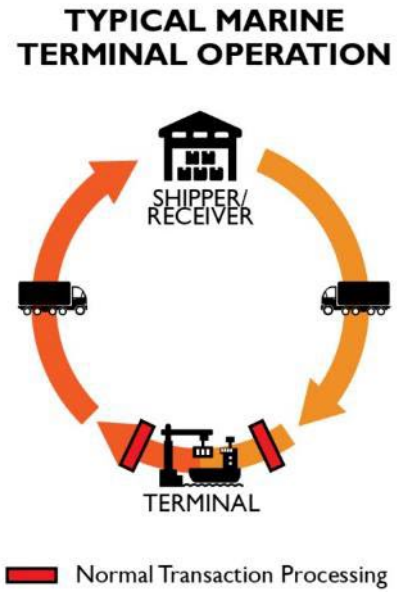
- **Automated truck (Level 4) in queue**
- **Automated truck (Level 4) in queue + off-site staging**
- Alternative transport mode to/from off-site staging

Level 4 Automation

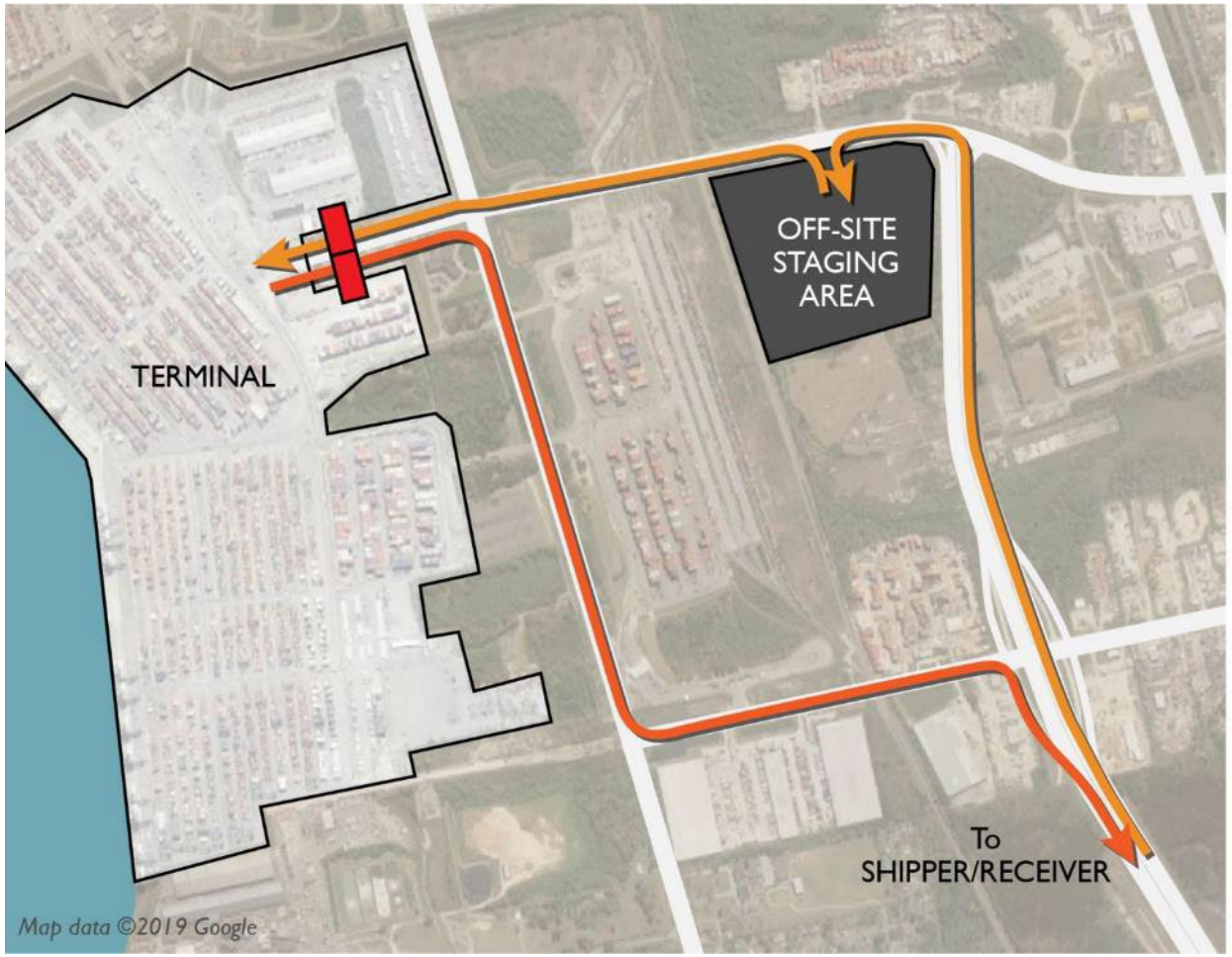
SAE Automation Levels	
Level	**Description**
0	*No Automation:* Human driver controls all aspects of the driving task.
1	*Driver Assistance:* Execution of one driving task such as steering or acceleration/deceleration through a driver assistance system.
2	*Partial Automation:* Execution of multiple driving tasks through driver assistance systems.
3	*Conditional Automation:* Control of all driving tasks with the expectation that the human driver will respond to a request to intervene.
4	*High Automation:* Control of all driving tasks even if a human driver does not respond to a request to intervene.
5	*Full Automation:* Control of all driving tasks under all roadway and environmental conditions.

