

PLAN 2050

Transportation ▶ People ▶ Opportunity

The COVID-19 Pandemic and North Jersey Freight

Implications of the Crisis for the NJTPA Region's Supply Chains and Freight Transportation System

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Contents

EXECUTIVE SUMMARY	3
INTRODUCTION	5
STARTING GLOBALLY BUT STILL AN ABRUPT CHANGE EVENT.....	7
REACT—THE IMMEDIATE RESPONSE	8
INTERMEDIATE ACTIONS DURING THE PANDEMIC.....	12
RESHAPE: AN ACCELERATION OF PRE-PANDEMIC TRENDS	16
POTENTIAL IMPLICATIONS FOR THE NJTPA REGION.....	24
MOVING FORWARD TOGETHER AND STRONGER	26

About the NJTPA

THE NJTPA IS THE FEDERALLY AUTHORIZED Metropolitan Planning Organization (MPO) for 6.7 million people in the 13-county northern New Jersey region. Each year, the NJTPA oversees more than \$2 billion in transportation improvement projects and provides a forum for interagency cooperation and public input. It also sponsors and conducts studies, assists county planning agencies and monitors compliance with national air quality goals.

A Metropolitan Planning Organization (MPO) is a federally mandated and federally funded transportation planning agency made up of representatives from local government and key transportation agencies. Congress created MPOs to give local elected officials a stronger role in guiding federal transportation investment and to ensure that these decisions are based on a continuing, cooperative and comprehensive (“3C”) planning process.

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Executive Summary

COVID-19 HAS CREATED a global health emergency with devastating impacts on people and economies. Throughout the pandemic, people have relied on supply chains and freight transportation systems to provide critical goods and sustain those sheltering in place. In some cases, the pandemic abruptly altered consumption of certain products and freight services, with significantly heightened demand for some and reduced or even halted

demand for others.

Every disruptive event requires temporary measures and adjustments. However, major disruptive events, such as the pandemic, can lead to permanent changes, both in terms of how future emergencies are handled and how supply chain systems operate.

The NJTPA region has learned from past disasters, such as 9/11 and Superstorm Sandy, to develop a response that relies on the three “C’s”—collaboration, coordination, and communication—which have helped collectively through the pandemic. Examples include proactive public/private collaborations to keep New Jersey food supplies flowing, ensure effective operations at the Port, and rapidly address freight system issues as they arose.

Three phases generally occur after a major disruption in supply chains and freight systems:

- **React** to the immediate situation;
- **Reboot** supply chains and freight systems through analyses of effective practices and lessons learned; and
- **Reshape** supply chains and freight systems for the longer-term based on the analyses.

In terms of supply chains and freight movement, the pandemic has been an accelerant. Certain trends already occurring prior to the pandemic accelerated, including:

- **Expanded use of e-commerce and “buy online, pick up in stores or curbside” (BOPIS)** by consumers
- **Production and supplier location diversification** in response to overseas production facilities closed early in the pandemic and the need to ensure sufficient domestic production of certain critical items.
- **Shifting from just-in-time lean inventories to having more inventory on hand** to address production and supply chain disruptions and readiness to meet the consumer e-commerce demands.
- **Increased importance of information technologies** to pivot quickly, monitor conditions, and address the needs of remote working.

- **Continuing workforce shortages** in the domestic production and distribution which can impede the effective movement of goods.
- **Enhanced deployment of automation options** to accelerate the movement of goods and increase social distancing among workers in supply chain facilities.

New Jersey has long been the supply chain state for North America, with significant concentrations of freight transportation and distribution operations located throughout the state and particularly in the NJTPA region. These industrial and transportation concentrations have continued to successfully serve the region and the nation through the pandemic. As the region emerges from the pandemic, the key implications for the region and surrounding area include:

- **Pursue potential new production operations** as the domestic capacities to produce pharmaceutical supplies and other key goods are encouraged and enhanced. As a region and state with existing and proven abilities in these sectors, economic development opportunities exist.



- **Anticipate more industrial space requirements** as the shift to e-commerce and BOPIS continues along with potential new production operations.
- **Address workforce needs and accessibility**, which is critical in location decisions and to provide employment opportunities throughout the Region.
- **Continue to optimize the multimodal freight system** which has proven itself throughout the pandemic and is required for both current needs and potential new operations in the Region.
- **Proactively address requirements associated with information and automation technologies** which are increasingly crucial to operations and place new demands on communications and utilities.

The NJTPA region has unfortunately experienced several catastrophic disruptions in the last 20 years. Yet the region has always worked together to respond and become stronger. As the region emerges from the pandemic, it can continue to apply effective practices, learn new lessons and pivot to the changing needs of people and businesses.



Introduction

THE COVID-19 PANDEMIC has had devastating health and economic impacts. The global health emergency has also altered the functioning of the systems for moving the goods that businesses and households depend upon. This briefing report summarizes how the pandemic has disrupted the NJTPA region’s supply chains and the longer-term implications for the region.

The NJTPA region has experienced major disruptive events in the past, including 9/11 and Superstorm Sandy, that in crucial respects have helped the region’s freight sector respond and adjust to the crisis. Yet, each major disruption is unique, brings new challenges and alters the future.

The pandemic has been a “trend breaker” event—it has permanently altered demand on the freight system, shifted supply chain strategies, and confirmed the value—learned in the past crises—of collaboration, communication and coordination as means to successfully navigate challenges.

The pandemic has also highlighted new challenges and strengths. It has been a global health emergency, with New Jersey and neighboring New York being the hardest hit area initially in the US. With 600,000 cases and nearly 49,000 fatalities in the two states during the early months¹, the pandemic devastated the area, placed new demands on healthcare, food, and transportation systems, changed the immediate economic context, and underscored the criticality of supply chains.

This freight briefing report is organized into several sections including:

- Characterizing the pandemic as a unique disruptive event and the resilience terminology used.
- How the pandemic differed from other major disruptive events that the region has experienced.
- The initial response phase where new challenges and demands affected freight movement and required immediate responses.
- The intermediate challenges as the pandemic continued over months with changing impacts on and actions required by the supply chain businesses and agencies operating freight infrastructure.
- The emerging longer-term impacts on supply chains and potential implications for the region’s freight system.

¹ *The New York Times*, statistics as of September 2, 2020.

