

# Port Planning and Investment Toolkit

## Module 1: General Projects



U.S. Department of Transportation

**Maritime Administration**



**American Association  
of Port Authorities**

Alliance of the Ports of Canada, the Caribbean, Latin America and the United States



# General Projects Module Contributors

Numerous port and financing industry volunteers assisted in the creation and refinement of this General Projects Module of the Port Planning and Investment Toolkit (PP&IT or Toolkit). Thank you to the contributors from the following ports and organizations for your time, consideration and invaluable input.

AECOM	Port of Hueneme, CA
Georgia Ports Authority	Port of Long Beach, CA
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PortMiami, FL	Virginia Port Authority
Port of Coos Bay, OR	Worley Parsons
Port of Houston Authority	<i>WSP   Parsons Brinckerhoff</i>

*WSP / Parsons Brinckerhoff and PFM Group were the primary authors of the PP&IT General Projects Module.*

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This Toolkit module was developed through a cooperative agreement between the U.S. Department of Transportation (USDOT), Maritime Administration and the American Association of Port Authorities. [DTMA-91-H-2013-0004]. Opinions or points of view expressed in this document are those of the authors and do not necessarily reflect the official position of, or a position that is endorsed by, the United States (U.S.) Government, USDOT, or any sub-agency thereof. Likewise, references to non-Federal entities and to various methods of infrastructure funding or financing in this document are included for illustrative purposes only and do not imply U.S. Government, DOT, or subagency endorsement of or preference for such entities and funding methods.



# Preface

The American Association of Port Authorities (AAPA) and the USDOT, Maritime Administration (MARAD) signed a cooperative agreement to develop an easy-to-read, easy-to-understand, and easy-to-execute Port Planning and Investment Toolkit (PP&IT). The goal of the project is to provide U.S. ports with a common framework and examples of best practices when planning, evaluating and funding/financing freight transportation, facility and other port-related improvement projects.

The analytical tools and guidance contained in this comprehensive resource are designed to aid ports in developing “investment-grade” project plans and obtain capital for their projects in a variety of ways, including: (1) improve the chances of getting port infrastructure projects into Metropolitan Planning Organization (MPO) and state transportation plans to qualify for formula funding; (2) better position port projects for federal aid; and (3) assist ports in obtaining private sector investment.

Since each port investment project is unique with its own set of strengths and obstacles, the material in this module is not intended to address specific requirements of any single project, user or port; it is a resource for a diverse group of users to become familiar with port planning, feasibility and financing and to highlight opportunities for engagement and coordination throughout the project definition process. This document is not a replacement of existing policies or consultation handbooks and does not constitute a standard, specification or regulation. The exhibits, processes, methods and techniques described herein may or may not comply with specific national, state, regional and local regulatory requirements.

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This module will be updated periodically as new regulations and policies are developed affecting port planning, feasibility and investment requirements related to the applicable laws discussed in the document. Additional information, updates, and resources of the Toolkit are available on the AAPA website at <http://www.aapa-ports.org/PPIT> and the MARAD website at <https://www.maritime.dot.gov/ports/port-planning-and-investment-toolkit>.

For all other queries regarding the PP&IT, please contact Aaron Ellis, Public Affairs Director, AAPA at 703-684-5700.



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## List of Acronyms

AAPA	American Association of Port Authorities
AMT	Alternative Minimum Tax
AP	Availability Payment
ATCMTD	Advanced Transportation and Congestion Management Technologies Deployment
BAFO	Best and Final Offer
BCA	Benefit Cost Analysis
BCO	Beneficial Cargo Owner
BCR	Benefit Cost Ratio
BUILD	Better Utilizing Investments to Leverage Development
CAA	Clean Air Act
CAB	Capital Appreciation Bond
CapEx	Capital Expenditure
CCAB	Convertible Capital Appreciation Bond
CIB	Current Interest Bond
CIP	Capital Improvement Program
CMAQ	Congestion Mitigation and Air Quality
CPI	Consumer Price Index
CWA	Clean Water Act
DBF	Design-Build and Finance
DBFOM	Design-Build, Finance, Operate and Maintain
DOT	Department of Transportation
FAF	Freight Analysis Framework
FAST Act	Fixing America's Surface Transportation Act
FASTLANE	Fostering Advancements in Shipping and Transportation for the Long-Term Achievement of National Efficiencies
FHWA	Federal Highway Administration
FY	Fiscal Year
INFRA	Infrastructure for Rebuilding America
I-O	Input-Output
IRR	Internal Rate of Return
IRS	Internal Revenue Service
ITS	Intelligent Transportation System
LOC	Letter of Credit
LRTP	Long Range Transportation Plan
MAE	Multiple Account Evaluation
MARAD	Maritime Administration
MPO	Metropolitan Planning Organization
NEPA	National Environmental Policy Act
NHFN	National Highway Freight Network
NHFP	National Highway Freight Program
NPV	Net Present Value
NSFHP	Nationally Significant Freight and Highway Projects



O&CD	Opportunities and Constraints Document
O&M	Operation and Maintenance
OpEx	Operating Expenditure
P <sub>3</sub>	Public-Private Partnership
PAB	Private Activity Bond
PP&IT	Port Planning and Investment Toolkit
PPM	Professional Port Manager
RFP	Request for Proposals
RFQ	Request for Qualifications
RLOI	Request for Letters of Interest
R&R	Renewal and Replacement
ROI	Return on Investment
RRIF	Railroad Rehabilitation and Improvement Financing
SIB	State Infrastructure Bank
STBG	Surface Transportation Block Grant
STIP	Statewide Transportation Improvement Program
SWPPP	Stormwater Pollution Prevention Plans
TEU	Twenty-Foot-Equivalent Unit
TIFIA	Transportation Infrastructure Finance and Innovation Act
TIGER	Transportation Investment Generating Economic Recovery
TIP	Transportation Improvement Plan
U.S.C	U.S. Code
USDOT	U.S. Department of Transportation
VfM	Value for Money



# Introduction

The American Association of Port Authorities (AAPA) and the U.S. Department of Transportation (USDOT) through the Maritime Administration (MARAD) organized a team of port industry experts throughout the U.S. to develop this module of the Port Planning and Investment Toolkit (PP&IT or Toolkit). The module provides port owners with information and practices to assist when planning and evaluating projects that require financing and/or funding from public, private or combined sources. It also outlines the steps and processes used by planning professionals and financiers, which may be new to some port professional staff and commissioners.

## Purpose & Need

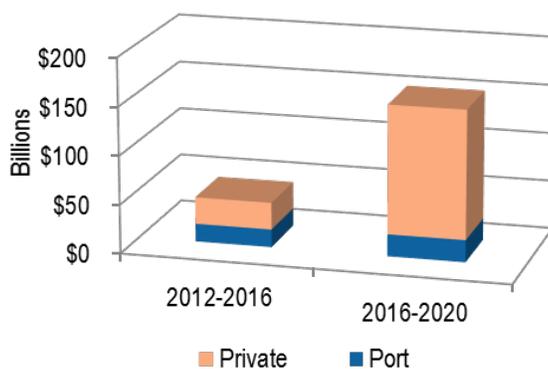
U.S. ports move billions of tons of goods today and need significantly more capacity to handle the peak cargo volumes projected in the future.

This requires costly investments in port infrastructure and equipment. Because these rapidly growing capital needs cannot be fully met from traditional revenue sources, port owners have sought innovative methods to finance infrastructure investment by engaging with a new, larger cast of public and private partners. These partners must have access to in-depth planning, environmental assessment, outreach, feasibility and financial analysis outcomes before determining whether to provide funds for a port project under consideration.

Port owners have emphasized the need for a resource to guide them as they prepare plans, evaluate the feasibility and estimate the financial performance of their projects to attract public and private investment. Such a resource would assist them in reaching their goal of obtaining funding and financing for the implementation of critical development, expansion, repair and upgrade projects.

This module of the Toolkit is intended to be useful for owners of ports of all sizes and within all markets by helping to outline the steps for successful project definition and implementation through articulating assumptions, clarifying ambiguities, quantifying details and identifying the important considerations to achieve project funding and/or financing. It also assists port professional staff with technical responsibilities to present their plans for a project and its associated benefits to executives and governing boards.

**Project Port & Private Capital Expenditures on Port Infrastructure**



*Results of AAPA's 2012-2016 & 2016-2020 Port Infrastructure Investment Survey*

## Context

This module has been created to guide the definition of any project for which a port owner is seeking financing and/or funding. The term *project financing* as used in this module refers to the means by which debt and/or *equity* is acquired to pay for a project or portion thereof, requiring the project's cash flow or *assets* for repayment. *Project funding*, in this module, refers to the means by which internal reserves, direct user charges/fees, or government investment are raised or obtained and used to pay for a *project* or portion thereof.

Because the range of potential users of this Toolkit module is diverse, the term *port owner* throughout this document encompasses *port authorities*, *terminal operators*, private companies, and *project sponsors* that own and/or operate a port. A *port* is considered to be a single- or multiple-facility entity that enables the transfer of cargo and/or passengers between logistically-linked *transport modes* (e.g., truck to barge to ocean-going vessel). A port may provide services at inland multimodal facilities as well as along navigable waterways.

Port developments may have multiple components that are linked together by a common objective; however, port owners seeking financing and/or funding should separate each independent component into individual projects to minimize the compounding of financial and permitting risks. Each project should have *independent utility*, i.e., it is functional without the development or improvement of other separate assets. While the project may include sub-projects related to the phasing of project construction, these phases of the project would typically not have independent utility.



A project with independent utility will have an independent development timeline such that its unique benefits, costs and impacts can be clearly ascertained. Although additional benefits or costs of a project may result in the future due to synergies with other planned improvements at a port, the project should stand on its own merits in the event that the other projects never come to fruition. The cumulative impacts of other projects that have occurred or may occur in a project area should still be considered, particularly for environmental review.

Accordingly, the use of the term *project* throughout the Toolkit modules comprise the acquisition, development, expansion or renovation of a single site, facility, infrastructure element, or operational resource to meet an identified or emergent need. For example, the project could be a new distribution center as an outcome of a planning effort or procurement of gantry cranes as a result of an abrupt increase in vessel sizes calling at the port. A project endorsed by a port owner should enable the movement of freight through a port's coastal and/or inland assets.



### Fulfilling Federal Environmental Requirements

If there is a possibility that the potential project will be subject to Federal *action*, due to partial or full federal funding, impacts on federal lands or waterways, or a need for federal permits, then compliance with federal environmental regulations will be necessary. Federal regulations with particular relevance to ports include the Clean Air Act (CAA), Clean Water Act (CWA) and the National Environmental Policy Act (NEPA). For more information, refer to the Environmental Protection Agency's "A Ports Primer for Communities - Office of Transportation and Air Quality". Environmental review requirements can be applicable to both comprehensive planning efforts and specific project planning efforts. For example, *NEPA* requires the identification and analysis of potential environmental effects of major proposed Federal actions and alternatives before those actions take place.

The principles or essential elements of NEPA decision making include:

- Assessment of environmental and socioeconomic impacts of a proposed action or project
- Analysis of a range of reasonable alternatives to the proposed project, based on the defined purpose and need for the project
- Interagency participation, coordination and consultation
- Public involvement including opportunities to participate and comment
- Consideration of appropriate impact reduction methods including avoidance, minimization and mitigation/compensation
- Documentation and disclosure

In advance of project-specific planning, port owners should determine what environmental studies or other information may be required, and what mitigation requirements are likely, in connection with federal environmental regulations. While the environmental review process can have implications for permitting and other Federal engagement, it is also an opportunity for a port owner to identify and communicate the ways in which a potential project will benefit the local and regional community. Project-level NEPA review and other environmental compliance requirements are discussed in more detail in Section 2.1.3.4 Environmental Impacts of this module.

### Outline

The project definition process and formulation of a project plan are simultaneous processes that consist of a series of stages to establish that a "potential project" is feasible and to advance it to a "financeable project". The Toolkit modules are structured to follow this natural progression of a project through the planning, feasibility and financing stages, as shown in Exhibit I-1.

Project definition takes place at the culmination of the "Identification" process whereby a port owner has already established the overall port vision and needs, quantified port gaps, and identified *potential projects* that fill those gaps.

During project **planning** efforts, details of a *potential project* are quantified and project alternatives are formed. While certain project alternatives will be briefly considered and eliminated, the *reasonable project alternatives* will address the project goals and objectives, while giving consideration to social, economic, environmental and other impacts. Port owners should engage with external stakeholders, such as port users, nearby communities and regulatory agencies, to determine possible impacts of the project alternatives.

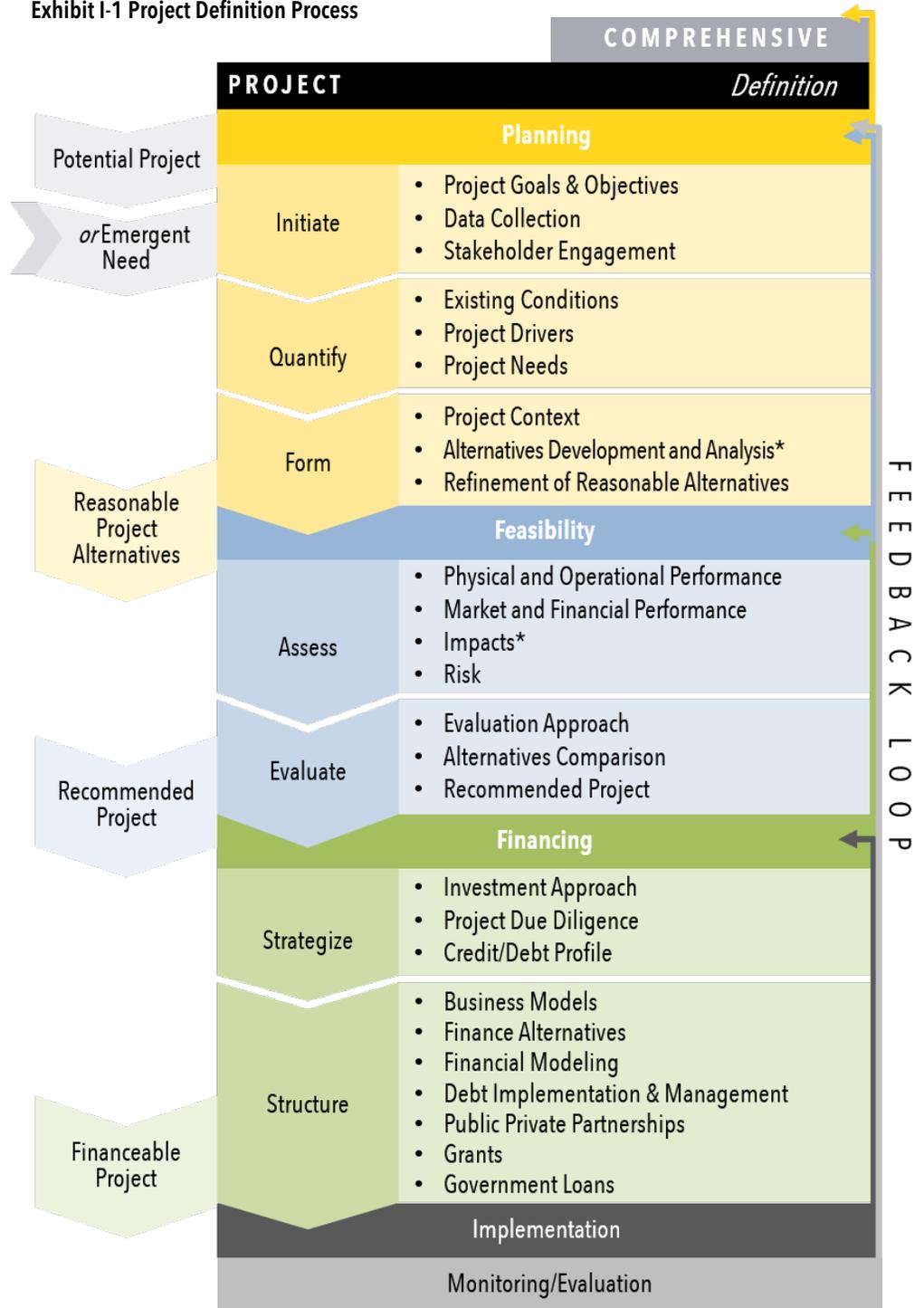
When conducting project **feasibility** activities, the reasonable project alternatives are subjected to systematic and comprehensive evaluation and the highest performing project alternative is selected and refined. From the resulting *recommended project*, project costs and a strategy for **financing** those costs can be identified. The *financeable project* can then be submitted for approval and financing to the appropriate entities. Once the necessary approvals and financing are in place, the *project plan* can be **implemented**. Plans are rarely implemented to perfection so regular **monitoring** and periodic **evaluation** should be carried out to identify shortcomings and to make enhancements.



Within and between each stage, project definition activities may loop back to previous efforts to continually improve the project planning, feasibility and financing strategy. The activities occurring at each task (i.e., initiate, assess, strategize, etc.) can also be iterative and overlapping and might require reconsideration of previous conclusions if conditions change. For example, during the evaluation of a project’s feasibility, the cost of one component of the project may not return a high enough benefit and the project alternatives may need to be revisited and amended. Likewise, during the analysis of financing and funding strategies, the sequencing and timing of improvements may prohibit the highest financial performance. At that point the project alternatives should be revised, the feasibility reevaluated and ultimately the financing strategy reexamined.

The PP&IT Project-Specific Modules (e.g., *Intelligent Transportation System (ITS) Projects*) follow the same project definition process, incorporating planning, feasibility and financing stages and the associated tasks of each stage. Depending on the activities involved for a Project-Specific Module, additional stages may also be incorporated into the overall process, such as a Deployment Stage to support initial implementation efforts.

**Exhibit I-1 Project Definition Process**



\* Consideration of NEPA compliance for projects requiring Federal Action is of particular importance during these efforts.



# Planning

Ports play an important role in supporting global and domestic trade, regional economic development and technological advancement, so the planning of a port project should involve more than an analysis of demand and capacity. It also should take into account market forces and institutional structures and integrate business and environmental strategies and stakeholder needs.

A “build it and they will come” strategy has little likelihood of success. The realization of any project hinges on having a well-defined plan that provides essential information for informed decision-making and successful financing. A *comprehensive plan* that communicates a port owner’s vision and business objectives may be prepared prior to creation of a project plan. This section focuses on guiding users through a common set of *project-specific* planning concepts

and methods in the development of a project plan to maintain a highest and best use strategy for port owners’ resources with regard to market, community, environment, land-use, economic and financial considerations.

The process shown in Exhibit 1-1 identifies the primary efforts involved in initiating and quantifying a potential port project and forming project alternatives. This general approach can be refined and customized to accommodate project specific requirements necessary to identify planning solutions that are practical and viable.

Few projects will require execution of all planning efforts so it is important to understand a project’s requirements before committing significant resources. When identifying the relevant project planning efforts and level of detail required for each, consider whether the project plan will need to:

**Exhibit 1-1 Project Definition: Planning Process**



\* Consideration of NEPA compliance for projects requiring Federal Action is of particular importance during these efforts.

- Provide strategic clarity to increase industry and/or investor confidence
- Engage specific stakeholders including regulatory governance, neighbors, tenants, industry, communities
- Determine institutional, social, environmental, and/or economic impacts and mitigation approaches
- Integrate with local/ regional/ national regulations and transportation plans and policies
- Identify issues outside of the port’s purview, such as a road and rail traffic /access to the port
- Provide quantities and schedules of implementing project attributes including permitting, design, construction, or acquisition

The planning tasks and activities described in the following section, once adapted to a potential project, can be used to develop a project plan that has a logical, consistent and organized format and which decision makers and investors can quickly comprehend and evaluate.

## 1.1 Initiate

The Initiate Task involves developing a thorough understanding of the objectives guiding the effort, as well as stakeholder perspectives that may affect the specifics of a potential project's direction. If there is a significant time lag between major project planning, feasibility and financing efforts, the elements of initiation should be considered or undertaken at the outset of each effort. Similarly, certain efforts in the Initiate Task may need to be repeated if the project goals, scope, schedule, budget, stakeholders or other conditions change during the project definition process.

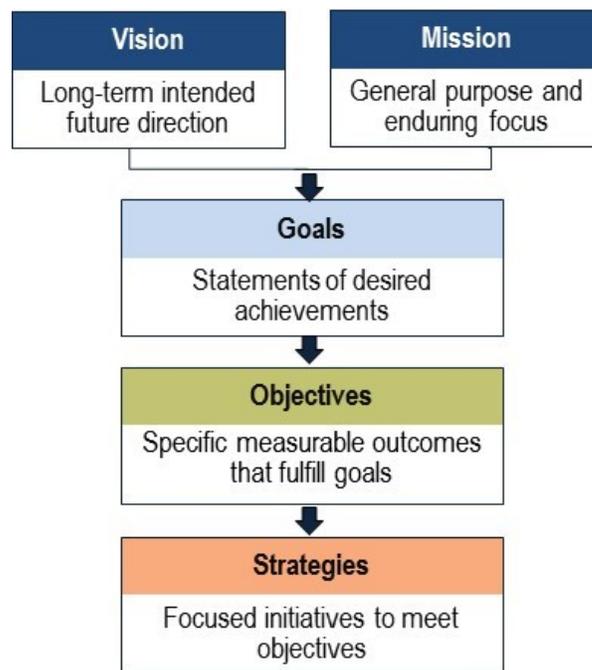
During project initiation, a series of kickoff meetings with key project members and stakeholders addresses the following items, at a minimum:

- Roles and responsibilities
- Project team and stakeholder points of contact
- Project quality control and communication protocols
- Sources of information
- Project goals and objectives
- Work program, milestones and schedule
- Key project issues and sensitivities, including outreach and other permitting and environmental requirements (if applicable)

### 1.1.1 Project Goals & Objectives

An initial draft of the project goals and objectives should be generated during the kickoff meetings and be presented during stakeholder engagement to incorporate constituent interests and needs. The project goals and objectives should be aligned with the port's vision and mission, and informed by stakeholders' values in pursuit of consensus. Strategic initiatives designed to attain the objectives may also be part of the project. Exhibit 1-2 illustrates the relationship between vision, mission, goals, objectives and strategies.

**Exhibit 1-2 Guiding Elements of a Port and a Project**



Project goals and objectives should be distilled through a comprehensive engagement and refinement sequence until they are concise and clearly articulated. Every project member should have a clear understanding of what the port owner hopes to achieve throughout the project definition process.



Keep the goals and objectives of the project at the forefront, acting as the continuing basis for developing new project elements, for prioritizing competing elements, and for comparing and contrasting alternatives as the project proceeds.

The project goals and objectives become the basis of the evaluation criteria in the Feasibility Stage. Revisit project goals and objectives periodically to ensure the intent of the recommended project plan and strategies correspond with the port’s vision and mission in view of evolving priorities.

**1.1.2 Data Collection**

Many port owners conduct ongoing data collection efforts to ensure that decision makers have sufficient information about port investments, performance, operations, and community priorities. For specific projects, data collection begins during the kickoff meetings and continues through the duration of the project definition process. The project team should develop an understanding of what information is available, the applicability of available data related to the project, and expected uses of the collected data.

Exhibit 1-3 provides a categorized list of data that could be needed for port projects. This data may be readily available from the port staff, project stakeholders, or from secondary sources such as web-based studies, reports and databases or from other public and private agencies. Some data may be obtainable only through interviews or operational observations, which should be handled with respect for confidentiality of sources.

**1.1.3 Stakeholder Engagement**

Port owners must constantly adjust and rebalance their actions to serve the varying needs of their community and customers. Stakeholder outreach is not only imperative in developing a port’s overall vision; it supports the creation of project plans that can best serve a broad diversity of developmental requirements. Thus, identifying the project stakeholders and understanding their concerns is a critical element that must feed into any project definition process.

Stakeholders such as those listed in Exhibit 1-4 should be engaged early and often to avoid unexpected discoveries late in the process that could potentially derail a project. Stakeholder

**Exhibit 1-3 Sample Types of Project Data**

Strategic	Infrastructure	Operational	Market	Financial
Port Planning Documents	Site Boundaries and Adjacencies	Vessel Statistics	Historical Port Volumes	Life Cycle Costs
Land Use Studies	Facility Configuration Plans	Berth Operating Statistics	Market Forecasts	Revenue
Waterfront and Near - Waterfront Land Ownership Documents	Maps and Aerials of Existing Sites, Facilities and Infrastructure	Yard Operating Statistics	Freight Origins-Destinations Surveys and Statistics	Cost of Capital/ Evaluation Discount Rate
Port Business and Management Documents	Truck and Rail Access, Inland Rail and Highway Networks	Equipment Inventory	Customer Leases/Contracts	Asset Depreciation
Regional Economic and Business Data	Inspection/ Condition Assessment Surveys and Reports	Equipment Deployment Patterns and Productivities	Competitor Port Documents	Tariffs
Transportation Plans and Improvement Program Documents	Waterside Access	Labor Deployment Patterns	Carrier Schedules, Capacity and Fleet Sizes	Macroeconomic Forecasts (Consumer Price Index & Interest Rates)
State/Local Freight Plans	Environmental Site Assessment Reports	Labor agreements		Contracting Requirements

engagement may be performed in various forms as those shown in Exhibit 1-5. The timing and extent of the outreach effort and the forums used to communicate should be tailored to the specific needs of the port, project and stakeholders. The effort should focus on engaging relevant stakeholders with the appropriate level of knowledge, while balancing the need to keep stakeholders informed about the project.

Outreach should include engaging regulators and environmental agencies early in the project definition process to review the type of environmental assessment that may be necessary for a potential project. Environmental review can take a long time and resolving environmental issues is frequently the bottleneck in developing and completing a project. Even in cases where there is no negative environmental impact, it is very useful to identify and communicate the ways in which a future project will benefit stakeholders, specifically the community. Refer to Section 2.1.3.4 Environmental Impacts of this module for additional information on the environmental review process.

**Exhibit 1-4 Project Stakeholder Types**

Terminal operators and tenants
Ocean carriers
Cargo owners
Stevedore/terminal labor
Community and neighbors
Inland transportation providers - truckers and rail lines
Logistics providers - warehousing suppliers, shippers
Financial/infrastructure investors
Local/tribal governments
Environmental agencies
Regulators
Metropolitan planning organizations (MPO)
Regional planning boards
State transportation authorities/departments
Non-governmental organizations

**Exhibit 1-5 Forms of Stakeholder Engagement**

Committee, Council, Working Group Meetings	Media Outreach	Internet Communications (Websites, Social Media)
Informal Private One-on-One Meetings	Stakeholder Interviews	Publications and newsletters
Public Meetings, Forums, Workshops, Seminars	Advisory Panel	Open or Invitation Only Focus Groups

The port owner should host public/community meetings and/or conduct workshops and small scale seminars to discuss the potential project direction and solicit feedback. Presenting draft versions of project documents, along with providing a well-defined comment period to gain further feedback, is essential to gaining support early in the process.

The creation of a project Advisory Panel is recommended to involve key stakeholders in the project definition process. Members of an Advisory Panel should include individuals who can enhance the project plan through their expertise and knowledge, such as facility owners and operators, community leaders and/or freight industry representatives. An Advisory Panel may have different roles depending on the project, which may include, but not be limited to:

- Helping to form project goals and objectives
- Identifying stakeholders
- Contributing insight on the regional landscape of port activity and freight movement with regard to the potential project
- Facilitating stakeholder connections and communication
- Securing community input and buy-in for the project
- Reviewing and evaluating the findings from interviews and analyses
- Providing validation and quality assurance on the draft and final documents and initiatives



The Advisory Panel should include a chair and vice chair to provide oversight and direction, as well as port staff to provide guidance. Plan on scheduled meetings with the Panel and the project team, and provide a summary of the meeting minutes to members of the Panel, who then can distribute to their constituents. Project staff should also perform site visits with members of the Panel for a better understanding of the potential project. Advisory panelists often have a responsibility to report out to their communities and then provide that community feedback to the project.

Throughout the project definition process, maintain regular communications with all parties. Appropriate project information and materials should be made available through the port's website, partner agency websites, regular publications and/or social media so that members of the public who are interested can review them. In addition, always have a means to provide input via diverse and accessible communications channels. A project website is useful for team members and stakeholders to check on the progress of the project and provide input, and to provide background materials available for reference.

If a stakeholder has a vested interest that may not align with the port's goals, identify conflict resolution strategies that will help establish common ground and maintain the port's positive relationship with its stakeholders.

### Working with your MPO

Metropolitan Planning Organizations (MPO) are regional transportation planning bodies, made up of representatives from local governments and transportation authorities. Under federal law, any urbanized area with a population of at least 50,000 must have an MPO.

MPOs follow a continuing, cooperative, and comprehensive planning process (known as "3C principles") to produce their region's [Long Range Transportation Plan](#) (LRTP) and Metropolitan [Transportation Improvement Program](#) (TIP). These plans involve the planning and programming of transportation facilities, including ports, intermodal facilities, airports, and intercity and high-speed rail lines. MPOs are also responsible for distributing federal transportation funds to their region.

Port owners should partner with their MPOs to ensure that each agency's plans are complementary, and ports should involve their MPOs when planning projects that will impact the local transportation network. Certain port projects should also be incorporated into local, regional and state planning documents such as a city's capital improvement program, a TIP, a [Statewide Transportation Improvement Program](#) (STIP), and/or a LRTP.

Incorporation of projects into these plans can be a first step in securing funding through the Federal-aid formula programs such as the National Highway Freight Program. You can find your MPO using USDOT's [MPO database](#). The following resources provide more information on the local, regional and state transportation planning process:

- [Metropolitan Planning Focus Page](#) - Provides resources about the metropolitan transportation planning process on the Transportation Planning Capacity Building Program website
- [The Transportation Planning Process Briefing Book](#) - Provides details on Federal transportation planning regulations and requirements at the statewide and metropolitan planning levels.

## 1.2 Quantify

Quantify the port’s capabilities, demands, and needs that led to the identification of the potential project. Capabilities are derived from close examination of the physical and operational aspects of each element in the port’s existing conditions, including navigation works, goods movement terminals, and external rail and road links. Port demands are derived from market, commercial, logistics and regulatory drivers. Project needs are derived by quantifying the gap between capabilities and drivers.

### 1.2.1 Existing Conditions

All project plans should include a foundational assessment of the port’s current capabilities and condition of port infrastructure with respect to the proposed potential project. An inventory of assets and a record of the port’s operations may be required depending on the project.

The effort may also involve investigating the port’s historical performance, and researching the land use, regulatory, labor, environmental, and cultural setting at the port. Port flood hazard areas should be given consideration to ensure the project plans take into account resilience to extreme weather and sea level rise. The assessment should also determine how nearby road and rail infrastructure may impact the potential project.

The assessment can be conducted via web research, site visits, and interviews with tenants and port staff as appropriate. When completed, the assessment should form the foundation of the subsequent planning steps for the proposed potential project.

The effort may happen concurrently with the Initiate Task to save time and money. The assessment will serve as the basis for the development of an [\*Opportunities and Constraints Document\*](#) (O&CD) during the Form Task.

#### 1.2.1.1 Assets

Document and visually-observe the condition of the relevant site(s), facilities, equipment and landside and waterside access by conducting site visits to each of the port locations related to the potential project. In certain circumstances, project stakeholders may be invited to participate so that discussions of specific issues and considerations can be conducted while on-site.

These site visits and data previously collected as part of the Initiate Task are used to inventory the assets and characteristics of each port resource related to the potential project. Exhibit 1-6 lists example inventory items.

**Exhibit 1-6 Example Asset Inventory Items**

Category	Asset Inventory Items
Site Characteristics	Boundaries, topography, bathymetry, geometry, flood hazard areas
Utility infrastructure	Installations, routes, access, and capacities for water, power, sewer, data, drainage
Waterside access	Berth characteristics, channel depth and geometry, turning basins, anchorages, distance to channel, air draft
Landside connectivity	Truck and rail access areas, connecting highway and roadways, height/width restrictions, estimated capacity and service level of each rail and roadway segment, road weight limitations, safe operating speeds, identifiable bottlenecks, nearby intermodal yards, airport locations, pipelines, etc.
Facility configurations and conditions	Gates, buildings, operating areas, parking areas, storage units, goods handling facilities, support facilities
Equipment types and characteristics	Operating equipment, cargo and/or passenger handling equipment
Environmental setting	Air quality, noise, light pollution, water quality, wetlands, pre-existing pollutants, cultural resources



### 1.2.1.2 Operations

Develop a profile of the operations at current facilities and potential project locations based on the site visits, interviews with operators and data collected on operating patterns. Process maps or system diagrams can be utilized to document the flow of current and expected operations, to assist in characterizing how a potential project may need to adapt to shifting operating patterns and evolving technologies. Exhibit 1-7 lists example operational profile components that should be considered for potential projects that involve cargo operations at a port.