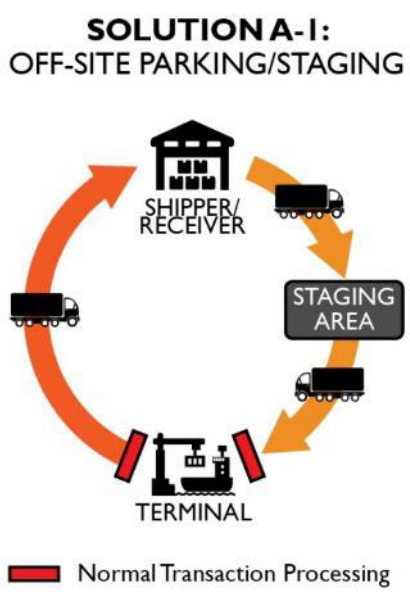
Typical Terminal Operation



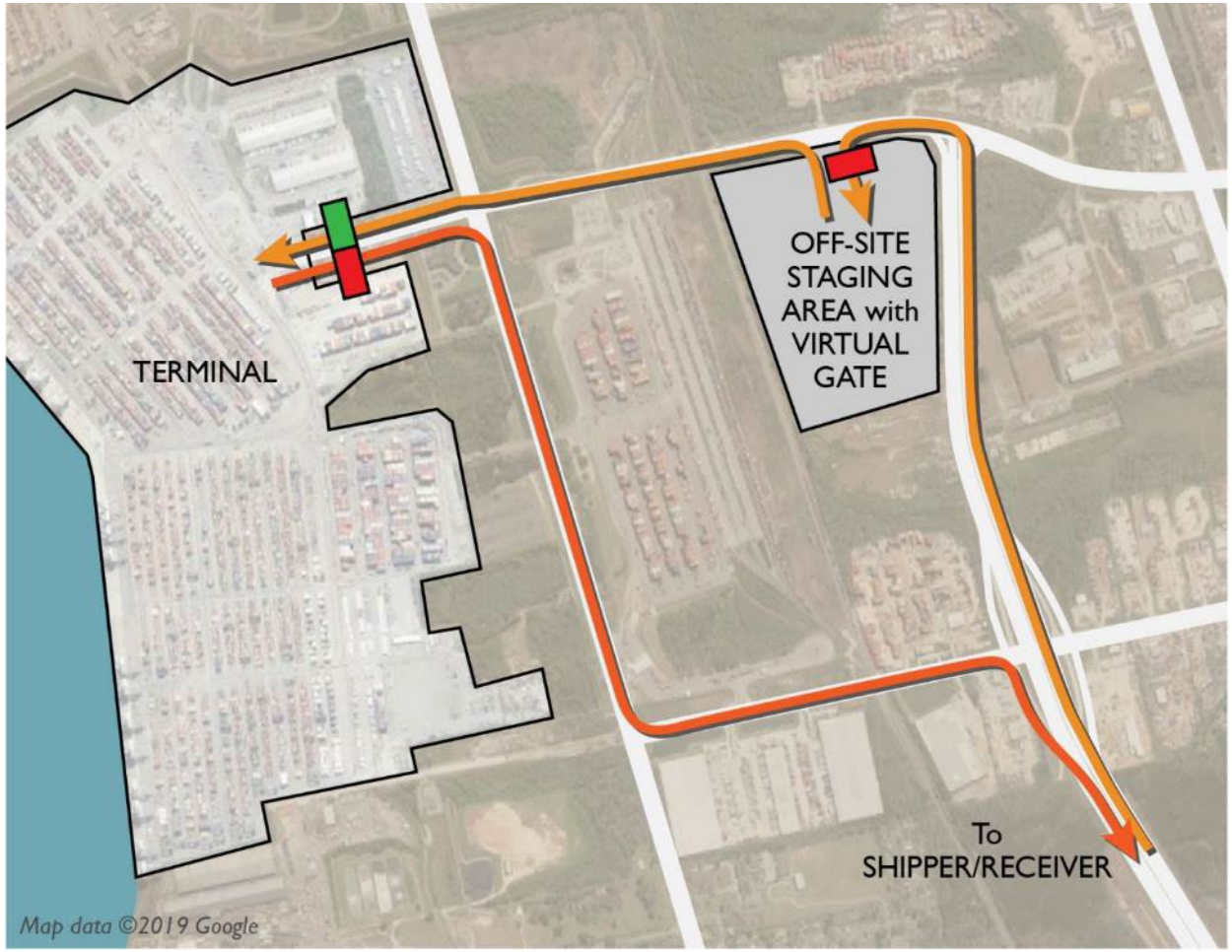


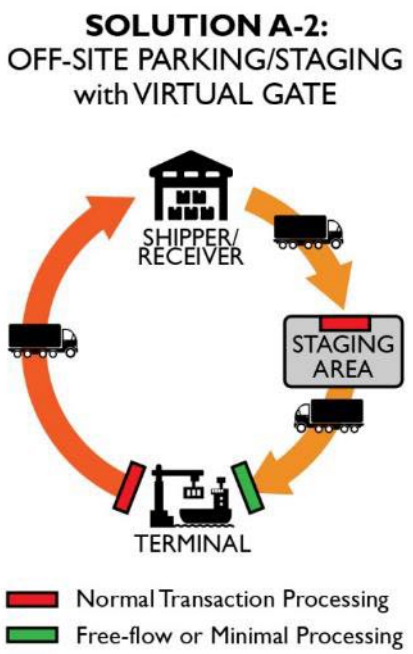
Off-Site Parking/Staging



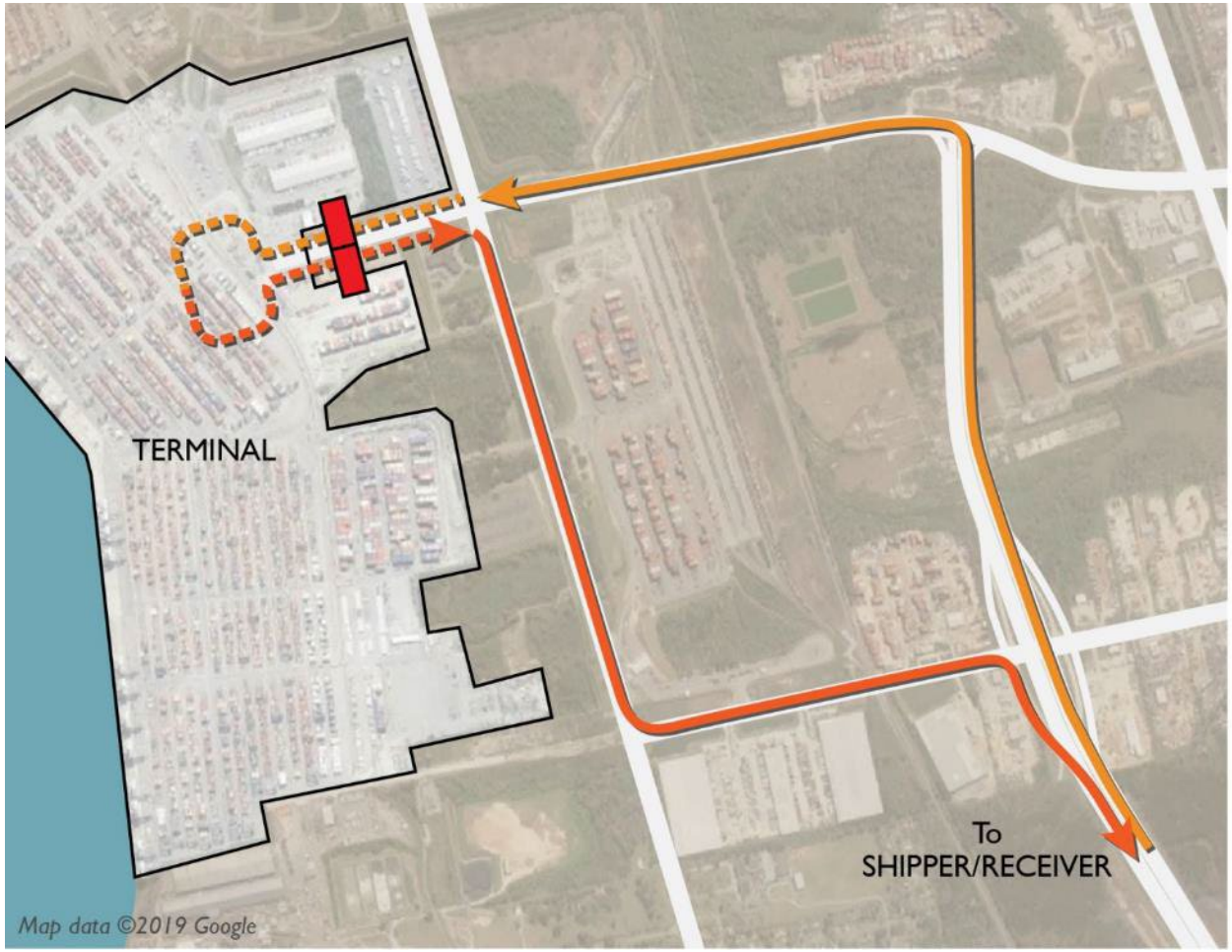


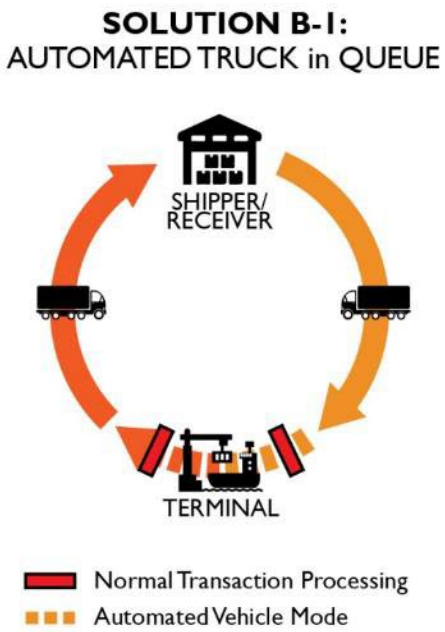
Off-Site Staging + Virtual Gate



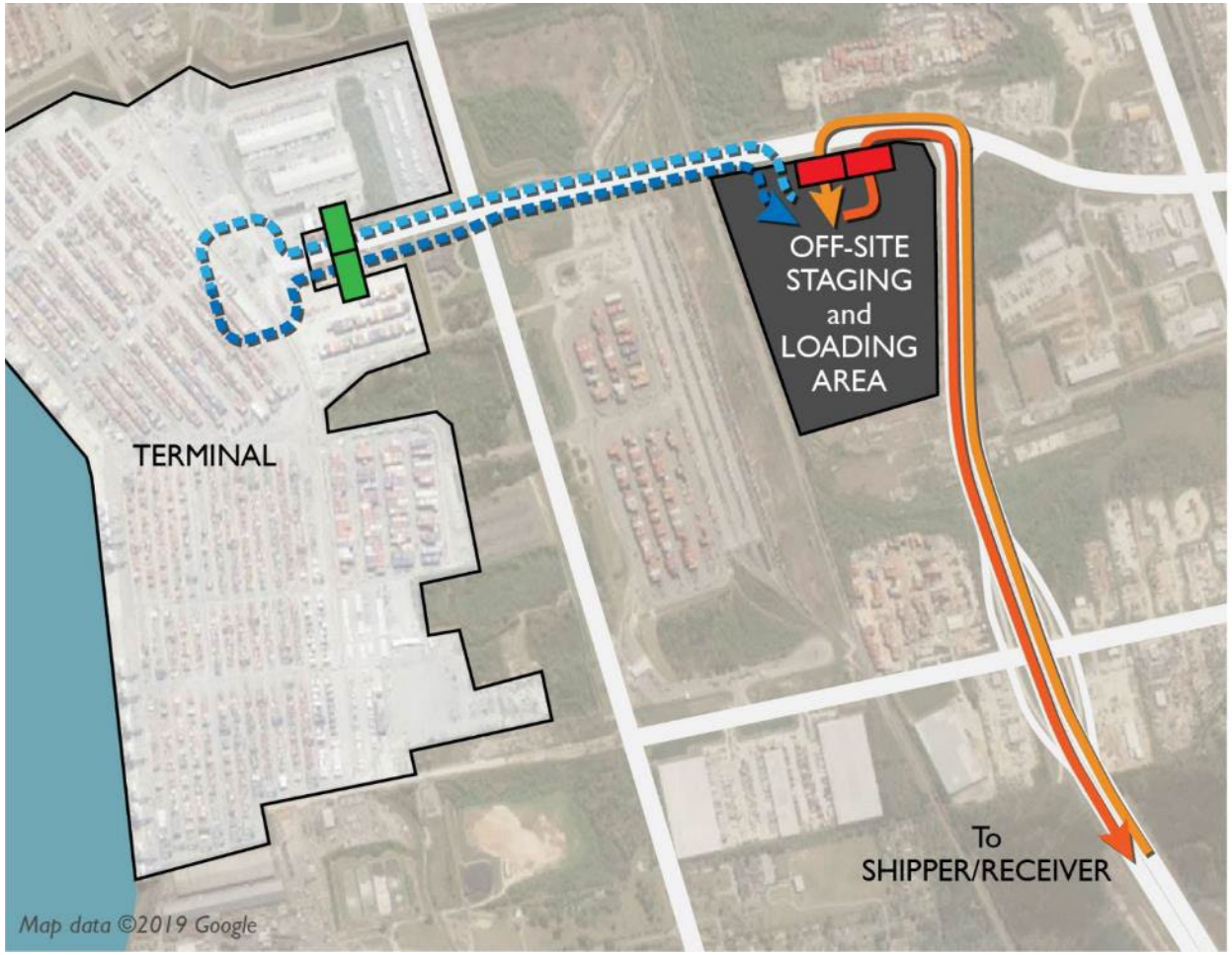


Automated Truck in Queue

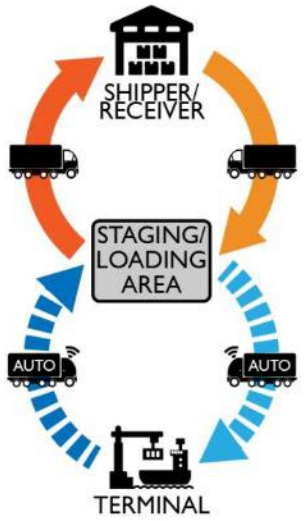




Automated Truck + Off-Site Staging



SOLUTION B-2:
AUTOMATED TRUCK in QUEUE
with
OFF-SITE PARKING/STAGING



Normal Transaction Processing
Free-flow or Minimal Processing
Automated Vehicle

Solutions Tested in 5 Scenarios

- Generic Port (based on 2017 Business Case Analysis)
- Major Urban Port: Local Market (e.g., NY/NJ)
- Major Urban Port: Local/Hinterland Market (e.g., Los Angeles)
- Minor Urban Port: Hinterland Market (e.g., Savannah)
- Inland Port (e.g., Columbus)

Benefit-Cost Analysis

Costs

- Land (capital)
- Improvements (capital + operating)
- Vehicles (capital + operating)
- Technology (capital + operating)
- Labor (operating)

Quantified Benefits

- Reduction in queue time
- Reduction in gate transaction time
- Reduction in idling emissions
- Fuel savings