React, Reboot, Reshape

Characterizing the Pandemic within the Framework of Supply Chain and Freight System Disruptions and Challenges

MAJOR DISRUPTIVE EVENTS can be characterized by the impacts caused, including the geographical scale, the freight infrastructure affected, the commodity movements disturbed, and the time needed to recover and resume normal operations. Every major disruption is unique. While preparations can often be made prior to many events, some circumstances can be unanticipated and require new types of responses.

Organizations prepare for potential disruptive events through risk assessments and simulations while recognizing that events can occur that may not have been considered. When a functional disruption occurs, three phases generally are part of the response:

- **React**—the steps that need to immediately take place to address the disruption and sustain supply chains and communities.
- **Reboot**—the intermediate actions taken as organizations assess the disruption and recover more fully.
- **Reshape**—the longer-term actions taken to address the altered context for operations and future investments.



WISTECH COLLEGES

The pandemic has been a unique disruptive event, differing in key ways from previous disruptions. It is a global health emergency with impacts at all levels from international to local. The pandemic was not an “infrastructure” event, in that no physical infrastructure was damaged, although it is critically important that the region maintain the continued health and well-being of workers responsible for infrastructure operation and cargo movement, who have been designated essential workers for good reason.

Another unusual attribute of the pandemic is its extended time period. Previous large-scale functional disruptions such as 9/11 or Superstorm Sandy generally had a definable end, after which focus shifted to

rebooting and reshaping. The pandemic’s prolonged nature has created an interim/transitional freight demand and supply situation.

Starting Globally But Still An Abrupt Change Event

WHILE CONCERNS ABOUT THE PANDEMIC first centered on China, the health emergency rapidly grew into a significant global and domestic disruptive event with serious implications.

The Pandemic was an Abrupt “K” Shaped Demand Event

K

Abrupt Increases in Demand

Examples: Personal Protection Equipment, Cleaning Supplies, Food, Household Items, E-commerce Provision

Sharply Decreased Demand

Examples: Restaurants and Office Building Supplies, In-Store Retail

In March 2020, as concern about the pandemic intensified, offices, retail stores, restaurants and non-essential medical offices were closed, and the region moved to sheltering in place, working from home and educating from home. The pandemic quickly caused abrupt changes in demand for various goods and services.

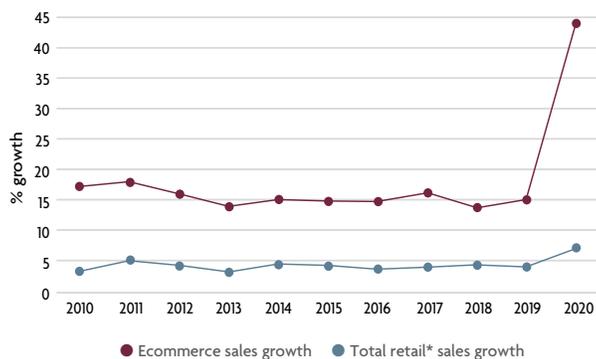
Demand for personal protective equipment (PPE), cleaning supplies, food and household items abruptly grew as hospitals geared up and households hunkered down. Consumers created an intense surge in demand for items such as toilet paper and cleaning supplies, while simultaneously swiftly increasing online ordering. At the same time, with many establishments closed, demand for certain types of products dramatically dropped.

E-commerce growth had been occurring prior to the pandemic but accelerated dramatically during the pandemic:² In 2010, e-commerce sales represented 6.4 percent of all U.S. retail sales. That share grew to 10.7 percent in 2015 and 15.8 percent in 2019. Online spending represented 21.3 percent of total retail sales in 2020, a 44 percent increase in a single year (left).

The Pandemic Accelerated the Use of Ecommerce

Comparing growth: US **ecommerce** vs. **total retail*** sales

Year-over-year growth, 2010-2020



Source: Digital Commerce 360, U.S. Department of Commerce; Updated January 2021

*Total retail figures exclude sales of items not normally purchased online such as spending at restaurants, bars, automobile dealers, gas stations and fuel dealers

2 Ali, “US ecommerce grows 44% in 2020,” *Digital Commerce 360*, January 29, 2021. Available: <https://www.digitalcommerce360.com/article/us-ecommerce-sales/#:~:text=Online's%20share%20of%20total%20retail,2019%20and%2014.3%25%20in%202018>



React—The Immediate Response

LIKE PREVIOUS DISRUPTIVE EVENTS, the immediate response largely involved collaboration, coordination, and communication to address urgent needs and conditions. The mandate was clear: Ensure effective movement of key supplies for health care, area residents and critical businesses. As in most cases, effective practices learned or applied during previous disruptive events were used.

The private sector immediate response included:

- ***Pivoting to manage changing product demands and supply chain issues.*** Supply chain issues appeared early as production lines and businesses throughout the world shutdown. Fortune reported in February 2020 that 94 percent of the Fortune 1000 companies were experiencing supply chain issues.³ In the NJTPA region, companies had to quickly adapt as some customers' demand for their products dropped precipitously, while demand for other products rose equally fast, creating a “K” demand situation. For example, Baldor, a specialty food provider primarily serving the restaurant industry, quickly instituted a successful home order portal and delivery program. Unionwear, a Newark firm specializing in such products as caps and portfolios, shifted in the short term to making PPE. On a national level, King Arthur, a major flour producer, expanded processing capacity and rapidly created a three-pound plastic bag suited to the equipment of a contract production facility.
- ***Keeping the workforce safe and healthy.*** Protocols were developed and implemented to ensure the health of the workforce. Examples included securing PPE, enacting social distancing measures, taking all workers' temperatures, enhancing cleaning of equipment, installing plexiglass dividers, and having employees work remotely where possible.
- ***Keeping goods flowing.*** Truck drivers, port workers, warehouse labor, railroad workers and others continued to move freight and were designated as “essential workers” by federal and state governmental agencies.
- ***Enhance information systems connectivity.*** Logistics providers worked to improve the flow of information with customers and suppliers, as well as within their own companies.
- ***Adjust to changing equipment capacity while anticipating future surges.*** With production facilities closed, container vessel movements were canceled, with the Port Authority of New York and New Jersey (PANYNJ) seeing 25 cancelations in June 2020 and 19 in July. As production facilities came back online later in the pandemic, canceled vessel calls stopped and cargo volumes rose significantly. Indeed, during the last five months of 2020, the Port

³ Sherman, “94% of the Future 1000 are seeing coronavirus supply chain issues,” *Fortune*, February 21, 2020.

handled the equivalent of eight months of container cargo.⁴ In the aviation sector, with the significant reduction in passenger air travel, passenger aircraft were converted to cargo use to aid in the rapid movement of high-demand items.