**Exhibit 1-7 Operational Profile Elements**

Operating hours, shifts, start times, labor contractual elements
Port/facility logistics and circulation
Gate transactional and security patterns
Equipment deployment, productivity and years of service
Vessel patterns - schedule reliability, vessel sizes, discharge and load quantities
Cargo arrival and departure data
Cargo types and sizes, storage patterns and densities, and velocities
Stevedoring arrangements, gang size
Truck arrival and departure patterns and truck staging/parking
Intermodal rail patterns
Major water, rail, and road carriers, and their alliances and relationships
Dominant or prominent beneficial cargo owners
Traffic patterns - timing of traffic congestion and surges on near-port roadways
Distribution centers served by the port, proximity and operating hours

### 1.2.1.3 External Influences

A high-level review of land use, zoning, political, environmental and regulatory programs, policies and developments that may impact the potential project area is recommended for the planning effort. For example, it may be useful to review state and/or local government transportation plans or their current and proposed public policies. Is there a plan to lower the city's carbon footprint, which could restrict certain port initiatives? Is there a plan to increase coastal access, deepen the channel, add a foreign trade zone or build a grade separation at a nearby rail crossing? Is there an initiative to expand passenger service on mainlines shared with

freight trains or to attract big box retailers? Do any facilities play important roles in defense or security? The answer to these questions could affect the potential project and may dictate the course of the planning efforts.

In dealing with external influences, port owners should work with their local governing bodies and other stakeholders to communicate how the project goals can assist in achieving wider regional goals, such as attracting new businesses, increasing middle-class jobs and promoting economic development.

### 1.2.1.4 Volumes and Trade Flows

The project plan should reflect a thorough understanding of the port's role in its wider marketplace. The research and analysis should combine statistically valid and verified data collected during the Data Collection step to fully inform the planning process on port volumes, origins and destinations, commodity types and transportation modes.

A targeted survey of relevant shippers, carriers, logistics providers, and terminal operators can improve understanding of the port's current market within the port region, as well as any priorities, requirements and concerns.

This information will serve as a baseline from which market-driven forecast scenarios can be developed. Further details on the assessment of *market dynamics* and preparation of *market forecasts* are provided in Section 1.2.2 Project Drivers of this module.

### 1.2.1.5 Capacity

It is essential to understand the capacities and capabilities of existing port and near-port transportation systems, and to establish a common basis for judging the impact of the potential project on all components of a port's infrastructure and operational capabilities. For example, a potential project to develop a breakbulk facility adjacent to an existing

container terminal could impact the port’s channel traffic, berth occupancy, equipment allocation, intermodal and gate operations, as well as nearby roadways.

Capacity is often defined as the maximum throughput that can be handled by a port or facility in a specific time period. Capacity reflects a complex interaction of physical, operational and commercial drivers. As such, facilities with similar physical systems may have very different capacities, and a facility with a fixed physical system can experience changes in capacity over time. For example, differences or changes in storage dwell time have a profound influence on capacity, but dwell time is independent of any physical system, and is strongly influenced by tariffs and logistics practices. Because capacity can change over time, port owners should monitor and update those key performance drivers that most influence capacity.

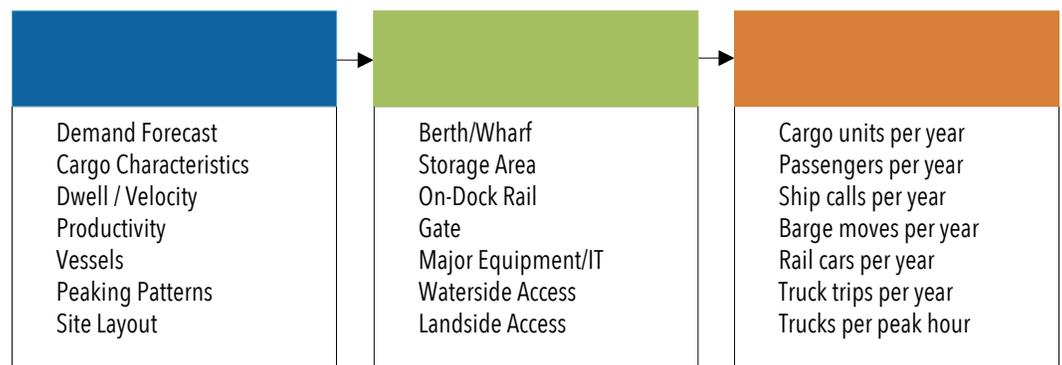
Ports may exceed estimated capacity during brief peak periods. However, operational costs may rise and service may degrade as they do so. Additionally, port facilities at capacity lose flexibility to respond to conditions that are outside the optimum condition, such as equipment breakdowns, vessel delays, or weather-driven interruptions. Finally, port facilities that must share assets – especially berths and cranes – may not always have access to the assets they need. In practical terms, it is usually difficult to operate at maximum capacity for extended periods. For this reason, planners often design facilities to a “sustainable capacity” or “practical capacity”.

This module refers to *capacity* as maximum practical capacity, which is defined as that throughput which, if exceeded, would cause a disproportionate increase in unit operating cost or business delay, within the context of a facility’s land use, layout, and uncontrollable commercial drivers.

Because throughput capacity is a primary variable used to justify project needs and to ultimately quantify project improvements/costs, a sound and defensible approach to estimate capacity is required. While there are numerous methods to estimate port capacity, the complex flow of cargo and/or passengers through a port will certainly require computerized analysis in the form of capacity models. Further details on models, tools and an example approach to estimate throughput capacity is provided in *Appendix C. Exhibit 1-8* illustrates a sample framework to perform static capacity analysis of port facilities.

Work collaboratively with terminal operators to develop realistic and measurable input data for a capacity model. Historical operating statistics from the data collection effort should underpin inputs into the model. Inputs include, but are not limited to, projected demand, throughput mixes, modal profiles, storage dwell times, arrival patterns, equipment productivity, and peaking factors.

**Exhibit 1-8 Throughput Capacity Analysis Framework**





### 1.2.2 Project Drivers

Project drivers are forces external to a port that impact a potential project and that may be the impetus behind a project. Identification of the project drivers allows the port owner to generate practical, effective project alternatives and strategies that will fulfill the project objectives. When considering all the reasons a port undertakes a project plan, consider that projects may have drivers in the following four categories:

- Regulatory Environment
- Market Dynamics
- Competitive Position
- Market Forecast

#### 1.2.2.1 Regulatory Environment

Government agencies have the authority to promulgate regulations and requirements that affect port operations and port development, predominately in the following areas:

- Land use
- Environmental
- Transportation
- Labor
- Community
- Security
- Health and Safety
- Funding

For instance, a port owner may endorse a project to meet a state or local mandate; to achieve consistency with state, regional, or local government master and/or transportation plans;

to connect stated public policy goals with port objectives, such as increasing employment in the community; or to qualify for state or federal grant matching funds.

One example of an environmental regulation that became a significant driver for port projects was the 2007 at-berth regulation set forth by the California Air Resources Board. This regulation mandates that cruise ships and container ships use shore power instead of running their auxiliary engines when calling at ports in California. The first compliance milestone was 50 percent of calls using shore power by January 1, 2014. The compliance rule gets progressively stricter over time, rising to 80 percent by 2020.

The shore power rule, or “cold ironing,” led to port development projects at six different ports in California. Another example of regulations leading to port projects is the National (or state) Pollutant Discharge Elimination System, which requires stormwater pollution prevention plans (SWPPP) at ports. Each port needs a permit to discharge stormwater run-off into nearby waters. The SWPPP must be approved by the governing water board, and may include items such as drainage plans, bio-swales, slot drains, storm drain lines, stormceptor units, oil/water separator units, and sediment separator units.

Port owners should maintain good relationships with the agencies that have authority over different aspects of their operation. For example, air boards or air management districts can regulate fuel use and emission controls for vessels, tugs, locomotives, cargo handling equipment, and drayage trucks. Water boards monitor storm water run-off and water quality. Fish and wildlife agencies oversee water quality and habitat conditions for fish, marine mammals, and benthic plants and creatures. Nearby airports can restrict the placement of tall cranes or otherwise inhibit operations. Local government and development agencies may have land-use regulations protecting the shore line or expanding public access to the water. Local ordinances may also dictate noise and light conditions at a facility, or may protect view corridors.



### 1.2.2.2 Market Dynamics

An assessment of ongoing regional and global trends and the nature of their impact on the port will help quantify future demand and define other marketplace drivers that may influence a project plan. Market factors include those shown in Exhibit 1-9.

It is important to consider major market groups by origin/destination, and identify likely drivers and competitive factors relative to the potential project. A market analysis comprises the following tasks, as applicable:

- Develop traffic flows that originate, terminate, pass through, or are in proximity to the market regions of the port.
- Determine potential changes in regional traffic flows due to changes in international and domestic trade and logistics patterns.
- Identify possible geographic markets and commodities that would obtain value from the realization of the potential project.

To identify the major freight flows relevant to the port, several sources of trade and transportation data are publicly available. The Federal Highway Administration’s (FHWA) *Freight Analysis Framework (FAF) database* provides historic and forecast detail on freight trade flows between foreign trade regions, port regions and inland origins/destinations. Exhibit 1-10 shows a sample analysis of FAF data identifying freight flows originating in California and destined for states along the East Coast. *U.S. Census Bureau international trade data* provides more detailed commodity and port level information on imports and exports by foreign country.

### Exhibit 1-9 Sample Market Factors

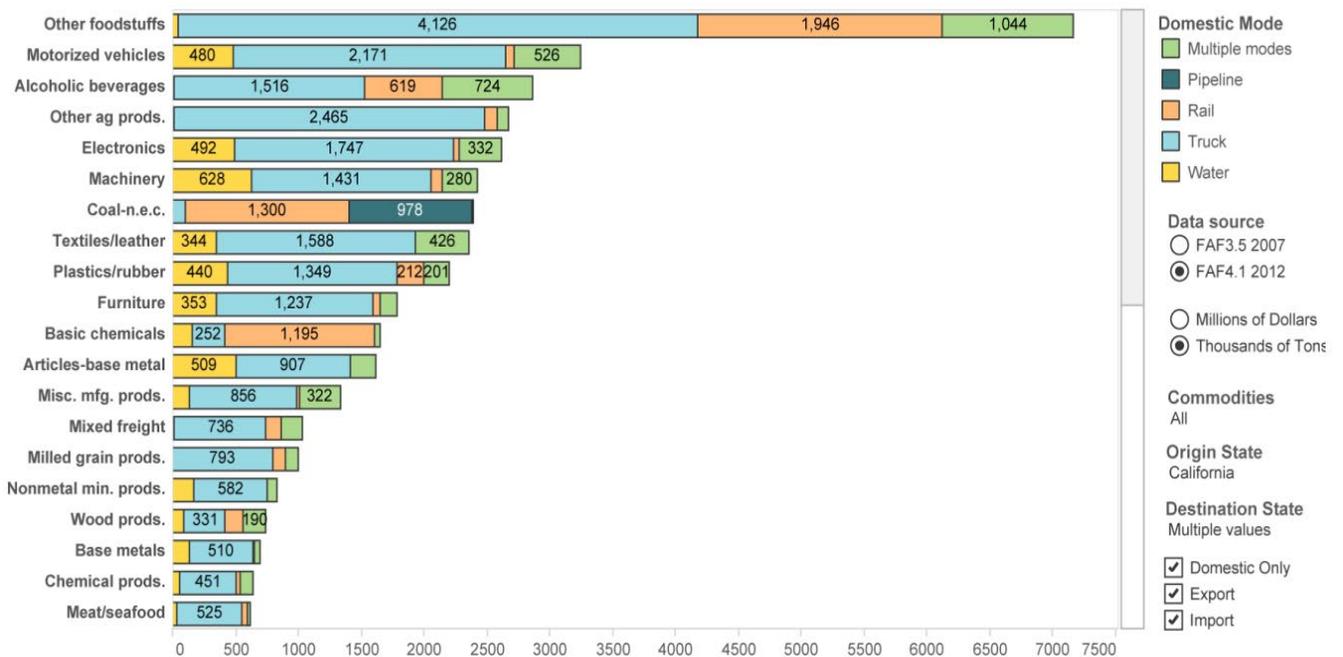
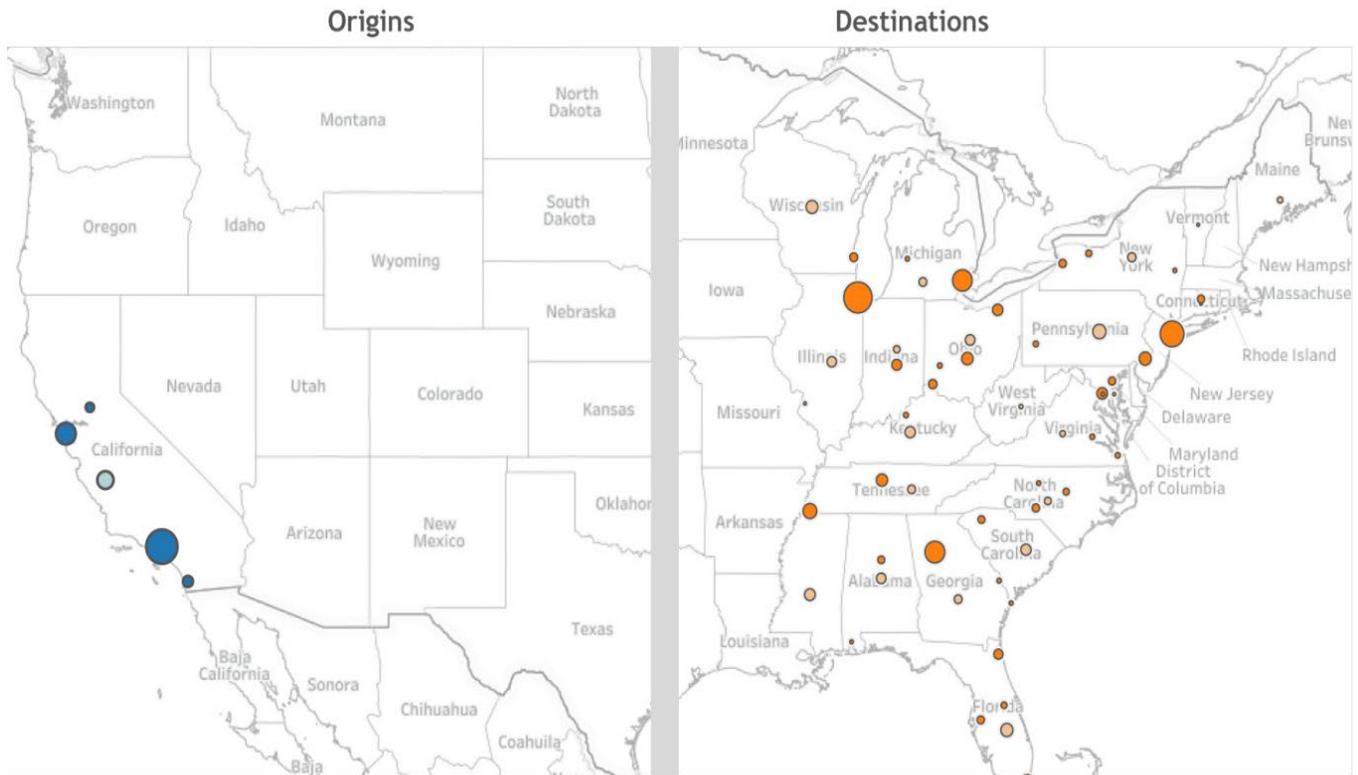
Carrier alliances and consolidation
Liner / Alliance / Terminal operator relationships
Seasonal and yearly fluctuations in cargo/passenger composition
Deployment of larger ships
Global shifts in manufacturing and sourcing of goods
Major changes in transportation infrastructure-Canal expansions, port dredging, inland waterway development
Shifts in domestic production for exports
Altering distribution and shipping patterns
Advances in technology and automation
Trucking industry changes
Evolving rail infrastructure and train deployments
Variations in inland logistics and markets (discretionary cargo)
Labor developments-workforce availability
Progress in water quality standards
Increasing embedment in the community
Modifications in environmental protection
Shifting financial universe-business cycle/recession, cost of finance, investor interest

Other sources of data include statistics from the *Bureau of Transportation Statistics*, including *cross border freight data*; *American Association of Port Authorities*, the *Army Corps of Engineers*, the *Surface Transportation Board*, and port and state transportation websites. This data can provide a useful view of aggregate and detailed historic commodity flows as well as long term forecasts from FAF. In addition to publicly available data, commercial data are available for international shipments and global forecasts of trade.

Customers’ contracts and leases can also be reviewed to assess the potential for possible shifts in customer demands and volumes.



Exhibit 1-10 Sample Analysis of FAF Freight Flows



### 1.2.2.3 Competitive Position

Port owners often advance projects to improve the port’s competitive position. Most port owners are expected to aggressively seek out opportunities to invest and improve its freight and passenger facilities (“driving economic vitality”) and customer service capabilities (“providing unparalleled levels of service”), while being mindful and considerate of environmental concerns and community input. In addition, ports operate under conditions of constant change with respect to: market opportunities; customer requirements; transportation, operational, management, and environmental technologies and practices. Port owners often need to act quickly, or at least preposition themselves to act quickly, or risk losing a major business opportunity.

A competitive analysis may be performed to identify the relative position and market share of the port compared to other ports serving its existing and potential markets. The analysis should determine markets for which the port has realistic and sustainable competitive advantages that would support the development of the potential project.

The relevant comparative factors to utilize in such analyses will vary depending on the type of potential project, but in general should include those listed in Exhibit 1-11. The major drivers of a port’s competitive positioning (i.e., features, services, costs, and financial strength) are considered across the major operations involving ports (i.e., shipping, terminals, and inland logistics).

**Exhibit 1-11 Potential Competitive Assessment Factors**

Port	Features	Services	Costs	Financial Strength
Shipping	<ul style="list-style-type: none"> <li>• Channel depth and access</li> <li>• Turning basins</li> <li>• Transit distance</li> <li>• Tides</li> <li>• Congestion and delays</li> <li>• Air draft (bridges)</li> </ul>	<ul style="list-style-type: none"> <li>• No. of services by trade lane</li> <li>• Frequency and transit times</li> <li>• Geographic coverage</li> <li>• Port rotations</li> <li>• Feeder services</li> </ul>	<ul style="list-style-type: none"> <li>• Pilotage</li> <li>• Towing</li> <li>• User fees</li> </ul>	<ul style="list-style-type: none"> <li>• Business relationships</li> <li>• Operating agreement</li> <li>• Bargaining power</li> </ul>
Terminals	<ul style="list-style-type: none"> <li>• Quantity and size</li> <li>• Capacities and capabilities</li> <li>• Total and contiguous berth length</li> <li>• On/off-dock intermodal capability and access</li> <li>• On-site support facilities/ warehouses</li> <li>• Geographic proximity</li> </ul>	<ul style="list-style-type: none"> <li>• Cargo                             <ul style="list-style-type: none"> <li>– Container</li> <li>– Bulk</li> <li>– Breakbulk</li> </ul> </li> <li>• Cruise</li> <li>• Operations                             <ul style="list-style-type: none"> <li>– Productivity</li> <li>– Technology</li> <li>– Turnaround</li> </ul> </li> <li>• Labor relations</li> </ul>	<ul style="list-style-type: none"> <li>• Lease</li> <li>• Stevedoring</li> <li>• Wharfage</li> <li>• Dockage</li> <li>• Handling</li> <li>• Storage</li> </ul>	<ul style="list-style-type: none"> <li>• Governance structure</li> <li>• Operating arrangement</li> <li>• Profitability</li> <li>• Rating/debt position</li> <li>• Committed capital improvements</li> <li>• Fixed operating costs</li> <li>• Cost efficiency</li> <li>• Reserves</li> </ul>
Inland	<ul style="list-style-type: none"> <li>• Highway                             <ul style="list-style-type: none"> <li>– Proximity</li> <li>– Travel distance/ time to market</li> </ul> </li> <li>• Rail                             <ul style="list-style-type: none"> <li>– Proximity</li> <li>– No. of railroads</li> <li>– Facilities/Yards</li> <li>– Travel distance/ time to market</li> <li>– Routes</li> </ul> </li> <li>• Distribution centers</li> </ul>	<ul style="list-style-type: none"> <li>• Trucking                             <ul style="list-style-type: none"> <li>– Truck/driver availability</li> <li>– Frequency</li> <li>– Geographic coverage</li> </ul> </li> <li>• Rail                             <ul style="list-style-type: none"> <li>– No. of Trains</li> <li>– Frequency</li> <li>– Geographic Coverage</li> </ul> </li> <li>• Logistics</li> </ul>	<ul style="list-style-type: none"> <li>• Truck</li> <li>• Tolls</li> <li>• Rail</li> <li>• Drayage</li> </ul>	<ul style="list-style-type: none"> <li>• Business relationships</li> <li>• Operating agreement</li> <li>• Bargaining power</li> </ul>



The cargo/customer base of competitive ports may also be examined to the extent possible, including interviewing industry representatives to determine if there are developments within the port hinterland that may influence the direction of the potential project. The market factors and a port's competitive analysis becomes the foundation upon which future demand forecasts are developed and project alternatives are prepared and evaluated.

#### 1.2.2.4 Demand Forecast

A demand analysis serves to establish expected levels of throughput for the project and allows for the estimation of anticipated revenues over the project's life. Forecasting is, of course, an inexact art, and forecasts are subject to greater uncertainty over longer forecasting horizons. The use of scenarios, based on alternative economic outlooks and alternative assumptions about fundamental driving factors, can provide a sense of how much and why actuals may vary from forecasts.

Forecasting volumes can involve methodologies ranging from simple time trend extrapolation to detailed modeling and forecasting of specific product groups. In general, forecasts should take into account:

- Regional and national economic growth
- Historical trends in cargo/passenger growth
- Events identified during research and interview program as likely to influence future volumes
- Possible changes in the relative competitive position of the port and its facilities



Forecasting of imports may be best done by relating volumes to a range of projected levels of underlying domestic demand such as consumer spending, investment in buildings, and changes in inventories, best practice being to test sensitivities on each of these inputs to develop a risk adjusted forecast. A more detailed discussion of forecasting U.S. container imports is provided in *Appendix D*.

For exports, more specific drivers of product volumes may be identified such as expected production of agricultural, energy, or other bulk exports, the expected position of such exports in world markets, and exchange rates and economic growth of importing countries.

Market projections should be prepared in a spreadsheet with notes that clearly indicate both the forecasting methodology and underlying assumptions for the forecasts. The market projections may be divided into the following categories, as applicable:

- Domestic Container/Trailer
- International Container
- Dry and Liquid Bulk
- Breakbulk
- Neo Bulk
- Project & Specialized Cargoes
- Daily Passengers
- Multi-day Passengers

Drawing on the information gathered during the interview process and examination of current modal usage patterns, baseline projections of rail and truck movements may also be established for the applicable origin / destination pairs within the port's market region.

To allow for testing of sensitivities, which will be required by financial investors and rating agencies in later stages of the project definition process during finance efforts, the demand analysis should include not only a baseline forecast, but also high volume and low volume scenarios. The baseline forecast is typically used for the analysis and planning. The upside forecasts are used to identify the worst case environmental impact, while the downside is used for [credit rating](#) and financing purposes. Underlying factors affecting this range may include competition across terminals, within a port, or among ports. Associated with these local factors is the uncertainty around macroeconomic factors affecting international trade.

The low, high and medium projections for each cargo or passenger type should include explicit quantitative forecasts for the planning horizon in five-year increments at a minimum. Identify the underlying fundamental drivers of demand so that the forecasts can be most effectively communicated with, and understood by, the many external audiences that will be reviewing the potential project during the initial planning efforts, as well as later review activities (such as project credit rating or environmental reviews).

A market forecast supporting a proposed potential project should answer the questions posed in Exhibit 1-12, but should also include three other aspects of demand:

- First, what are reasonable assumptions and ranges for projecting port demand? For economic drivers what are high and low scenarios for the major sectors?
- Second, what other downside risks or opportunities may affect the projections?
- Finally, how do demand projections relate to port capacity and how does this affect the timing of possible project development?

### Exhibit 1-12 Basic Questions for Assessing Port Demand

- What markets/products could reasonably be attracted to the port?
- What are the projections for the fundamental drivers of these product volumes?
- What are the origins and destinations of the products?
- What advantages does the port have in serving these markets?
- Where does the port stand in relation to carriers' service rotations and how might this change in the future (e.g., as a result of evolving alliances or modifications in ship size)?
- What are "upstream" and "downstream" ports focused on?
- What are the port's advantages in terms of inland transportation for products, foreign origins or destinations?
- What share does the port have of volumes for those markets (products, foreign regions, inland regions) that it could realistically serve?
- What are competitive ports' shares of these markets?
- What advantages does the port have, or could potentially have, versus competitive ports in these markets (e.g. inland transportation time or cost)?



### 1.2.3 Project Needs

Before project alternatives can be created, define the project needs in terms of potential project elements such as infrastructure, equipment and/or operations. Gap analyses are used to identify the magnitude of project drivers that exceed the current conditions. Once the magnitude of the needs are quantified and defined, approaches to addressing those needs should be considered.

#### 1.2.3.1 Gap Analysis

Determine project needs by performing a gap analysis that assesses the differences between a port’s capabilities and performance and its opportunities and objectives relative to the potential project.

Quantify capacity gaps by comparing current capacity against the forecasted demand ranges for each cargo type and facility as needed. Project impact gaps should also be considered. There may, for example, be perceived or documented gaps

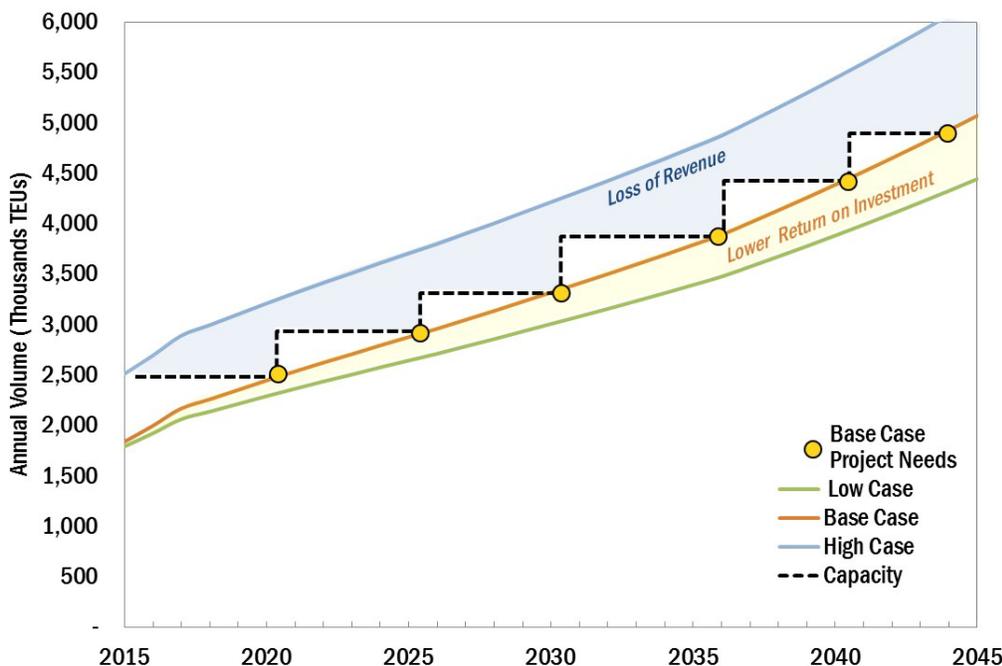
between existing and desired road congestion conditions, or air emissions, or worker safety, which need to be addressed to bring the project objectives in line with the port’s mission, vision and goals.

The quantified gaps are translated into project needs, which may include changes to infrastructure, equipment and/or operations required to address the project drivers. When determining project needs, take into account the variability of the gaps between project drivers and existing capabilities along with the potential risk factors, which can impact the timing of development and the project’s return on investment.

For example, the purchase of additional cranes to handle the larger vessels projected to call at a port in the future may result in a lower return on investment if the carrier alters its service route and eliminates the port call. Similarly, a port may lose revenue awaiting the completion of a terminal

expansion if market demand outpaces the port’s projections and the additional cargo is shifted to another regional port. Exhibit 1-13 shows the potential impacts of the variability of forecasted demand volumes and capacity when determining project needs.

**Exhibit 1-13 Project Needs – Demand and Phase Capacities**



### 1.3 Form

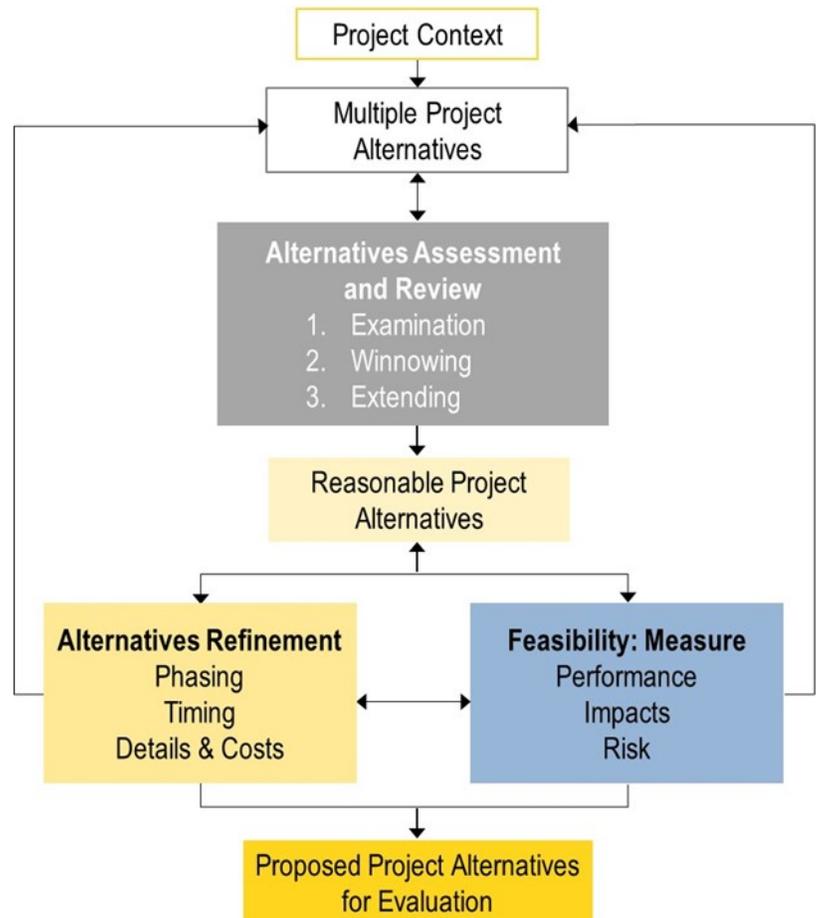
Once the existing conditions, projected demands, and gaps have been identified, prepare a range of project alternatives that can be undertaken to meet the project needs while minimizing project impacts. In forming project alternatives, provide sufficient detail to facilitate the measurement of impacts and performance of each alternative later in the project definition process. In many cases, the outcome of the analysis described in the Feasibility Section will feed back into this Form Task, leading to iterative adjustments and refinements to the alternatives. The ultimate goal of the Form Task is to identify a small number of highly-refined and reasonable plan alternatives for further analysis and assessment of feasibility.

#### 1.3.1 Project Context

An early step in the Form Task is to understand the context in which project alternatives need to be formulated. At any given time, a port owner will perceive a range of opportunities and constraints for project formation and execution. Characterize these at the outset, and track new opportunities and constraints throughout the project alternative development process.

The project context generally takes the form of an O&CD. The O&CD summarizes the conditions that may provide physical opportunities and constraints within the geographic environment. The document is typically in the form of a map of the potential project area, to identify any on-site and adjacent facilities and infrastructure that cannot be easily relocated and/or may constrain development, such as wharf areas, power substations, utility vaults, security buildings, rail infrastructure, and access roadways, tunnels, and bridges.

