



Ports





EXECUTIVE SUMMARY

The nation's more than 300 coastal and inland ports are significant drivers of the U.S. economy, supporting 30.8 million jobs in 2018 and 26% of the total GDP. Ports and port tenants plan to spend \$163 billion between 2021 and 2025, up by over \$8 billion over the last four years. Investments are focused on capacity and efficiency enhancements as maximum vessel size has doubled over the last 15 years, and tonnage at the top 25 ports grew by 4.4% from 2015 to 2019. Federal funding has increased through multimodal competitive grant programs. However, there is a funding gap of over \$12 billion for waterside infrastructure such as dredging over the next 10 years, with additional billions needed for landside infrastructure. Smaller and inland ports are especially challenged to maintain their infrastructure and have difficulty competing for federal grants. Meanwhile, a port's success is reliant on the infrastructure outside of its gates, which is often congested or in poor condition. For example, just 9% of intermodal connector pavement — the portions of roadway that connect a port to other modes — are in good or very good condition.

INTRODUCTION

The United States' more than 300 ports¹ serve as major economic drivers and places of employment. According to the American Association of Port Authorities (AAPA), seaports contributed \$5.4 trillion to the economy, or nearly 26% of the total GDP in 2018. The economic impact of ports is only growing. AAPA estimates that 30.8 million jobs were supported by ports in 2018, up from 23.1 million in 2014.²

Seaports in the U.S. are often located in or adjacent to large coastal metropolitan areas. By comparison, inland ports are located on the Great Lakes or the inland waterway network and are frequently in more rural areas. Ports thrive on their flexibility to handle a variety of products, from bulk aggregates and agriculture to

liquids and manufactured goods and equipment.

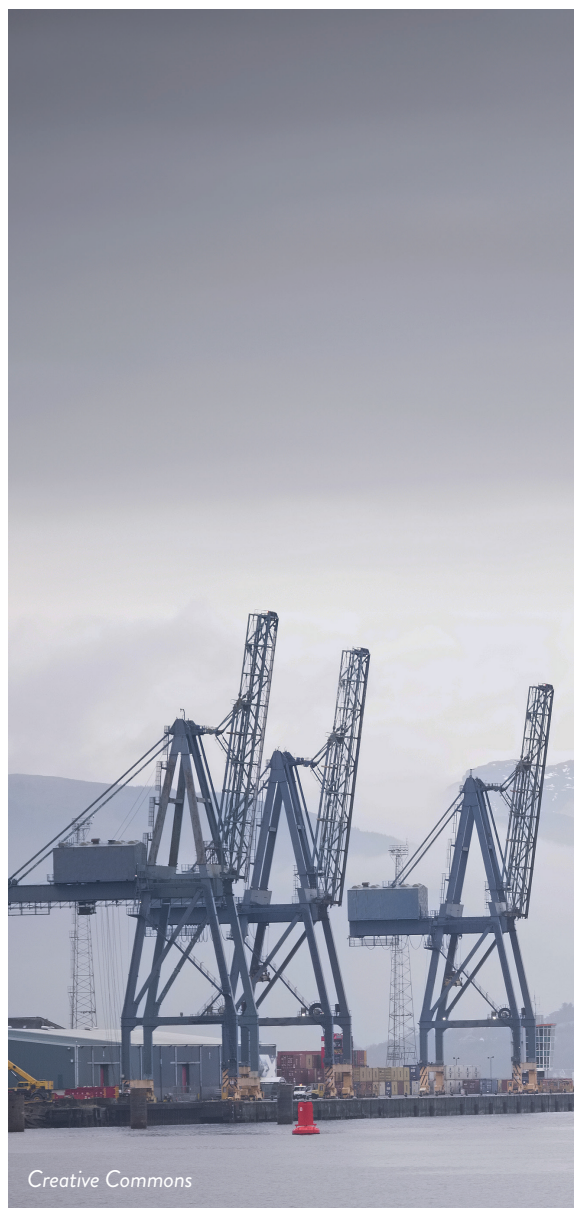
Port facilities vary widely in terms of productivity, footprint, customers, and governance.³ Some ports are privately owned and operated, while others are managed by a government or quasi-government authority representing a city or state.⁴ The owner of a port may lease space or infrastructure to a tenant, most commonly a terminal operator. Terminal operators are responsible for maintaining equipment and buildings, but typically partner with a public agency for major capital projects.⁵ The varied ownership structures contribute to the uniqueness of each port — the industry saying goes, “once you’ve seen one port, you’ve seen one port.”