The public sector responded in its collaboration and coordination with the private sector. Actions included:

- **Activate and/or form public/private sector teams to immediately address critical supply chain issues by focusing on existing relationships, collaborations, and knowledge.**
- **Proactively and immediately address freight movement issues.**
- **Proactively identify and develop strategies for dealing with potential bottlenecks**
- **Identify and address the range of resident and business needs.**
- **Understand and address multi-state considerations and issues.**
- **Communicate frequently and concisely.**

The New Jersey Food and Supply Chain team was one example of a public/private, purpose-driven team, with members that included the New Jersey Food Council, the Governor's Office, the New Jersey Economic Development Authority, NJTPA, PANYNJ, Conrail, the Community Food Bank of New Jersey, and other organizations. The Council on Port Performance (CPP), an established public/private working group founded after Superstorm Sandy, met more frequently to ensure that the Port remained in operation and could address changes in movement volumes, including both rapid decreases and increases in cargo activities.



Ensuring that truck parking facilities remained opened was an example of an action to address an immediate freight movement issue that required multi-organizational multi-state cooperation, used existing relationships and collaborations, and disseminated

concise information quickly. On March 17, the Commonwealth of Pennsylvania closed all 35 of its highway rest stops to all activity following the declaration of a state of emergency.⁵

4 Bethann Rooney, Port Authority of New York and New Jersey, presentation to the NJTPA Freight Initiatives Committee, February 16, 2021.

5 Kingston, "Pennsylvania shuts its rest stops to all activity, including parking," *FreightWaves*, March 17, 2020. Available at: <https://www.freightwaves.com/news/pennsylvania-shuts-its-rest-stops-to-all-activity-including-parking>

Although federal hours of service regulations had been suspended for essential movements, truck drivers still required secure places to rest, refresh, find food and refuel. Truck drivers, though deemed essential workers, faced numerous obstacles in performing their duties as noted by the American Transportation Research Institute:⁶

The trucking industry encountered numerous obstacles as trucks continued to operate while most of the country began to implement shelter-in-place orders. States closed public rest areas, reducing the number of safe places where truck drivers could rest and use the facilities. State licensing agencies also closed, prohibiting drivers from renewing the Commercial Drivers Licenses (CDLs). State orders to close dine-in restaurants severely limited food options for commercial drivers who are not able to access drive-thru food outlets in their trucks.

The New Jersey Department of Transportation worked with the operators of the State's rest areas and the trucking associations to quickly ensure that the public rest areas along the New Jersey roadways would remain open. The NJTPA then worked with its partners in the Metropolitan Area Planning (MAP) Forum, a consortium of 10 Metropolitan Planning Organizations (MPOs) from New Jersey, New York, Connecticut and Pennsylvania, to reach out to agencies in all four states to ensure that rest areas remained open and/or made reopening a high priority. Information regarding rest area availability was disseminated with the assistance of area trucking associations. New York City opened two emergency truck rest areas in Staten Island and the Bronx to help with essential movements. The MAP Forum, in collaboration with the New York Economic Development Corporation, New York City Department of Transportation, and the New Jersey Department of Transportation, working with several national and regional trucking associations also undertook an informal online survey of truck drivers to understand the issues and needs that were encountered during the early months of the pandemic with a specific focus on truck parking.

Ensuring the continued smooth operation of the region's Port complex also required several considerations. From a freight movement standpoint, with the closing of restaurants, nonessential stores and businesses, and containers for these customers still anticipated to arrive, NJTPA and the Port Authority collaborated with industry associations and CPP members to develop and disseminate an electronic survey of warehouse operators to ascertain their ability to accept anticipated inbound containers, as well as their ability to potentially provide additional storage capacity for other companies' unneeded containers and products.

At the same time, the Port community mobilized to ensure the ongoing health and well-being of the workforce. Efforts included securing PPE, significantly increasing sanitizing and cleaning, monitoring temperatures, quarantining workers as needed and enacting new processes

⁶ American Transportation Research Institute and the OOIDA Foundation, *COVID-19 Impacts on the Trucking Industry*, April 2020, p. 7.

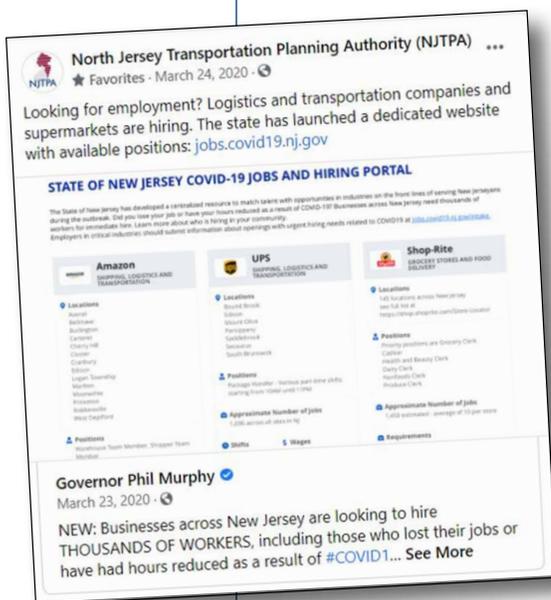
to ensure social distancing. As was noted by the PANYNJ, “Extraordinary efforts are being made throughout the port and terminals to implement rigorous procedures, in accordance with CDC guidelines, for enhanced, hospital-grade cleaning & disinfecting. Additionally, new procedures have been implemented throughout the Port to limit face to face interaction between different supply chain actors (i.e. truckers and ILA clerks, ILA and vessel crew etc.).”⁷

In addition, the New Jersey Food and Supply Chain team worked with numerous public, private and non-profit organizations to provide New Jersey residents with access to much needed food and household items. With so many people furloughed, the Community Foodbank of New Jersey reported large increases in food insecurity: “The food bank distributed 4.8 million meals in March—800,000 more than March of 2019. April will turn out to be the biggest month for meals in the food bank’s history, according to President/CEO Carlos Rodriguez.”⁸ Team members assisted with supplies, in some cases repurposing goods no longer required because of restaurant closures and/or helping to meet pressing demands. For example,

Redi Fresh Produce, Port labor, the Red Hook Container Terminal, PANYNJ and a trucking company worked together to deliver container loads of fresh pineapples to food banks.⁹

Agencies overseeing food recipient programs also responded, modifying procedures to ensure that individuals could get food delivered rather than having to go to stores and show credentials. Similarly, the specifications and timing for each month’s allotments required attention to ensure that enough goods were on-hand and to accommodate different product sizes available during the initial months of the pandemic.