**Exhibit 1-14 Alternatives Development Process and Connection with Feasibility**





The map should show neighboring properties, identifying space that may be available for purchase. Other opportunities may include underutilized resources, or switching land from one use to another or major equipment such as ship to shore cranes, conveyors, gangways and cargo storage area/passenger processing equipment. An example of a basic O&CD is shown in Exhibit 1-15.

On the constraints side, identify any nearby land use which may be perceived to restrict expansion opportunities on the O&CD. This includes easements, power lines, or utilities, such as stormwater outfalls, that cannot be easily relocated. Neighboring uses such as military facilities, air fields or power plants may come with their own specific set of restrictions which should be included.

Additionally, some locales may have community concerns such as protected view corridors or public access points, which should be indicated on the document. To the extent possible, also identify sensitive environmental areas such as wetlands,

floodplains, sensitive or protected fish and wildlife habitat and take into consideration the unique needs associated with these types of areas.

Regularly review, revise and refine the O&CD over the course of the project definition process, and use it as the common foundation on which all project alternatives are developed, judged, compared, and qualified.

### 1.3.2 Alternatives Development and Analysis

The process of forming project alternatives is iterative, and with each round of alternatives development and analysis, new alternatives are proposed and improvements and new ideas are generated.

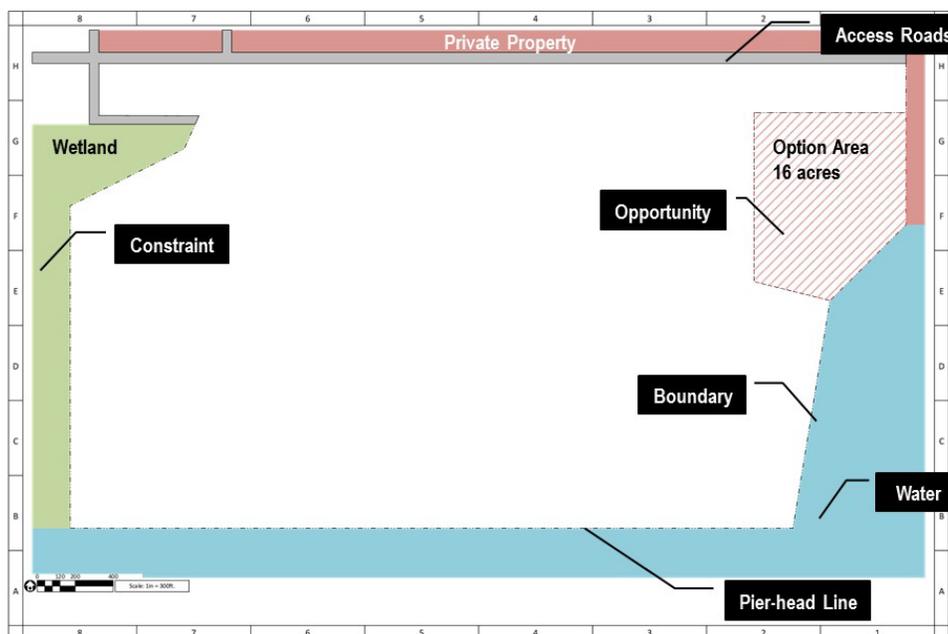
During the process, the number of alternatives “in play” may shrink, grow, and shrink again. Alternatives may be discarded, then later be resurrected in the face of changes to the project context, refinements to the project goals and objectives, and/or measurements of feasibility. Additional alternatives may also be identified at any time during the planning process. The number of

iterations necessary to achieve closure is difficult to predict with absolute certainty, so some flexibility in the schedule for this step in the planning process is advisable.

#### 1.3.2.1 Alternatives Creation

Enter the planning effort with multiple project alternatives in mind. Recognize that “No-Change” or “No-Build” is a project alternative and often considered a base case. Pursuit of a single project alternative generally leads to “tunnel thinking”, and prevents the port owner from rationally addressing the viability of alternative development strategies, and constrains planners from considering the interests of the broadest range of port stakeholders.

**Exhibit 1-15 Illustrative Basic O&CD**



Develop project alternatives based on the project context and directed by the project goals and objectives. For example, for a cargo facility, the objective might be to increase storage capacity by a determined percent. The planner would prepare a range of site configurations to serve that objective, considering different geometries, technologies, equipment, circulation patterns, or operating rules. It is not unusual for the first iteration of project alternatives to present a dozen ideas at a very conceptual, low-resolution level, in order to spur creative consideration of various possibilities.

Be mindful of the provision of public benefits and impacts (e.g., safety, sustainability, environmental, etc.) and community input when creating the alternatives. For those projects involving federal action, NEPA requires multiple alternatives with public engagement occurring prior to settling on a final alternative.

**1.3.2.2 Alternatives Assessment and Review**  
Review and gauge each proposed project alternative in relation to the project context, goals and objectives with each planning iteration. The focus of this effort includes:

- **Examination:** Understanding, at a high-level, the physical and institutional elements of each alternative, and how those elements relate to existing conditions and to elements in other alternatives.
- **Winnowing:** Eliminating alternatives that do not sufficiently align with project goals and objectives, such as providing inadequate capacity or having the potential to generate unacceptable impacts.
- **Extending:** Identifying new alternatives that should be considered or alterations to proposed project alternatives that might provide a better balance of performance capabilities and impacts.



The review should be done by all members of the project team, and the set of reviewers should be the same for each iteration, so that each reviewer's understanding of the history of the process is identical and complete. The reviewers may not always agree on how to achieve the project goals and objectives with respect to the project alternatives. Some may favor certain elements of one project alternative over others. Some may not be convinced that an alternative will succeed in achieving a particular objective. Some may have significant environmental, legal, policy, or technical concerns about a project alternative.

Engage the community and other interested stakeholders to seek their perspectives on the various alternatives, and use those engagements to remind the stakeholders of the potential benefits of the proposed potential project. Ask stakeholders to identify areas of concern, including scheduling of the work, site layouts, and possible short and long-term changes in near-port traffic as a result of the potential project. Incorporate community feedback and ideas where it is feasible and document all the engagement efforts that take place.



Strive to build consensus among the diverse parties by forming or restructuring the project alternatives to accommodate various reviewers' and stakeholders' perspectives and concerns. Thoroughly document the review results, and distribute across the project team for review and correction, so that a thorough record of the planning process is established and maintained. This will likely save the port owner from having to re-examine alternatives that have already been discarded for good and salient reasons.

At the end of this review effort, the project team should have a select number of reasonable alternatives that can be refined and subjected to a higher level of scrutiny and assessment of feasibility.

**1.3.3 Refinement of Reasonable Alternatives**  
Refinement of the reasonable alternatives should focus on identifying, in logical, discrete steps, how the port would move from the existing conditions to the final project, within the project context. In order to have an understanding of performance and impacts at each step of project

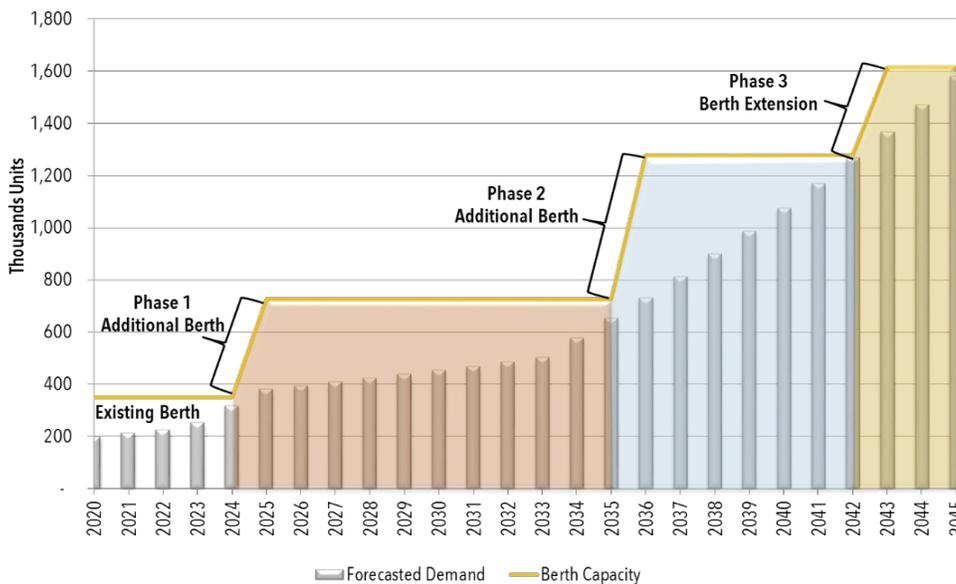
implementation including timing of capital investments, elements of this task will often take place simultaneously to assessing feasibility efforts.

1.3.3.1 Phasing

A project plan should incorporate the ability to divide a project's development program into major discrete steps that can be implemented over time. These phases (Exhibit 1-16) may entail demolition, construction, equipment procurement, operational enhancements, or a combination of some or all of these elements. The project may also include elements or phases that require work on infrastructure outside the port owner's control, such as nearby roadways or rail infrastructure, and these elements should be clearly identified.

The first phase of each alternative should be based on the existing conditions, and each subsequent phase should clearly demonstrate all changes from the prior phase. Delineate the precise order of project element implementation as part of the phasing of each project alternative.

Exhibit 1-16 Phased Development Example



Conceptual phasing documents for the development of a project should show the orderly progress of capital improvements and equipment acquisition. Prepare phasing documents to allow for port construction or acquisition of major assets with minimum disruption of existing operations or forecasted demand.

For a redevelopment project, phasing analysis is essential in understanding the financial and operational impacts of decommissioning equipment and/or a portion of a port facility. If it is likely that implementation of a phase will temporarily reduce capacity or cause negative impacts,

prepare a construction or “decommissioning” scheme that shows the port during that phase. The phasing of a project may consist of a sequence of alternating decommissioning and operational phases, as shown in Exhibit 1-17. Phasing also allows the evaluation of temporary routing patterns for internal and external operating equipment, and helps the terminal operator visualize clearly how the port will evolve over time.

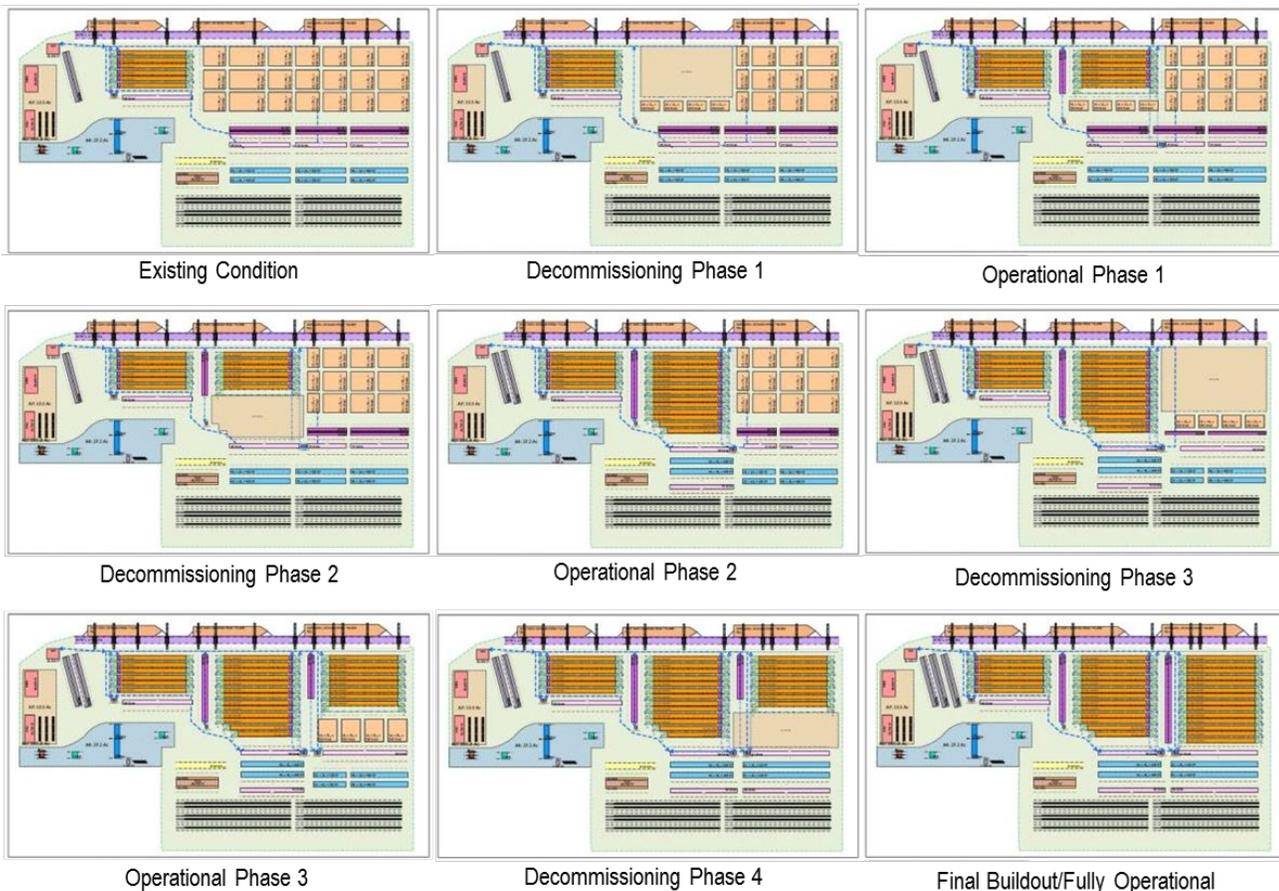
The port owner should coordinate with its state department of transportation (DOT) and MPO to determine whether any projects scheduled for construction might impact port access routes. Incorporate this information into the phasing documents such that any reduction in capacity as a result of a port project may be aligned with the disruption period of the transportation project(s).

Phasing analysis ensures that the location and routing of any major infrastructure, buildings, and utilities remains coherent and compatible, and avoids costly reconstruction of poorly located facilities. These physical characteristics should be summarized, throughput capacities should be calculated, and possible impacts should be reported in the phasing documents for each reasonable alternative. This will provide insight into the fluctuation of each alternative’s financial and service performance over time.

### 1.3.3.2 Timing

Once the phasing of each project alternative is determined, the sequence and timing of phased improvements should be considered in relation to the market forecast(s) of demand and the availability of funds for capital expenditure.

**Exhibit 1-17 Decommissioning and Operational Phases**





A comparison of the phased timing of the project alternatives and the demand forecast will allow the port owner to understand the date ranges by which each phase would need to be completed to minimize impacts on market potential.

In parallel with identifying the timing of improvements and demand intersections, estimate the time required to implement each phase, as shown in Exhibit 1-18. This will be essential in determining the start and end date for each phase, and will inform calculation of potential financial impacts of any displacement of capacity that may occur during each phase of a project alternative's implementation. It is likely that this examination of timing will alter the nature of the phases, so that phase overlaps do not cripple a port's operation for an extended period. This may well be sensitive to market timing: rapid market growth may require the use of small, closely-spaced phases, each aimed at improving port performance with minimal disturbance.

The timing of development or acquisition phases will also be influenced by the capital finance plan. When funding will be available (whether from the proceeds of public or private financing or from public grant funds) will dictate when money can be spent on the project.

### 1.3.3.3 Details

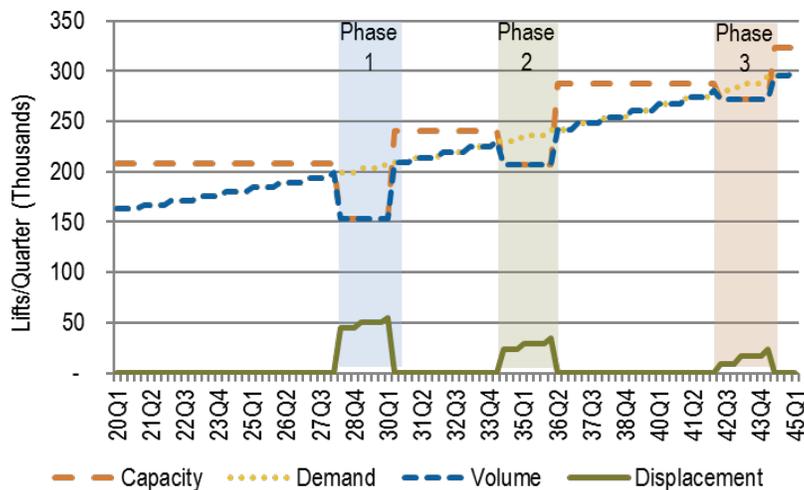
Examine, at least at the conceptual level, some of the critical details associated with each reasonable alternative. For example, in terminal development, conceptual drawings for electrical power distribution, water distribution, and site drainage may be merited. It is not uncommon for infrastructure elements to influence the order in which a site is developed or reconfigured, to minimize cost and eliminate redundant development. These details can vary widely depending on the project. For example, the fire protection systems and stormwater drainage systems for dry bulk cement storage areas, cruise terminals, ferry terminals and petroleum facilities vary widely. These conceptual details will also drive the better definition of quantities that drive development costs.

### 1.3.3.4 Costs

Generate order-of-magnitude construction costs, environmental mitigation costs and equipment acquisition costs to correspond with the phasing documents for each reasonable project alternative. Quantities should be derived directly from the documents, and unit costs should reflect historic data from similar projects as well as local cost factors and escalation. If a port owner plans to finance or fund the project using federal government grants or loans, the cost estimates should take into account Buy America requirements. Ideally, a timed sequence of development sub-projects should be developed, each with its own cost and with start and end dates tied to the market-driven development calendar.

These high-level cost estimates are intended to support informed decision-making during the initial alternatives review and winnowing process. Detailed financial analysis of the project alternatives that enables the identification of a recommended project is discussed in the Feasibility Section of this module.

**Exhibit 1-18 Phased Timing and Displacement of Capacity**





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# Feasibility

Critical to the success of any project is the understanding of the processes that a port’s customer or investor will go through in determining the potential financial and economic return for a successful port project. This section focuses on performing feasibility analyses specific to a port’s individual capabilities, markets, and competitive relationships, to identify the physical, operational, commercial, political and financial metrics that will govern project success.

Feasibility analyses typically include measuring the benefits and costs of the project alternatives. Benefits include capability or capacity, positive impacts and revenue generated by the project alternatives. Costs include operating and capital costs, finance costs, and negative impacts or externalities generated by the project alternatives.

Feasibility is directly linked to planning, and efforts outlined in these stages often occur concurrently to ensure that project alternatives are thoroughly formed and rigorously explored. The process shown in Exhibit 2-1 identifies the primary efforts involved in determining the feasibility of project alternatives, the outcomes of which may prompt modifications to the alternatives.

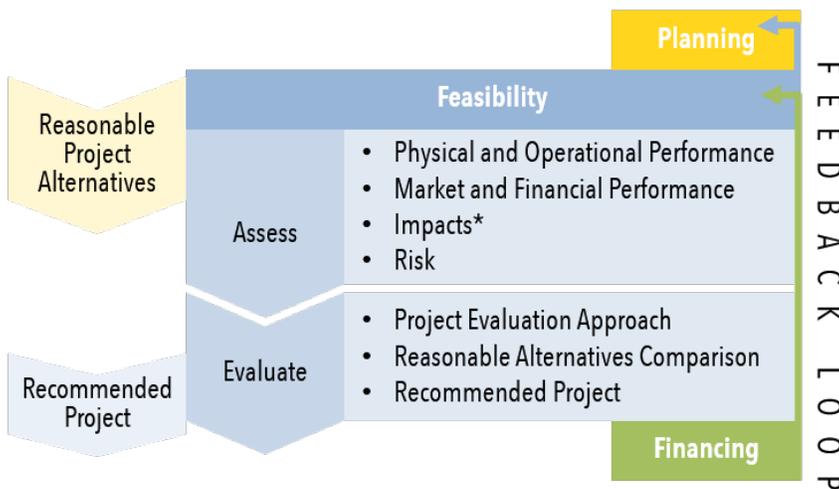
The general approach focuses on: 1) assessing the quantitative and qualitative performance, impacts and risk of each reasonable project alternative, and 2) comparing the project alternatives using on an evaluation process that will result in the selection of the optimal project solution.

## 2.1 Assess

Feasibility analysis relies on the appraisal of quantitative and qualitative measures involving project implementation and completion. Quantitative values include performance, capabilities, impacts, costs, benefits, competitive factors, and risks. These flow from analytical tools used to develop and characterize the project alternatives. Qualitative values reflect the ability of the project alternative to fulfill project objectives that cannot be numerically quantified, including social goals, institutional goals, and regulatory imperatives. These flow from the collective judgment of the project team. The analyses required to establish quantitative and qualitative performance of the project alternatives, include:

- **Physical and Operational:** Measure the physical capacity and/or productivity derived from the capital and operating resources of each project alternative and determine whether they support the operational performance required to meet the forecasted demand.

Exhibit 2-1 Project Definition: Feasibility Process



\* Consideration of NEPA compliance for projects requiring Federal Action is of particular importance during these efforts.

- **Market and Financial:** Determine whether each project alternative improves the port's ability to attract the forecasted demand, compete for the target markets, and serve its customers at the rate levels that are required to generate an adequate return on the project's investments. Assess the financial feasibility of each project alternative based on agreed metrics, including payback period, the (accounting) return on investment, the net present value of the net free cash flows, and the (pretax) internal rate of return.
- **Impact:** Gauge the institutional, social, economic and environmental impacts of each project alternative on its surroundings and stakeholders and determine whether these impacts are viable.
- **Risk:** Conduct an analysis of the sensitivity of each project alternative to potential variances in projected conditions such as volume, rates and capital investment costs.

### 2.1.1 Physical and Operational Performance

Physical and operational performance features such as capacity and productivity can be established through the deployment of sophisticated static models that form a clear, transparent link between port capital and operating resources and resource performance.

#### 2.1.1.1 Capital Resources

Capital resources are frequently tied to elements that increase or sustain the operational performance of a port. As such, it is desirable for there to be a connection between the phasing plan developed as part of the Form Task during the planning process and the list and quantity of major capital investments that may be required for each project alternative.

Waterfront operations are generally affected by the geometry of access channels and berths, length of wharves or the number of berths at a given wharf, and the number of vessel-service

#### Exhibit 2-2 Examples of Waterfront Capital Resources

- Channel and berth dredging
- Breakwaters and shore protection
- Containment dikes or bulkheads
- Fill materials
- Wharves
- Vessel cranes
- Equipment that serves the vessel cranes, such as tractors
- Conveyors, passenger bridges, or other vessel service elements
- Wharf equipment power supplies and distribution
- Shore power installations

cranes available. As such, the waterfront performance of these asset types will be represented by capital resource values, either on the supply or the demand side. These values can be used to establish the timing and magnitude of developments or improvements required to provide or enhance these capital resources.

Landside operations are generally affected by cargo storage area or passenger processing areas, storage/passenger density, and the availability of cargo and passenger handling/processing/transfer equipment. As such, the performance of these asset types will be represented by capital resource values unique to landside elements. For example, required storage area depends on storage density, goods movement velocity, cargo handling equipment and terminal management systems, which likely drive a number of capital projects, such as pavement, drainage, lighting, buildings, storage structures and power supply. These values can be used to provide the timing and magnitude of expenditures for each project alternative.

Equipment also influences performance of waterfront and landside assets, as well as support facilities. Equipment reliability and fleet size can be used to size required maintenance and repair buildings. Entry/exit gate performance, peaking factors, and operating hours can be used to size the gate complexes and estimate required waterfront and landside improvement patterns.

**Exhibit 2-4 Examples of Landside Capital Resources**

- Dredge material placement
- Grading
- Environmental impact mitigation
- Pavement/roadways
- Yard cranes and transport equipment
- Equipment runways and foundations
- Conveyors
- Pipeline networks
- Stormwater collection, retention, and release
- Power supplies and transformers
- Power distribution
- Fire water distribution
- Lighting
- Passenger buildings and transfer areas
- Goods inspection facilities
- Warehousing space
- ITS equipment and infrastructure
- Equipment and truck parking
- Security installations
- Service structures

Intermodal rail volumes and rail performance characteristics can be used to size rail resources, including tracks, paved areas, exchange or storage areas, and goods handling equipment.

Capital resource values structure the definition and quantification of phase-dependent project alternatives. Sequencing the implementation of improving these resources defines the implementation schedule of each project alternative and structures capital expenditure forecasts.

**Exhibit 2-3 Examples of Support Facility Capital Resources**

- Administration and operational buildings
- Maintenance Facilities
- Fuel storage and dispensation/charging
- Gate lanes and related equipment
- Security stations and instruments
- Railroad storage or working tracks
- Road & rail access
- Rail operating equipment
- Harbor craft

**2.1.1.2 Operating Resources**

During port operations, a range of resources are deployed that may include, but are not limited to:

- Operating workforce
- Management labor
- Fuel
- Power
- Other utilities (water, communication, data)
- Machine supplies
- Replacement parts

The utilization of operating resources influences the estimation of capital resources and the magnitude of fixed and variable operating expenditures for each project alternative. Therefore, operating resource values are an integral part of capacity and productivity modeling as well.

**2.1.1.3 Capacity and Productivity**

The enhancement of port performance capabilities such as throughput capacity and productivity is achieved by implementing a project that can serve a particular volume of passengers or goods at a cost that is sustainable and competitive. The throughput capacity of a project is a function of capital and operating resources and the rate at which those resources are used. The productivity rate of a resource generally has two components: physical space and time. With regard to physical space, the analysis must recognize that, in addition to physical space actually in use, empty space maintains fluidity and allows the facility to operate at adequate productivity. Sufficient space is also necessary to sustain accessibility to objects that must be handled or processed. With regard to time, the analysis must recognize that demand is uneven over time, and that physical space has been reserved to allow efficient service of peak conditions.

For example, in the context of a freight terminal, analysis of the berth must allow for the physical lengths of vessels, as well as the gaps between vessels required for mooring and maneuvering.

The analysis must also reflect the need to have berths available when vessels arrive, even if their schedule reliability is low and to take into account seasonal variations in call durations caused by changes in vessel exchange rates.

Consider all major constraints when calculating capacity for each project alternative, and assess each one at a level of utilization that is consistent with maintaining the efficiency and flexibility of the port. For elements that do not impose a hard constraint, such as labor or low-cost equipment, the relationship between a project's performance capabilities and resource requirements must be an output of the model.

Estimate the capacity, productivity and resource requirements of each project alternative and its phases, both during "construction" phases and during "operational" phases when the improvements are utilized. A reduction in capacity and/or productivity during this time may influence potential revenue as well as variable operating expenditures. An example approach to estimate throughput capacity is provided in *Appendix C*.

### 2.1.2 Market and Financial Performance

In measuring the market and financial performance of a project, consider the costs and benefits to the customer. Customer benefits in the form of lower costs – for beneficial cargo owners (BCOs), shipping lines, railroads, truckers, warehouse/distribution center operators, and other logistics service providers – make a port a more attractive place to conduct business and support sustainable revenue streams (i.e., lease payments, per-unit charges, etc.). For example, during the planning of the Alameda Corridor, the potential for user fees to produce shifts in traffic to other ports was extensively tested. Port owners must therefore consider not only their own market and financial structures, but also those related to larger global supply chains.

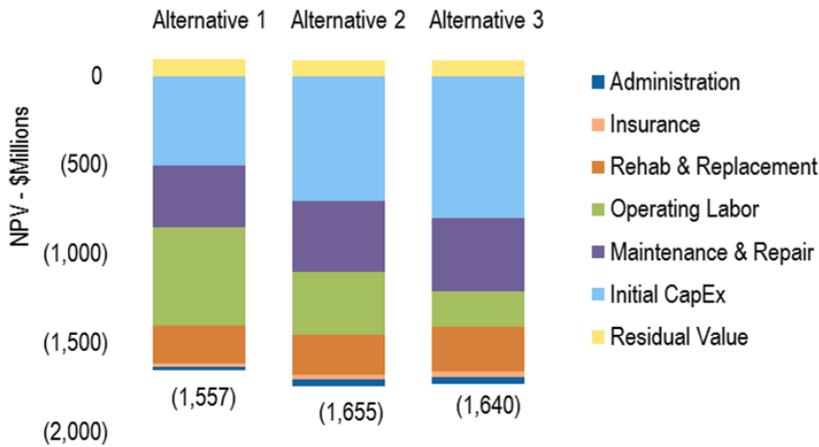
#### 2.1.2.1 Revenue Forecast

Port revenues associated with a project are often heavily dependent on activity-based drivers such as quantity of passengers and/or cargo handled, number and duration of ship calls, and days of storage. Project revenue forecasts are developed, in part, from the predicted increase in activity generated by a project. Project revenues can also vary widely depending on:



- **Fixed or variable rate structure.** Revenues may be relatively fixed in nature such as base acreage payments, or variable based on throughput volumes multiplied by applicable rates. In many cases rates may be set in service contracts of varying durations such as those between ports and carriers. These contracts can also be complex dealing with many tariff categories, some with built-in escalators based on labor contracts or on factors such as published price indices.
- **Customer benefits.** Many projects will result in additional or enhanced services that benefit port users. Port owners can charge higher rates if a project produces economic benefits for its customers. However, rates cannot exceed the level of benefits offered to the customer without the loss of business.
- **Competitive dynamics.** Revenues can also be impacted by the port's market position and related pricing dynamics. If a project increases a port's competitive advantage based on the features, services, and financial factors listed in Exhibit 1-11, the port may receive additional revenues gained from new customers.
- **Port ownership.** For private owners all revenues are likely received by the owner. In the case of landlord ports, direct revenues may involve lease payments for port acreage, but ports may also share in direct facility revenues, thus sharing in total revenues. Long term leases or concessions may be highly complex and include provisions about port versus private investments and volume guarantees.

**Exhibit 2-5 Illustrative NPV Analysis of Project Alternatives**



Prepare revenue forecasts for each project alternative. Short term forecasts should be largely derived from demand forecasts and relatively set rates. Longer-term forecasts should take into account the predicted impact the project may have on the port’s competitive position.

Since the development of these forecasts generally requires consideration of a range of complex factors with uncertain outcomes, make adjustments for *risk* (refer to Section 2.1.4), which will be required by credit rating agencies. In addition, consider how project revenues may be distributed, which, along with broader benefits, may affect overall evaluation of the project alternatives.

#### 2.1.2.2 Cash Flow Modeling

A life cycle cash flow analysis reflects projected revenues generated by anticipated volumes, and costs from project implementation. Costs are typically separated into two categories for financial modeling: *capital expenditures (CapEx)* and *operating expenditures (OpEx)*. CapEx are typically split into initial costs of construction and equipment and on-going costs of *renewal and replacement (R&R)* of these assets (sometimes known as periodic, capital or life cycle maintenance). OpEx are typically split into fixed costs that are independent of throughput volume

and variable costs that change with the throughput volume.

Combine revenues and costs into a single cash flow model that spans the useful life of the project. Measure the financial performance of each project alternative using the cash flow model to calculate metrics such as *return on investment (ROI)*, payback period, *net present value (NPV)* or *internal rate of return (IRR)*. An example output of a cash flow model showing the NPV of project alternatives is shown in Exhibit 2-5. Ultimately, the relevance of each financial metric will depend in large part on the investment objectives of the financiers of the project. A shorter payback period may be more suitable for small scale projects, while the highest long-term NPV may be preferred by institutional investors seeking long-term growth opportunities.

Cash flow modeling also provides the means to adjust the phasing of project alternatives to maximize project financial performance metrics while maintaining service levels to meet projected demand. An iterative process usually occurs when CapEx and OpEx schedules are modified to achieve better financial performance against forecasted demand. Modifications to CapEx and OpEx schedules may include moving the occurrence of a cost or eliminating a cost all together. Adjustments may limit revenue potential by constraining capacity, so an integrated approach linking physical attributes to both revenues and costs is required.

Equally important to a project’s financial performance is its public benefit, particularly if the project relies on federal aid. Efforts to maximize project revenue should be balanced with attention to social, economic, environmental and other impacts.

#### 2.1.2.3 Capital Expenditures

Infrastructure development or redevelopment and equipment acquisition are the primary capital expenditure investments that comprise CapEx schedules.

Depending on the project alternative, capital investments in new infrastructure/ equipment, renovations/retooling and/or major asset replacement trigger the sequencing of costs in a CapEx schedule. Replacement of capital assets is driven by an asset reaching its useful life while new investment is driven by needs identified by a gap analysis.