CAPACITY & CONDITION

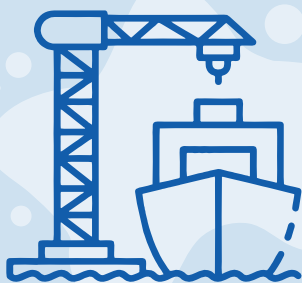
Port infrastructure includes docks, piers, channel harbors, and more. In general, the conditions from terminal to terminal within a port vary. However, all ports are challenged to maintain their infrastructure in harsh marine environments. Corrosion from saltwater and de-icing salts, constant wet and dry cycles, temperature variations, and more accelerate the rate of decline of everything from cranes to wharfs.⁶ Port owners are tasked with monitoring the structural integrity of their infrastructure in these harsh environments.

Many ports can trace their origins back a century or more, and all owners are pressed to continue to modernize their infrastructure. Seaports, for example, are consistently expanded to accommodate larger container ships. Vessel capacity at container ports is measured in TEUs, or “twenty-foot equivalents,” which equals one 20-foot container. Maximum vessel capacity has doubled in size over the last 15 years, from 10,000 TEUs in 2005 to almost 20,000 TEUs today.⁷ As vessels have increased in size, port infrastructure — including berths, cranes, and channel depths — have required investment to keep pace. Today, a growing number of shallow water ports are dredged to a channel depth of 45 feet or more, which is necessary for accommodating post-Panamax ships that are now able to traverse an expanded Panama Canal.⁸

Other retrofits and modernizations are needed to accommodate larger ships, including larger cranes. According to the U.S. Department of Transportation’s (DOT) Bureau of Transportation Statistics (BTS), in 2019 the top 25 container ports operated a total of 504



CRANES AT PORT OF GALVESTON IN TEXAS



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ship-to-shore gantry cranes, and nearly 50%, or 235, were classified as super post-Panamax, or cranes large enough to load and unload super post-Panamax ships.⁹

In general, ports are expanding and adding capacity across the country. BTS reports the total tonnage handled at the top 25 ports in the country grew by 4.4% from 2015 to 2019.¹⁰ This growth is reflective of an industry that is investing in its capacity and growing its ability to accommodate larger volumes.

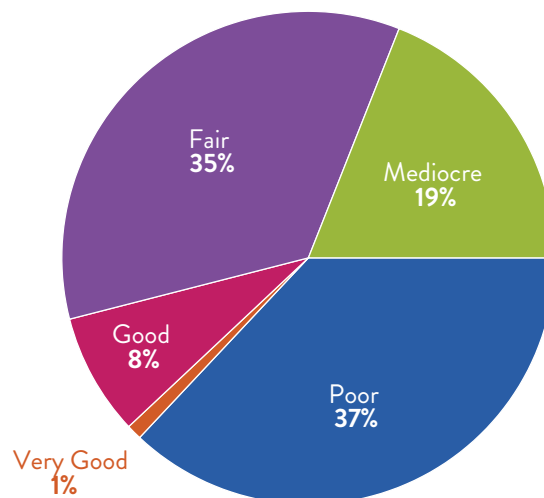
While most ports are adding capacity to address growing freight volumes, their success is contingent on the capacity of, and ease of access to, other modes of transportation such as roads and rail. On-dock rail allows for containers to be loaded directly onto rail lines that are adjacent to port terminals. According to BTS, a total of 44 out of the 88 active container terminals at major U.S. ports had on-dock rail access in 2019. All major ports either have on-dock rail or are located nearby to rail facilities.¹¹

Intermodal connectors are the portions of roadways that link our National Highway System to ports and other modes. These segments are traditionally underfunded, as historically they have not fit neatly into existing funding programs. A 2017 Federal Highway Administration (FHWA) report collected pavement condition readings from the 798 designated freight intermodal connectors and found that 37% of pavement condition was rated as poor. These segments also contend with congestion; FHWA specifically identifies port connectors as having some of the worst congestion, with a 14% speed drop between free-flow conditions and slowest daytime conditions.¹²

FUNDING & FUTURE NEED

Funding for port infrastructure is derived from a variety of sources, including federal, state, and local funding, as well as private sector revenue streams. Waterside infrastructure needs, namely for dredging, are paid for through the federal Harbor Maintenance Trust Fund (HMTF). The HMTF collects its revenue through a 0.125% user fee on the value of the cargo in imported containers, which equates to approximately \$15 per container box. Ports, particularly on the East and Gulf coasts, have significant dredging needs, but the fund's balance has traditionally been used to pay for things other than port needs, its designated purpose.