The New Jersey Jobs and Hiring Portal was created to address concerns regarding the extensive furloughs and workforce shortages in the critical food, healthcare, and supply chain operations. Many organizations made extensive efforts to advertise the portal and the job openings.



7 “Port of NY and NJ Maintains A Strong Supply Chain Amidst COVID-19,” *Breaking Waves*, March 23, 2020. Available at: <https://www.portbreakingwaves.com/port-of-ny-nj-maintains-a-strong-supply-chain-amidst-covid-19/>

8 “A State on Edge: ‘If you need food, I’ll get it to you.’ N.J.’s largest food bank faces unprecedented demand,” *NJ.com*, May 1, 2020. Available at: <https://www.nj.com/coronavirus/2020/05/a-state-on-edge-if-you-need-food-ill-get-it-to-you-njs-largest-food-bank-faces-unprecedented-demand.html>

9 “Port of NY & NJ Partners Open Their Hearts and Warehouses to Communities in Need,” *Breaking Waves*, April 21, 2020. Available at: <https://www.portbreakingwaves.com/port-of-ny-nj-partners-open-their-hearts-and-warehouses-to-communities-in-need/>

Precise communication was critical. In addition to communicating the availability of truck parking, multiple questions arose regarding the definition of “essential workers.” For example, *The Journal of Commerce* reported, “The Port Authority worked with neighboring states to help ensure operators of warehouses and distribution centers understood their facilities were considered essential services. In one case, a cargo owner shipping 500 containers weekly shut down its Pennsylvania warehouse after the state’s initial essential service messaging.”¹⁰



Intermediate Actions During the Pandemic

Ensuring Workers' Health, Managing Freight Movement Shifts and Rebooting

AS THE PANDEMIC CONTINUED through 2020, organizations involved in supply chains continued to adjust to ensure their workforce’s well-being, worked to sustain effective movements through shipment surges, and considered longer term changes in production, connectivity, and technologies.

Ensuring Workforce Health on the Job

The pandemic did not damage infrastructure. However, to continue to operate and move freight, workers needed to be on-site. At the 2020 Council of Supply Chain Management Professionals’ National EDGE Conference (held virtually), the key concern repeatedly voiced by supply chain senior executives was keeping their workforce healthy. The high priority placed on workforce health was also heard at numerous other supply chain forums.

With their workers designated as essential and already facing workforce shortages prior to the pandemic, companies deployed multiple strategies for protecting the health of workers who needed to be physically present on the job. For example, Apple Computer in its *Supplier Responsibility 2020 Progress Report* noted that:

[W]e worked with our suppliers to develop and execute a plan that puts the health of people first. Thousands of Apple employees have worked tirelessly to execute that plan in partnership with our suppliers around the world. First and foremost, that’s meant working with our suppliers around the world on a range of protections suited to the circumstances in each country, including health

10 Szakonyi, “JOC Uncharted: COVID-19 response shows NY-NJ port resilience,” JOC.com, June 12, 2020. Available at: https://www.joc.com/port-news/us-ports/port-new-york-and-new-jersey/joc-uncharted-covid-19-response-shows-ny-nj-port-resilience_20200612.html

screenings, limiting density, and ensuring strict adherence to social distancing in their facilities. We're requiring the use of personal protective equipment—both during work and in all common areas—and have worked together to implement enhanced deep cleaning protocols and deploy masks and sanitizers.

Our teams have also partnered with suppliers to redesign and reconfigure factory floorplans where needed and to implement flexible working hours—including staggered work shifts—to maximize interpersonal space. We continue to work closely with leading medical and privacy experts to develop advanced health and safety protocols.¹¹

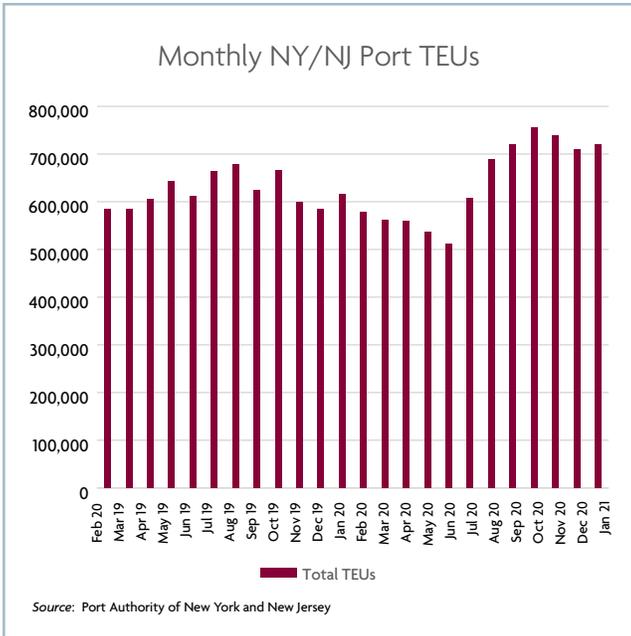
Similar measures were taken at freight operations in the region. For example, John Nardi, President of the New York Shipping Association, noted during his June 2020 presentation to the NJTPA Freight Initiatives Committee that terminals, agencies and labor organizations cooperated to create a safe working environment and reduce worker anxiety.¹² In addition, during briefings that the PANYNJ provided throughout the United States, the terminal operators noted workforce protection measures, including:¹³

- Significantly increasing spending for PPE, including providing proper PPE to all staff members (masks, gloves, sanitizer) and single use disinfecting wipes and gloves to truck drivers.
- Implementing increased office and equipment sterilization and disinfection. This included multiple disinfections per day of computer equipment, doorknobs, container handling equipment and controls, and gate kiosks.
- Creating joint guidelines to stop the spread of Covid-19 Virus in the workplace.
- Creating shiftwork to limit the number of people working in close proximity.
- Changing cargo handling processes to reduce person-to-person interaction as much as possible
- Reducing the sharing of machinery to lower the risk of exposure.
- Implementing non-contact temperature checking for over 3,000 employees daily over all three shifts.
- Suspending business travel.
- Having employees, where possible, work remotely using technology and HD CCTV cameras for operations planning and monitoring.