- Drayage TMT and THT reductions

Qualitative Benefits

- Congestion reduction
- Improved safety
- Community benefits (i.e., eliminating truck staging in neighborhoods)
- Free up truck parking capacity for long-haul truckers
- Productivity and reliability improvements across the supply chain

Relative Benefit-Cost Ratios

SOLUTIONS	SCENARIOS				
	Generic Port	Major Urban to Local Market	Major Urban to Mixed Market	Minor Urban to Hinterland	Inland Port
Off-Site Staging/Parking	Moderate	Low	Low	Moderate	Moderate
Staging/Parking + Virtual Gate	High	High	High	Very High	High
Automated Truck in Queue	Moderate	Moderate	Moderate	Moderate	Moderate
Automated Truck + Off-Site Staging	Very High	High	High	High	Very High

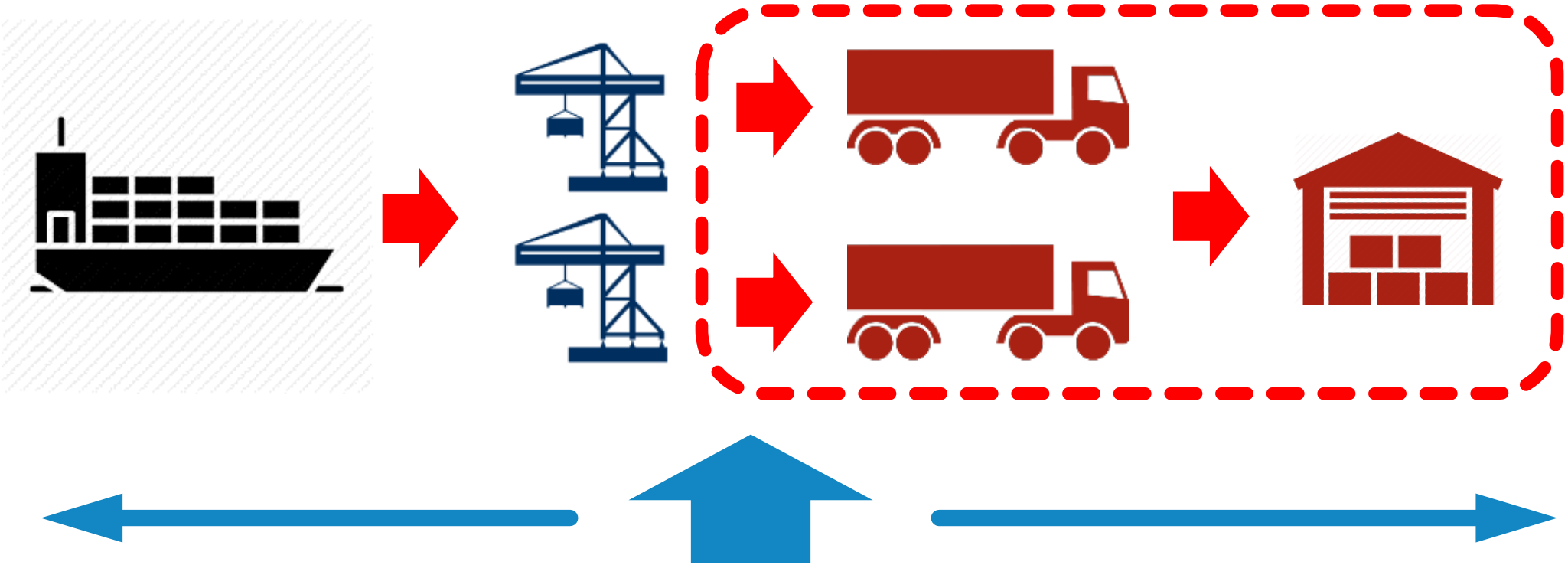
(Assumes capital amortization at 3% discount)

Barriers to Implementation

- Legal and jurisdictional hurdles
- Complexity of marine cargo supply chain
- Labor agreements
- Divergence of costs and benefits across the supply chain – ties to incentives to fund solutions!

Photo credit: www.pexels.com

Who Pays for Improvements?



Improvements at one point in the cargo handling process may have benefits across the entire supply chain!

Questions?