Figure 1. Intermodal Connector Pavement Condition



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For the first time, in Fiscal Year (FY) 2019, total Harbor Maintenance Trust Fund appropriations met the level of new receipts and interest. The subsequent CARES Act codified the requirement that the money coming in must be spent on dredging, as intended by the original creation of the Harbor Maintenance Trust Fund. The 2020 Water Resources Development Act took this a step further, allowing for the use of the unspent balance of \$9.3 billion dollars in the HMTF by 2030.¹³

Landside federal funding is typically provided through grants. The U.S. DOT's Better Utilizing Investments to Leverage Development (BUILD) Transportation

Discretionary Grant program allows for federal multimodal investment opportunities. The BUILD program and its predecessor (Transportation Investment Generating Economic Recovery, or TIGER) provide an average of 12% of available funding each round to port projects, or roughly \$1 billion over the past 11 cycles.¹⁴

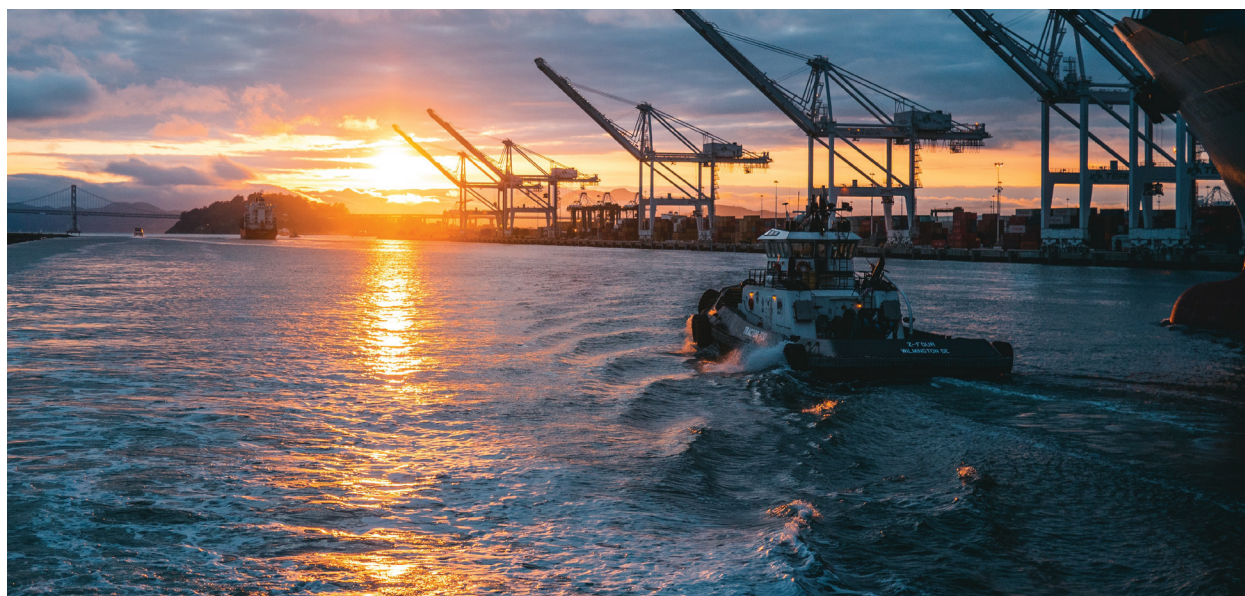
A newer program is the FAST Act's Nationally Significant Freight and Highway Projects program, renamed INFRA in 2017. INFRA is designed for large highway freight projects, but up to \$500 million can be spent on multimodal projects, including those located inside a port gate. So far, 16% of available INFRA dollars have been awarded to port projects, or roughly \$358 million.¹⁵ Both INFRA and the BUILD program are oversubscribed, with approximately \$10 or more of requests for every \$1 available for award.¹⁶

Additionally, federal funding is now available through the U.S. DOT Maritime Administration's Port Infrastructure Development Program (PIDP). PIDP was authorized in the FY2010 National Defense Authorization Act but was not appropriated money until FY2019. Congress' FY2019 appropriations bill provided \$287 for PIDP, and \$221 million was available the following year.^{17 18} It should be noted that most PIDP funding is reserved for coastal seaports or Great Lake ports, meaning inland ports receive a much smaller amount of funding.

Some states have dedicated funding for ports, including Florida, Minnesota, Missouri, Virginia, and others.^{19 20 21 22} Additionally, ports — especially those located inland — have a diversified revenue stream that can include housing, urban development, and more.