11 Apple Computer, *Supplier Responsibility 2020 Progress Report*, p 2.

12 John Nardi, New York Shipping Association, COVID-19 Presentation to the NJTPA Freight Initiatives Committee, June 2020.

13 Port Authority of New York and New Jersey, Lehigh Valley Briefing, May 21, 2020.



Managing Changing Freight Flows

As the pandemic continued through the year, production facilities reopened, stores adjusted to changing demand and fewer vessel movements were canceled. This allowed companies to replenish inventories and to shift from “just-in-time” inventory levels to keeping more stock on hand to meet growing orders for some products, resulting in increased freight movements.

For example, after seeing declines in monthly containerized cargo movements (as measured in 20-foot equivalent units or TEUs) during the early months of the pandemic, the New York-New Jersey saw a surge in container activity in August and September of 2020. Indeed, the August, September, October, November, and December container activity levels at the Port were significant increases year-over-year for the Port. For example, in December 2020, the seaport moved 709,075 TEUs, an increase of 21.3 percent from December 2019.

As previously noted, a survey had been sent to warehouse operators and discussions were held with Port customers in anticipation of such a surge. However, additional actions were also needed to ensure that containers did not pile up at maritime terminals, enough chassis were available to move containers, and sufficient doublestack container rail cars were provided by the national railroads to continue to efficient goods movement. The PANYNJ summarized some of the key actions being taken by the agency and its partners to ensure supply chain fluidity through the maritime terminals:¹⁴

- Keeping marine terminals open on holidays.
- Adding extra hours of operation on nights and weekends.
- Infusing extra chassis into the network.
- Working overtime to keep chassis units roadworthy.
- Adding empty rail cars into the intermodal network, including adding additional trains.
- Asking Port customers that were receiving the containers to extend and coordinate operating hours to match additional work times where applicable, move containers to off-terminal locations as quickly as possible, and return chassis as soon as possible to expedite other movements.

14 Port Authority of New York and New Jersey, *Breaking Waves*, November 9, 2020. Available at: <https://www.portbreakingwaves.com/measures-taken-at-the-port-to-handle-increasing-container-volume/>

Private Sector Supply Chain Rebooting

After the initial responses, private sector supply chain organizations began assessing intermediate and potential longer-term adjustments, including:

- **Suppliers** were assessed to determine whether they continued to fulfill orders or were unable to do so. If the suppliers were unable to fulfill orders, the assessment explored the reasons, including mandated facility closures, insufficient workers, raw material shortages, and/or canceled transportation services (such as the canceled container vessel sailings discussed previously). The assessments allowed companies to consider whether their existing suppliers needed to be replaced or augmented to ensure that orders were fulfilled in the future. Some companies, as previously noted, also worked with their suppliers to ensure workforce health and safety.
- **Production Facilities** were assessed in terms of whether they were closed by governmental order; could economically pivot or be adapted to rapidly shifting demand requirements; were sufficiently diverse in location so as to reduce the probability of mandated closures or changing international tariffs; and what was needed to address workforce health (including as previously noted additional automation, shift adjustments, sanitation, temperature monitoring, etc.).



- **Transportation Providers** were assessed in terms of their ability to continue to provide needed services. Some organizations saw their demand for transportation services increase dramatically, while others had to sharply reduce their use of services because of facility closures. Different forms of transportation services were sometimes required as e-commerce accelerated. Companies also needed to evaluate whether transit times were increasing, whether pandemic regulations limited in-facility deliveries, and whether alternative international and domestic transportation options should be considered and were economically available. In many cases, companies worked with their transportation

providers to adjust for additional costs and address worker health and safety.

- **Distribution Facilities** were assessed in terms of whether they were affected by store or other customer facility closures, which could result in inventory piling up. Assessments also included consideration of whether distribution facilities that previously had not handled e-commerce fulfillment could be pivoted to serve this growing market segment. As with

other facilities, operations were evaluated to understand if they were affected by worker or product shortages, as well as measures that needed to be implemented for worker health and safety.

- **Customers** also had to be reviewed, as some might have experienced their own facility closures and had to cancel orders. Some might have been in financial distress. Other customers (and/or their customers' customers) may have shifted to e-commerce or remote operations that required different order fulfillment processes. Consumer purchasing pattern shifts (such as the increase in home improvement and baking products) were assessed in terms of their implications, including whether these were short- or longer-term changes.
- **Connectivity** was and is key in the quick addressing of the “K” demand shift, facility closures, and efficient communication with suppliers, customers, and transportation providers, as well as within organizations. Shifting to remote working and order processing required different information technologies and, in some cases, equipment. Because of the increased reliance on information technology, cybersecurity considerations also needed to be evaluated.



Reshape: An Acceleration of Pre-Pandemic Trends

AFTER REBOOTING AND ENSURING that supply chains were sustained, organizations considered the findings of their assessments in light of longer-term contextual and operational changes. Several key context-changers have emerged.

Certain trends were already occurring prior to the pandemic and have accelerated because of the pandemic, including:

- Expanded use of e-commerce and buy online, pick up in store (BOPIS) by consumers
- Production and supplier location diversification
- Shifting from just-in-time lean inventories to having more inventory on hand
- Increased importance of information technologies
- Continuing workforce shortages
- Enhanced deployment of automation options

E-commerce as a share of retail sales has been growing as previously noted. The pandemic significantly accelerated the e-commerce market share. Walmart and Target, in reporting their third quarter 2020 financials, noted this growth. Walmart indicated that its online sales rose 79 percent in the quarter. Target said its online sales rose 155 percent, and these gains came

after Walmart's online sales rose 97 percent in the second quarter of 2020 and Target's online sales rose 195 percent also in the second quarter.¹⁵

The new level of growth is anticipated to continue because of the additional conveniences for consumers. *Yahoo Finance* noted: "the acceleration of e-commerce, which has gone hand-in-hand with the embrace of retail BOPIS, is the safest bet of pandemic consumer trends to stick around."¹⁶ McKinsey and Company reached the same conclusion: "Consumers report high intention to continue using models such as BOPIS (56 percent) and grocery delivery (45 percent) after the pandemic."¹⁷

The convenience of e-commerce and BOPIS expanded to new markets, particularly for food products. Trade publication *Supermarket News* noted: "COVID-19, in its own way, has been an unprecedented, if unplanned trial opportunity for online grocery."¹⁸ One industry analysis found that sales from online grocery delivery and pickup services came in at \$5.7 billion in August 2020, up 475 percent from \$1.2 billion in August 2019.¹⁹

This trend also means that the supply chain, including ordering, freight movement and delivery, and the user interface, is growing as the face of the customer experience. As such, new and additional pressures will be placed on the freight transportation providers and facilities to provide outstanding customer experiences.