For more information please contact:

Thomas Phelan, P.E., P.Eng.
Senior Intermodal Advisor
Gannett Fleming, Inc.
tphelan@gfnet.com
908-464-5455

U.S. Department of Transportation

TRB Webinar: Container Port Landside Congestion Experiences and Solutions

"The Drayage Perspective"

TRB NATIONAL ACADEMIES Sciences Engineering Medicine

HTA

Matt Schrap

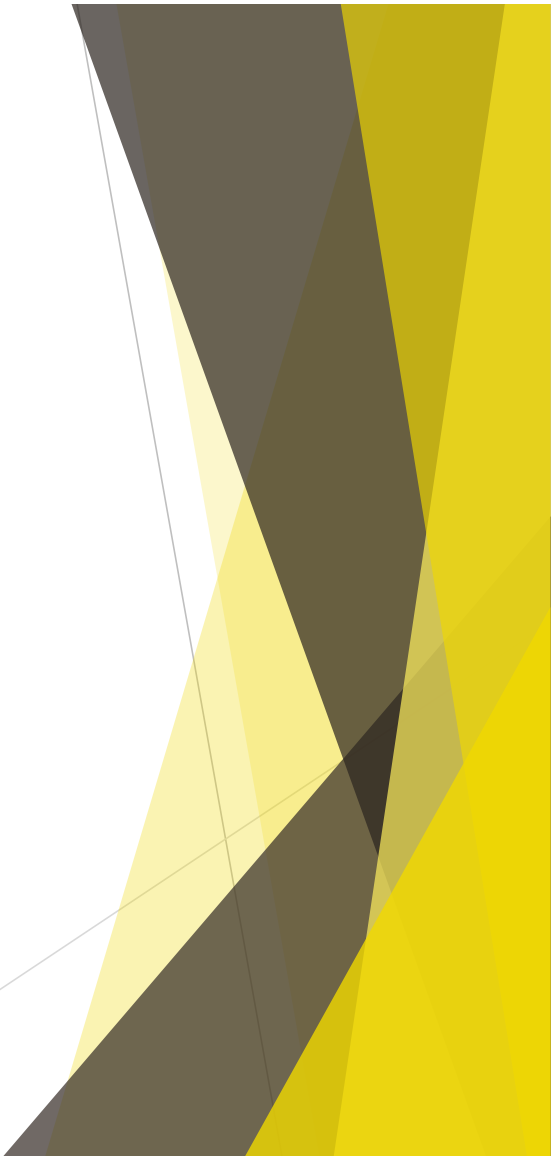
Chief Executive Officer

Harbor Trucking Association

What is Drayage?

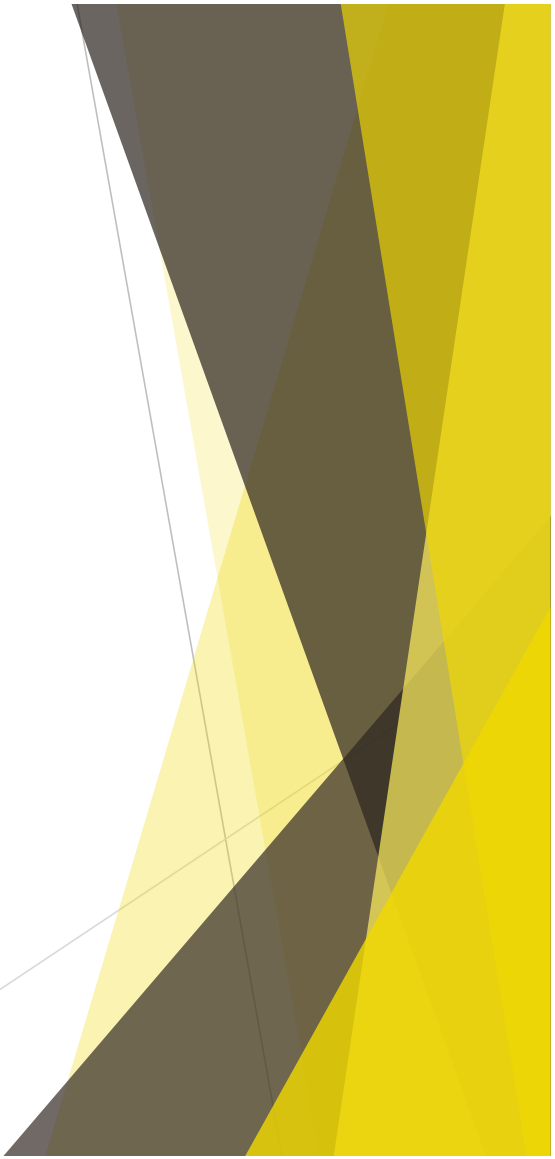
Meriam-Webster:

drayage
noun
dray·age ˈdrā-ij
: the work or cost of hauling by dray



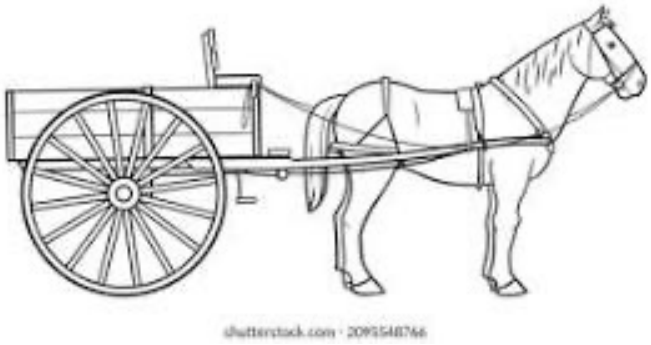
Meriam-Webster:

dray
noun
ˈdrā
Synonyms of *dray*
: a vehicle used to haul goods *especially* **:** a strong cart or wagon without sides



Meriam-Webster:

dray
verb
drayed; draying; drays
transitive verb
: to haul on a dray **: CART**



Today's Drayage?

- Heavy Duty Class 8 "Tractors"
- Chassis
- Intermodal Containers
- Ports (Harbor) or Rail Facilities
- Port - Marine Terminal Operators (MTO)
- Ocean Carriers

Drayage in POLA/POLB
December 2023

THE PORT OF LOS ANGELES

Clean Truck Program (CTP) - Gate Move Analysis

December 2023: Adjusted Engine Year

Move Summary

354,645	184,897	169,748
Full and Empty Moves	Total Full Moves	Total Empty Moves

Full Container Move Summary

179,462	162,561	91%
Adjusted Moves	Matched Moves	Matched Moves %

6,090	156,471
Matched Exempt Moves	Non-Exempt Moves

Truck Summary

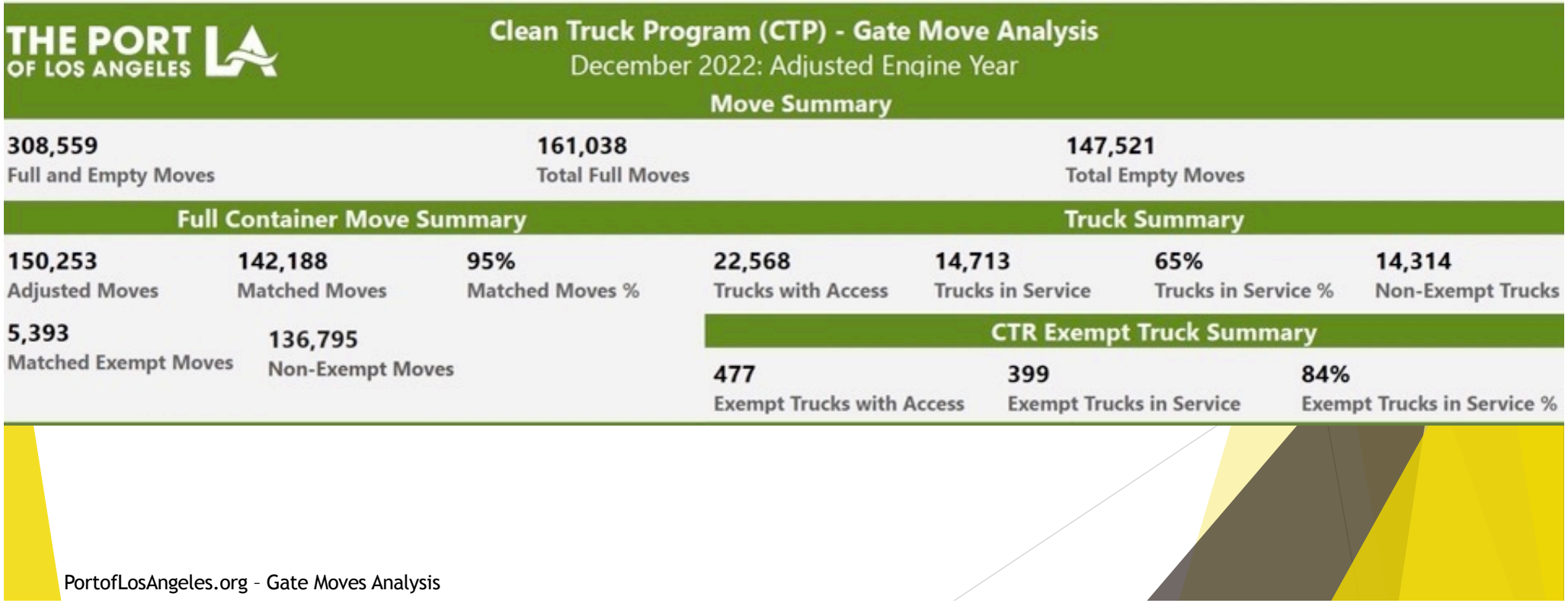
23,149	14,607	63%	14,205
Trucks with Access	Trucks in Service	Trucks in Service %	Non-Exempt Trucks