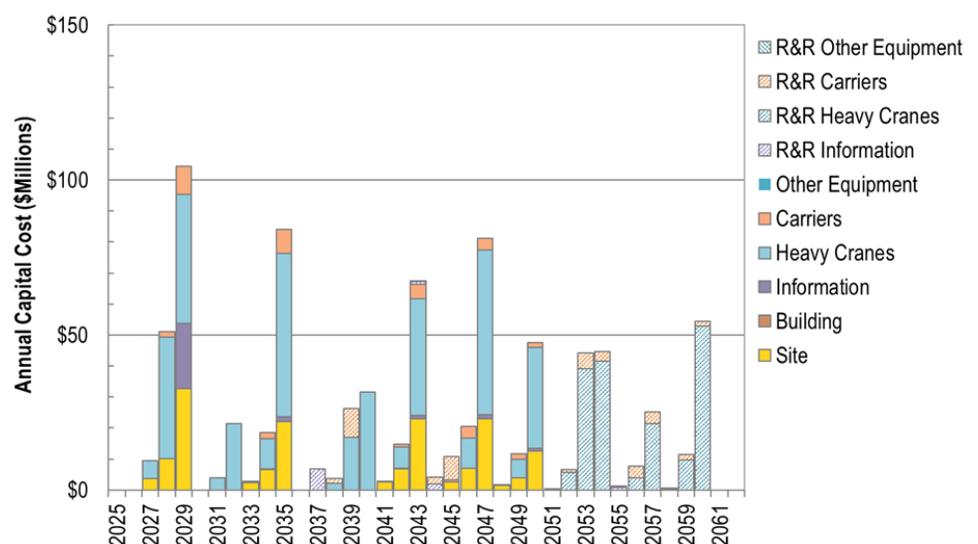
- Infrastructure:** Development of major port infrastructure such as channels, berths, wharves, storage areas, storage structures, passenger facilities, buildings, truck gates, maintenance facilities, support facilities and intermodal rail yards are examples of infrastructure capital developments that include an initial cost over a given useful life. Costs for these assets are estimated at various levels of project design. At a conceptual level, cost contingencies of up to 30 percent to 50 percent may be used due to the unknown conditions at a project site. At the final design of a project, cost contingencies may be close to 5 percent to 10 percent. Infrastructure CapEx items typically include the construction costs, planning/studies, permitting, design services, and construction management. Useful life of infrastructure is typically 30-50+ years depending on the item.
- Equipment:** Acquisition of port equipment such as quay cranes, bulk loading arms (liquid and dry), conveyors, gangways, container handling equipment, fork lifts, trucks, vehicles and locomotives are examples of Equipment CapEx items. Contingency for the acquisition, delivery and installation of equipment is usually in the range of 5 percent to 15 percent or may be set to zero percent if recent port-specific pricing is available. Useful life for port equipment typically ranges between 10 and 25

years depending on the class of machine and the rate at which it is being used.

- Renewal and Replacement/ Life Cycle Cost:** Most major assets have an option to renew on a regular cycle or at key points in the aging process. There is a trade-off between the initial infrastructure or equipment cost/design and the asset life and hence life cycle cost. In some cases the asset renewal has to be accelerated in the case of higher demand. Where those costs are particularly large or likely to accelerate, carry out a life cycle cost analysis to optimize that trade off. For longer projects, the cash flow model may need to reflect multiple rounds of R&R, at different intervals for different project elements.

Prepare a life-cycle pattern of initial costs and re-investments and a capital expense timeline (Exhibit 2-6) of each project alternative. The timeline must also indicate the pattern of cost incursions as each element is implemented. For example, infrastructure development frequently includes design, permitting and contracting costs that are incurred well in advance of actual construction costs.

**Exhibit 2-6 Illustrative CapEx Schedule**



Equipment installation frequently involves a time sequence of payments tied to initial ordering, material acquisition by the supplier, assembly, delivery and acceptance. The CapEx model should reflect these timing elements, and they should be tied to the duration and timing of each project element.

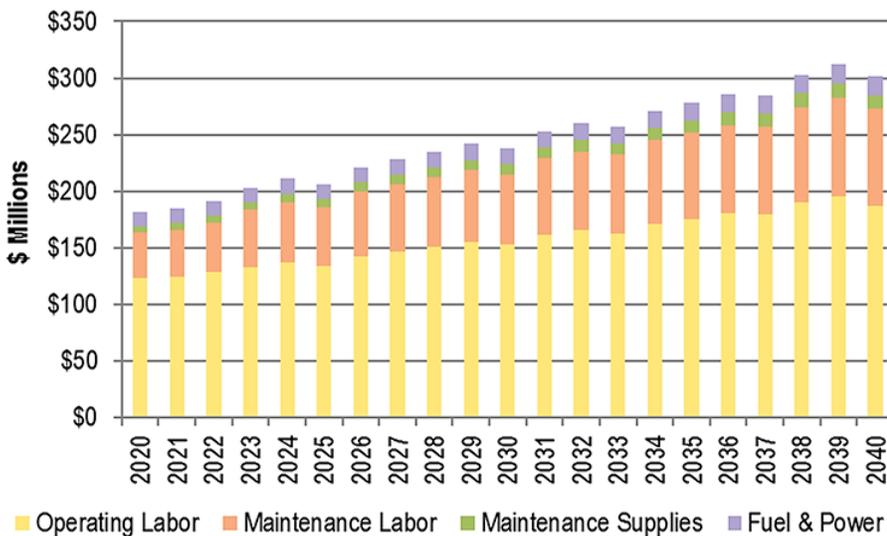
#### 2.1.2.4 Operating Expenditures

OpEx are related to throughput volume, and are typically forecasted in four categories; fixed costs, labor, energy and routine maintenance. Generally, cost rates for each category are projected from historical figures, and cost totals are estimated based on the volume, productivity, and operational deployment of machines and related resources associated with each project alternative.

- Fixed Operating Costs:** Lease and contractual costs are easy to establish, though, in some cases, need to be an estimate of a future negotiations or are tied to forecasted volumes. Most other fixed operating costs such as insurance, administration or management fees or salaries and advisor costs can be extrapolated from existing precedents.

- Operating Labor:** Quantities of labor positions are estimated by work rules and affected by the quantity of staff needed to manage and operate equipment or otherwise process passenger and/or cargo. Forecasted labor needs are driven by demand forecast volumes. Combine labor positions with rates for each labor category to arrive at the final labor costs. Labor rates include raw pay rates, overhead and margin and may vary depending on the location and type of labor deployed. Terminal operators and labor unions are helpful sources of labor rates if historic values are not available.
- Energy:** Fuel and electricity are the two primary forms of energy used in ports to operate equipment, provide lighting and enable the use of communications. Estimate energy costs using equipment and terminal operating hours, fuel and electricity consumption rates and their unit costs. Equipment manufacturers can frequently help with fuel and energy consumption rates. Utility providers and fuel vendors are good sources for cost rates.
- Routine Maintenance:** Preventative and reactive maintenance are estimated in similar ways and may be estimated together if a combined rate is available. Equipment run time or age is typically used against maintenance rates to estimate the total maintenance costs, which include labor and consumables. Consumables include items such as parts, lubricants, tires and supplies. Equipment run time or age influence the value of preventative and reactive maintenance rates. Equipment vendors can be helpful in estimating maintenance rates if historic values are not available.

**Exhibit 2-7 Illustrative OpEx Schedule**



Develop an operating cost schedule including costs for direct/operating labor deployment, maintenance labor, parts, supplies, fuel, and power consumption.

Similar to CapEx schedules, the timing of OpEx is driven by the comparison of capabilities and needs, and the phased development of the project. If additional equipment is brought on line, additional labor, energy and maintenance is required. If technology changes are implemented in a project alternative, unit operating cost rates may also change.

### 2.1.3 Impacts

While potential impacts should be considered throughout the project definition process including the earliest planning efforts, perform a thorough impact analyses when assessing feasibility to increase certainty that the likely range of impacts fall within acceptable bounds. Potential mitigation measures for anticipated unavoidable negative impacts should also be identified early in the process and integrated into the project alternatives.

The analysis should focus on the positive and negative impacts of each project alternative independently and as incremental to the “no change” alternative or base case. Identify and measure the direct and indirect impacts of each reasonable alternative in response to existing and projected institutional, social, economic, environmental, regulatory, and/or physical conditions.

Direct impacts are manifestations of the use of the port’s resources by the port’s actors. Direct impacts affect the port’s actors, such as shipping lines, terminal operators, and BCOs. Indirect impacts affect stakeholders outside of the port, such as neighboring communities and drivers on nearby public roadways. Induced impacts are broader, secondary effects of the overall operation of the port, where a direct tie cannot be made to particular resources or actors. Exhibit 2-8 lists examples of each type of impact.

Port projects usually generate impacts beyond those immediately related to the port’s operation.

**Exhibit 2-8 Direct, Indirect, and Induced Project Impacts**

Impact Type	Direct	Indirect	Induced
Institutional/ Port User	Vessel turnaround time	Vessel traffic	Regional waterfront access
	Truck / train service time	Adjacent road/rail use	Regional road/rail use
Social	Port safety	Protection of nearby community	Regional security
	Operating noise	Noise pollution	Regional noise health effects
Economic	Port labor employment	Local logistics employment	Regional employment
	Operating expense	Customer costs	Regional economy
Environmental	# of machines and operating hours	Air emissions	Air quality
	Fuel / power consumption	Power grid capacity	Climate change
	Facility runoff	Water quality	Coastal environment

Most of the direct external impacts affect the port’s institutions, the local workforce, and the port’s stakeholders including logistics providers, customers and citizens in nearby communities. These impacts are estimated through quantitative analysis or a qualitative assessment by knowledgeable professionals and managers.

#### 2.1.3.1 Institutional and Port User Impacts

Each project alternative may produce a range of impacts on the port’s institutions (see Exhibit 2-9 for examples), requiring the port owner to respond with the deployment of mitigating resources.

The port’s customers and users will have an influence on the competitive attractiveness of any project.

#### Exhibit 2-9 Examples of Port Institution Influences

- Regulatory agency approvals
- Security facilities and staff requirements
- Customs facilities and staffing needs
- Environmental monitoring capabilities

A quantitative and/or qualitative assessment, based on discussions with the port’s stakeholders, should be undertaken to assess project influences. Exhibit 2-10 lists examples of impacts from port users.

**Exhibit 2-10 Examples of Port User Influences**

- Operational and schedule flexibility
- Information systems deployment and management
- Navigation, including tugs and pilots
- Technical sophistication or modernity
- Service rates and productivity
- Ability to accommodate potential market changes

**2.1.3.2 Social Impacts**

Port projects can have complex effects on their host communities, including positive or negative impacts on land use, traffic, natural resources, etc. Identify and measure the wide range of social (public and private) impacts including state of good repair, livability, economic competitiveness, sustainability, and safety for each project alternative.

**Exhibit 2-11 Examples of Public Benefits**

- Improved safety
- Reduced long-distance trucking to serve a community resulting in less highway pavement damage
- Reduced adverse impacts (noise, lighting, air pollution) on neighborhoods surrounding ports
- Lower transportation costs and travel times for businesses resulting in improved economic competitiveness
- Reduced emissions from green technologies contributing to sustainability

The effects in each of these categories can be translated into monetized equivalents as part of a Benefit-Cost Analysis (BCA). The monetized benefits are calculated over a period of 20 to 30 years, discounted back to NPV, and compared to project costs to generate a Benefit Cost Ratio (BCR). Importantly, the factors considered in Financial Analysis (direct receipts) and Economic Impact Analysis (jobs, wages, taxes, etc.) are excluded from BCAs, since these are usually just restatements of the direct economic benefits of a project.

For additional information, refer to Section 2.2.1.2 Benefit Cost Analysis in this module.

**2.1.3.3 Economic Impacts**

The economic value of each project alternative should be measured in different ways. The different measures address distinctly different questions, and together provide a deeper analysis of a project than any single approach. Economic Impact Analysis is used to measure the direct, indirect, and induced effects of each project alternative. Economic impacts must be carefully considered, as direct transportation benefits are often double counted and can greatly overstate the actual benefits of a project alternative. Many times, economic impacts are only transfers from other ports, and analysts must be careful not to double or triple count benefits in their analysis.

Typically, temporary impacts during project implementation and long-term or sustained impacts following an operational period are analyzed separately, using “Input-Output” (I-O) models. Many such models exist, including the MARAD’s *Port Kit* model as well as many private sector packages.

Information on construction/acquisition costs, cargo/passenger activity, and other factors are used as key variables in these models that estimate direct jobs, indirect and induced jobs (based on spending from direct jobs), and related measures such as personal income from wages and taxes paid. I-O models are able to differentiate these effects within individual counties and states, as well as the U.S. as a whole, based on the location of construction and improvements. More customized economic impact analysis approaches consider the population of port-dependent stakeholders. For example, if a U.S. industry requires port services for import, export, or domestic transportation services, its jobs might be considered port-supported. In cases where the loss of port capacity would translate directly into the loss of jobs, they may be considered port-dependent.

### 2.1.3.4 Environmental Impacts

Early identification and assessment of potential impacts to the human and natural environment is critical to the success of any project. Engagement with resource and governing agencies as well as the community to identify environmental concerns will assist planners with developing project alternatives that reduce environmental impact. The risks of not undergoing proper environmental review can be serious, including lawsuits and future distrust by institutions and stakeholder/community groups, as well as significant delay and added expense for projects.

Environmental review processes vary by state and region, and even by municipality within a state. Port owners should engage with their state DOT and MPOs early in the planning process to determine the environmental review process for their project. Projects that include Federal action will fall under *NEPA guidelines*. Federal *action* includes funding, permits, policy decisions, facilities, equipment, or employees. Examples include projects wholly or partially funded with Federal grants or any dredging or waterways projects that involve permits or action from the U.S. Army Corps of Engineers. If port owners think that there is even a possibility that they will seek federal grants or financing for a project in the future, they should consider following the NEPA environmental review process.

Projects that do not include any Federal action will still need to follow the environmental review process required by their state and locality. Some projects will need to comply with requirements from federal (NEPA), state, and local governments. Most state environmental agencies follow the same general process as NEPA, but each will have its own terminology and requirements. Differences may include what is considered significant and how to establish the baseline for comparison. The Environmental Protection Agency’s Port Compliance Tool provides more

information for port owners’ on environmental compliance with *state* and *federal* regulations.

Exhibit 2-12 provides a list of the primary federal agencies that may have environmental authority or influence over a given port project.

#### Exhibit 2-12 Agencies and Possible Impacts of Concern

U.S. EPA	<ul style="list-style-type: none"> <li>• Clean Water Act: stormwater run-off during construction and normal operations, vessel discharge (ballast water)</li> <li>• Clean Air Act: Emissions, General Conformity (dredging)</li> <li>• Storage tanks and spills</li> <li>• Brownfield and Superfund sites</li> <li>• Wetlands</li> </ul>
U.S. Fish & Wildlife	<ul style="list-style-type: none"> <li>• Invasive species, threatened and endangered species</li> <li>• Wetlands</li> <li>• Oil spill response</li> </ul>
U.S. Army Corps of Engineers	<ul style="list-style-type: none"> <li>• Dredging permits – berth and private channel dredging, federal channel deepening as well as operations &amp; maintenance dredging, in-water work permits, fill materials; wetlands</li> </ul>
U.S. Coast Guard	<ul style="list-style-type: none"> <li>• Ballast water, oil spills, waste transfer, vapor control systems, bunkering, compliance with international shipping regulations (IMO)</li> </ul>
U.S. Department of Transportation	<ul style="list-style-type: none"> <li>• Hazardous materials transport, gas pipelines</li> </ul>
Federal Maritime Commission	<ul style="list-style-type: none"> <li>• Certain activities of marine terminal operators, passenger vessel operators and carriers</li> </ul>

The environmental review process can be complex and should be navigated with attention to detail and expert guidance. Ports should allow sufficient time and resources to navigate the environmental review process. Environmental planning and stakeholder engagement should be conducted at the onset of the project definition process to help alleviate some of the complexity and ensure project timing is not extensively delayed.

Environmental review is normally a project specific formal review, but some regional and state plans also require reviews of larger groups of projects such as TIPs or Metropolitan Transportation Plans that require an air quality analysis or a review of the Environmental Justice considerations where the package of all projects in a plan or program are reviewed together.



#### 2.1.4 Risk

Risk is a key concern to any investor whether public or private. The ever present trade-off between risk and return is unavoidable and where a project alternative has a high level of risk that needs to be reflected in the required return/discount rate or in specific downside sensitivities to

reflect the impact of those risks.

Risks can be addressed in two key ways:

- **Risk mitigation** where measures are put in place to reduce the chance of them occurring;
- **Risk sharing** or transfer where the contracts allocate all or some of the risk to the construction contractor, terminal operator or other third party, as long as the price charged for this transfer is economic.

Identified risks for each project alternative should be defined, evaluated and classified in terms of probability and impact in a risk register. Care should be taken to distinguish risk causes from risk impacts. Mitigation strategies should be included where feasible and cost-effective to control risk. Types of port project risks that may be considered include:

- Material cost changes (particularly steel)
- Revenue risks, such as inability to capture projected cargo/passenger volume, unforeseen port competition, major economic recession
- Construction delays and cost overruns
- Equipment acquisition delays
- Inflation risk

- Risk on the availability of or cost of raising finance
- OpEx overruns
- Life cycle cost overruns or acceleration
- Force majeure risks (i.e. high impact, low probability uninsurable act of God risks)
- Insufficient revenue capture

While there are a range of risk management processes and structures to guide this type of effort, the financing/funding entities, whether public or private, will typically dictate the format and approach. Engage the financing/funding entities early in the planning process to begin developing a risk register and agree on a risk allocation to avoid project delays during the feasibility and financing stages. *Risk analysis* is discussed in more detail in Section 3.1.2.2 of this module.

## 2.2 Evaluate

Port projects are often undertaken in complex operational, commercial, and institutional conditions and in sensitive natural and urban environments, each with its own requirements. Accordingly, there are a number of techniques and criteria that may be used to evaluate port project alternatives. Much of this Feasibility section focuses on quantitative measures such as throughput capacity, revenue projections and financial performance, as well as environmental and economic impacts.

Some performance measures cannot be mathematically quantified – they are open to human judgment. Qualitative measures such as compatibility with community interests, availability of skilled work force, and project flexibility are examples of types of evaluation criteria that are subject to wider variation in interpretation and priority. In such cases, very clear value statements must be made that allow the team to clearly judge the alignment between project features and qualitative measures.

Selection of a “best” project frequently requires deliberation and trade-offs of a broad array of performance, impact and risk elements. The nature of the trade-offs depends on the perceived importance of each element, which is naturally open to earnest debate. The results of stakeholder outreach must be considered, and the interests of all parties thoughtfully and transparently balanced.

### 2.2.1 Project Evaluation Approach

Depending on the focus and purpose of the evaluation, an approach may involve the application of a single measure, a combination of different quantitative and qualitative measures, or customized according to specific requirements. Common types of evaluation techniques used by the port industry to assess project feasibility include:

- Cash flow evaluation,
- Benefit-cost analysis, and
- Multi-criteria evaluation.

Other evaluation approaches may be required for port owners pursuing funding or financing for their project. Develop a suitable evaluation approach that aligns with the specific project goals and objectives, port owner and project sponsor requirements and in consultation with relevant stakeholders. Ensure all relevant parties have an understanding of the evaluation approach, process, and what outcomes are expected as a result.

#### 2.2.1.1 Cash Flow Evaluation

Cash flow is essential in determining the financial viability of an investment. Evaluation measures that are still used for high level screening of projects include pay-back period and (accounting) ROI. Both have serious flaws and have been superseded by analysis that more accurately reflects the differences in future cash flows generated by a project.

Key to the measurement of return over a number of future years is the principle known to economists as the “time value of money”. These

methods are based on a simple idea: today’s money is worth more now than the same amount received in the future, because today’s money can be invested. This is similar to how money is deposited in an account at a fixed interest rate and increases value over time. Future cash flows from an alternative investment are discounted at the opportunity cost of capital in order to determine whether it provides a better return. This can also be explained as interest lost by taking money out of a bank account or similar safe investment to fund a project. Another way of looking at this concept, if the investor needs to borrow money, is to consider what future money would be worth now after taking account of the cost of borrowing.

- **Net Present Value:** The NPV of a cash flow is the sum of those current (i.e. Present) values of all the future revenues less future costs, including the cost of the investment. If totaled over the life of the project/investment, it gives the project value in current money. That value is highly dependent on the (discount) rate used to reflect the opportunity cost of capital or cost of borrowing and any additions to reflect risk.
- **Internal Rate of Return:** The IRR avoids the need to choose a discount rate as it turns the proposal around and looks for the discount rate at which the NPV of the initial investment plus the future cash flows over the analysis period is zero. It is typical to compare the project life IRR to a target hurdle rate to screen project alternatives with similar risks. IRR also has its challenges when particularly high revenue growth is expected and the evaluation period is long. In those cases the initial annual running yield may also be used to compare different options as investors have limits to their patience in waiting for returns.



Exhibit 2-13 illustrates the risks of using simple metrics like pay back that ignores the cash flows after “pay back” is achieved. The three curves displayed represent the NPV of the cash flows through the analysis period (assumed in this case to be equal to the term of a lease) for three development scenarios:

- Scenario 1: corresponds to an initial investment that would be constrained by funding availability, such as grants or cash on hand;
- Scenario 2: relies on available funding, as well as upfront financing through debt and/or *equity*, thereby allowing for a greater upfront investment; and
- Scenario 3: similar to scenario 2, except that the development would be broken out into two phases.

Two key financial metrics can be identified using this chart:

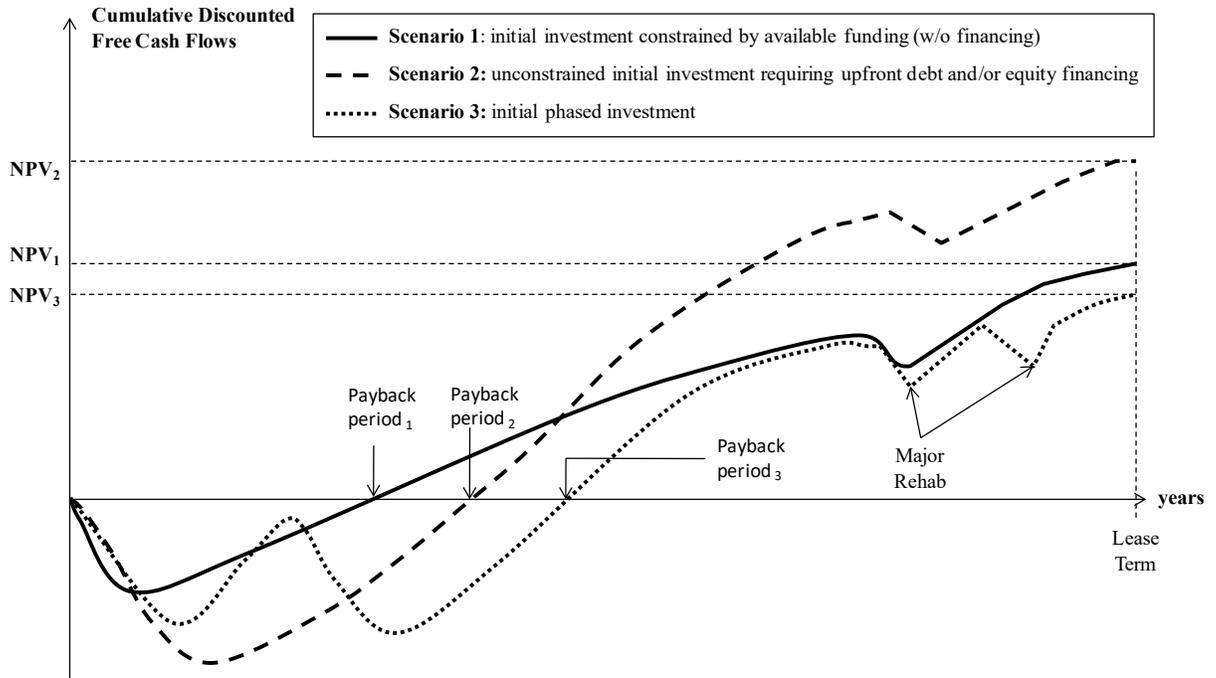
- The NPV of each scenario at the expiry of the lease. This value is equal to the sum of the

discounted free cash flows through the analysis period; and

- The payback period in present value terms, which corresponds to the number of years that are required for the initial investment to be repaid (i.e. yield an NPV equal to zero). This is shown graphically by the intersection of each curve with the y-axis.

While the payback period for scenario 1 is shorter than for scenario 2, the NPV ends up being smaller; in scenario 2, the higher initial investment allows capturing a greater share of incremental throughput. The two-phased approach depicted in scenario 3 results in a longer payback period and also a lower NPV. While this may seem like the worst of the three options, it does have the benefit of spreading the upfront capital expenditure over a greater period of time, thereby allowing for demand to build-up before proceeding with the second phase. This delay does imply a lower NPV over the lease duration period, but it does provide for greater flexibility in managing the facility’s expansion.

**Exhibit 2-13 Illustrative Cash Flow NPV for Multiple Project Delivery Scenarios**



### 2.2.1.2 Benefit-Cost Analysis

A formal BCA is frequently an essential step in gaining project funding from outside sources. A BCA is an evaluation framework to assess the economic advantages (benefits) and disadvantages (costs) of each project alternative. Benefits and costs are broadly defined and are quantified in monetary terms to the extent possible. The overall goal of a BCA is to assess whether the expected benefits of a project alternative justify the costs from a national perspective.

A BCA helps to discern the net welfare change created by a project alternative, including cost savings and increases in benefits, as well as disbenefits where costs can be identified (e.g., project capital costs), and welfare reductions where some groups are expected to be made worse off as a result of a project alternative.

The BCA assesses the incremental difference between the base case and the project alternatives, which represents the net change in welfare over a project life-cycle. The importance of future welfare changes are determined through discounting, which is meant to reflect both the opportunity cost of capital, as well as the societal preference for the present.

Applicants for federal funding have been required to support their applications with a formal BCA prepared according to the USDOT *BCA Resource Guide*. This methodology includes the following analytical activities:

- Assessing benefits with respect to each of the five long-term outcomes (i.e. state of good repair, livability, economic competitiveness, sustainability, and safety) defined by the USDOT;
- Defining existing and future conditions under the base case as well as under the project alternatives;



- Assessing the independent utility of each project if the overall application contains multiple separate projects linked together in a common objective;
- Estimating benefits and costs during project construction and operation, including at least 20 years of operations beyond the project completion when benefits accrue;
- Using USDOT recommended monetized values for reduced fatalities, injuries, property damage, travel time savings, and emissions, while relying on best practices for monetization of other benefits;
- Presenting dollar values in real dollars. In instances where cost estimates and benefits valuations are expressed in historical dollar years, using an appropriate Consumer Price Index (CPI) to adjust the values;
- Discounting future benefits and costs with real discount rates of 7 percent and 3 percent (sensitivity analysis) consistent with USDOT guidance; and
- Dividing the total discounted benefits by the total discounted costs to determine the BCR.

In addition to this guidance, port owners should refer to *Office of Management and Budget Circulars A-4 and A-94* in preparing BCAs for federal grant applications.

With the BUILD Transportation Discretionary Grant program and the dedicated freight funding under the FAST Act, port owners should be familiar with the principles of a formal BCA as it is expected to remain important.

### 2.2.1.3 Multi-Criteria Evaluation



A multiple criteria decision-making approach facilitates the analysis of the complex trade-offs (e.g. cost vs. operational performance) between project alternatives. Both quantitative and qualitative measures, including

cash flow and BCA values, can be combined into an evaluation process to allow for a comprehensive assessment of each alternative. Criteria for evaluating project alternatives are defined by the project team and relevant stakeholders and are based on the project goals and objectives. The criteria should reflect quantitative and/or qualitative business and project priorities. A multi-criteria evaluation approach could include criteria categories such as:

- Financial
  - NPV
  - IRR
  - Revenue potential
  - Debt service coverage ratio
  - CapEx
  - OpEx
  - Life-cycle cost per unit handled

- Economic Impact
  - Direct
  - Indirect
  - Induced
- BCR
- Operational
  - Capacity
  - Vessel service performance
  - Landside transport service performance
- Environmental
- Project risk

Weight each criterion relative to the other criteria to prioritize their related level of importance. For example, a weight ranging from 1 (unimportant) to 10 (vital), based on the consensus of the project team and/or project sponsor may be used. Similarly a value for each quantitative and qualitative score may use the same scale. Since the weighting process is subjective, there may be skepticism about the validity of the chosen weights. Perform a sensitivity analysis to address any uncertainty in the determination of criterion weights.

An evaluation matrix should be produced that reflects the characteristics of each project alternative on the basis of the specific criteria. The multi-criteria evaluation matrix is used to distinguish the relative score of each project alternative as it performs against each criterion.

One example of this type of matrix is a multiple account evaluation tool, or MAE. An MAE categorizes criteria into separate accounts, such as environmental, equity (social) and/or financial accounts. An account may include just quantitative, qualitative or a mixture of both types of criteria. For each quantitative account, the matrix should provide a detailed valuation of an alternative using clear units of measure.

For each qualitative account, the matrix should clearly and concisely describe the account's features so that all stakeholders have the same understanding of the qualitative criteria intent, as shown in Exhibit 2-14.

For each project alternative, a score is assigned for each criterion on a predetermined scale. The values for each quantitative criterion are calculated based on a project alternative's

calculated performance and then normalized to the agreed upon scoring scale, in which the alternative with best performance receives the highest score and other alternative receive proportional value. For example, if Alternative 1 generates the highest number of jobs and Alternative 2 generates half the number of jobs as Alternative 1, then the score for Alternative 1 is normalized to "10" and the score for Alternative 2 is "5" based on a 1 to 10 level scale.

**Exhibit 2-14 Illustrative Qualitative and Quantitative Criteria**

Account Element	Measure	Weight 1 - 10	Values		
			Alt. 1	Alt. 2	Alt. 3
<b>Operational Performance</b>					
Capacity at Site Buildout	M TEU/Year	8.5	1,500	1,200	1,300
Berth Productivity at Buildout	Net Lifts/Hr	9.5	32	28	29
Gate Truck Cycle Time	Min/Truck	7.0	3.0	2.5	2.8
Intermodal Service	Qualitative	7.0	Serves 24-hour rail operations		
<b>Development</b>					
Suitability for Phased Implementation	Qualitative	7.0	Augments capacity easily and without loss of efficiency		
Development Complexity	Qualitative	7.0	Supports development that is within reach of staff's skills		
Risk of Delay	Qualitative	8.0	Minimizes risk of delays from infrastructure/IT complexity		
<b>Financial</b>					
Net Present Value of Costs (\$M)	NPV	9.0	\$ (1,700)	\$ (1,500)	\$ (1,400)
Initial (5-year) Capital Outlay (\$M)	\$(5-Year)	9.5	\$ 600	\$ 700	\$ 800
Unit Operating Cost	\$/Vessel Lift	8.0	\$ 50	\$ 40	\$ 35
<b>Workforce</b>					
Worker Safety	Qualitative	8.0	Minimizes or eliminates lost time and catastrophic injuries		
Skilled Workforce Availability	Qualitative	7.0	Supports availability of workers with the correct skills		
Optimization of Workforce	FTE/100k Lifts	7.5	20	15	10
<b>Environmental</b>					
Carbon Fuel Consumption	Gal/Lift	6.5	1.50	0.50	0.75
Noise Pollution	Qualitative	5.0	Minimizes or eliminates offsite operational noise		
Light Pollution	Qualitative	4.0	Minimizes upward and lateral light emissions		
Total Energy Consumption	GJ/Year	7.0	250,000	300,000	310,000
Land Utilization	TEU/Acre/Year	8.0	6	5	5
<b>Commercial</b>					
Market Competitiveness	Qualitative	8.0	Increases port's competitive position		
Terminal Modernization/Innovation	Qualitative	8.0	Uses advanced technology and innovative concepts		
Security	Qualitative	7.0	Protects freight integrity		
Port Wide Strategy	Qualitative	8.0	Aligns with the Port's mission		

For each qualitative criterion, each member of the project team provides their informed opinion of value, with the highest value representing perfect agreement with the “Qualitative Test Statement” and values for each alternative set in proportion. These raw scores are then multiplied with the criteria weights to establish an overall criteria “score” for each project alternative.