The diversification of supplier and production locations was already occurring prior to the pandemic. The 2011 earthquake, tsunami, and nuclear disaster in Fukushima, Japan created ripple effects throughout supply chains worldwide when single-source, single-location companies in the affected area were destroyed.²⁰ Learning from that event, many companies have diversified their both suppliers and production locations to reduce the risks.

15 Roberts, "Target and Walmart prove the pandemic e-commerce surge won't reverse," *Yahoo Finance*, November 20, 2020. Available at: https://finance.yahoo.com/news/target-and-walmart-prove-the-pandemic-ecommerce-surge-wont-reverse-133454888.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xllmNvbS8&guce_referrer_sig=AQAAANxMfSp4bK-bbleOYTPdb13JKn_7-K_3F-mkz53UPBxUxM4QEjKu8C4fCAumQf_kR9JcKN0g5bUVH_014rifZH2-7V84mM6HgZGfRRk98IB1iORzgPcUInwIrvvWhDswR8FMGMjnnLp9cAiXXJTPPPzrLLygWO75RajhW6e7w3ue

16 Ibid

17 Briedis, Kronschnabi, Rodriguez and Ungerman, "Adapting to the next normal in retail: The customer experience imperative," McKinsey and Company, May 14, 2020. Available at: <https://www.mckinsey.com/industries/retail/our-insights/adapting-to-the-next-normal-in-retail-the-customer-experience-imperative>

18 Browne, "Is the new online grocery shopper here to stay?" *Supermarket News*, June 30, 2020. Available at: <https://www.supermarketnews.com/online-retail/new-online-grocery-shopper-here-stay>

19 Redman, "Bigger customer base portends more growth for U.S. online grocery market," *Supermarket News*, September 10, 2020. Available at: <https://www.supermarketnews.com/online-retail/bigger-customer-base-portends-more-growth-us-online-grocery-market>

20 Strauss-Wieder, "Supply Chain Business Continuity: A Framework for Proactive Resiliency Planning and Operations," *TRNews*, Volume 311, September-October 2017, pp. 13-19.

The pandemic accentuated the need for diversifying these locations as well as the strategic importance of having certain production capabilities available domestically. The strategic importance of domestic capabilities to produce and quickly deliver PPE as well as eventual vaccines became apparent. As a result, both public and private sector initiatives are already underway to enhance and expand capabilities within the US and diversify overseas suppliers.

Two key needs emerged with long term implications for domestic economic development and future supply chains:

- Addressing public priorities for enhanced domestic production of pharmaceutical and related products to respond to the current pandemic and to be prepared for potential similar events in the future; and
- Ensuring sufficient supplies and production to meet domestic needs that can respond to rapid pivoting of demand and/or overseas facilities affected by functional disruptions in the future.



As a major consumer region with historic strengths in production of certain products, such as pharmaceuticals, food, plastics, and petrochemicals, along with a developed multimodal freight system, the enhanced demand for such facilities could create economic opportunities for the region and additional freight activity.

Public Priorities

Domestic pharmaceutical production was not widely expected to increase prior to the pandemic. However, public needs in this area have made this a much higher priority, and federal investments have jump-started production enhancement, raising the priority for expanding as well as increasing the flexibility of domestic manufacturing capacity for key items needed for the pandemic and potential future similar events. The Supply Chain Task Force of the Federal Emergency Management Agency (FEMA) noted that it “is applying a four-prong approach of Preservation, Acceleration, Expansion and Allocation to rapidly increase supply today and expand domestic production of critical resources to increase supply long-term.”²¹ FEMA’s expansion efforts focus on generating capacity with both traditional and non-traditional manufacturers, through such measures as adding machinery or re-tooling assembly lines to produce new products.²²

21 FEMA Advisory, *Coronavirus (COVID-19) pandemic: Supply Chain Stabilization*, April 8, 2020.

22 Ibid

The Biomedical Advanced Research and Development Authority (BARDA) within the U.S. Department of Health and Human Services “launched a strategic partnership in May 2020 to foster and expand Pharmaceutical Manufacturing in America by increasing U.S.-based manufacturing capacity to produce active pharmaceutical ingredients and generic medicines needed during the COVID-19 response, and during future public health emergencies.”²³ BARDA noted that the majority of the active ingredients and chemical compounds needed for critical medicines are currently manufactured overseas using older manufacturing processes.²⁴

BARDA’s strategy includes:

- Investing in the expansion of domestic manufacturing capacity of supplies such as needles, syringes, and vials as well as pharmaceutical manufacturing.
- Funding industry efforts to shift from the older approach of “batch” manufacturing of pharmaceutical products to continuous manufacturing of these products domestically, as well as innovative and next generation manufacturing approaches.

Largely geared towards production and delivery of current and future vaccines, the BARDA grant awards highlight how the “reboot” phase identified the range of the products needed and changed the longer-term context for the industries involved in producing and delivering these products. BARDA awards in 2020 have included:²⁵

- \$117 million to Retractable Technologies, Inc; Becton, Dickinson and Company; and Smiths Medical, Inc for expanding the capacity to manufacture needles and syringes.
- \$204 million to Corning Pharmaceutical Technologies and Corning Incorporated for glass tubing and vials and \$143 million to SiO2 USA for developing and establishing high performance glass/plastic vials.
- \$49 million to Thermo Fisher Scientific for domestic product of sterile injectable drug products.
- \$0.7 million to Snapdragon Chemistry to demonstrate a continuous manufacturing process platform.

It should be noted the federal government also awarded billions of dollars to Regeneron, Novavax, Johnson and Johnson, Pfizer, and other pharmaceutical companies to fast-track vaccine development, manufacturing, and distribution as part of the pandemic response.

23 <https://www.medicalcountermeasures.gov/barda/influenza-and-emerging-infectious-diseases/coronavirus/pharmaceutical-manufacturing-in-america/>

24 Ibid

25 Ibid

Private Sector Diversification

In addition to increasing domestic capacities to support healthcare, private sector companies have been investigating increasing production capacity domestically or nearer to the United States. As noted, this trend accelerated with the 2011 Fukushima disaster.