CTR Exempt Truck Summary

632	402	64%
Exempt Trucks with Access	Exempt Trucks in Service	Exempt Trucks in Service %

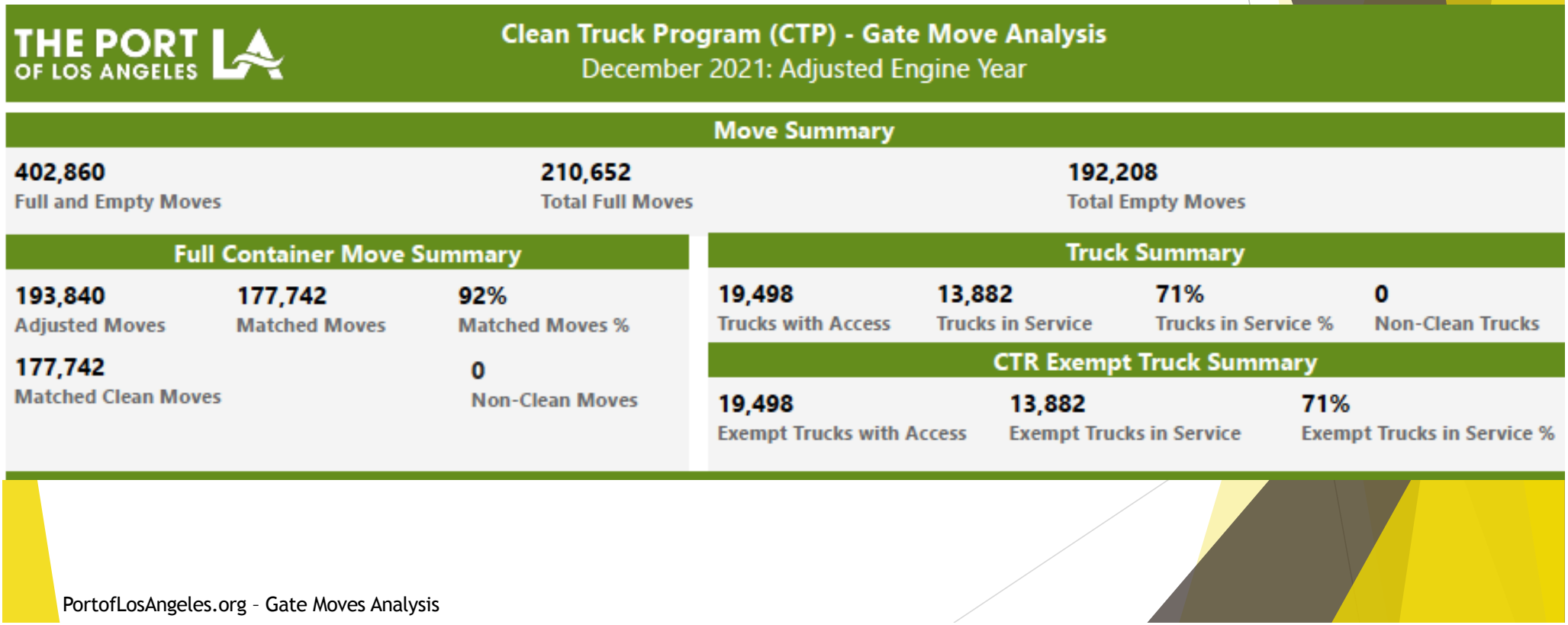
PortofLosAngeles.org – Gate Moves Analysis

Drayage in POLA/POLB
December 2022



PortofLosAngeles.org – Gate Moves Analysis

Drayage in POLA/POLB
December 2021



Container Port Landside Congestion

Port Landside Congestion

- MTOs -

- 109 Ships at Anchor – Nov 2021
- First Time Caller Vessels
- Extended Dwell Import Containers
- 170,000+ Empty Containers LA/LB
- Empty Return Closures

Empty Containers

All Port of Los Angeles Terminals

THE PORT OF LOS ANGELES

Wednesday, January 31, 2024

Total Empty Containers

33,010

Change Since Nov. 15, 2021

-50%

Port Landside Congestion

- Trucks -

- Extended Turn Times
- Restrictions on Empty Returns
- Dual Transaction Requirements
- Decreased Appointment Opportunity
- Overextended Warehouse Capacity
- Container Storage Yards
- Stressed Chassis Supply

Los Angeles/ Long Beach		Please Review Data In Details Tab												
Average Visit Time (Minutes)														
	Aug. 22	Jul. 22	Jun. 22	May. 22	Apr. 22	Mar. 22	Feb. 22	Jan. 22	Dec. 21	Nov-21	Oct-21	Sep-21	Aug-21	Jul-21
Fenix Marine Services	99	100	101	89	102	105	88	90	88	107	100	107	102	95
CUT West	***	***	***	***	***	***	***	***	***	***	***	***	***	***
ITS	101	102	98	92	99	106	113	111	108	121	109	104	115	84
LBCT(Pier F)	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Matson	37	42	43	41	41	37	38	42	43	42	41	39	44	46
LBCT(Pier E/F)	41	73	60	61	49	72	56	56	69	58	61	52	65	58
PCT	81	81	73	82	74	77	75	79	85	91	98	83	82	69
Pier 400 (APMT)	88	107	84	93	98	92	95	96	102	104	76	84	82	84
Pier A (SSA Pier A)	65	83	70	72	61	78	64	94	104	100	99	79	62	68
Everport Terminal Services	63	90	75	75	68	58	67	62	83	85	103	84	79	69
Trapac	92	95	104	91	110	111	128	109	102	106	101	87	89	87
TTI	97	98	106	117	112	100	110	118	110	106	105	109	98	82
WBCT	88	94	97	103	111	110	98	120	109	111	112	104	98	92
YTI	74	69	74	72	69	71	78	74	68	82	83	73	72	64
Average Across All Terminals	77	86	82	82	89	89	89	92	92	95	92	87	86	78
Percent of Moves Over 2 Hours	29%	24%	21%	22%	24%	24%	23%	25%	25%	27%	25%	23%	22%	17%

Courtesy of Harbor Trucking Association

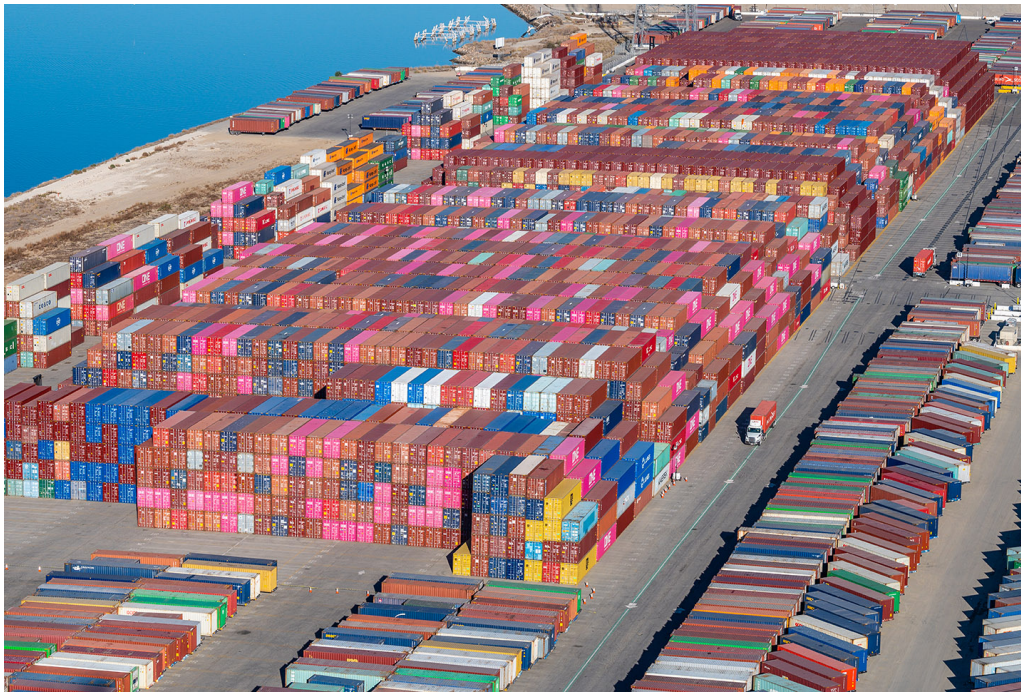
Port of Los Angeles Dual Transaction %					
2021					
Month	APMT	FMS	Trapac	YTI	WBCT
January		39.77%	53.03%	44.79%	
February		46.48%	48.95%	44.49%	
March	40.66%	46.78%	47.09%	45.49%	
April	31.07%	40.66%	42.23%	39.39%	
May	30.30%	42.71%	44.06%	38.14%	
June	22.73%	48.47%	44.27%	36.86%	
July	28.43%	51.41%	48.21%	35.86%	40.73%
August	27.84%	50.77%	58.06%	40.66%	43.11%
September	27.48%	49.36%	58.14%	38.30%	47.58%
October	35.11%	53.84%	53.17%	43.39%	44.52%
November	46.28%	57.41%	57.11%	56.07%	48.19%
December	49.44%	50.10%	63.01%	53.71%	46.84%