As shown in Exhibit 2-15, total weighted scores are tabulated for each alternative and may even be tabulated for each account grouping of criteria under each alternative. This provides a comparison of project alternatives or elements of project alternatives.

**Exhibit 2-15 Illustrative Evaluation Results**

Account Element	Measure	Weight 1 - 10	Normalized/Assigned Scores			Total Score		
			Alt. 1	Alt. 2	Alt. 3	Alt. 1	Alt. 2	Alt. 3
<b>Operational Performance</b>		<b>32.0</b>				<b>283</b>	<b>268</b>	<b>270</b>
Capacity at Site Buildout	M TEU/Year	8.5	10.00	8.00	8.67	85	68	74
Berth Productivity at Buildout	Net Lifts/Hr	9.5	10.00	8.75	9.06	95	83	86
Gate Truck Cycle Time	Min/Truck	7.0	8.33	10.00	9.09	58	70	64
Intermodal Service	Qualitative	7.0	6.3	6.7	6.7	44	47	47
<b>Development</b>		<b>22.0</b>				<b>193</b>	<b>168</b>	<b>148</b>
Suitability for Phased Implementation	Qualitative	7.0	9.0	8.0	7.0	63	56	49
Development Complexity	Qualitative	7.0	8.7	7.7	7.3	61	54	51
Risk of Delay	Qualitative	8.0	8.7	7.3	6.0	69	59	48
<b>Financial</b>		<b>26.5</b>				<b>225</b>	<b>235</b>	<b>241</b>
Net Present Value of Costs (\$M)	NPV	9.0	8.24	9.33	10.00	74	84	90
Initial (5-year) Capital Outlay (\$M)	\$/5-Year	9.5	10.00	8.57	7.50	95	81	71
Unit Operating Cost	\$/Vessel Lift	8.0	7.00	8.75	10.00	56	70	80
<b>Workforce</b>		<b>15.0</b>				<b>109</b>	<b>118</b>	<b>131</b>
Worker Safety	Qualitative	8.0	6.3	8.3	9.3	51	67	75
Skilled Workforce Availability	Qualitative	7.0	8.3	7.3	8.0	58	51	56
Optimization of Workforce	FTE/100k Lifts	7.5	10.00	7.50	5.00	75	56	38
<b>Environmental</b>		<b>30.5</b>				<b>217</b>	<b>259</b>	<b>250</b>
Carbon Fuel Consumption	Gal/Lift	6.5	3.33	10.00	6.67	22	65	43
Noise Pollution	Qualitative	5.0	5.0	8.0	9.0	25	40	45
Light Pollution	Qualitative	4.0	5.0	8.0	9.0	20	32	36
Total Energy Consumption	GJ/Year	7.0	10.00	8.33	8.06	70	58	56
Land Utilization	TEU/Acre/Year	8.0	10.00	8.00	8.67	80	64	69
<b>Commercial</b>		<b>31.0</b>				<b>185</b>	<b>240</b>	<b>255</b>
Market Competitiveness	Qualitative	8.0	6.0	7.0	8.0	48	56	64
Terminal Modernization/Innovation	Qualitative	8.0	5.0	8.0	8.0	40	64	64
Security	Qualitative	7.0	7.0	8.0	9.0	49	56	63
Port Wide Strategy	Qualitative	8.0	6.0	8.0	8.0	48	64	64
						<b>1286</b>	<b>1345</b>	<b>1333</b>

### 2.2.2 Reasonable Alternatives Comparison

The outputs of the quantitative and/or qualitative measures of the project alternatives are ranked and compared against each other, including the base case, with emphasis on specific criterion that will have the most influence in the decision-making process. The criteria will differ depending on the evaluation approach. The comparison can be made between each reasonable alternative's estimated future cash flow, benefits and costs, or based on multiple criteria.

For cash flow evaluation and BCA approaches, project alternatives that best meet the project objectives and have higher NPV, IRR or BCR values should be ranked higher. For multi-criteria evaluation, compare the aggregated total weighted scores to establish a ranking of the alternatives. At times, the total scores may not be different enough to conclude that one alternative justifies a higher rank than another (e.g. Alternative 1 and 3 scoring shown in Exhibit 2-15). In these cases, additional analysis of key criteria or a sensitivity analysis may assist in substantiating a higher ranking of a particular alternative. In addition, the comparison may take into account factors that remain uncertain, or the "known unknowns" of a project alternative. For example, comparison of project alternatives developed for an automated facility could consider speculative issues such as:

- Impact of future labor negotiations on manning and jurisdiction,
- Impact of potential future energy cost instabilities,
- Impact of external future IT improvements on cost of automation, or
- Additional revenue from anticipated but unidentified activities.

The ranking and comparison should clearly demonstrate that one alternative is preferable to the base case and to the other reasonable project alternatives considered during the planning process.

### 2.2.3 Recommended Project

Once the project alternatives have been compared, ranked based on separate and/or cumulative criteria score values, and vetted with the stakeholders and project decision-makers, the project team should agree on a recommended project. Clearly and completely document the findings, interpretations, limitations, conclusions, and judgments that led to the selection of the recommended project.

Once a project alternative is identified as the recommended project, identify any specific attributes from that project alternative that did not perform as well as the same attributes on the other alternatives. Consider incorporating the higher performing attributes from the other alternatives into the recommended project to optimize feasibility.

For example, one of the lower performing alternatives could include the best rail access attributes. Integrating the high performing attribute into the recommended project will require an evaluation of the impact of such a project change (e.g. adding the rail attribute to the recommended project may decrease the performance of other criteria). Therefore, it is important to investigate such opportunities for increased project feasibility in a sensitive and systematic process. Once the recommended project's feasibility is optimized, it is ready to be considered for alternative financing and funding approaches.





# Financing

While every port investment project is different, and each project plan has unique attributes, ports should generally evaluate and approach the feasibility of investment opportunities using an approach grounded in prudent due diligence and fundamental credit/investment evaluation. Ports function as intermodal facilities for goods and passengers, and they are by necessity public-private partnerships in the broadest sense. As a result, the range of financial solutions for public ports is very broad. In order to make the best use of scarce funding sources, it is important for port owners to understand the full range of potential financial structures, and not be wed to just one potential solution.

The finance processes presented in this section and shown in Exhibit 3-1 are the steps that have been undertaken in port project financings. They have been successfully used to attract billions of investment dollars for public port and transportation enterprises.

## 3.1 Strategize

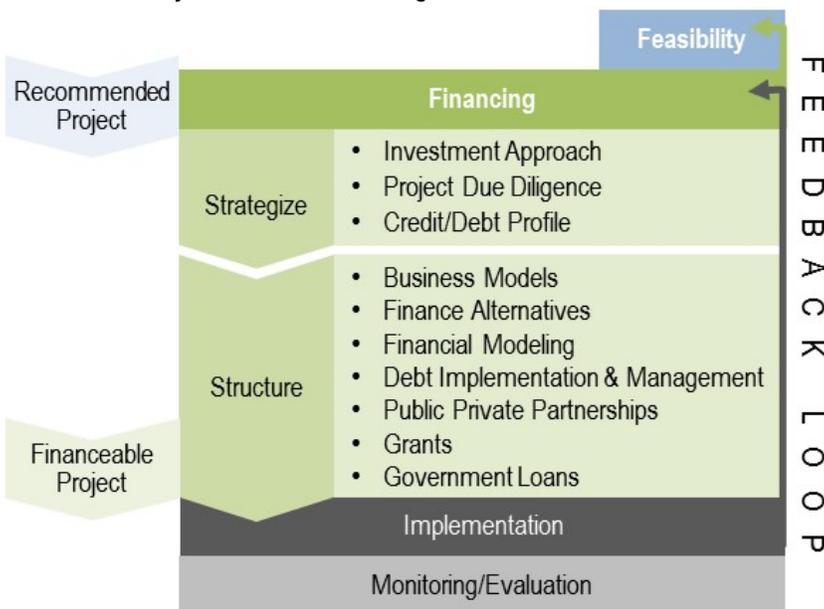
The port industry is very fragmented from a financial markets perspective. Larger ports tend to have large scale projects and capital improvement programs (CIP), along with sophisticated capital structures necessitated by such extensive capital needs. Smaller ports with fewer or smaller projects may rely more on governmental and operating funding sources for ongoing CIP requirements. As such, strategy is a primary consideration of any investment decision, and a key factor when defining the various project objectives, strategies and timelines for pursuing selected forms of infrastructure investment and delivery.

### 3.1.1 Investment Approach

The project finance or public private partnership (P3) approach should be in congruence with a port's underlying mission and the specific project objectives established in the Initiate stage. For example, would the port owner prefer to seek upfront fee from a P3 concession for use on other port facilities, or would maximizing revenue sharing from the project better meet the port owner's long-term needs?

A review of port financial and planning documents and legal framework is needed in order to develop an understanding of the finance options available for the recommended project and how capital investment might further the port's strategic goals. The review should help the port, investors, and other stakeholders to understand the overall strategic guidelines and criteria regarding the identification of appropriate project/P3 opportunities, the utilization of financing structures, and the selection of potential private sector partners. Ultimately, a port's strategic goals for any given project should inform any approach to capital investment.

**Exhibit 3-1 Project Definition: Financing Process**



Further, many port owners utilize policy documents to guide decision processes. Policies relevant to funding strategies may include:

- **Debt/Financing Policy:** establishes guidelines regarding debt issuance for funding capital investment, including capital structure and risk parameters. Some port owners will also have a separate swap policy to guide decisions on the use of swaps (for example, interest rate swaps on debt).
- **P3 Policy:** establishes guidelines and criteria regarding the identification of appropriate P3 opportunities, selection of private sector partners, and parameters for entering into related agreements.

Depending on state law and legislation, many port owners may utilize state and/or local statutes to guide their internal policy documents. The material and processes included in this section assume that a port owner has the legal ability to issue debt and/or enter into P3 contracts, without regard to state and/or local statutes of any particular port locality.

### 3.1.2 Project Due Diligence

Due diligence requirements for a given port project vary depending upon the type and size of project/port. For example, projected cargo and revenue data is important for large cargo terminal development projects given the financing requirements, particularly for project finance/P3s.

However, a port owner seeking to finance some small CIP projects for existing facilities and/or

refinance some outstanding debt could have simpler requirements. They might use historical audited operating and financial results and a historical net revenue over maximum annual debt service Additional Bonds Test under an existing bond indenture to meet new money financing requirements. Therefore, an initial step in project due diligence is to understand the nature of the project and how it fits into the overall port system financing scheme.

Typically relevant data regarding the port is available in an enabling act, master plan and/or strategic plan. In addition to reviewing these documents, other itemized factors to review may include, but are not limited to, those listed in Exhibit 3-2.

Evaluating investment opportunities for large project developments will require cargo demand and revenue studies, forecasts of initial CapEx, R&R requirements and estimated OpEx needed for a terminal or other port facilities.

**Exhibit 3-2 Due Diligence Factors**

Due Diligence Factors	
Organizational and Regulatory Documents	Legal
Financial	Legal basis to pursue P3 and/or other financing options
Audited financials to include breakout of port costs - 3 years	Attorney letters and pending litigation
Monthly revenue reports, container throughput, and operating statistics - 3 years	Board minutes
Material Contracts	Insurance
Shipping line 1	Summary of coverages
Shipping line 2	Claims - pending and last 3 years
Shipping line 3	Market Information
Operator	Market Studies
Miscellaneous facility use agreements	Master plans
Purchase and supply agreements	Port marketing materials
Real Property	Media clips
Maps/photos, as-built drawings, rail layout	Environmental
Intermodal-rail lease agreements	Phase One assessments
Fixed asset inventory	Permit status, violations, citations
Land and building titles/deeds	Historical and projected capital expenditures
Copies of permits	Historical - past 5 years
Condition assessments	Projected CapEx
Property management forms	Expansion Plans
Labor Contracts	Current design
Terminal/cranes - policy, staffing, performance	Berth & crane capacity analysis
State Department of Transportation Policy	Contracting requirements



For smaller scale projects, a port owner may not need an outside study of demand and revenue and costs, instead relying on in-house expertise and forecasts. Any capital investment evaluation, including of a lease/

concession, must incorporate a thorough understanding of the underlying business economics.

Additionally, the due diligence should incorporate a *risk analysis*, which is needed to quantify a range of likely economic outcomes. A further aspect of project due diligence is an analysis of the ports' outstanding debt and how existing capital structures might impact future investment decisions. For example, some P3 capital investment structures would require the *defeasance* of pre-existing debt, and the economics of any such defeasance must be factored into the overall evaluation.

Thus, the approach to project due diligence (Exhibit 3-3) necessitates extensive cost and revenue forecasting, *credit rating* (if relevant) and capital markets financing experience to adequately address the nuances of any given port project financing.

### 3.1.2.1 Feasibility Screening

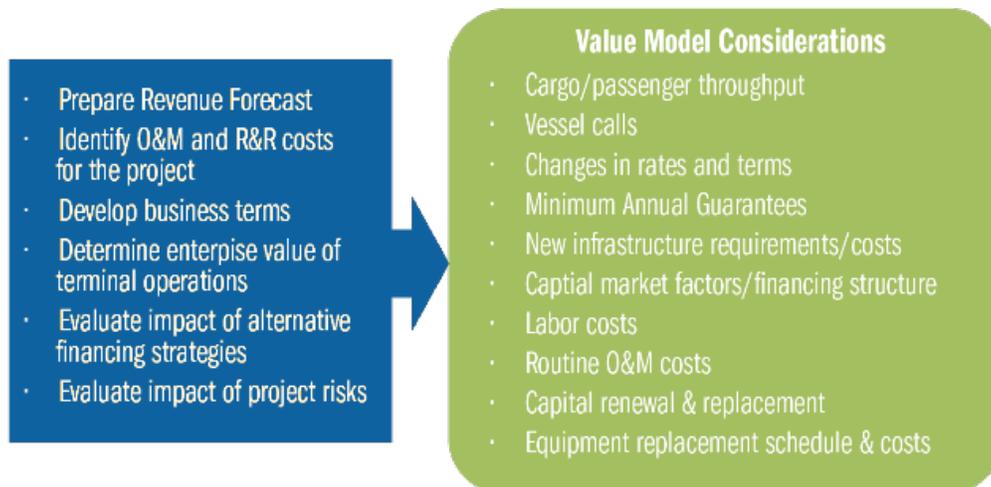
An early step in screening involves a review of existing demand forecasts and cost data, in order to assess what additional information is needed to make a preliminary determination of the recommended project's financial feasibility. As project definition activities proceed, it is critical to review the costing, financing, and operation and maintenance (O&M) documents, and the demand and revenue forecast as these elements are key drivers of the economic feasibility of a project.

In most instances, for a project that requires third party public financing to be economically viable, the development of investment-grade revenue and cost forecasts are required. The term "*investment grade*" is used to signify the level of detail and risk analysis required by the credit rating agencies in order for them to assign a rating of investment grade or above.

An investment-grade cost and revenue forecasts for the project are critical to a port owner's decision-making process and would be an integral

part of any final financing plan, assuming access to third party public financing is desired. A port owner and its advisors should be involved in the process of developing and reviewing these projections/reports and maintain an emphasis on credit standards to ensure that access to financial markets and partners is achievable for the project.

**Exhibit 3-3 Due Diligence Approach**



- Prepare Revenue Forecast
- Identify O&M and R&R costs for the project
- Develop business terms
- Determine enterprise value of terminal operations
- Evaluate impact of alternative financing strategies
- Evaluate impact of project risks

#### Value Model Considerations

- Cargo/passenger throughput
- Vessel calls
- Changes in rates and terms
- Minimum Annual Guarantees
- New infrastructure requirements/costs
- Capital market factors/financing structure
- Labor costs
- Routine O&M costs
- Capital renewal & replacement
- Equipment replacement schedule & costs

The screening tasks outlined in Exhibit 3-4 are overlapping and iterative since components such as demand and revenue often change. The output from this assessment can be used to determine if a port owner should proceed with the recommended project as planned, modify the project alternatives to meet market demand and cost limitations, or to discontinue the project altogether.

### 3.1.2.2 Risk Analysis

As discussed in Section 2.1.4 of this module, the port owner and other project team members should develop and evaluate risk factors that could impact the viability of the recommended project. Key inputs to the development of the financing options will be the results of the revenue, and CapEx and OpEx forecasts. As such, evaluate these inputs to determine potential deviations from estimates.

The major financial elements of this stage of work effort include:

- Define project financing risks and evaluation criteria/measures in order to craft and assess the impact to financial scenarios
- Use risk adjusted revenue forecasts, OpEx estimates and CapEx forecasts and implementation schedules to test and refine different financing strategies
- Identify stress points in the project pro forma cash flow due to the sensitivity analysis
- Develop credit rating and investor risk mitigation strategies and incorporate the same into the plan of finance
- Identify a short list of mitigating financial strategies with key decision makers and project team members

For smaller CIP financings that fit within a port's overall system financing structure, risk analysis may be limited if system net revenues are clearly sufficient to support additional debt service requirements.

### Exhibit 3-4 Financial Feasibility Components

<b>Demand &amp; Revenue Report:</b> estimate future cargo/passenger market and operating performance of port operations under current and alternative operating structures
Overview of regional, national and international cargo/ passenger markets
Conduct detailed market analysis for the port/terminal of the current and potential cargo/passenger markets
Rate and volume measurements and revenue projections - 30+ years
Develop capacity measures of cargo/passenger operations
Determine market driven capacity enhancements
<b>Engineering Report:</b> estimate project capital costs, and operating and lifecycle costs of port assets, under current and alternative operating structures
Existing facilities and operations
Project description including: location, regional market, design capacity, and purpose (e.g. support new container business)
Recommendations for infrastructure and equipment to meet capacity needs, versus baseline capacity
Estimate and itemize capital costs
Projected operating & maintenance costs - 30+ years
Future renewal & replacement costs - 30+ years
<b>Plan of Finance:</b> using net revenues and cost estimates from the demand & revenue and engineering reports, develop a preliminary plan of finance
Consider various potential business terms
Consider enterprise value of port/terminal asset
Alternative financing strategies may be necessary to meet investor, creditor, and rating agency thresholds

That is, the risk analysis may be limited to system wide strains on net revenues or an evaluation of how present day financing fits into the system plan of finance if future capital needs are on the horizon, all of which can be analyzed via a port system cash flow model approach. Alternatively, for large project developments, all risk assessments and sensitivity scenarios should be evaluated primarily through a project-specific financial model.

Risks manifest themselves in different ways depending upon the timing and type of risk, as well as the structure of the financial plan. For example, construction risk could result in additional public funds being needed for project completion.



Mitigation factors include design-build contracts with fixed prices and liquidated damages for late completion, as well as capital cost contingencies and capitalized interest.

Other potential considerations pertain to the ability of a port to issue subordinate debt under an existing bond indenture, or the ability to include additive project net revenues when determining additional bond test thresholds upon the issuance of new project debt secured by port system net revenues. While some ports already have bond indentures structured to accommodate subordinated liens and projected revenues, other ports rely on more limiting bonding parameters in their indentures.

Depending on the circumstances, there may be methods to restructure existing bond indentures without harming existing debt holders or jeopardizing credit ratings. For example, “closing” an existing senior lien indenture and creating a new subordinate lien indenture as the functional indenture going forward, with effective second and third liens. Careful consideration must be made regarding potential impacts to credit ratings and future borrowing capacity.

### 3.1.2.3 Outstanding Debt Considerations

Undertake due diligence to understand the nuances of a port’s outstanding debt to determine how existing capital structures might impact future investment decisions. For ongoing CIP financings that fit within the context of a port’s system capital structure, care must be taken such that investment/financing decisions do not result in breaking through the floors of both bond indenture debt service coverage thresholds as well as rating agency debt service coverage ratio ranges, as relevant.

Separately for project finance/P3 undertakings, certain P3/concession capital investment structures may, for example, require the defeasance of pre-existing debt, and the economics of any such defeasance must be factored into the overall project evaluation. Two key steps are to figure out 1) which of the port’s outstanding debt issues should be allocated to which facility, and 2) the cost to defease/terminate this debt and any related interest rate swaps assuming such debt is allocated to the facilities upon which the recommended project will be developed. Outstanding debt that was issued directly for the subject terminal facilities, as well as debt that was partially/indirectly used for the subject facilities needs to be examined.

### 3.1.3 Credit/Debt Profile

Creditworthiness, and thus financial viability, underpins all capital investment decisions, and so port owners must develop a thorough understanding of their creditworthiness and traditional debt programs. Traditional debt programs are often the easiest and least expensive to implement, and therefore they should not be overlooked while also considering new project delivery techniques.

Understanding the credit rating process and potential impacts related to any specific project under consideration for capital investment is a key step for two different but important reasons. First, utilize the due diligence and credit profile to help assess the attractiveness of the project for outside investment. Is the project creditworthy as a stand-alone enterprise outside of a “system” financing? Second, determine the impact, if any, on the port’s existing credit ratings.

Capital markets financing and P3s can have unintended consequences to a port's financial operations if not properly structured. As such, analyzing and comprehending the port's [credit/debt profile](#) must be completed with a broad perspective.

### 3.1.3.1 Credit Elements of Project Finance

Project finance credits in the transportation sector can require analysis of complex data and project structures. Further, the characteristics of project creditworthiness vary across delivery methods and sub-sectors such as ports. Generally, project finance attributes include the following:

- Non-recourse debt – debt holders cannot look to the general obligation or full faith and credit of the public project sponsor
- Capital financing is secured by project operating revenues
- Construction risk is incorporated into the financing credit
- O&M risk is incorporated into the financing credit
- Financial plans typically incorporate a full lifecycle cash flow analysis
- Credit ratings are typically lower due to construction risk, long-term revenue uncertainty, and long-term OpEx uncertainty
- More complex and innovative contracting
- More complex and innovative debt structures

Inherent in project finance structures is the notion that a new project will be constructed, and if the construction contracting method chosen involves a third party, such as via a design-build contract, then related considerations and analysis include:

- Detailed description of the contractor's qualifications and the construction contract terms - The contract discussion should include the price, risks shifted to the contractor, schedule, performance and payment bond requirements and providers, liquidated damages and how those are sized,

any warranty period or other terms that the general engineering consultant views as important.

- Description and estimate of any port project costs that are outside of the design-build contract such as land purchases or construction management.
- Risk estimates for all port costs and any design-build contract risks assumed by the port - The engineering report should describe these risks and provide both cost and time potential impacts. Following these risks, mitigation measures need to be detailed. Examples of mitigation measures include: contingency funds built into the contract, owner's provided insurance, capitalized interest beyond construction completion to absorb delays, among other measures.
- A contractor replacement analysis should the contractor go bankrupt - This analysis should show how much incremental time and money would it take to complete the recommended project, net of any payments made by bond providers. A description of how the port would cover these costs is also necessary.





More broadly, elements and sub-elements of credit to consider when evaluating project viability include, but are not limited to, those shown in Exhibit 3-5.

**Exhibit 3-5 Elements of Credit**

<b>Socio-Economic Need</b>
<ul style="list-style-type: none"> <li>• Safety</li> <li>• Environment</li> <li>• Economic development</li> </ul>
<b>Economically Justified</b>
<ul style="list-style-type: none"> <li>• Efficient transportation</li> <li>• Generates revenues</li> <li>• Connecting key business/trade regions</li> </ul>
<b>Revenue Study</b>
<ul style="list-style-type: none"> <li>• Economic forecast</li> <li>• Demand forecast</li> <li>• Independent and credible</li> <li>• Bond offering disclosure</li> </ul>
<b>Construction &amp; Operating Issues</b>
<ul style="list-style-type: none"> <li>• Construction and O&amp;M cost risk</li> <li>• Lump sum/fixed price contracts</li> <li>• Financial strength/performance of construction team</li> </ul>
<b>Risk Management Plan</b>
<ul style="list-style-type: none"> <li>• Environmental mitigation</li> <li>• Construction completion</li> <li>• Surety bonds &amp; insurance</li> </ul>
<b>Public Support &amp; Public Interest</b>
<ul style="list-style-type: none"> <li>• State and local political support</li> <li>• Federal agencies</li> <li>• Public equity/funding for EIS, design and engineering</li> </ul>

**3.1.3.2 Port Credit Attributes**

In addition to general project finance credit elements, port financing approaches, including for both project finance/P3s and ongoing CIP financings, entail specific credit criteria for repayment quality. Included below is a brief review of the credit attributes considered important by market analysts. Each of the rating agencies uses their own specific qualitative and quantitative factors in reviewing port credit attributes. The focus is on port operating revenue attributes, but certainly the introduction of state or local tax-backed sources would change the credit profile somewhat, potentially in a positive way.

**Market Position**

**Competitive dynamics:** Since many ports are engaged in multiple lines of business - containerized, breakbulk or bulk cargo operations; passenger cruise activity; or real estate development - the competitive dynamics of each sub-market must be understood, including the degree of competition from other ports.

**Location and local economy:** Location affects travel time to and from major trade partners, transportation links to inland markets, and local demand for port import products and supply of export products.

**Importers and distribution centers:** Port of entry or exit is increasingly tied to a port’s relationship with importers and its proximity to major distribution centers.

**Measuring demand:** Certain key demand measures and trends include market share, market size, share of discretionary cargo (cargo that is destined for or originates from outside of the port’s Metropolitan Statistical Area), the balance of trade (the ratio of volume of imports to exports), cargo volume (as measured most commonly by twenty-foot-equivalent units, or TEUs), cargo tonnage, and cruise activity.

**Structural and Operational Factors**

**Governance structure:** A port’s ruling body might be a local or state government, or an independent board. The governance structure may determine if a port must compete with other public entities for public funds, divert port revenues to support non-port operations, and the type of debt a port can issue. Ports may also be operated by a private concessionaire under a long-term agreement with a state or local government.

**Scope and nature of operations:** Considerations for an authority managing multiple business lines or facilities include the mix of revenues pledged to the system’s debt, and the extent the port

operation makes a net revenue contribution to or receives an operating or capital subsidy from the authority's other business lines.

**Operating structure:** There are two basic types of port operating structures: (1) Landlord ports - leased to a private operator, and lease payments are usually based upon a minimum annual guaranteed payment and an amount tied to cargo volumes; and (2) Operator ports - facilities are used on a common carrier basis with the port controlling use of the facilities, and performance is dependent upon cargo volume.

**Facilities, capacity, and transportation infrastructure:** Key factors include (a) depth of main access channel, turning basin, and berths, (b) number and type of cranes, (c) wharfage and dockside facilities, (d) presence of on-dock or near-dock rail facilities, (e) terminal capacity, (f) railroads serving the port, (g) proximity to highway network, and (h) availability of land for storage and expansion.

**Cargo mix:** Diversity in cargo operations generally will have a positive effect on a port's overall credit profile.

**Major trading partners:** The strength and growth prospects for a port's trading partners, including trade route distribution, are an important factor in credit evaluation.

**Major shipping lines and alliances:** A factor in the analysis of ports is the diversity and financial strength of the shipping lines calling at a port. Shipping alliances add another layer of uncertainty for ports - as partners realign, they may radically change the amount of cargo shipped through a port in a relatively short period of time.

**Labor relations and productivity:** Successful ports have the advantage of well-managed labor relations and above-average productivity, including the use of new technology to gain efficiencies.

## Financial Factors

**Financial performance:** Key financial factors include revenue stability, revenue diversity, debt service coverage, and expense drivers.

**Balanced operations:** The ability to achieve a balanced bottom line to mitigate variable operating performance is important for the long-run financial health of all ports and becomes critical for those that do not have significant financial reserves.

**Operating and non-operating revenues:** An important consideration is the extent to which a port owner relies on operating revenues and non-operating revenues, such as federal grants, state funding sources, or local tax support to cover operating and capital expenditures.

**Revenue stability:** Minimum annual guaranteed payments required by contracts with the port's customers can help insulate a port's financial operations from cargo fluctuations.





**Revenue diversity:** Ports with greater revenue diversity are often financially stronger because of the stability that multiple revenue sources provide. Diversity of revenue stream by business line, such as cargo, cruise, and real estate, and by revenue type, such as wharfage, dockage and lease revenue, determine a port's reliance on any particular income source.

**Debt service coverage:** Debt service coverage calculations measure a port owner's ability to repay the principal and interest on its debt from net revenues.

**Expense drivers:** Primary port expenses include salaries, administration, security, and cost of operating and maintaining facilities.

#### Debt Position and Capital Plan

**Debt levels:** An analysis of the relative leverage of a port's assets or revenues can reveal vulnerabilities to debt service coverage over the life of the bonds.



**Capital and financing plans:** Analysis of a port's credit quality includes a review of the strategic and economic rationale of the capital program, its underlying assumptions relating to market development and cargo growth, and the effect that the program is likely to have on a port's financial and debt position.

**Debt security:** Debt security considerations include the type of pledge (gross revenue or net revenue), the type of revenues pledged (port revenues, tax revenues, lease payments, etc.), availability of other resources (*debt service reserve* funds and operating and maintenance reserves), and the strength of the bond *covenants* (*rate covenant* and *additional bonds test*, etc.).

**Debt structure:** Debt structure considerations include the mix of variable and fixed-rate debt, whether debt service is level, accelerated or deferred, and whether or not there are any interest rate swap agreements.

#### Management and Business Strategy

**Responses to industry risks:** In assessing a port owner's ability to respond to a variety of risks and opportunities, key indicators include a coherent long-range strategic plan, clearly articulated debt and investment management policies, past record of successfully dealing with industry volatility, and the ability to achieve favorable results such as balanced operations.

**Budgeting practices:** Assessment of budgeting practices includes reviewing a port owner's method of budgeting and of monitoring the budget to determine whether sufficient flexibility and controls are in place to prevent surprises.

#### 3.1.3.3 Rating Agency Considerations

Underlying credit ratings are of paramount importance to bond investors, particularly given that bond insurance is currently less widely used to back-stop port bond issues. The rating agencies change their guidance from time to time and it is important to understand how the changes will affect a port's credit rating.

Port owners need to understand how each rating agency analyzes their credit – while the rating agencies look at similar fundamentals, each agency can have a slightly different view and analytical approach. Additionally, rating agency annual surveillance is an important process in the bond market to ensure ongoing credit transparency.

Port owners and/or their advisors should be familiar with rating agency requirements (Exhibit 3-6). Regular discussion regarding credit trends with senior transportation/port analysts at S&P, Moody's and Fitch is imperative to positive credit rating outcomes.

Rating agency outreach efforts can be accomplished through the preparation of presentation materials that provide a comprehensive assessment of key credit strengths such as:

- essentiality and strong economic rate making ability;
- cargo/passenger demand;
- financial operations and management;
- debt service coverage and *liquidity*;
- efforts to improve capital assets and serve customer needs; and
- initiatives to mitigate and manage risks, such as cost containment measures and steps to address the effects of slow economic recovery cycles.

Participate in rating meetings and periodic update calls to ensure the rating agencies have a clear understanding of a given port/project.

Regularly communicate with the rating agencies in order to define the rating strategy, prepare relevant presentation materials and participate in meetings with analysts to keep them up to date and address their concerns. Such regular dialog means the port owner can anticipate and proactively respond to issues to avoid their manifestation into a negative rating action.

Exhibit 3-6 Credit Rating Criteria



Similarly, regular dialog about the port owner's plans and commitments to operate and maintain its infrastructure in a state of good repair, address growing transportation needs and ensure bondholder protection will help reinforce efforts to secure improved ratings.

As part of this effort, conduct stress tests consistent with rating agency guidelines to assess the flexibility of the financial strategy to address downside risks. Potential stresses that could be tested include the impacts of cargo declines consistent with recessionary periods, increases in capital plan costs, increases to future financing costs, operating expenses, etc. Based on the results of alternative stress scenarios, potential mitigation strategies can be identified that can be used to demonstrate to the rating agencies the port's wherewithal to address such challenges.

Additional information from the rating agencies can be found on their websites:

- [www.fitchratings.com](http://www.fitchratings.com)
- [www.moody.com](http://www.moody.com)
- [www.standardandpoors.com](http://www.standardandpoors.com)



### 3.1.3.4 Debt Profile

A port's debt profile is an important investment/credit consideration as it may determine the ability to use debt to finance infrastructure projects, and also serves as a key component in any repayment analysis.