This time, with the pandemic, companies moved more quickly to increase domestic production. The U.S. Cybersecurity and Infrastructure Security Agency (CISA) reported:

There is little leeway for error, so when the pandemic hit, many organizations faced shipment delays, first in Asia, then in Europe, and then in regions of South America. As a result, 57.2 percent of respondents reported that they would diversify their supplier base post-pandemic, with 29.9 percent looking to shift away from the Far East, and 13.2 percent expecting to source less from China. In mid-March, BCI's first Coronavirus Preparedness Report found that 16.3 percent of organizations had already moved to source some or all goods more locally. Two months later, that number had jumped to 36.4 percent.²⁶



Supplier closures and canceled international transportation during the pandemic, particularly during its initial months, have further increased attention on domestic or near-shore (such as Mexico) production and supplier options. A survey of manufacturers and retail customers by the Toll Group, a major third-party logistics provider, found that:²⁷

- The pandemic has hardened feelings that concentrating business in China [a single geographical area] is risky after government-mandated lockdowns at the virus' origin froze manufacturing and international shipping for weeks, leaving customers without access to critical goods.
- Businesses in the retail (25 percent) and health care (55 percent) sectors are looking to regionalize their supply chains.
- 23 percent of industrial manufacturers and 29 percent of technology customers are looking to source more products from local suppliers.

26 Cybersecurity and Infrastructure Security Agency (CISA), *Building a More Resilient ICT Supply Chain: Lessons Learned During the COVID-19 Pandemic*, November 2020, p. 11.

27 Kulisch, "COVID supply chain disruptions reinforce 'China+1' strategy," *Freightwaves*, November 3, 2020. Available at: <https://www.freightwaves.com/news/covid-supply-chain-disruptions-reinforce-china-1-strategy>

Expanding or shifting production capacity and suppliers is now an active risk containment strategy consideration, though one that companies temper through financial evaluation, including the cost of labor, transportation, taxes and tariffs, as well as the availability of the workforce with the required skills and access to raw materials and customer markets. A Pricewaterhouse Cooper (PwC) analysis found that commodities with greater potential for capacity expansion in the United States or near-shore locations included fabricated metals, agriculture and furniture, building materials, machinery, motor vehicles, industrial components, consumer packaged goods, specialty chemicals, consumer electronics, textiles and plastic products.²⁸

Shifting to having more inventory had begun prior to the pandemic as a result of previous disruptive events that significantly affected production lines and growing customer demands for expeditious delivery via e-commerce.

In assessing their supply chain performances and needed changes, companies appear to be further shifting from having lean just-in-time inventory to having more inventory on-hand in order to avoid back orders, as well as the supplier and transportation issues encountered during the pandemic. CISA noted in their assessment of the pandemic that:

The pandemic exposed how some manufacturing companies were unprepared because of their reliance on lean inventory models, which provide great efficiency and cost effectiveness in normal environments. However, recent disruptions and the pandemic have illustrated the risks of not holding much inventory of critical components or equipment, and the economic consequences of delayed customer deliveries that can follow as a result.²⁹

Expanding inventory strategies may involve keeping more products on hand, which translates into a greater need for warehousing space. Maintaining immediate availability may also mean financially working with suppliers to reserve inventory, as demonstrated by some federal grants for vaccine production, and enhancing information technologies to virtually control the supply and movement of those products.

Information technologies have been essential for the continued operation of companies. The technologies provide end-to-end connectivity and visibility throughout the supply chain as well as “control towers” for monitoring flows. The criticality of information technologies in supply chains was first highlighted with Superstorm Sandy when power outages temporarily severed these systems and further demonstrated in more recent cyber-attacks such as the 2017 NotPetya disruption.

28 PwC presentation, *Rethinking Your Supply Chain Post COVID*, Council of Supply Chain Management Professionals webinar, May 14, 2020.

29 CISA, op cit, p. ii.

Gaps in information and connectivity also occurred during the rapid changes in the early months of the pandemic. As noted in a Forbes article, “During the pandemic, we learned the hard lessons from spotty information on supply chain activity across the entire spectrum.”³⁰

Information technologies have been relied upon for communications, coordination and pivoting during the pandemic, both within and among organizations and individuals. As a result, there are increased concerns about cybersecurity. As noted by McKinsey and Company:

The extraordinary efforts of many organizations to protect workers and serve customers during the COVID-19 pandemic have also increased their exposure to cyberthreats. Large-scale adoption of work-from-home technologies, heightened activity on customer-facing networks, and greater use of online services all present fresh openings, which cyberattackers have been quick to exploit.³¹



JAMIE WILSON

The accelerating advancement and deployment of information technologies will thus continue with more applications being brought into use more quickly to increase visibility and supply chain situational awareness, rapidly identify changing demand requirements, pivot production and transportation, create “digital twins” of facilities that can reduce the need for on-site visits, undertake simulations, and enhance customer experiences in the expanded e-commerce environment. At the same time, increased investments in information technology applications and equipment, along with attention to cybersecurity, will also occur.

Workforce

Workforce shortages that already existed throughout the supply chain became more pronounced during the pandemic, as businesses both required more from their operations and implemented new procedures to keep their workers healthy. These shortages remain long-term challenges that must continue to be addressed.

30 Polakoff, “Five Supply Chain Lessons Learned For A Post-pandemic World,” *Forbes*, October 23, 2020. Available at: <https://www.forbes.com/sites/forbestechcouncil/2020/10/23/five-supply-chain-lessons-learned-for-a-post-pandemic-world/?sh=4095573e7afd>

31 Boehm, Kaplan and Sportsman, *Cybersecurity’s dual mission during the coronavirus crisis*, McKinsey & Company, March 25, 2020.

The 2020 edition of American Transportation Research Institute (ATRI)'s annual survey of the most critical trucking issues identified the driver shortage to be the number one issue.³² Workforce shortages at all skill levels continued at distribution facilities and have increased with the continued growth of e-commerce, as noted at the 2020 NAIOP I.CON national industrial real estate conference:

The surge in demand for e-commerce has required logistics operators to function on schedules they normally reserve for the holiday season. Even with employees working around the clock, one third-party logistics provider is only able to operate at 80 percent capacity because of labor constraints. These constraints will likely continue to be a challenge for the industry. Logistics operations related to e-commerce are labor-intensive and will continue to be for the foreseeable future.³³

Current efforts to market career opportunities, enhance training programs and apprenticeships, maintain the health of workers, and increase retention are anticipated to continue. In addition, with so many individuals seeking new opportunities after losing their jobs during the pandemic, initiatives to direct these individuals into transportation, logistics and distribution occupations have accelerated.