In general, ports continue to invest in their own infrastructure. A survey conducted by the American Association of Port Authorities (AAPA) reports that ports and port tenants plan to spend \$163 billion between 2021 and 2025, up from the forecasted \$154.8 billion in the 2016-2020 AAPA study. Many ports have successfully leveraged the modest increases in available public funding to make more efficient and innovative investments in capacity and condition projects.²³ It should be noted that forecasted capital spending over the next four years is contingent on an economic recovery and the continued availability of federal and state funding.

ASCE's 2021 Failure to Act economic study looks at available funding compared to needs for navigational-related improvements, including dredging and lock and dam repair. The report shows that unmet waterside infrastructure needs at coastal ports will be \$12.3 billion over the next 10 years.²⁴ Importantly, ASCE's infrastructure gap estimate does not consider landside investments. In 2018, AAPA's U.S. member ports identified \$32.03 billion for landside needs.²⁵ Inland river ports and terminals also have significant needs that are not reflected in the AAPA estimate.



In the coming years, port owners and city planners will need to decide how to handle sea level rise. Relocating an entire port to higher ground is almost certainly cost-prohibitive, but port owners may decide to raise docks or relocate facilities offshore. Connecting modes, such as on-dock rail and service roads, would similarly need updates to continue providing access to ports.



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OPERATIONS & MAINTENANCE

The USDOT Strategic Plan identifies lifecycle and preventive maintenance as a strategic objective to keep the nation's infrastructure in a state of good repair. To implement this strategic objective, the Maritime Administration initiated an internal review in 2017 and found that ongoing planning frequently fails to target state-of-good-repair projects and could be

better at considering resiliency to threats like weather and earthquakes. The Maritime Administration subsequently instituted a risk-based asset management program and is encouraging port owners and operators to utilize the risk rating and scoring systems created by the agency.²⁶

PUBLIC SAFETY & RESILIENCE

Ports have a key role to play in helping a community recover from a natural or manmade disaster. Goods can be transported via oceans and inland waterways to communities in need when other trade routes are blocked. Similarly, berths can accommodate emergency vessels and personnel, as was observed in 2020 when the 1,000-bed hospital ship *USNS Comfort* docked at Port 90 in Manhattan to serve patients during the COVID-19 crisis.²⁷ Ports are also able to support force deployment in the instance homeland protection is needed. Nine federal agencies, including the U.S. Army, U.S. Army Corps of Engineers, and the Maritime Administration work together to ensure preparedness for national defense emergencies.²⁸

In the coming years, port owners and city planners will need to decide how to handle sea level rise. Relocating an entire port to higher ground is almost certainly cost-prohibitive, but port owners may decide to raise docks or relocate facilities offshore. Connecting modes, such as on-dock rail and service roads, would similarly need updates to continue providing access to ports. Some limited investments are being made today to head off potential complications of sea level rise. The Port of Virginia, for example, is spending \$375 million to raise their power stations several feet off the ground and position their data servers as far inland as possible.²⁹



Photo courtesy of Illinois Ports Association

SENECA REGIONAL PORT ON THE ILLINOIS RIVER

INNOVATION

In the U.S., the Ports of Long Beach and Los Angeles each have one fully automated terminal. Three semi-automated terminals can be found in Virginia and New Jersey.³⁰ Automation stands to add throughput capacity and provide safety benefits.³¹

Advanced analytics, such as blockchain, use existing and historic data collected with devices and sensors,

through open-sourced platforms can improve efficiencies at ports. Such benefits are already being realized abroad.³² Advanced analytics also aid ports in becoming more resilient as predictive approaches driven by machine learning ensure flexible, responsive, and adaptive management amid highly complex and dynamic scenarios.



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RECOMMENDATIONS TO RAISE THE GRADE

- Remove the multimodal cap on INFRA funds and increase overall investment in the INFRA and BUILD programs to ensure ports can effectively distribute and receive goods as ships continue to grow in size.
- Appropriate funds to the Congressionally authorized projects to ensure that projects crucial to freight movement are completed in a timely manner.
- Adopt new technologies to reduce wait times at docks, boost efficiency, improve resilience, and increase security.
- Improve freight and landside connections to strengthen the entire freight system and reduce congestion that is costly to the economy when moving goods.
- Ensure that ports are a part of comprehensive disaster planning. Ports play a critical role in the aftermath of a disaster, facilitating the movement of people and the delivery of supplies. Integrating ports into a holistic disaster recovery plan — one that is developed with all stakeholders and is based on the data and data sharing — is vital to ensuring a community can quickly recover.
- Port owners and operators should utilize asset management to prioritize limited funding and pinpoint needed repairs.
- Ensure smaller ports can compete in existing and new competitive grant programs.
- Spend down the balance of the Harbor Maintenance Trust Fund on port projects.



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