As an example, for an on balance sheet system financing, existing debt and debt structures may limit additional debt capacity for a project. For an *off balance sheet* privately secured financing, the structure of the debt can determine its attractiveness to third party investors. Investors, creditors, and rating agencies may view debt profiles from different vantage points, however the underlying question to be answered - i.e. what is the probability that the capital provider will be fully repaid on time? - remains the same across capital markets participants. Some key features of debt instruments that compose debt portfolios are listed in Exhibit 3-7.

### Exhibit 3-7 Key Features of Debt Instrument

Security for Debt - tax-backed, net operating revenue, lease revenue, etc.
Bond Indenture <u>flow of funds</u> - senior and subordinate repayment structures
Rate Covenant and Additional Bonds Test - debt service coverage levels
Credit Rating
Type of Debt - public, private, government program

For port owners to attract outside investment, they must maintain constant dialogue with investors, creditors and rating agencies and present clear, concise information on port capital structure. A debt profile summary can be utilized, which is a detailed description of an issuer's overall debt portfolio and credit profile that is updated as changes in capital structure occur. A debt profile summary typically includes all of the relevant information about an issuer's debt including current ratings, debt service graphics, debt service coverage and eligibility for refunding. Exhibit 3-8 shows example debt profile components/outputs.

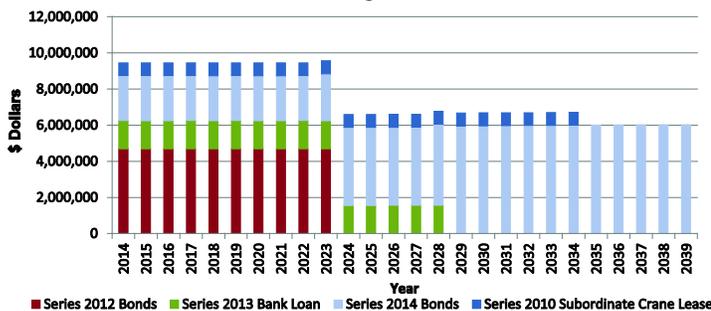


Exhibit 3-8 Debt Profile Summary

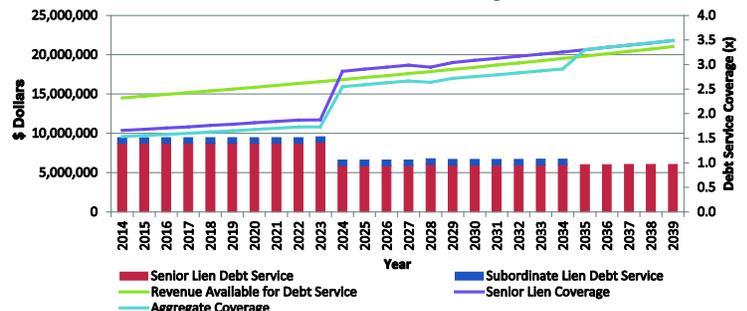
Year	Series 2012 Bonds			Series 2013 Bank Loan			Series 2014 Bonds			Total Senior Lien Debt Service
	Principal	Interest	Debt Service	Principal	Interest	Debt Service	Principal	Interest	Debt Service	
2014	\$ 3,490,000	\$ 1,200,000	\$ 4,690,000	\$ 935,000	\$ 630,000	\$ 1,565,000	\$ -	\$ 2,490,000	\$ 2,490,000	\$ 8,745,000
2015	3,595,000	1,095,300	4,690,300	965,000	597,275	1,562,275	-	2,490,000	2,490,000	8,742,575
2016	3,700,000	987,450	4,687,450	1,000,000	563,500	1,563,500	-	2,490,000	2,490,000	8,740,950
2017	3,815,000	876,450	4,691,450	1,035,000	528,500	1,563,500	-	2,490,000	2,490,000	8,744,950
2018	3,925,000	762,000	4,687,000	1,070,000	492,275	1,562,275	-	2,490,000	2,490,000	8,739,275
2019	4,045,000	644,250	4,689,250	1,110,000	454,825	1,564,825	-	2,490,000	2,490,000	8,744,075
2020	4,165,000	522,900	4,687,900	1,145,000	415,975	1,560,975	-	2,490,000	2,490,000	8,738,875
2021	4,290,000	397,950	4,687,950	1,185,000	375,900	1,560,900	-	2,490,000	2,490,000	8,738,850
2022	4,420,000	269,250	4,689,250	1,230,000	334,425	1,564,425	-	2,490,000	2,490,000	8,743,675
2023	4,555,000	136,650	4,691,650	1,270,000	291,375	1,561,375	105,000	2,490,000	2,595,000	8,848,025
2024	-	-	-	1,315,000	246,925	1,561,925	1,830,000	2,490,000	4,320,000	5,881,925
2025	-	-	-	1,360,000	200,900	1,560,900	1,905,000	2,417,168	4,322,168	5,883,068
2026	-	-	-	1,410,000	153,300	1,563,300	1,980,000	2,341,223	4,321,223	5,884,523
2027	-	-	-	1,460,000	103,950	1,563,950	2,065,000	2,262,165	4,327,165	5,891,115
2028	-	-	-	1,510,000	52,850	1,562,850	2,315,000	2,179,995	4,494,995	6,057,845
2029	-	-	-	-	-	-	3,865,000	2,094,298	5,959,298	5,959,298
2030	-	-	-	-	-	-	4,025,000	1,940,125	5,965,125	5,965,125
2031	-	-	-	-	-	-	4,195,000	1,779,728	5,974,728	5,974,728
2032	-	-	-	-	-	-	4,370,000	1,612,690	5,982,690	5,982,690
2033	-	-	-	-	-	-	4,550,000	1,438,598	5,988,598	5,988,598
2034	-	-	-	-	-	-	4,740,000	1,257,243	5,997,243	5,997,243
2035	-	-	-	-	-	-	4,935,000	1,068,418	6,003,418	6,003,418
2036	-	-	-	-	-	-	5,140,000	871,708	6,011,708	6,011,708
2037	-	-	-	-	-	-	5,355,000	666,905	6,021,905	6,021,905
2038	-	-	-	-	-	-	5,575,000	453,595	6,028,595	6,028,595
2039	-	-	-	-	-	-	5,790,000	240,285	6,030,285	6,030,285
Total	\$ 40,000,000	\$ 6,892,200	\$ 46,892,200	\$ 18,000,000	\$ 5,441,975	\$ 23,441,975	\$ 62,740,000	\$ 50,014,140	\$ 112,754,140	\$ 183,088,315

Series 2010 Subordinate Crane Lease			Subordinate Lien Debt Service	Aggregate Debt Service	Revenue Available for Debt Service	Senior Lien Coverage	Aggregate Coverage	Credit Ratings	
Principal	Interest	Debt Service						Moody's	A1 (stable)
\$ 312,801	\$ 400,000	\$ 712,801	\$ 712,801	\$ 9,457,801	\$ 14,500,000	1.66x	1.53x	S&P	A+ (stable)
325,313	387,488	712,801	712,801	9,455,376	14,717,500	1.68x	1.56x	Fitch	A+ (stable)
338,326	374,475	712,801	712,801	9,453,751	14,938,263	1.71x	1.58x		
351,859	360,942	712,801	712,801	9,457,751	15,162,336	1.73x	1.60x		
365,933	346,868	712,801	712,801	9,452,076	15,389,771	1.76x	1.63x		
380,570	332,231	712,801	712,801	9,456,876	15,620,618	1.79x	1.65x		
395,793	317,008	712,801	712,801	9,451,676	15,854,927	1.81x	1.68x		
411,625	301,176	712,801	712,801	9,451,651	16,092,751	1.84x	1.70x		
428,090	284,711	712,801	712,801	9,456,476	16,334,143	1.87x	1.73x		
445,213	267,588	712,801	712,801	9,560,826	16,579,155	1.87x	1.73x		
463,022	249,779	712,801	712,801	6,594,726	16,827,842	2.86x	2.55x		
481,543	231,258	712,801	712,801	6,595,869	17,080,260	2.90x	2.59x		
500,805	211,996	712,801	712,801	6,597,324	17,336,463	2.95x	2.63x		
520,837	191,964	712,801	712,801	6,603,916	17,596,510	2.99x	2.66x		
541,670	171,131	712,801	712,801	6,770,646	17,860,458	2.95x	2.64x		
563,337	149,464	712,801	712,801	6,672,099	18,128,365	3.04x	2.72x		
585,871	126,931	712,801	712,801	6,677,926	18,400,290	3.08x	2.76x		
609,305	103,496	712,801	712,801	6,687,529	18,676,295	3.13x	2.79x		
633,678	79,124	712,801	712,801	6,695,491	18,956,439	3.17x	2.83x		
659,025	53,776	712,801	712,801	6,701,399	19,240,786	3.21x	2.87x		
685,386	27,415	712,801	712,801	6,710,044	19,529,398	3.26x	2.91x		
-	-	-	-	6,003,418	19,822,339	3.30x	3.30x		
-	-	-	-	6,011,708	20,119,674	3.35x	3.35x		
-	-	-	-	6,021,905	20,421,469	3.39x	3.39x		
-	-	-	-	6,028,595	20,727,791	3.44x	3.44x		
-	-	-	-	6,030,285	21,038,708	3.49x	3.49x		
Total	\$ 10,000,000	\$ 4,968,822	\$ 14,968,822	\$ 14,968,822	\$ 198,057,137				

Outstanding Debt Service



Debt Service Coverage





### 3.2 Structure

Port owners need a process to develop a range of finance alternatives to consider before determining the most appropriate structure to move a project forward. Project stakeholders must qualitatively evaluate the advantages and disadvantages of public, hybrid, and P3 operating and financial alternatives as it relates to the port and the project. Some alternatives may prove to be unfeasible or undesirable and would thus be eliminated from further consideration.

For example, a port owner may be interested in availability payment P3s, but if the port doesn't have significant non-operating revenues to make those payments and/or its revenues are already pledged to outstanding indebtedness, then an availability payment structure does not make sense. Thus, a framework is needed for a qualitative analysis of financing structures.

The results of a structural alternatives analysis should enable a port owner to understand the detailed advantages and disadvantages of various financing alternatives before choosing a particular path. One of the more important aspects of investment decisions is to realize that certain finance approaches may not be in the best interest of the port.

#### 3.2.1 Port Business Models

Project development and P3s should be considered strategically within the range of procurement alternatives available to ports. U.S. ports have traditionally used capital financing approaches that have corresponded to a variety of operating models. Each financing approach and operating model have associated attributes with respect to key factors such as management control, types of contracts/lease agreements, facilities financed, type of and security for debt, tax

**Exhibit 3-9 Port Operating Models**

Financing Approach	Public Agency Tax-Backed	Public Agency Operating Revenues	Long Term Landlord Finance	P3 Concession
Operating Model:	Public Operator	Public Operator/ Landlord	Long Term Landlord	Passive Landlord
Primary Management Control:	Public	Public	Public-Private	Private
Typical Contracts & Lease Agreement:	N/A for Grants & Tax Revenues	Multiple Tenants; Variable Contracts Discretionary Terms	Single Tenant; Long Term Must Cover Debt	Single Tenant; Longest Term to Cover Debt & Equity Return
Typical Facilities Financed:	Public Use; Infrastructure such as Roads and Dredging	Private Activity; Docks, Wharves, Cranes, Warehouses, Buildings, etc.	Private Activity; Docks, Wharves, Cranes, Warehouses, Buildings, etc.	Private Activity; Docks, Wharves, Cranes, Warehouses, Buildings, etc.
Sources of Revenues and Security for Debt:	Grants, Gov't Transfers, Taxes	Tariffs, Throughput Fees, Security Fees, Facility Lease Revenue, etc.	Corporate Rental Minimum Guarantee & Throughput Fees	Tariffs/Lease Revenue, etc. Received by Private Concessionaire
Type of Debt:	Agency Revenue Bonds	Agency Revenue Bonds	Agency Special Purpose Conduit Bonds	Privately raised Debt & Equity
Tax Status/Term:	Gov't Purpose & AMT Tax-Exempt 10-30 years	Gov't Purpose & AMT Tax - Exempt 10-30 years	AMT Tax-Exempt 20-40 years	Taxable Debt 50-99 years
Primary Private Partners:	Shipping Company, Railroads, Private Haulers/Trucks	Shipping Company, Railroads, Private Haulers/Trucks, Terminal Operator	Terminal Operator/ Corporate Guarantor (likely operator parent and/or shipping co.)	Private Equity Concessionaire

status and debt terms. Each approach can be implemented successfully, and the approach used depends in part on management’s preferences and public support.

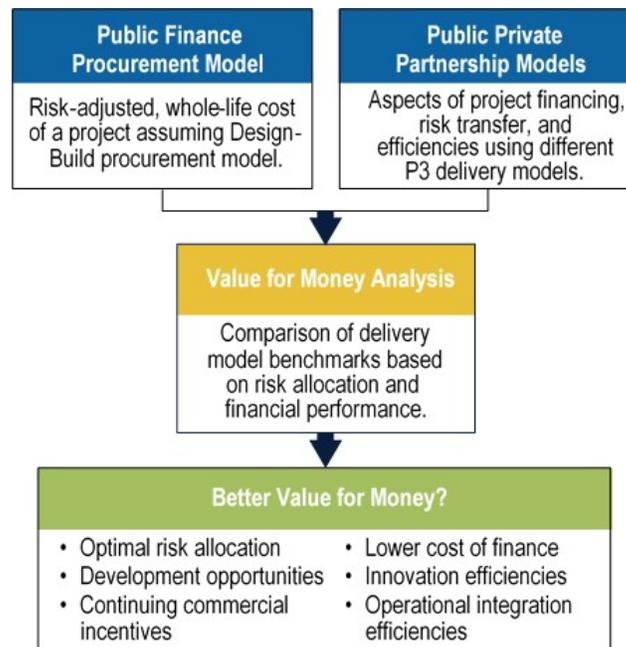
Exhibit 3-9 outlines four approaches most often seen in use today. The P3/concession/equity approach has received much attention in recent years, spurred on by private equity funds aggressively seeking infrastructure investment alternatives. The long-term landlord approach is a hybrid model involving a long-term single tenant *operating and use lease agreement*, with the port issuing municipal finance secured on payments from the tenant alone. One of these two models might be the basis for a port owner’s consideration of a new P3 transaction and would help define any negotiation, however, public alternatives should also be evaluated and can provide a comparison by which to measure the P3 alternatives.

In practice, the approaches outlined in Exhibit 3-9 are often used simultaneously for different terminals and different projects by the same governmental port agency. For the port as a whole, there is nothing mutually exclusive about these approaches. Port owners can successfully use multiple approaches at once within the entirety of a system of port infrastructure. Port owners must strategically decide how broad or narrow its financing approach might be, in particular in the context of both future expansion as well as ongoing CIP needs.

### 3.2.1.1 Selection of Business Models

Many infrastructure investors advocate *Value for Money (VfM)* analysis to evaluate the benefits of risk transfer under a P3 compared to conventional capital procurement options, and VfM is used in USDOT *major project financial plans*. VfM “prices” risk transfer by producing a discounted net present value amount that represents the aggregate impact of the various sensitivities on the port as procurer.

**Exhibit 3-10 Value for Money Public Comparator Approach**



An assessment of VfM for P3 procurements is a comparative concept, and requires the use of a “public sector comparator” to evaluate VfM, as shown in Exhibit 3-10.

While VfM has its uses for high-level comparative analysis, it was designed for *Availability Payment (AP)* P3s where the public sector is paying for the service in either case and the service portion of the AP is priced to reflect the increased risk the private partner is accepting. This methodology is not intended to be applied to revenue risk P3s. The likely area of application of this kind of P3 for port projects would be common support infrastructure, which benefits the port as a whole, such as highway or freight rail access.

### 3.2.2 Port Finance Alternatives

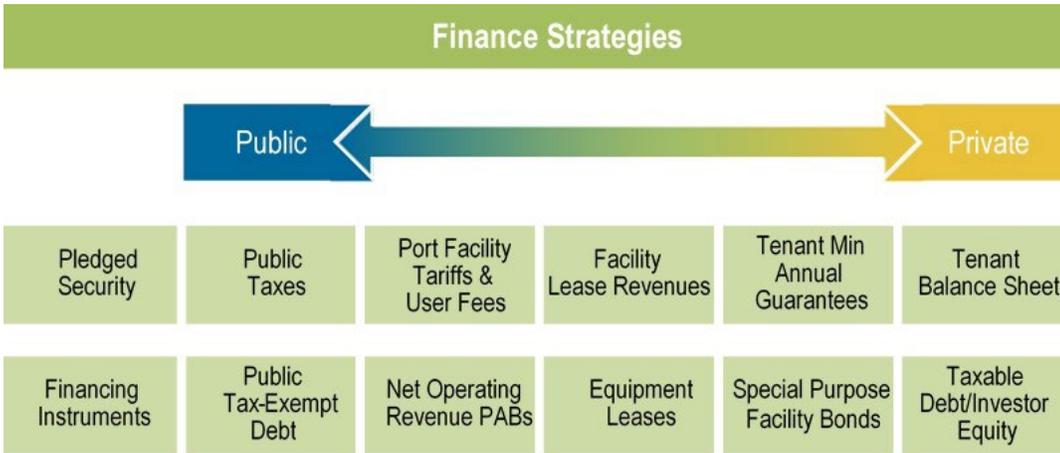
Many U.S. ports issue non-recourse net operating revenue supported debt, typically on a “system” approach as opposed to a single project. Compared to debt raised by P3 concession companies, public ports have typically used very conservative debt practices. Many U.S. ports utilize a variety of tenant lease and use agreements by which private partners might construct, finance and/or operate facilities – the related revenues support various



types of debt. Exhibit 3-11 shows the range of financing strategies employed by ports, from public to private financing, with various security pledges and financing instruments.

general obligation bond financings for “bank qualified issuers” (less than \$10 million of debt in any given calendar year). As the marketplace has changed and as their balance sheets have expanded, banks have begun developing long-

Exhibit 3-11 Port Finance Strategies



term financing tools for larger and larger financings, across a spectrum of security structures. Port owners now have greater opportunity to implement bank loan financings at potentially attractive rates with flexible terms and prepayment provisions.

Generally, smaller sized financings with shorter term lengths (15 years or less) are often more

### 3.2.2.1 Private Activity Bond Features

*Private Activity Bonds (PABs)* are securities issued by a government agency to provide debt financing for private projects that are developed for a public purpose. Because of the public purpose, federal tax law provides that most port capital infrastructure is exempt facilities under the code. The use of PABs typically results in reduced financing costs versus conventional taxable bonds or private bank financing since interest on the PABs is not subject to federal income taxes (unless more than 10 percent of the bond proceeds are designated for private use). PABs are typically payable from payments made by the private user of the property financed, although the bond security structure can vary widely. They can be structured and implemented for both traditionally financed port projects as well as projects involving P3 finance strategies.

efficient when issued as a bank loan, relative to a publicly offered bond issue, due to lower costs of issuance, fewer disclosure requirements and the ability to be issued in a shorter timeframe. Further, some banks may be willing to take on larger financings in excess of \$100 million at more attractive terms than can be achieved via the public bond market.

### 3.2.2.2 Commercial Bank Financings

Historically, commercial banks participating in the public finance markets would provide small,

When a port owner considers an upcoming financing need, an analysis should be completed as to whether a *publicly offered* financing or a *privately placed* bank loan would be more efficient. The port owner and advisors should take all factors of the financing into consideration (term, size, principal structure, credit, and market conditions) and summarize the financing alternatives including expectations of what structure and terms could likely be achieved in the current market, as well as a discussion of the pros and cons of each alternative. Exhibit 3-12 provides a brief summary of some of the pros and cons to consider when analyzing a bank loan financing.

**Exhibit 3-12 Bank Loan Pros and Cons**

Pros	Cons
<ul style="list-style-type: none"> <li>Does not require transaction be rated or insured</li> <li>No offering documents or registration required</li> <li>Banks usually do not require Debt Service Reserve Fund</li> <li>Disclosure usually limited to receipt of CAFR and budget (no official statement)</li> <li>Minimal cost of issuance</li> </ul>	<ul style="list-style-type: none"> <li>Most banks prefer financings with a term of 10 years or less; some will allow terms up to 15-20 years</li> <li>Risk of future tax law changes retained by the issuer. Bank loans usually contain interest rate “gross up” language, providing the bank the right to increase the loan rate should tax law changes negatively impact the bank’s after tax yield.</li> <li>Term limited to 20 years and some banks will not provide a fixed rate for the entire term. Instead, the bank would have a “put” option during the term of the loan (e.g. 5, 10, or 15 years). This allows the bank the options to “put” the loan back to the issuer and force them to refinance at current market rates.</li> </ul>

3.2.2.3 Port Project Finance Bond Alternatives  
 Aside from tax-backed bonds, there are four main security structures that a public port can use to issue debt, either as part of its system of port facilities and/or in a long-term lease/P3 scenario:

- Port Net Operating Revenue Bonds
- Port Asset Backed Debt
- Port Special Purpose Facility Bonds, backed by lessee/concessionaire revenue and parent guarantee
- Port Special Purpose Facility Bonds, backed by the net operating revenue of a single terminal concession, i.e. apart from the port’s “system” net operating revenue

The chosen debt security structure is port and project specific, taking into consideration the unique operating and business characteristics of any given port and project.

Port “System” Net Operating Revenue Bonds

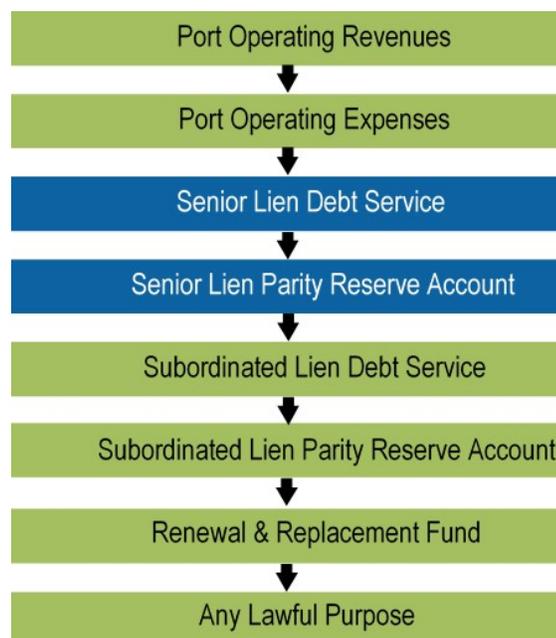
**Security for Debt:** Port system net operating revenue, with a Minimum Annual Guaranty and/or revenue sharing from the long-term lease counted as part of the port’s operating revenue.

**Bond Indenture:** Secures revenues for benefit of debt holders. Flow of funds (Exhibit 3-13) specifies the priority of payments for secured revenues; typically includes provisions for operating expenses, debt service and reserves, renewal &

replacement funds, and any lawful purpose. Issuer covenants specified, including:

- Rate Covenant: 1.20x-1.50x senior lien debt service coverage, 1.10x-1.25x aggregate debt service coverage.
- Additional Bonds Test: 1.25x-1.50x senior lien debt service coverage, 1.10x-1.25x aggregate debt service coverage on a historical and/or projected basis.

**Exhibit 3-13 Senior Lien**



**Credit Rating:** Depends on various factors analyzed by the rating agencies including, but not limited to: size, cargo diversification, trade lanes, demand and revenue, ongoing CIP requirements, debt structure and debt service levels.

- U.S. port credit ratings are typically in the range from AA to high BBB, with the majority in the A category.

**Type of Debt:** Includes publicly issued bonds, private placements, and government loan programs; with fixed and variable interest rates.

Port Asset Backed Debt

**Security for Debt:** Port system net operating revenue, with a Minimum Annual Guaranty and/or revenue sharing from the long-term lease counted as part of the port’s operating revenue.

**Bond Indenture:** Asset-backed debt typically categorized as subordinate debt in the *flow of funds* (Exhibit 3-14). Subordination of debt accomplished via additional hard asset security such as a crane lease or property mortgage.

- Rate Covenant and Additional Bonds Test the same as in the master indenture (see prior section).

**Credit Rating:** Given the subordinated repayment position in the flow of funds, credit ratings assigned to such debt are generally at least one notch lower relative to the senior lien debt.

- Due to asset backing, lease transactions are often privately placed and thus unrated.

**Term of Debt:** Dependent on life of asset.

- Crane Lease: 15-20 years committed funding; 30 year *amortization*.
- Property mortgage: up to 30 years.

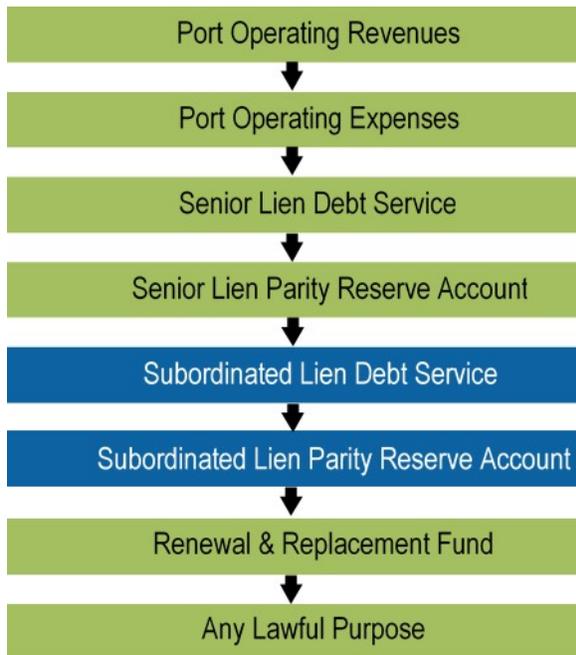
**Type of Debt:** Includes publicly issued bonds, private placements, lease financing, and government loan programs (e.g. State Infrastructure Bank loans); with fixed and variable interest rates.

Port Special Purpose Bonds – Lessee Guarantee

**Security for Debt:** Payments of special purpose rent received by the port or the trustee pursuant to an agreement with lessee/concessionaire. Rent/lease payments supported by a corporate guaranty. Additional bond security can be provided with a *Letter of Credit (LOC)* backed by lessee/concessionaire corporate guaranty (see Exhibit 3-15).

**Bond Indenture:** Secures lease/concession rent/lease payments for benefit of debt holders. Overarching feature from port owner’s perspective is off-balance sheet debt which is not additive to the port’s system debt.

**Exhibit 3-14 Subordinate Lien**



Covenant requirements vary depending upon strength of credit/guarantee, and may include corporate-style parameters for debt and equity in addition to municipal market debt service coverage covenants.

**Credit Rating:** Dependent upon the financial strength of the corporate guaranty, as well as the financial strength of the LOC provider.

**Type of Debt:** Includes publicly issued bonds and private placements; with fixed and variable interest rates.

Single Terminal Concession: Stand-alone Special Purpose Bonds

**Security for Debt:** Net operating revenue of a single terminal concession.

**Bond Indenture:** Secures concession revenues for benefit of debt holders and also incorporates rent and revenue sharing payments to the port (see Exhibit 3-16). Overarching feature from port owner’s perspective is off-balance sheet debt.

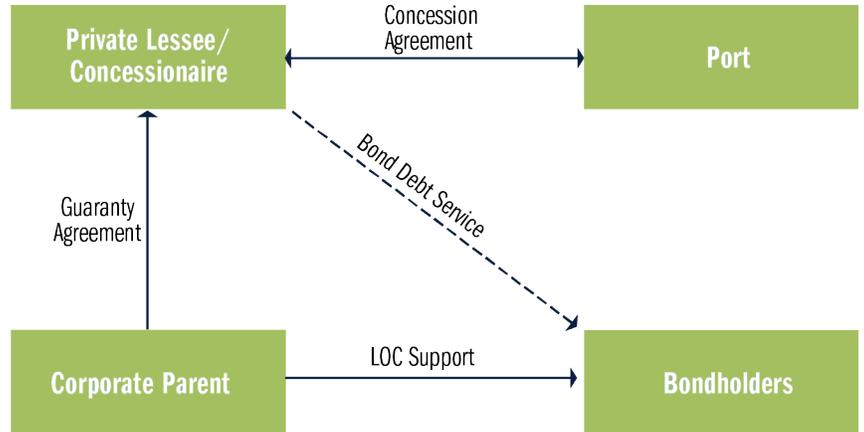
- Rate covenant and Additional Bonds Test levels typically higher for single terminal net revenue pledge versus port system net revenue pledge (e.g. 1.40x-1.75x senior lien debt service coverage for single terminal pledge).

**Credit Rating:** Ratings depend on the strength of the terminal/concession cash flows and security structure as defined in the financing documents, as well as the terms of the concession agreement. If a single terminal, the size and lack of diversification will likely lead to a BBB rating at best.

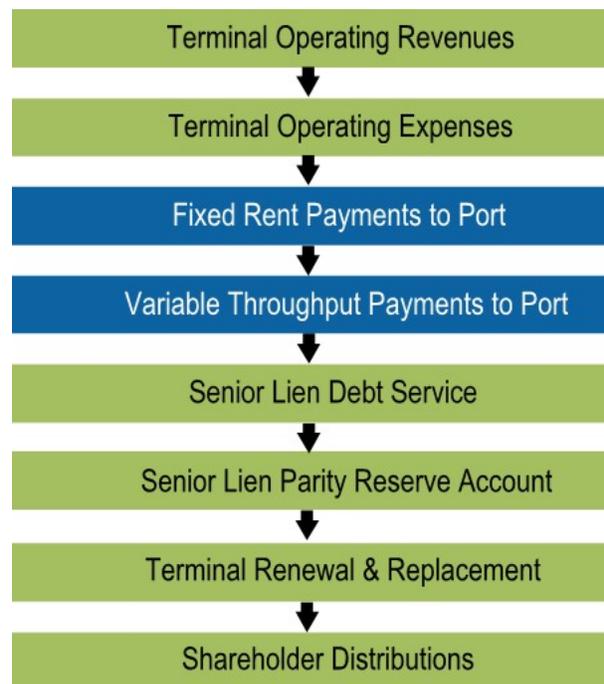
**Tax Status of Debt:** Upfront payments not used for eligible facility capital costs could not use PABs and such costs would be funded from taxable debt or equity.

**Equity:** Concession and financing documents would need to provide for distributions to shareholders to pay taxes and provide a return on investment.

**Exhibit 3-15 Lessee Guarantee**



**Exhibit 3-16 Payments to Port**





### 3.2.2.4 Project

#### Revenue Bond

#### Considerations

Project revenue bond structures are unique to the requirements and characteristics of the project being financed. Across revenue bonds, however, a common set of attributes is typically used to structure such bonds in order that such debt both fits issuer

parameters and meets marketability requirements for investors/creditors. Exhibit 3-17 lists some bond attributes and strategies frequently found in project financings.

**Exhibit 3-17 Project Bond Attributes and Strategies**

<b>Security Sources</b>
<ul style="list-style-type: none"> <li>• Net Operating Revenues</li> <li>• State and Local Taxes</li> <li>• Value Capture</li> </ul>
<b>Bond Lien &amp; Structure</b>
<ul style="list-style-type: none"> <li>• Senior &amp; Subordinate Debt</li> <li>• Diversification of Product</li> <li>• Short-Term/Long-Term Mix</li> </ul>
<b>Security Requirements</b>
<ul style="list-style-type: none"> <li>• Capitalized Interest</li> <li>• Coverage Ratios</li> <li>• Reserve Funds</li> </ul>
<b>Issuance Timing</b>
<ul style="list-style-type: none"> <li>• Interim Construction Financing</li> <li>• Use Public Equity First</li> <li>• Bond Best/Highest Rated Credit First</li> </ul>
<b>Credit Enhancement</b>
<ul style="list-style-type: none"> <li>• Federal Programs - TIFIA</li> <li>• Special Tax Supplemental Pledge</li> <li>• Bond Insurance/LOC</li> </ul>
<b>Private Sector Enhancements</b>
<ul style="list-style-type: none"> <li>• Deferred Compensation</li> <li>• Vendor Concessions/Parking</li> <li>• Private Equity</li> </ul>

### 3.2.3 Financial Modeling

Financial modeling should focus on the components of quality quantitative analyses to support investment decisions and ultimately any capital financing. Using the output and results of previous stages and tasks, a comprehensive financial model should be developed to evaluate each project and financial option of interest to a port owner. A financial model should be structured to assess the financial impacts of different operating, business and financial structures and determine the optimal structure employing risk analyses, as applicable. The financial analysis should incorporate the findings from the credit profile in order to (1) determine the likely interest rate profile based on current credit spreads, and (2) determine the level of equity and risk a potential private partner could be expected to commit in order to achieve a desired return on investment and thus the potential feasibility of the P3 approach. The model should be spreadsheet-based and flexible so that risk sensitivities can be evaluated and their impact on outcomes measured.