Automation

Increased application of automation technologies is also being explored and implemented by supply chain companies to address rapid demand and fulfillment requirements, increase social distancing among facility personnel, and increase productivity in the face of workforce shortages. As noted in one trade publication:

Now that the pandemic has helped untap the potential of e-commerce, specifically in the grocery area, there is little doubt that investments that make the process more efficient will come in the future... As part of this major supply chain evolution, I expect to see companies continue to optimize the operations of their logistics facilities, as well as increased investment in robotic systems to enhance processes, as they seek to create environments that prioritize the health, safety and well-being of employees.³⁴

32 American Transportation Research Institute, *Critical Issues in the Trucking Industry—2020*, October 2020, p. 3.

33 Moura, "A Resilient Industrial Sector Adapts to the Crisis," NAIOP, June 24, 2020.

34 Shaver, "A New Push For Warehouse Automation," *Globe Street*, September 2, 2020. Available at: <https://www.globest.com/2020/09/02/automation-a-new-push-for-warehouse-automation/>



STEVE HOCKSTEIN/HARVARD STUDIO

Potential Implications for the NJTPA Region

NEW JERSEY HAS LONG BEEN THE SUPPLY CHAIN state for North America, with significant concentrations of freight transportation and distribution operations located throughout the state and particularly in the NJTPA region. These industrial and transportation concentrations have continued to successfully serve the region and the nation through the pandemic. The success

and quick responsiveness of the region's supply chain sector, combined with the significant population located both within the area and within its market reach, are factors that propel the sector to continue to grow and adapt.

The key implications for the region and surrounding area include:

- Pursue potential new production operations
- Anticipate more industrial space requirements
- Address workforce needs and accessibility
- Continue to optimize the multimodal freight system
- Proactively address requirements associated with information and automation technologies

Pursue potential new production operations: The NJTPA region and the state have a long history of fostering innovative manufacturing dating back to 1792, when Alexander Hamilton founded the first industrial park in Paterson. Given the area's locational strengths, including its proximity to end users and transportation systems, opportunities exist for the region and state to pursue opportunities related to companies seeking to add or expand production operations.

In addition to historic strengths in food, plastics, chemical, pharmaceutical and other industrial production, the region's central location in one of the most densely populated consumer markets in North America makes the area a prime location as companies seek to have certain production and distribution operations closer to end users.

Anticipate more industrial space requirements: The industrial real estate market has been red hot in the NJTPA region for several years, with more than 100 new industrial buildings completed since the beginning of 2017. In 2020 alone, 31 buildings were added in a record 10.4 million square feet, and 34 buildings in 11 million square feet were under construction at the end of the year.³⁵ Even with the considerable construction activity, demand has continued to exceed the supply of available space.

35 CBRE, *NJ Industrial Market View*, 4Q2020.

With the increased emphasis on e-commerce and production fueled by the pandemic, it can be assumed that the demand will remain high. As a result, it is likely that the redevelopment of brownfield properties and repurposing of land uses will continue. Successful brownfield redevelopment for industrial use has already occurred in Middlesex, Union, and Warren counties.

Address workforce needs and accessibility: Labor has become one of the most important criteria in final site selection for industrial development. Without sufficient labor availability, the competitiveness of a site significantly decreases. As noted by Prologis, the largest owner and developer of industrial property, “The need for skilled logistics workers has never been greater, particularly as warehousing and logistics operators strive to meet demand driven by consumers shopping online.”³⁶ Because of this significant need, Prologis has initiated a public/private collaborative effort to market, develop and deliver the workforce needed by the occupiers of their buildings.³⁷



The expected growth in production and e-commerce, driven in part by the pandemic, will only increase the demand for labor in logistics and related sectors.

The NJTPA region has already amplified transportation, logistics and distribution workforce development efforts through the Council on Port Performance’s Workforce Development Implementation Team and other initiatives. As the region increasingly pivots towards these occupational needs, efforts to involve all communities, particularly minorities and women under-represented in the industry, will continue.

However, ensuring a sufficient workforce involves more than recruitment and training. Accessibility is a growing concern that needs to be addressed—potential workers need mobility options to get from home to where jobs exist and are growing. The emerging locations of these jobs, combined with the varying shift requirements, represent fundamental changes in transportation needs that will need to be addressed.

Continue to optimize the multimodal freight system: Public and private sector organizations that manage and oversee the region’s multimodal freight system have already been working to adapt it to 21st century needs with investments in nearly all modes and types of facilities.

36 <https://www.prologis.com/customers/cwi>

37 Ibid

However, as the requirements placed on the freight system continue to evolve—including increased e-commerce, new production and distribution locations, and quick pivoting to changing demands, all brought to the fore during the pandemic—additional investments are likely needed. Further, the pandemic identified the critical nature of certain elements of the system, such as truck parking, that will need to be addressed. NJTPA, along with other agencies in the region continue to work to enhance and optimize freight transportation options in the region and across jurisdictions. Examples of these efforts include the NJTPA Freight Rail Industrial Opportunities (FRIO) Corridors program, the NJTPA Freight Concept Development Program, truck parking initiatives, and public and private investments in the region’s port, air cargo facilities, railroads, and roadways.

Address requirements associated with information and automation technologies: As discussed in this report, information technologies have been growing in importance in recent years and are anticipated to become as important as physical movement of goods. Combinations of automation and information technologies have been implemented for years in industrial buildings, including such examples as Warehouse Management Systems (WMS) and Warehouse Control Systems (WCS), which provide real-time information on inventory, delivery, and shipping, as well as instructions for staff to execute. With advancements in information technologies and artificial intelligence, these systems will reach new levels of utilization that will help meet the need for social distancing, enhance productivity, and relieve workforce shortages.



Moving Forward Together and Stronger

THE REGION APPLIED EFFECTIVE PRACTICES learned from major disruptions such as 9/11 and Superstorm Sandy in responding to the pandemic, including ensuring cooperation, collaboration, and communication among key players in the freight sector. As the region and its freight sector move through the phase of responding to the crisis, more focus must be placed on the retooling and reshaping phases. This includes gathering and acting

upon new lessons learned to help create an even more resilient region prepared for future events and challenges.