Port of Los Angeles Dual Transaction %					
2022					
Month	APMT	FMS	Trapac	YTI	WBCT
January	54.27%	54.38%	53.26%	44.08%	48.68%
February	52.46%	49.44%	57.63%	36.50%	44.31%
March	50.13%	46.68%	49.92%	39.39%	34.70%
April	44.52%	40.93%	51.20%	37.31%	47.20%
May	44.03%	40.76%	46.21%	31.44%	43.00%
June	43.17%	44.20%	40.71%	31.45%	39.09%
July	45.16%	44.32%	41.19%	35.53%	40.28%
August	46.17%	43.27%	39.18%	25.56%	34.64%
September	31.83%	40.29%	33.12%	24.87%	30.58%
October	28.92%	35.06%	33.17%	17.44%	30.57%
November	29.64%	31.39%	28.02%	28.27%	29.93%
December	30.46%	29.49%	34.26%	27.92%	21.19%

Port of Los Angeles Dual Transaction %					
2023					
Month	APMT	FMS	Trapac	YTI	WBCT
January	34.05%	32.54%	30.59%	25.02%	
February	35.63%	34.47%	29.16%	21.62%	
March	32.29%	29.89%	34.08%	23.13%	
April	35.37%	31.73%	31.52%	27.64%	
May	34.61%	34.98%	20.24%	23.56%	23.90%
June	36.76%	34.88%	27.13%	24.31%	31.84%
July	42.61%	33.62%	28.66%	28.18%	29.11%
August	35.04%	33.16%	38.30%	29.19%	32.14%
September	50.52%	32.30%	36.18%	28.68%	30.78%
October	54.17%	35.80%	39.02%	31.19%	29.99%
November	58.00%	39.29%	36.93%	28.55%	31.90%
December	47.86%	34.13%	32.82%	27.33%	32.19%

Courtesy of the Port of Los Angeles

Container Port Landside Congestion
- Solutions -



POLB
Pier S Short Term Overflow Resource (STOR)

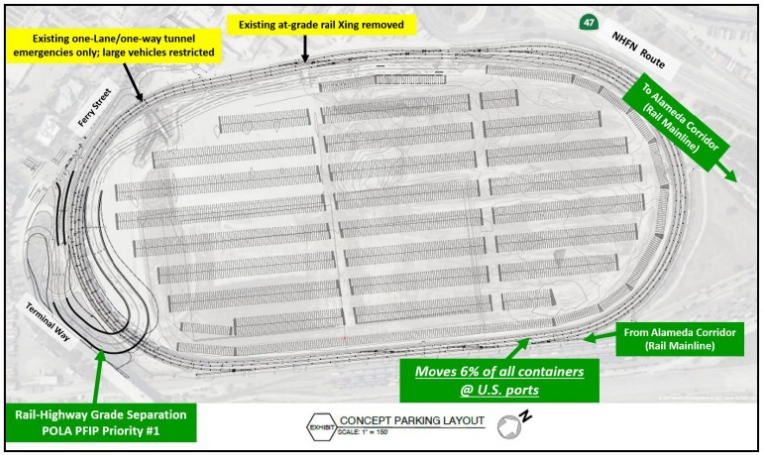
Photos Courtesy of Port of Long Beach

POLA
Maritime Support Facility/LAXT

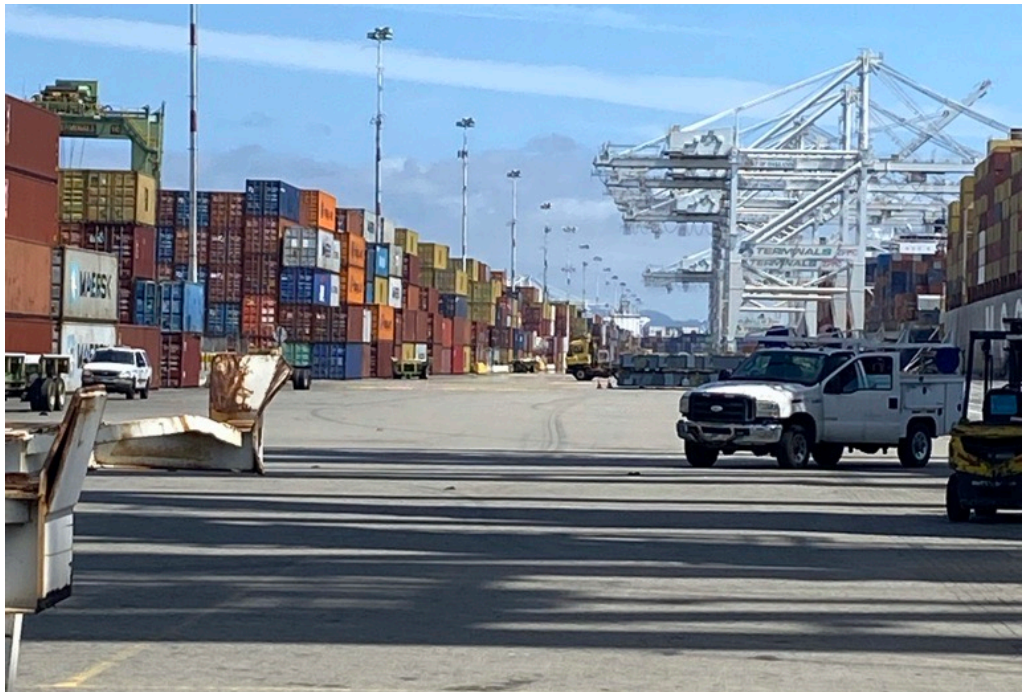
Photos Courtesy of Port of Los Angeles

California State Transportation Agency - Port Freight Infrastructure Program America's Port®: Port of Los Angeles National Multimodal Freight Network Improvement Program Maritime Support Facility Improvement and Expansion Project

Project Images/Renderings:



Courtesy of Port of Los Angeles



Port of Oakland
Howard Terminal – USDA Container Yard

Other Responses

- POLA/POLB Dwell Fee – Never Implemented
- MTO Dwell Fee – Still Being Collected
- Local Efforts for Off-Dock Facilities
- State of California Off-Site Storage Facilities
- Private Container Storage Yards
- Additional Gates at Some MTOs
- Public Data Collection Efforts – POLA/POLB
- F.L.O.W. Initiative - USDOT

Executive Order N-19-21

- Gross Weight Limits Exemption on Freight Routes
- Non-State Sites for Short Term Storage
- State Owned Property Near Ports For Short Term Storage
- Expedited State Leases for storing “Cargo Containers”
- Direction to Develop Long Term Proposals for Port Improvements
- Interagency Coordination on Prioritization
- Federal Supply Chain Disruption Task Force Coordination

New Leases Will Make State-Owned Properties Available for Storing Up to 20,000 Shipping Containers to Help Alleviate National Supply Chain Issues

Feb 15, 2022 | *Press Release*

Partnership with national warehouse marketplace, Chunker, targets storage needs

SACRAMENTO – The Newsom Administration announced today that six California sites have been identified and leases have been signed to allow for the storage of shipping containers on state property to help alleviate congestion at California ports,

The effort is result of Executive Order N-19-21, which aims to strengthen the resilience of California's and the nation's supply chains.

"California has taken swift action to keep goods moving at the state's ports, leveraging our strategic partnerships to develop multifaceted solutions, including securing additional storage space for thousands of shipping containers," said Governor Newsom. "These efforts are a vital investment to help meet the needs of not only Californians, but our entire nation, and we'll continue advancing innovative solutions to address this global challenge."

Takeaways

- Painful & Costly Lessons Learned
- Coordinated Efforts Local/State/Fed
- Avoid Self Imposed Efficiency Constraints
- Leverage Increased Transparency Initiatives
- Engage Private Sector Solutions
- Avoid Repeats

Thank You

Matt Schrap
matt@harbortruckers.org
@mattschrap

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HTA

PORT HOUSTON

RYAN MARIACHER

DIRECTOR OF CONTAINER TERMINALS

PORT HOUSTON

HOUSTON SHIP CHANNEL, A FEDERAL WATERWAY

1.54 MILLION
JOBS IN TEXAS

3.37 MILLION
JOBS NATIONWIDE

$439 BILLION
ECONOMIC IMPACT IN TEXAS

$906 BILLION
ECONOMIC IMPACT ACROSS THE U.S.