The project financial model should be integrated with a port pro forma cash flow model. The port model should incorporate all projected operating revenues, OpEx, R&R, and outstanding debt service. It should have the flexibility to consider incremental revenues, OpEx, and debt service associated with the project. Just as important, it should have the flexibility to subtract revenues, expenses, and debt service, as applicable, should the project be pursued as a stand-alone P3 concession. While the economics of a P3 concession or other innovative finance approach may look attractive, the port owner has to guard against adverse consequences to its ongoing fiscal position. The dual perspective of a system and project model can help to identify such consequences of a recommended project such that a port owner can adjust its strategy accordingly.

### 3.2.3.1 Evaluating Project Finance & Delivery Alternatives

To evaluate project opportunities and financial viability, identify key project inputs and quantified risk assumptions for projects across various public and P3 delivery alternatives. Thereafter, a detailed project finance and cash flow model (more comprehensive than only using a net present value analysis) can be developed using the approach in Exhibit 3-18 including:

- Multiple types of debt can be incorporated
- More than one security lien can be modeled
- Nuances such as debt service coverage ratios, debt to equity ratios, and reserve/liquidity balances must be maintained
- Risk adjustments can be “stressed” against the base case to determine the severity and/or acceptability of impacts
- Capability to analyze different objectives such as more upfront capital versus increased long-term revenue sharing

As applicable, the model should incorporate various debt financing strategies and products

that could be used to make the recommended project financially feasible. Such products might include, but are not limited to, various forms of PABs, leasing programs, tax/fee revenue financing, *State Infrastructure Bank (SIB)* loans, *Transportation Infrastructure Finance and Innovation Act (TIFIA)* credit, and *Railroad Rehabilitation & Improvement Financing (RRIF)* program loans, among others. The use of such strategies should be developed through close communication with port staff and key decision makers to assure that all issues considered important are properly addressed. The goal of the project financial modeling task is to create a sustainable plan of finance that minimizes “public” funding and results in an overall cost of funds that works for the recommended project.



**Exhibit 3-18 Modeling Approach**

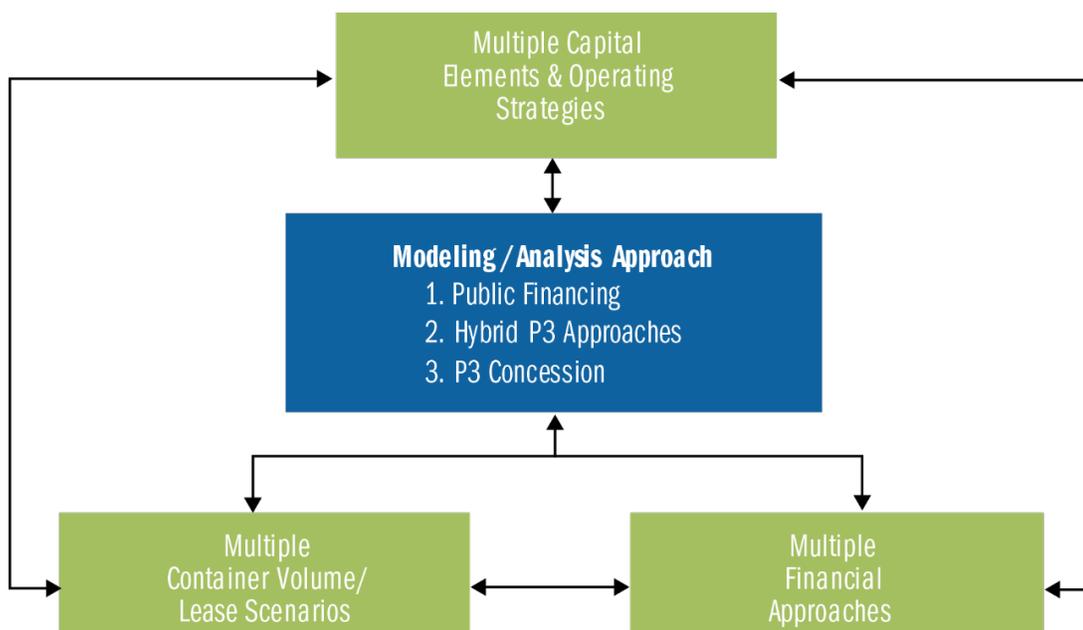




Exhibit 3-19 Financial Plan Outline



### 3.2.3.2 Approach for Development of a Financial Plan

Developing a project financial plan also entails conducting a review of the port’s overall financial situation and developing a strategic financial plan related to debt management and infrastructure development, including planning for P3 transactions as needed. A requisite for this task is an understanding of material project finance areas including debt structures and programs, P3s, and port project development. The plan should be developed through close communication with key port stakeholders to assure that it addresses all issues considered important. Exhibit 3-19 provides a general outline for developing a financial plan.

This approach will likely build on the port’s success in developing prior strategic financial plans. A preliminary list of major topics for the plan includes:

- Credit rating outlook and strategies
- Non-traditional financing approaches including bank debt, Federal and State programs, private equity
- Use of P3s for construction, financing, and/or operation
- Debt profile including re-structuring/ refunding opportunities for existing debt
- Detailed capital project and cash flow modeling, which should incorporate capital costs, projected available revenues and sources, estimated operating & maintenance costs and the timing of potential debt issuance
- Asset-liability management analysis, including potential use of short-term variable rate financing tools
- Investment strategies

Generally for project financings it is necessary to prepare long-term (30+ year) capital planning models for transportation/port organizations. The financial model is used to identify alternatives to meet capital requirements while remaining within certain financial market limitations. An iterative modeling process (Exhibit 3-20) allows financial planning to impact project requirements within stated program policy constraints.

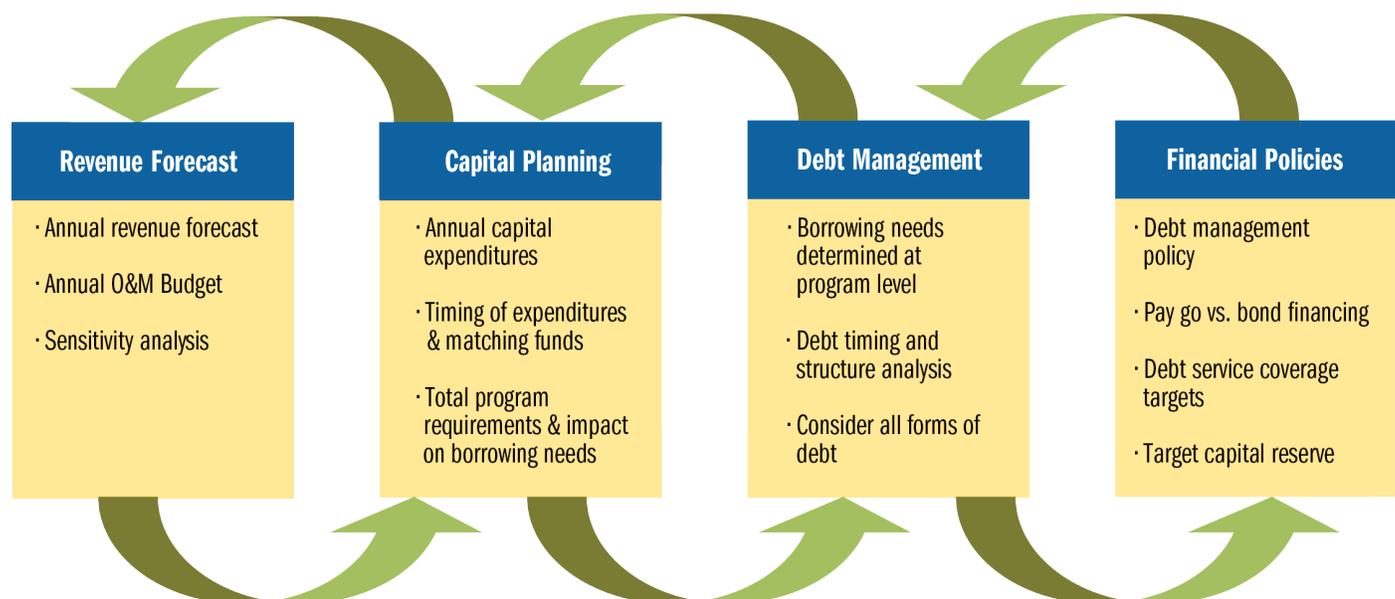
The overall result should be a comprehensive analysis and corresponding set of recommendations that will provide a framework for the port’s financial management and financial needs for all its projects. The financial recommendations should incorporate and be consistent with the overall strategic direction of the port as well as the development of debt, investment and reserve policies. Financial plans are often used to support credit ratings as well as to support Federal and State grant and loan applications. New or greenfield project financing is very different from tax/fee- backed funding and even from an existing system net revenue financing. An investment-grade plan of finance requires a different approach than traditional municipal bonding programs. It is important to understand the credit

and operating profile for these different programs and projects, and to tailor a financial plan for the port’s particular needs.

A primary goal of financial planning is to become aware of all of the options at a port owner’s disposal and the consequences of utilizing each of them. Financial planning in and of itself is not intended to make policy choices for the port; rather the intention is to ensure that the port owner has the appropriate tools to craft a financing strategy that can lead to the lowest cost of borrowing consistent with broader policy and financial objectives. At the outset of the financial planning process, a port owner should develop a list of basic financial objectives that serves as the foundation for the entire process. Focusing the entire financial team on the port’s goals at the outset of the project facilitates moving the team forward in an organized manner.

Another primary goal of the financial planning model is to support bond issuance and other forms of financing. The financial plan helps to determine the amount, timing, and type of financing. It also helps to establish the creditworthiness of any associated bonds. The components of the financial plan listed above are key components to any credit

**Exhibit 3-20 Iterative Modeling Process**





evaluation. A well thought out financial plan indicates sound and prudent fiscal management. Solid credit ratings are essential to minimizing borrowing costs. The rating agencies place value on comprehensive financial plans and will analyze the components carefully as part of their credit assessment. Therefore, a credible financial plan can help to lower the borrowing costs by establishing a solid credit which in turn results in lower interest rates and/or lower costs of credit enhancement.

### 3.2.3.3 Project Finance Model

In analyzing and structuring for a variety of project finance techniques, numerous modeling constructs could potentially be developed to evaluate the viability of a recommended project. Regardless of the specific construct of the model, it should have the capability to perform complicated financing structures that may provide alternatives to traditional funding techniques including *senior* and *subordinate* structures with a deeply subordinate component, variable rate debt structuring options, deferred payment structures, etc. A base feasibility model should be utilized to evaluate all aspects of a recommended port project. The model can be utilized at various milestones along the project timeline, which can be critical given potentially lengthy development processes.

At the outset, models are utilized to evaluate a project's viability for investment interest. When the scope of a project is further developed, the model can be used to fine-tune estimates of cash flow, debt coverage, and reserves/liquidity. The model also serves as an important tool for supporting the sensitivity testing and credit rating processes.

With a working group consisting of port staff and financial and technical advisors, a customized financial model should be developed for port projects. The model should be updated to reflect new construction cost and timing estimates as well as legal covenants. The financing and valuation model should be interactive with the ability to provide a range of discounted cash flow valuations as well as to quickly evaluate multiple real-world financing scenarios applicable for new project construction. The model should be anchored by a fundamental knowledge of project finance creditworthiness and the general tenants of a financing type. It should also be able to accommodate a myriad of financial structuring options including federal loans such as TIFIA, project revenue PABs, subordination of operating costs, bank debt and private equity. Optimally managing all of these components is critical to attaining an investment-grade credit, regardless of whether the type of financing will be through the tax-exempt municipal market, or a form of private financing. Generally, the financing and valuation model should be based on specific project forecasts for revenue, CapEx and OpEx as with the initial feasibility model.

Upon inputting the various project requirements into the model, an understanding of project creditworthiness and financing structures should be used to determine an appropriate range of financing costs and reserve requirements.

An understanding of public debt structures and hybrid debt financing tools - such as PABs and TIFIA loans – is helpful in order to create alternative, flexible financing structures based on projected cash flows and the requirements of the facility. Modeling efforts should focus on developing an efficient financing structure that involves creating a balance of innovative financing mechanisms and credit/investor market acceptable conditions.

Exhibit 3-21 shows sample inputs and outputs from a project finance model.

### 3.2.4 Debt Implementation & Management

Ports of all types and sizes have ongoing capital needs to fund facility improvements and expansion. Further, project finance methods and P<sub>3</sub> structures may not be relevant for many smaller, mainstream port improvement projects. Thus, the requirements for demand and revenue forecast data, which are primarily needed for larger, new project developments and project finance/P<sub>3</sub>s, may not hold the same relevance for a port that wants to finance some existing facilities improvements under its CIP. In this case, a port can typically use historical audited operating and financial results in order to meet disclosure requirements, and issue new money debt under an existing bond indenture via an Additional Bonds Test (for example a historical net revenue over maximum annual debt service ratio of 1.25x), thereby meeting financial covenant requirements. The new debt would likely be secured primarily by a pledge of a port's net operating revenues.

#### 3.2.4.1 Debt Capacity and Issuance for Capital Improvement Programs

Port owners are frequently in the process of evaluating, negotiating and potentially implementing both large and small capital projects, including ongoing CIP requirements that require debt financing.

As an example, a port's CIP might include a refrigerated warehouse development or the procurement of yard cranes, both of which might be smaller pieces of a large port's overall system CIP and debt program, or for a smaller port the only sizeable components of the CIP.

Depending on the size of the CIP and expected debt issuance, the use of public bond markets might be beneficial (less costly for larger borrowings), complemented by alternative forms of debt (e.g. commercial bank loans). Solid investment grade credit ratings are key to structuring publicly issued debt and minimizing interest costs. If the expected amount of additional debt may strain senior lien debt service coverage levels, and thus credit ratings (if relevant), a port may want to consider other forms of financing and lien structures, including junior lien bonds, equipment leases, state infrastructure bank loans, special purpose (conduit) bonds, P<sub>3</sub>, and cash.

Further, if port system operating and financial results are not as strong as expected, any negative credit impacts of the additional debt would be exacerbated. For publicly issued and rated debt, it should be noted that the credit rating agencies also look at non-quantitative factors, such as management, governance, global trade patterns, etc., which are not factored into a quantitative debt capacity analysis.

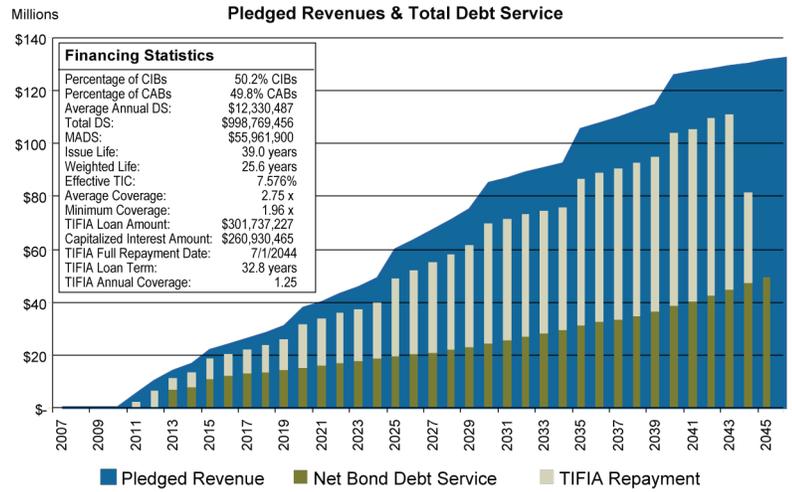




FINANCING

Exhibit 3-21 Sample Inputs and Outputs from a Project Finance Model

Public - Private Valuation Statistics	
Investment Amount:	\$220,000,000
Investment as % of Project:	29.38%
Internal Rate of Return:	7.11%
Net Present Value:	(\$0)
Equity Fully Repaid in :	7/1/2040
Years to Equity Repayment:	33.0 years
Average Annual Cash Flow:	\$118,204,206
Minimum Annual Cash Flow:	\$1,083,729



Sources and Uses of Cash Flow	Funds and Subaccounts Assumptions	Facility Inputs (Construction & Revenue Assumptions)
<b>Cash Flow Sources</b> Gross Project Revenues \$53,599,216,248 Construction Fund Interest Earnings 50,891,221 Debt Service Reserve Interest Earnings 71,695,781 Liquidated Debt Service Reserve Fund 55,961,900 Renewal and Replacement Interest Earnings - Operations and Maintenance Reserve Interest Earnings 56,208,396 Rate Stabilization Reserve Interest Earnings - General Reserve Fund Interest Earnings - Equity Refinancing Proceeds - Accelerated Loan Proceeds - <b>Total Cash Flow Sources</b> \$53,933,973,546	<b>Facility Construction Fund</b> Gross or Net Fund? Net Construction Fund Earning Rate: 5.00% <b>Debt Service Reserve Fund</b> Include Debt Service Reserve Fund? Yes Debt Service Reserve Funding Basis: Gradual MADS DSRF Interest Earning Rate: 5.50% <b>Capitalized Interest Fund</b> Fund Capitalized Interest? Yes Gross or Net Fund? Net Capl Fund Earning Rate: 5.00% <b>Operations &amp; Maintenance Reserve Fund</b> Fund Operation & Maintenance Reserve? Yes O&M Months in Reserve: 2 months O&M Subaccount Earning Rate: 5.00% <b>Renewal and Replacement Reserve Fund</b> Fund Renewal & Replacement Reserve? No R&R Months in Reserve: 2 months R&R Subaccount Earning Rate: 5.00% <b>O&amp;M Loan / Reimbursement Subaccount</b> O&M Loan Rate (if Gross Pledge): 5.00% <b>Rate Stabilization Fund</b> Fund Rate Stabilization Reserve? No Op Revenue Months in Reserve: 2 months RS Subaccount Earning Rate: 5.00% <b>General Reserve Fund</b> Fund General Reserve? Yes General Fund Earning Rate: 5.00% Forced Initial Deposit Amount 0 Forced General Deposit (% of Available) 0.00%	<b>Construction Assumes:</b> 25% Contingency Construction Start Date: 12/1/2007 Construction End Date: 12/1/2016 Construction Length (mos): 110 months Facility Cost (YOE): 2,376,028,569 <b>Facility Revenue</b> Revenue Pledge, Gross or Net: Net Project Revenue Start Date: 1/1/2017 Other (1) Revenue Start Date: N/A Other (2) Revenue Start Date: N/A Other (3) Revenue Start Date: N/A <b>Revenue/Expenditure Long-Term Growth Rates</b> Gross Project Revenues 3.00% Other Revenue 1 3.00% Other Revenue 2 3.00% Other Revenue 3 3.00% Total O&M 3.00% Admin Costs 3.00% Roadway Maintenance 3.00% Renewal & Replacement Costs 3.00%
<b>Cash Flow Uses</b> Deposit to Construction Fund (Revenue & Interest) \$50,891,221 DSRF Interest to Debt Service 127,657,681 Renewal and Replacement Expenses 587,202,075 Deposit to Debt Service Reserve Fund 33,300,792 Deposit to Capitalized Interest Fund - Deposit to Renewal and Replacement Fund - Deposit to Operations and Maintenance Reserve 155,659,688 Operations and Maintenance Expenses 20,214,957,860 Deposits to Rate Stabilization Reserve Fund - Deposits to General Reserve Fund - Debt Service Payments 830,250,469 TIFIA Loan Payments 1,144,507,989 Equity to Construction 220,000,000 Income Tax Payments 10,689,210,659 Equity Distributions 19,880,335,113 Equity Refinancing Loan Payments - Acceleration Loan Payments - <b>Total Cash Flow Uses</b> \$53,933,973,546		

Actual borrowing capacity for any given project at any given point in time will depend on various factors, including but not limited to:

- tax status of the project contemplated,
- lien structure of the new debt, financial products used,
- capital markets environment including interest rates,
- net revenues from the contemplated project including terms of any proposed project operating leases, and
- existing system debt service requirements.

Tax status of the project asset being financed determines eligibility for the type of debt used. For example, governmental purpose projects are eligible to be financed with tax-exempt Capital Appreciation Bonds (CABs). Convertible Capital Appreciation Bonds (CCABs) can be used to defer interest and principal payments, with conversion to Current Interest Bonds (CIBs) so that debt service requirements begin, thus reducing the cost of funds relative to traditional, non-convertible CABs. PABs have Alternative Minimum Tax (AMT) status and thus are priced at an additional spread relative to non-AMT tax-exempt bonds. Asset-based tax-exempt financing can be used at a subordinate lien given the security of the hard asset.

In addition to any currently contemplated capital projects and debt issuance, a port may have ongoing CIP needs and other capital projects on the horizon. Multi-year capital requirements may necessitate a coordinated approach to a port's overall capital structure and plan of finance as any future CIP requirements above and beyond contemplated one-off capital projects need to be considered when evaluating debt capacity. As much as possible, a port owner should determine upfront the project(s), capital requirements and net revenues for its CIP.

#### 3.2.4.2 Debt Refunding for Savings

For ports both large and small, refunding outstanding bonds and loans can provide for debt service savings, and consequently, greater debt capacity to fund additional projects. The requirement for projected demand and revenue data, which is primarily needed for new project development and especially for project finance/P3s, is less emphasized for a straightforward debt refunding transaction.

Port owners and/or their advisors should actively monitor port debt portfolios for refunding opportunities to achieve net present value savings and/or cash flow relief. An active approach reduces the likelihood that a port owner misses investor market opportunities and can consistently produce significant reductions in interest expense. Certain structural features of a port's bonds are factored into a refunding analysis including the maturity date, coupon, yield, call date and price, and eligibility for refunding under the tax code (current refunding - within 90 days of the call date; advance refunding - more than 90 days to the call date; or forward refunding - locking in the refunding economics more than 90 days from the call date for a current refunding). The recommended savings threshold for a refunding varies depending on the type of refunding structure used (i.e. current refunding, advance refunding, or forward refunding), the risks inherent in the proposed refunding issue, and port preference.





Exhibit 3-22 Transaction Management



Issuer debt policies often require a minimum of 3 percent net present value savings for refundings, with higher savings thresholds typically recommended for forward delivery or other alternative structures and lower savings thresholds for current refundings with short durations.

Further, an interest rate environment of low short-term rates will likely result in a significant amount of *negative arbitrage* in most refunding *escrows*. It is generally not recommended that an issuer proceed with an advance refunding if the negative arbitrage is equal to or exceeds the net present value savings of the refunding. To reduce the impact of the negative arbitrage, refunding issues can be structured to maximize the time between pricing and closing of refunding bonds to shorten the escrow period. Such delayed delivery typically may be available for up to 30 days without any type of forward premium.

### 3.2.4.3 Debt Transaction Management

The due diligence, credit and debt profiling, and financial modeling and feasibility steps discussed in prior sections of this Module are the same such steps that are taken leading up to the issuance of bonds/debt. In many instances, developing the plan of finance overlaps with the transaction management process (Exhibit 3-22). Once the plan of finance is in place, the transaction management process is worked through to make certain that the necessary actions take place to complete the financing. Transaction execution whereby the port owner is the issuer of the debt includes, but is not limited to, development of a timetable, bond documents, financing team selection, credit enhancement, rating strategy, investor marketing, pricing and, as relevant, direct purchase and government program loan negotiation. Expertise is required in debt structuring, creating credit structures, managing the rating agency/insurer relationship and pricing bonds in order to complete the financing process in a smooth and cost effective manner.

Financing teams are assembled for each transaction, and while the specific structure of an issuance, among other port specific factors,

dictates the team of professionals required for the issuance of bonds, potential key players typically are those summarized in Exhibit 3-23.

**Exhibit 3-23 Key Players of Municipal Port Financing Transactions**

Financing Team	Role	Responsibility
Issuer	The governmental entity that is issuing bonds.	Selecting the financing team, determining the method of sale, assists in the preparation of financing documents, sets debt policies, and determines available financial resources for payment of debt service.
Municipal Advisor	Acts in a fiduciary capacity for the issuer	Develops Request for Proposals (RFP) for underwriters, bond counsel, and other members of the financing team. Develops plan of finance, advises on method of sale, and assists in preparation of rating agency strategy.
Bond Counsel	Provides legal counsel to issuer and prepares offering documents	Drafts bond resolution, indenture, loan agreement, and other bond financing documents. Interprets arbitrage regulations and tax law. Provides guidance in structuring issues related to tax law.
Underwriter	Acts as an intermediary between the issuer and bondholders	Has an "arms-length" relationship with the issuer. Provides proceeds at closing and manages syndicate. Prepares distribution analysis and executes bond purchase agreement on behalf of the syndicate.
Underwriting Syndicate	Assists the underwriter in the placement of the bonds	Has an "arms-length" relationship with the issuer. Shares the risk of underwriting the issue and provides proceeds at closing. Distributes bonds to investors.
Underwriter's Counsel	Provides legal counsel to underwriter and underwriting syndicate	Drafts bond purchase agreement, blue sky memorandum, and agreement among underwriters. Advises underwriters on applicable securities law. Assists in due diligence and provides legal opinion regarding disclosure by the issuer.
Rating Agencies	Issues opinion on the credit quality of the bonds	Issues ratings releases and reports informing investors on its opinion of the credit quality of the bonds. Monitors credit quality trends and adjusts ratings accordingly.
Escrow Agent	Holds funds or securities to pay debt service on refunded bonds	Custodian of funds or securities which will be used to pay principal and interest on refunded bonds.
Trustee (Paying Agent / Registrar)	Holds moneys and transmits payments to bondholders	Disseminates debt service payments to bondholders. Maintains records on behalf of issuer. Holds moneys in the project fund and other funds.
Verification Agent	Verifies sufficiency of cash flows to pay debt service of refunded bonds	Issues verification report calculating the sufficiency of cash flows to pay debt service of refunded bonds.
Other Counsel	Provides legal counsel regarding specific issues	Provides special counsel on complex topics. Includes disclosure counsel, special tax counsel, bank counsel, and borrower's counsel.
Feasibility Consultant	Analyzes viability of projects	Prepares report on the economic viability of projects secured by revenue bonds
Insurers/Credit Enhancers	Issues bond insurance or <u>letters of credit</u>	Improves the credit quality of a security by issuing bond insurance or a letter of credit, for a fee
Printer	Prints offering documents	Prints and/or posts online the preliminary and official statements for distribution into the marketplace.
Auditor	Audits financial statements for the issuer	Compiles and audits financial statements of the issuer and issues opinion.



The documentation required for the issuance of debt varies across transactions, issuers, and localities. Counsel appropriate for the specific issuer and form of debt can help to guide and manage documentation development and execution. Exhibit 3-24 summarizes typical documents for debt issuance, again noting that the particular circumstances of the issuance will determine actual documentation needs.

The Internal Revenue Service (IRS) encourages issuers to adopt written post-issuance compliance procedures that include the following key elements:

- Regular due diligence reviews;
- Identifying the employee or official responsible for the review;
- Training the responsible employee/official;
- Retaining adequate records that support compliance, such as those relating to the investment and expenditure of bond proceeds;
- Procedures that should identify noncompliance in a timely fashion; and
- Procedures that the issuer will take to correct any form of noncompliance.

By having these written procedures in place, the idea is that issuers should be better able to identify and resolve noncompliance in a timely manner. The IRS encourages adopting these measures because, in general, an issuer that has established written post-issuance compliance procedures and commits to following them is less likely to violate the federal tax requirements than an issuer that does not have such procedures in place.

In addition to meeting legal and regulatory requirements of a bond issue, post-issuance compliance and reporting provides both issuers and investors alike an opportunity to verify the financial health of a port. Do the port’s operating and financial statements convey positive or negative trends? Is the port meeting its financial covenant obligations under the bond indenture? For example, a port needing to meet a rate covenant requirement of 1.25x annual debt service under its bond indenture that reports actual fiscal year debt service coverage of 1.39x meets the legal requirements under such bond documents. However, from a credit ratings perspective, if that same port was rated single-A by a rating agency based upon the premise that

**Exhibit 3-24 Key Documents of Municipal Port Financing Transactions**

Document	Summary
Request for Proposal	Used to select providers of debt issuance services (underwriters, bond counsel, etc.)
Bond Resolution	Legal document authorizing a governmental entity to raise money through a bond issuance
Bond Indenture Agreement	Determines the exact nature of the security of the bonds. Establishes guidelines for the trustee and issuer
Loan Agreement	Agreement between an issuer and the holder of a loan specifying covenants and repayment terms
Bond Purchase Agreement	Discloses the agreement between an issuer and underwriting syndicate regarding a bond issuance
Blue Sky Memorandum	Describes the treatment of a new issue under applicable blue sky laws
Agreement Among underwriters	Agreement disclosing liability among underwriters in the syndicate
Escrow Deposit Agreement	Outlines investment and disbursement procedures for escrow agent
Notice of Sale	Alerts investors to an upcoming bond issuance
Preliminary Official Statement	Provides preliminary information regarding the issuance to investors
Official Statement	Provides final information regarding the issuance to investors
Verification Report	Details sufficiency of cash flows in a refunding transaction
Feasibility Report	Details economic viability of a project backed by revenue bonds

**3.2.4.4 Post-Issuance Compliance**

Issuers of tax-advantaged debt are required to monitor post-issuance compliance throughout the entire period that the bonds remain outstanding. The ongoing monitoring is generally categorized into two types of requirements: (i) the qualified use of proceeds and financed property and (ii) arbitrage rebate and yield restriction compliance.

debt service coverage levels would remain above 1.40x as had been reported in the past, then this most recent reporting metric may be cause for a negative ratings outlook or downgrade. The takeaway from this example is that post-issuance compliance and reporting can be used to convey the operational and financial health of a port to various stakeholders, with different uses of and perspectives on the same information.

### 3.2.5 Public-Private Partnerships

P3s, in the context of a port where there may already be private tenant terminal operators, is reserved for contracts where the private concession company undertakes significant capital investment at its own expense. Increasingly, the P3 sector in the U.S. is moving toward the use of municipal market financing tools such as PABs, TIFIA and RRIF loans, and particularly for ports, long term lease & use agreements (i.e. a “concession agreement”). At the same time, P3 concessionaires and infrastructure equity funds may be willing to commit equity to a project, and private equity investment is entirely compatible with the financing tools mentioned above.

Therefore, it is important that port owners understand how these techniques can work together (as well as where there may be conflicts) and to formulate comprehensive strategies for a port’s overall capital needs, debt strategies, and budgetary requirements. If a P3 can fit within and improve the overall financial strategy, then it should be considered.

The due diligence and financial feasibility techniques previously discussed in this section apply to and are needed for all types of capital, including for a P3 approach. Thus, a P3 approach is by nature an extension of project finance for port capital infrastructure development.

#### 3.2.5.1 P3 Background and Rationale

P3s refer to contractual agreements formed between a public agency and private sector entity that allow for greater transfer of risk and responsibility to the private sector for the delivery and operation of projects. Traditionally, private sector participation has been limited to separate planning, design or construction contracts on a fee for service basis – based on the public agency’s specifications. Expanding the private sector role allows the public agencies to tap private sector technical, management and financial resources in new ways to achieve certain public agency objectives such as greater cost and schedule certainty, supplementing in-house staff, innovative technology applications, specialized expertise or access to private capital. Exhibit 3-25 outlines several key objectives of P3s.