PORT HOUSTON

SUPER PORT COMPLEX ON A SCALE LIKE NO OTHER

#1 PORT IN THE U.S.
FOR WATERBORNE TONNAGE

MORE THAN
152M CONSUMERS
WITHIN 1,000 MILES

HANDLES
73% OF CONTAINERS
IN U.S. GULF OF MEXICO

#1 IN STEEL
IN THE U.S.

#5 CONTAINER PORT IN THE U.S.

BUSIEST U.S. WATERWAY

MORE THAN
266M TOTAL TONNAGE

MORE THAN
8,300 DEEP DRAFT SHIP CALLS
ANNUALLY

MORE THAN
200,000 BARGE TRANSITS
ANNUALLY

PORT HOUSTON

WHO WE ARE

We manage eight public terminals — including two container facilities we operate and six others for which we're the landlord

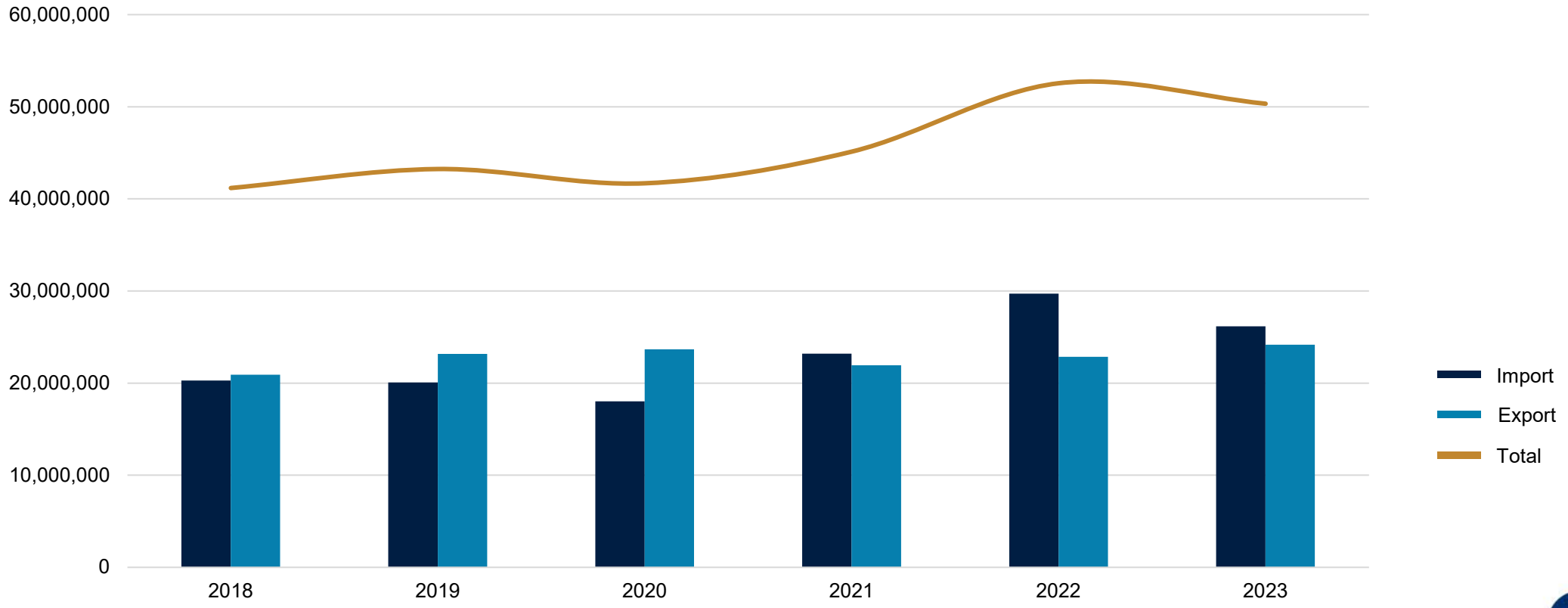
As the advocate and a strategic leader of the Houston Ship Channel, we support the more than 200 facilities and the neighboring communities along it by working with the federal government

We facilitate vital commerce through the port that helps keep the local and state economy moving

PORT HOUSTON

TONNAGE GROWTH | 2018 TO 2023

PH Tonnage excluding BIC (Short Tons)



Note: 1 Short Ton Equals 0.907 Metric Ton
Source: PH Accounting, PH Research & Forecasting

PORT HOUSTON

2022 SUPPLY CHAIN CHALLENGES

UNPRECEDENTED TIMES

- The global supply chain is like a pipeline
- Historic demand for imported consumer goods
- Insufficient import warehouse and distribution space
- Idle containers at port cut terminal capacity in half
- Ships at anchor waiting to dock or for space to discharge cargo

PORT HOUSTON

2022 TERMINAL STATUS EXAMPLE

PORT HOUSTON

Port Houston Current Summary
10/17/2022

	Prev. Week	Current
Ships at Anchor		
BCT	0	0
Bayport	17	15
Current Anchorage Delay (days)		
BCT	0	0
Bayport	23	18
Truck Turn Time (min)		
BCT	52	47
Bayport	55	61
Total Completed Transactions	68,520	67,172
Effective Yard Utilization		
BCT	84.4%	82.7%
Bayport	95.8%	91.4%
Loaded Import/Export Ratio %	65/35	63/37
Dwell (days) - *rolling 12 weeks*		
Export	9.83	9.84
Import	5.12	5.13

PORT HOUSTON

SUPPLY CHAIN CHALLENGES TODAY

- Vessel Capacity
- Container Dwell
- Container Availablity
- Trucks
- Chassis
- Labor
- Import DC

GONE!

PORT HOUSTON

2024 TERMINAL STATUS EXAMPLE

PORT HOUSTON

Port Houston Current Summary
01/16/2024

Port Houston Weekly Terminal Status Report		1/16/2024
	Prev. Week	Current
Ships at Anchor		
BCT	0	1
Bayport	6	5
Current Anchorage Delay (days)		
BCT	0	0
Bayport	6	8
Truck Turn Time (min)		
BCT	40	39
Bayport	45	40
Total Completed Transactions	55,891	68,862
Effective Yard Utilization		
BCT	69.0%	75.0%
Bayport	75.2%	73.0%
Loaded Import/Export Ratio %	56/44	55/45
Dwell (days) - *rolling 12 weeks*		
Export	9.54	9.71
Import	3.64	3.69

PORT HOUSTON

INVESTING FOR THE FUTURE

BAYPORT

FUTURE PROJECTS

BARBOURS CUT

FUTURE PROJECTS

TECHNOLOGY

PORT HOUSTON

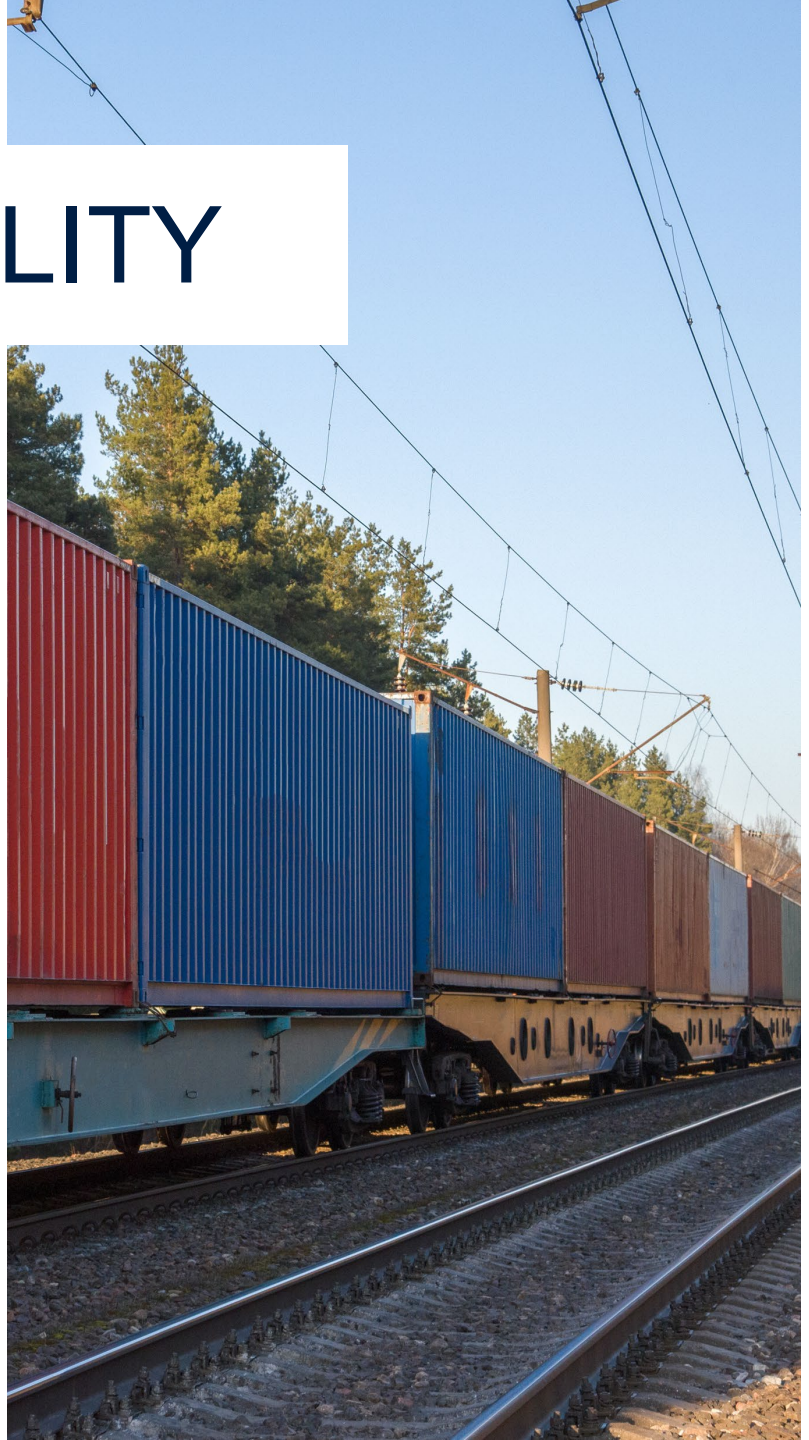
SUSTAINABILITY AT PORT HOUSTON

2050
CARBON NEUTRAL

PORT HOUSTON

PORT HOUSTON

FREIGHT MOBILITY

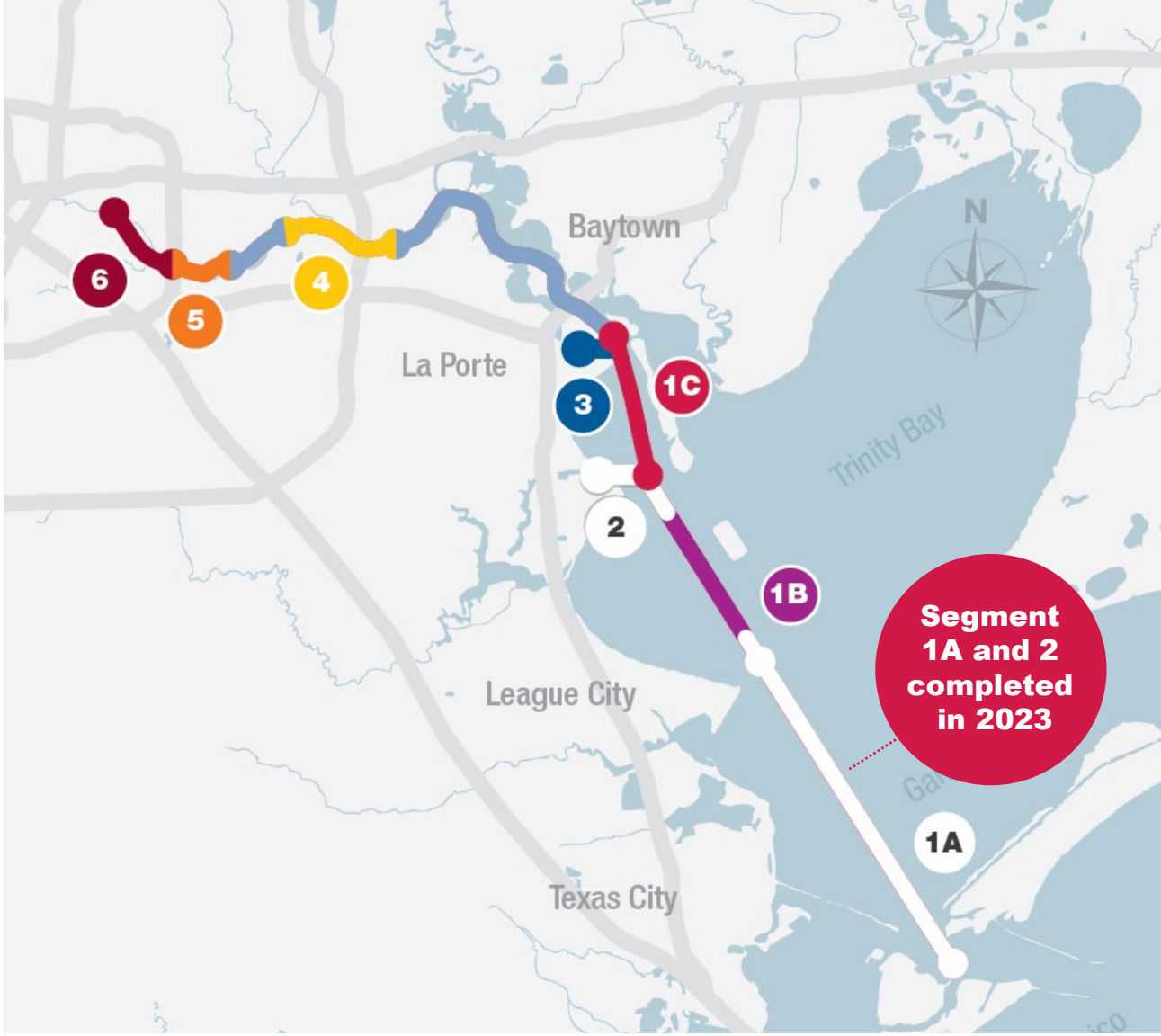


PROJECT 11— WHERE WE ARE

• In Q1 2023 Segment 1A (Bolivar to Redfish) and in Q4 2023 Segment 2 (Bayport Ship Channel) were completed, on schedule and on budget

• Work on the remaining Galveston Bay segments is currently underway by Weeks Marine and Curtin Maritime

By late 2024, more than 27 miles of the Galveston Bay area (**Segments 1A, 1B, 1C, and 2**) are expected to be fully completed.



Visit: **www.expandthehoustonshipchannel.com**

PORT HOUSTON

THANK YOU

PORT HOUSTON

PORT HOUSTON®

Today's presenters

Shannon McLeod
smcleod@aapa-ports.org

AAPA
ESSENTIAL. RESILIENT. UNITED.
SEAPORTS DELIVER

Thomas Phelan
tphelan@gfnet.com

GANNETT FLEMING

Matt Schrap
matt@harbortruckers.org

HTA Harbor Trucking Association

Ryan Mariacher
rmariacher@porthouston.com

PORT HOUSTON
THE INTERNATIONAL PORT OF TEXAS

Upcoming events for you

February 26, 2024

TRB Webinar: Disruptive Technologies and the Future of the Transportation Agency

July 15-18, 2024

TRB's 2nd Conference on Advancing Transportation Equity

https://www.nationalacademies.org/trb/events

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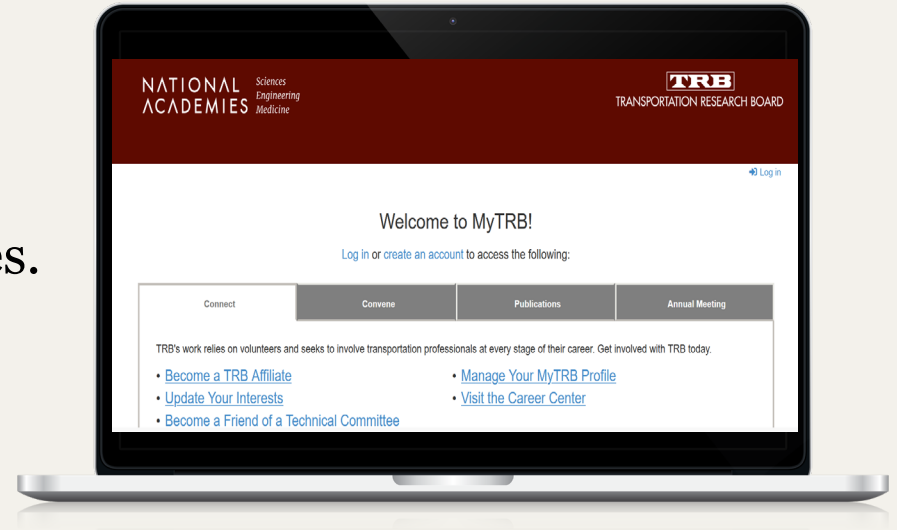

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