**Exhibit 3-25 P3 Key Objectives**

**Why Consider P3s**

<b>Leverage Private Sector Expertise</b>	<ul style="list-style-type: none"> <li>· Expand public sector capacity</li> <li>· Accelerate delivery</li> <li>· Transfer risk               <ul style="list-style-type: none"> <li>- Financial and operational</li> </ul> </li> <li>· Save or reallocate funds</li> <li>· Reduce debt</li> <li>· Improve operations</li> <li>· Transparent regulation of revenues               <ul style="list-style-type: none"> <li>- Tariffs, fees</li> </ul> </li> </ul>
--	--

**How P3 Approach Can Contribute to Project Delivery**

<b>Enhance Financial and Operational Capacity</b>	<ul style="list-style-type: none"> <li>· Relieve financial pressure(s)               <ul style="list-style-type: none"> <li>- Operation support from General Fund, debt capacity, pension costs, OPEB</li> </ul> </li> <li>· Streamline operations</li> <li>· Expand service</li> <li>· Transfer capital responsibility</li> <li>· Launch new program or service</li> <li>· Manage rate setting process</li> </ul>
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**The Value of P3s**

<b>Align Public and Private Interests</b>	<ul style="list-style-type: none"> <li>· A well structured and executed P3 can:               <ul style="list-style-type: none"> <li>- Increase agency operating capacity</li> <li>- Heighten accountability</li> <li>- Value time and performance</li> <li>- Value innovation and efficiency</li> <li>- Stimulate competition</li> <li>- Enhance revenues</li> </ul> </li> </ul>
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Some of the primary reasons for public agencies to enter into P3s include:

- Encouraging private entrepreneurial development and operation of infrastructure and related assets;
- Transferring risks to those best placed and most incentivized to manage and mitigate them;
- Enhance financing capacity by inviting private sector expertise in accessing and organizing project financing techniques;
- Accelerating the implementation of high priority projects by packaging and procuring services in new ways;
- Increase operational efficiency by allowing the private sector to provide specialized management capacity for large and complex programs; and/or
- Consolidation of similar asset classes under a single management program.

P3s have evolved over time and in many ways. It is important to understand that there is an array of P3 methods and techniques used both domestically and internationally. The range of potential P3 options varies from:

- Design-Build-Finance (DBF), where the port owner engages the private sector to design and construct the project utilizing their own construction finance and pays for the project over a period of time typically starting at the completion of a major milestone, to a
- Design-Build, Finance, Operate and Maintain (DBFOM) structure in which the port owner enters into a long-term concession with the private sector for the design, construction, financing and operation of the project and does not transfer ownership.

Exhibit 3-26 summarizes the continuum of P3 approaches from a purely governmental project to a purely private one.

Currently, many issuers are evaluating P3 alternatives to help accelerate projects including:

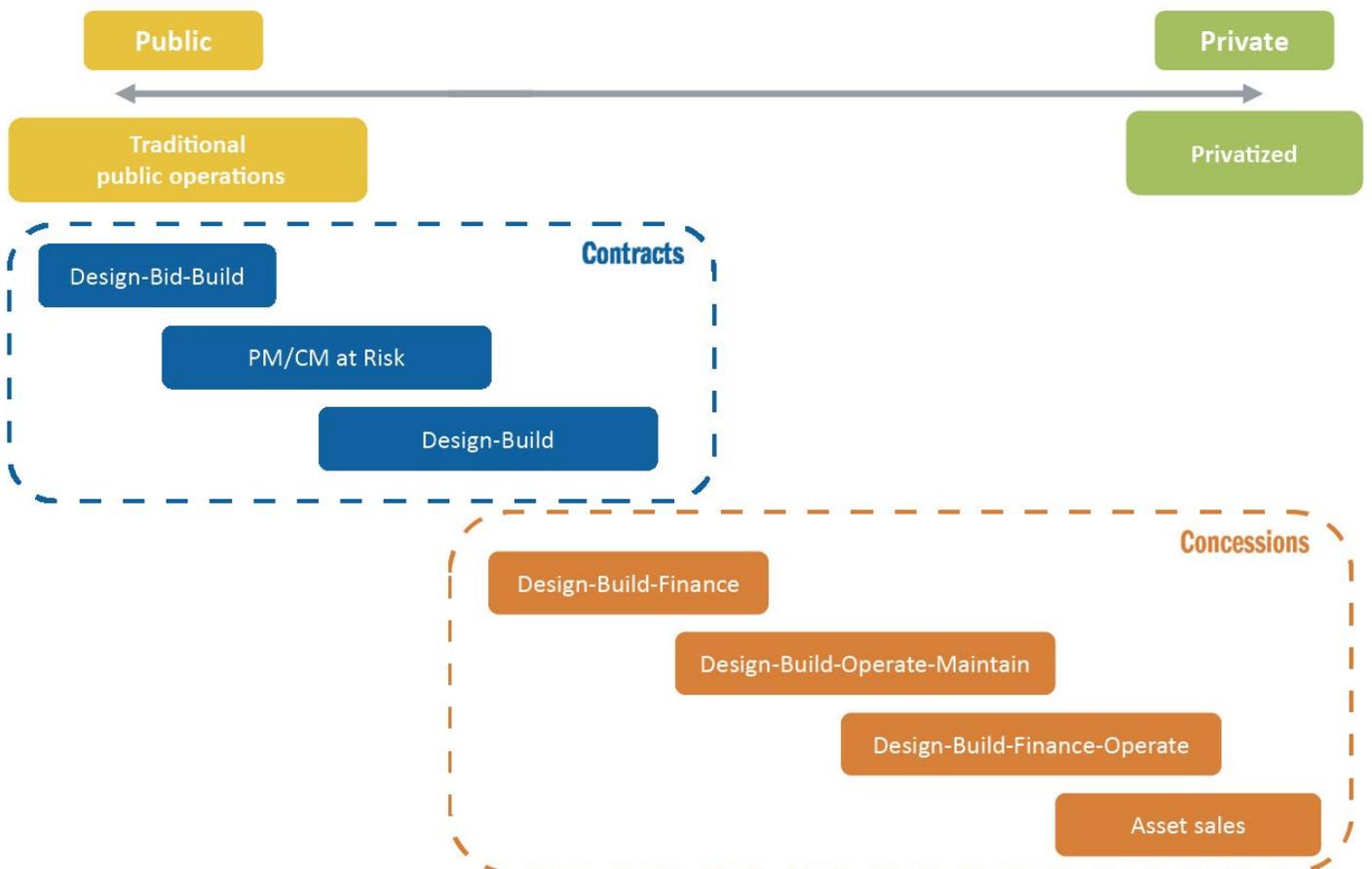
- DBF
- Design-Build-Operate-Maintain
- Availability Payment concessions (DBFOM)
- Revenue Risk concessions

Such P3 alternatives typically utilize various forms of debt including traditional tax-exempt municipal bonds, bank loans, private activity bonds, and/or TIFIA loans. Note that APs are treated by rating agencies as long term contractual commitment; Issuers should understand how Availability Payment obligations for a specific project will affect the sponsor agency’s debt ratings and accounting treatment.

It is also important to note that P3s are not project finance, despite in some aspects looking like project finance. There are many different P3 structures, and the degree to which the private sector assumes risk and responsibility – including financial risk – differs from one application to another. Additionally, different types of P3s lend themselves to the development of different facilities and others to the expansion of existing assets. The key is to understand the elements of project delivery alternatives and how project finance and P3 techniques can be utilized in various combinations.

Well-structured P3s provide benefits by allocating the responsibilities to the party – either public or private – that is best positioned to manage or mitigate the risk. With P3s, this is accomplished by

**Exhibit 3-26 Project Delivery Models**





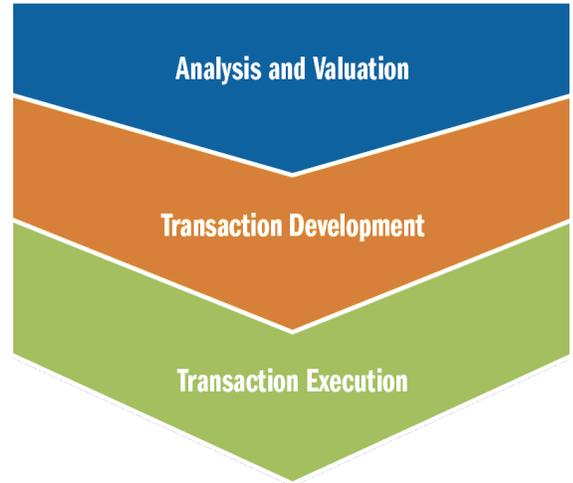
specifying the roles, risks and rewards contractually, so as to provide incentives for maximum performance and the flexibility necessary to achieve the desired results. At the core, these are often large and complex projects – most often with challenged credit profiles and financial feasibility – for which the risk allocations and risk-reward balance must create acceptable incentives for both the public and private sectors to proceed. But always the issues and methodology remain largely the same. Exhibit 3-28 shows the basic steps involved in the P3 process.

### 3.2.5.2 P3 Analysis and Valuation

The modeling of alternative project financing techniques and determining and finalizing preferred structures cuts across the various phases of P3s, i.e. valuation (Exhibit 3-28), development and execution. This integration of P3 stages with other project finance alternatives requires a systematic approach.

Any new stand-alone P3 concession is difficult to value and implement without robust project market data and other financial feasibility information available.

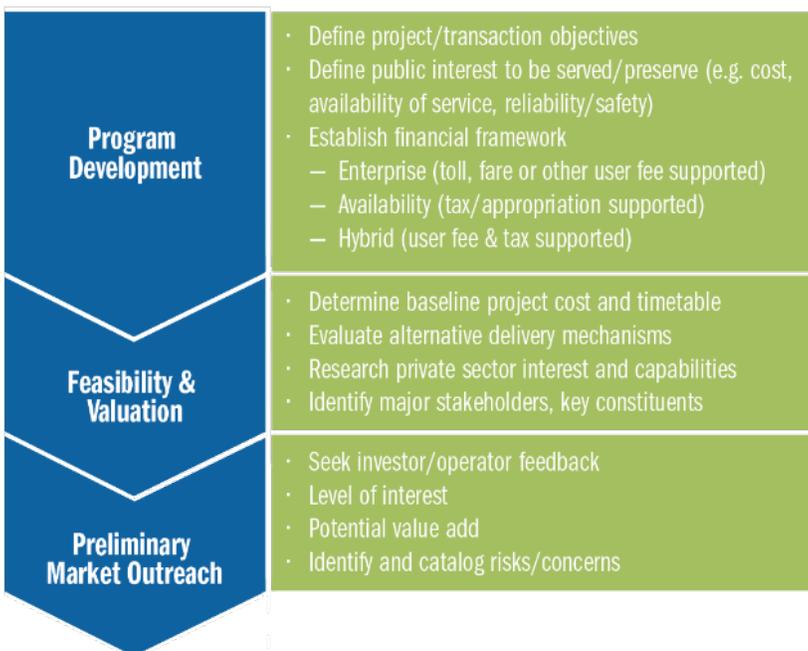
**Exhibit 3-27 The P3 Process: Valuation, Development & Execution**



This means market, revenue, O&M and R&R data must be thorough and up to date for the project comprehensively, not just from the port owner’s vantage point or the P3 partner’s perspective. Market environments can change rapidly. Thus, while the current environment may seem viable for a successful competitive solicitation process, it is highly recommended to start any engagement with a thorough market and financial feasibility study to ensure that the port owner’s preferred operating/financial/concession model meets the project goals.

If pursuing a stand-alone P3 concession, one approach may be to start with existing market, revenue, OpEx, and related feasibility materials and use them to the greatest extent possible to save both time and money. However, all market and feasibility materials must be current and meet credit/investor market scrutiny and credit standards for an investment-grade credit rating. Further, the ongoing O&M requirements and capital R&R requirements are significant components of the overall project financial feasibility as well as the concession agreement negotiations. Different projects have different requirements, and different engineers may have different perspectives. Formulating O&M and

**Exhibit 3-28 P3 Analysis and Valuation Steps**



R&R plans to meet industry standards and financial feasibility requirements is especially important for longer term concessions such as 50 years as well as concessions that might include future expansion.

The key to a successful solicitation and concession implementation, including financial closing, is a robust financial feasibility assessment. Market information should be vetted to a point that it can generate the maximum capital market interest. Modeling efforts should focus on developing an efficient financing structure that involves creating a balance of innovative financing mechanisms and capital market acceptable conditions. When creating a P3 valuation and financing model, it is also important that the project team have considerable credit/investor market knowledge and familiarity with credit agency analysts. Armed with this information as well as the requirements and limits of the project, the financing structure is modeled to create a financing structure that meets the purpose of the port owner – construction and operation of the project in the most effective manner.

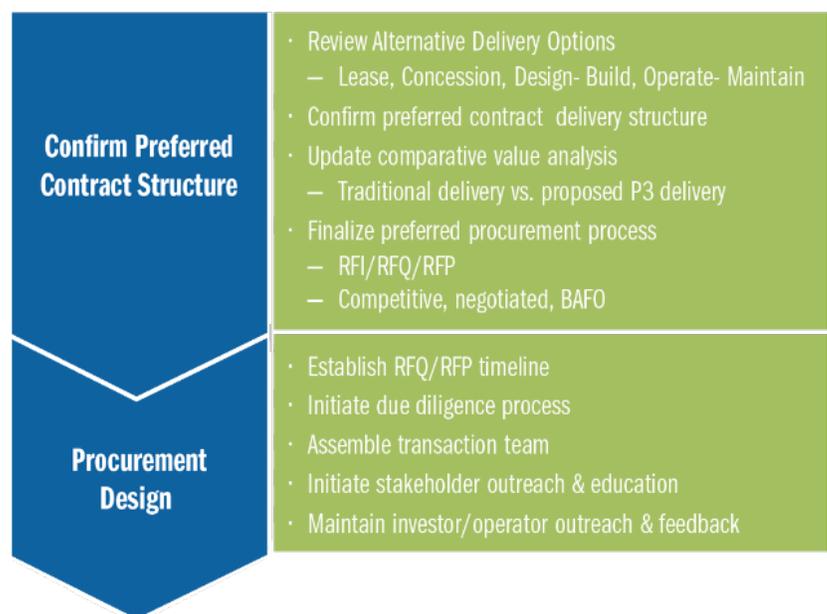
### 3.2.5.3 P3 Transaction Development

The project financial model and feasibility techniques previously discussed in this section continue to overlap with the P3 process in the P3 transaction development phase (Exhibit 3-29). Model inputs continue to be refined for changing capital market circumstances, and preferred delivery structures are further compared.

For each component of the P3 transaction development phase, the insight and interest of investors, contractors, and engineers will add value. The global infrastructure community is vast, thus it is prudent to promptly contact those entities that have expressed interest in a port’s infrastructure projects or reach out to other enterprises that can bring value to the project.

P3 procurements can attract bids from some of the largest funds and financial institutions in the industry. In addition to their own insights and due diligence measures, investors look to the port owner and its advisors to define the best procurement path for a project. The objective is for investors to more readily disclose their willingness to assume risk and share benefit in the interest of establishing a win-win environment for both public and private sector participants. Engaging investors, contractors and others from the start in developing a port’s P3 procurement process and in then compiling the information needed to compare and value P3 alternatives is of critical importance to moving a project forward.

#### Exhibit 3-29 P3 Transaction Development Steps



During the transaction development phase, the financing team continues to analyze different project delivery vehicles and secures market feedback and insight to help establish their relative value and limitations. At the center of this comparison lie issues of risk transfer – how much responsibility should the port owner be willing to transfer to established and experienced private entities.

Legal and operational considerations need to be reviewed in detail and procurement alternatives best suited for the recommended project and the port need to be identified.

A transaction schedule needs to be developed and/or modified to account for changing delivery and procurement methods since the start of the valuation process. Exhibit 3-30 is a sample timeline for a P3 process.

**Exhibit 3-30 Illustrative P3 Schedule**

PERIOD COMMENCING	0	1	2	3	4	5	6	7	8	9	10	11	12	13
	N	D	J	F	M	A	M	J	J	A	S	O	N	D
	Project Start						Execute Lease							
<b>PRE-DEVELOPMENT PHASE</b>														
<b>Initial Operating/Financial Alternatives; Valuation</b>														
Initial Meetings to discuss P3 Models		■												
Develop Financial Model for Preliminary Evaluation		■	■	■										
Evaluation by Financial Team/Advisor		■	■	■										
Team Meeting; Present Preferred Model				◆										
Conduct Soft Market Test			■	■										
Confirmation of Preferred Model				■										
Port Commission & Team Meetings				◆										
Sign-off from Port				■										
<b>Data Collection/Ongoing Transaction Preparation</b>														
Demand & Revenue			■	■	■	■	■							
Engineering/Construction			■	■	■	■	■							
Operations & Maintenance Requirements			■	■	■	■	■							
Insurance & Legal Requirements			■	■	■	■	■							
Ongoing Review of Financial Model Assumptions			■	■	■	■	■							
<b>SOLICITATION &amp; FINANCING PHASE</b>														
<b>Request for Qualifications Phase</b>														
Develop Project Term Sheet			■											
Review Timing with Port and Advisors			■	■										
Develop List of Potential Partners			■	■										
Develop/Release Information & Request for Qualifications			■	■										
Team Meeting and/or Calls; Approve RFQ & Review RFP				◆										
Response due from Potential Partners				■	■									
Review RFQs - Conference Calls as needed				■	■									
<b>Request for Proposals Phase</b>														
Develop RFP with Scope of Services - Calls as needed			■	■	■	■								
Develop Form of Proposed P3/Capital Lease Agreement			■	■	■	■								
Team Meeting; RFQ Shortlist & Approve RFP						◆								
Release RFP						■								
Data Room						■	■							
Meetings with Potential Offerers for Q&A						■	■	■						
Receive & Evaluate Proposals							■	■	■					
Selection and Negotiation of Final Terms								■	■	■				

**3.2.5.4 Concession Business/Financial Terms**  
 After working through the qualitative and quantitative assessments of financial investment alternatives, a port owner is in position to begin market outreach and implementation. A suggested first step is to create an outline of parameters or term sheet regarding 1) financing requirements and covenants, 2) construction and risk, and 3) operational terms. This can then be used to draft the concession agreement. Lease / concession agreements can be large and complex documents. It is very important that they support the desired investment but also equally important that they are complimentary to the port’s existing facilities, other capital improvements, operational attributes, legal framework, and credit profile.

For complex procurements such as for a P3 concession, the initial term sheet needs to incorporate significant detail regarding any final environmental, design, engineering, construction, operations, and financing of the project, as applicable for the project and the alternative chosen. Financial and business terms should be drafted to a level that will support a logical negotiation process and a feasible credit assessment.

**Key Terms**

In a P3 approach, in addition to completing the physical infrastructure and providing operational services, the contractor may provide an equity interest and service debt to finance the construction which remains at risk throughout the early years of the project. The port owner needs to clearly understand all project aspects to be covered by the concession. As examples, who will be responsible for equipment maintenance and replacement, future terminal capital expansion, contracting with shipping lines, etc.? Presumably the private concessionaire, but no two concessions or projects are the same, thus it is important to clearly understand the port owner’s preferences.

Additionally, a number of contracting approaches are possible including, for example, an operating and use lease agreement, and DBFOM. Further, key terms vary widely across project type, size, and complexity, which necessitates building the appropriate features into a summary project term sheet and ultimately into a P3 contract. Exhibit 3-31 shows a suggested list of terms that may serve as a basis for further customization.

**Exhibit 3-31 Key Business and Financial Terms**

Lessor
Description of Property for the Project
Capacity
Financial Expectation for the Private Partner(s)
Project Construction
Financing Assistance
Lease Agreement
Lease Term
Ownership of Project Land
Ownership of Project Infrastructure, Cranes and Equipment
Business Development
Existing Significant Contracts
Security
Environmental
Labor
Expansion
Schedule

**Term Sheet Sample**

Exhibit 3-32 is an example term sheet that focuses on the concession of a marine terminal facility. While the unique characteristics of any given port project will determine the informational categories and specific language for a term sheet, this example may serve as a starting point for customizing solicitation documents consistent with port objectives and policy constraints.



**Exhibit 3-32 Illustrative Term Sheet**

The AAPA Port Administration (APA) operates the USA Marine Terminal (UMT) at the Port of Anywhere. UMT is the primary container terminal at the Port and serves a regional population of over 10 million consumers and market in excess of 29 million within a five-hour drive.

APA believes that, with the scheduled opening of the expanded Panama Canal in 2015, UMT must have at least one 50-foot berth capable of handling larger vessels that will be transiting the Canal by that time. APA has decided to explore the possibility of a public-private partnership under which APA would lease UMT exclusively to private partner(s) and the private partner(s) would invest in a new berth, equipment, and other infrastructure at UMT, and provide a revenue stream to APA.

APA is seeking private partner(s) who are willing and able to commit to an investment that will meet the Administration's objectives of a new 50-foot berth and increased international waterborne container volumes at UMT. The private partner(s) would be required to meet a minimum annual guarantee and would be fully responsible for Berth construction as well as all operations and equipment at UMT during the lease term. The private partner(s) would also pay APA for existing terminal and waterside improvements at UMT. APA is willing to offer tax-exempt debt issuance on behalf of the private partner(s), if so desired, or the private partner(s) may put in place other financing as appropriate. Finally, the private partner(s) will be responsible for providing APA with an ongoing revenue stream during the term of the lease. In exchange, APA will grant the private partner(s) a long-term lease to operate UMT, and the private partner(s) will have exclusive operating rights for UMT during the term of the lease. The private partner(s) would be awarded the portfolio of business currently under contract to APA. Proposed key terms are outlined below.

Key Tem	Description
1. Lessor	AAPA Port Administration
2. Description of Property for the Project	A modern and productive intermodal container terminal known as the USA Marine Terminal (UMT), Port of Anywhere, USA, consisting of approximately 150 acres.
3. Capacity	2014 total capacity is estimated to be 1.5 million TEU's. Based on current operating methods, approximately half of the capacity of the UMT facility is covered under long-term contracts.
4. Financial Expectation from the Private Partner(s)	1) Funding for an construction of the Berth, including new cranes & all necessary equipment. Private partner(s) shall provide satisfactory evidence of secured obligation to finance and construct Berth by 2016. 2) Payment for existing terminal and waterside improvements and equipment. It is preferred that this take the form of funds at financial close; however, fixed annual payments or a combination of both may be considered. 3) An annual revenue stream to the APA for the term of the lease based on land rental and revenue sharing beyond 2014 container volumes
5. Berth Construction	Private partner(s) shall construct a 1,750 foot long by 170 foot wide reinforces concrete, earth filled, pile supported low level marginal wharf with 100-foot gauge gantry crane rail along the River. Private partner(s) shall install a portion of sheet pile toe wall to the West at Other Berth and a mooring dolphin east of the wharf terminus, with a minimal dredging at the face of the wharf.
6. Financing Assistance	APA may assist in project financing by facilitating the issuance of tax-exempt private activity bonds. APA may provide the private partner(s) with access to private activity tax exempt financing via the issuance of conduit Special Purpose Facility Revenue Bonds. Private partner(s) should be aware that they may not be able to take depreciation or other tax benefits in any infrastructure and equipment financed via tax-exempt private activity bonds.
7. Lease Agreement	Lease agreement will constitute a "full net lease" which means that the private partner(s), during the lease term, is responsible for keeping the facilities in good order at its own expense, including ongoing systems preservation and repair and replacement of existing equipment and infrastructure. Required operating and other standards will be set forth in the lease agreement.
8. Term	Minimum of 30 years from the lease commencement date.
9. Ownership of UMT Land	Land at UMT will remain APA owned.
10. Ownership of UMT Infrastructure, Cranes, and Equipment	All infrastructure, improvements, and equipment will be owned by the private partner(s) during the lease term. The private partner(s) shall purchase the existing 5 ship to shore cranes and 9 rubber tired gantry cranes, and will own any additional equipment it purchases.
11. Business Development	Private partner(s) will be responsible for business development and would maintain control over operations and shipping contracts. An estimate of the size of the container market within Anywhere's cost effective truck hinterland, along with projected volumes based on historical national and gulf coast growth, is available for review by private party.
12. Existing Significant Contracts	Private partner(s) to assume long-term ocean carrier contracts related to UMT. APA has the significant contracts listed below. A summary of these contracts has been prepared separately from this Term Sheet, and all UMT contacts are available for review by qualified short-listed offerors. 1) Gulf Shipping - Contract through 10/1/2016 2) Atlantic Shipping - Contract through 12/31/2017
13. Security	The APA will be responsible for security under the current Facility Security Plan.
14. Environmental	Private partner(s) must operate the terminal in full compliance with all applicable environmental laws and regulations, and will strive to operate with no or minimal environmental impact.
15. Labor	USA Marine Terminal is serviced by the International Longshoremen's Association. Existing crane and facility maintenance is currently performed by State employees who are members of AFSCME.
16. Expansion	Property known as the ICTF consisting of approximately 50 acres and South Coast Railroad, consisting of approximately 12 acres, could become the subject of future negotiation.
17. Schedule	APA seeks financial close by early 2015.

### 3.2.5.5 Solicitation Overview

A solicitation process may be conducted depending on the applicable project structure chosen in order to identify a private partner and investors for P3 project delivery. Without getting into any legalities and procurement rules, which are port specific, the following sections include a template for the types of qualifications that should be requested of respondents as well as evaluation factors. Basic contents of *request for qualifications (RFQ)* and *request for proposals (RFP)* are identified and put into outline format. Solicitation documents and management of solicitation processes are far too port and project specific to have an off-the-shelf form of RFQ or RFP available, or other solicitation form such as a *request for letters of intent (RLOI)*. Rather, the goal is to create an understanding and framework for how to conduct a thorough and productive solicitation.

### 3.2.5.6 P3 Transaction Execution

The project financial model continues to overlap with the P3 process in the P3 transaction execution phase (Exhibit 3-33). As part of the RFP process, the financial model is used to prepare “shadow” evaluations of any negotiated financial terms so that the port owner has an independent economic perspective. Model inputs continue to be refined for changing capital market circumstances, as relevant.

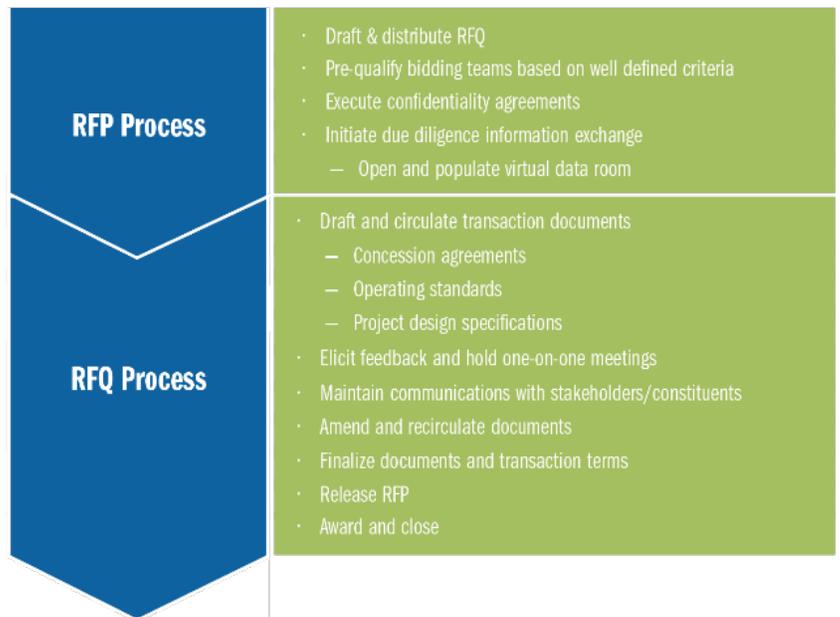
Once the port owner has considered and chosen an operating/business/financial model to pursue its goals, the financial analysis has determined feasibility, and a term sheet has been created, the solicitation process follows and could include the following steps:

- Market Teaser – The port owner and its advisors reach out to a wide variety of private market participants to generate interest in the upcoming solicitation. The market teaser contains a brief overview of the project’s positive attributes and the upcoming opportunity. The contents should be short enough for senior executives to read,

and designed to attract interest. The market teaser invites interested parties to contact the port for the RFQ.

- RFQ Evaluation and Shortlisting – The project team reviews and comments on the RFQ to be sent to industry participants. Upon receipt and review of qualifications from interested parties, criteria for shortlisting are established.
- Draft Concession Agreement (“Agreement”) – The port owner and its advisors establish business parameters to guide the development phase of the project and provide a framework for drafting legal documents. Basic terms include cost sharing during the development work phase, a determination of which operating and financing structures will be considered for the project, and a risk allocation. The form of the Agreement is prepared by counsel.

**Exhibit 3-33 P3 Transaction Execution**



- RFP Development including Approval of Evaluation Criteria and Certification of Useful Life Determination – The financial team and legal counsel send the port a useful life determination, the proposed final RFP, evaluation criteria, and project financial plan.



- P3 and Proposal Evaluation – After the port owner approves the solicitation items listed above, the final RFP will be sent to qualified shortlisted proposers, with emphasis on the selection criteria and financial underpinnings. The RFP responses need to be reviewed and interviews (first and possibly second rounds) with the proposers shortlisted will take place via calls/meetings.
- Preferred Bidder Negotiation or *Best and Final Offers (BAFO)* – No matter the quality of the solicitation process, proposers will likely try to bend any draft terms and conditions toward their preferences and advantages. So a BAFO process or final negotiations with the preferred proposer are recommended so that any contractual grey areas can be clarified. It should be noted that if an acceptable agreement cannot be reached, the port owner can formally end negotiations with a proposer and, in its discretion; either reject all proposals, modify the RFP and begin again the submission of proposals, or proceed to the next most highly ranked proposal and attempt to negotiate an agreement with that entity.

While overall responsibility and much of the risk for a project under a P3 arrangement is often shifted to the private partner, the success of the project begins with well-developed contractual documents that are structured to satisfy the owner's objectives for the project. While certain risks are appropriate for a P3 contractor to manage, those risks may be hard to quantify or manage within a P3 contractor's scope and will inevitably result in higher percentages of contingency pricing and more difficult financing terms, both of which drive costs up.

In addition to balanced risk allocation, appropriate owner's rights and responsibilities must be structured to support the contractor's success in implementing and operating the project. There are inherent risks in complex port terminal projects that can result in substantial financial impacts if not correctly managed. Risk should be allocated appropriately among the concessionaire and public participants to avoid high contingency costs and to minimize impacts. Concession documentation must be drafted to ensure risk allocation meets both port preferences and market acceptability.

The financial package of the preferred proposer must reflect the concession and related documents. Different types of investors and different types of credit instruments have different covenants and documentation requirements. Most importantly, it should all be consistent with and fit within the context of the port's overall system. The port's solicitation process should allow for all types of investors and credit products, and these can be conformed within the concession documentation after other business and operating terms are settled at commercial close (i.e. the signing of the P3/concession agreement).

After final award has been made to a bidding team and the required good faith deposit has been made, the closing process must still be managed to ensure that all steps are taken and documentation requirements are met to bring the transaction to a smooth financial close.

The effective date of a concession should be contingent upon the successful financial closing, as relevant. Requiring a hard bid with committed financing would cause proposers to incorporate risk premiums due to any uncertainties and grey areas they see in the draft concession agreement, as well as cost to hold financial commitments in uncertain markets as the concession is being finalized. By finalizing all detailed negotiations before getting committed financing, risk is reduced and the likelihood of success improved.

### 3.2.5.7 RFQ & RFP Contents and Evaluation Factors

The successful use of the P3 approach requires a well marshalled procurement process – where clear project expectations and the understanding of roles is built among the participants, the owner, prospective vendors and stakeholders. All solicitation materials should clearly communicate the preferred transaction structure and desired outcomes. This will minimize downstream negotiations and revisions.

The port owner’s advisors and legal team need to identify issues and craft solicitation documents designed to improve the likelihood of success. A two-step process is recommended which first seeks a RFQ before issuing a project RFP. A suggested approach is to start with qualifications, but also include the term sheet with the RFQ so that all parties have a clear understanding of what is expected. Qualified firms should be given access to the data room and invited to propose. The RFP should include the draft concession agreement, again so that complete transparency is maintained with respect to the port owner’s intentions for the project.

Every port and project will have a unique set of circumstances to be addressed by the RFQ and RFP processes.

Exhibit 3-34 outlines the general contents of RFQs and RFPs for a marine terminal P3 concession, noting again that specific project needs will drive actual contents.

**Exhibit 3-34 RFQ Contents**

<b>EXECUTIVE SUMMARY</b>
<b>PORT OWNER GOVERNANCE AND OVERSIGHT</b>
<b>TERMINAL INVESTMENT HIGHLIGHTS</b>
<ul style="list-style-type: none"> <li>● CURRENT OPERATIONS</li> <li>● MARKET</li> <li>● INLAND ACCESS                             <ul style="list-style-type: none"> <li>– Highway</li> <li>– Rail</li> </ul> </li> <li>● FUTURE OUTLOOK/EXPANSION</li> </ul>
<b>MARINE TERMINAL OVERVIEW</b>
<ul style="list-style-type: none"> <li>● MARINE TERMINAL CURRENT PHYSICAL FEATURES</li> <li>● DRAWING OF MARINE TERMINAL</li> <li>● ICTF CURRENT PHYSICAL FEATURES</li> <li>● DESCRIPTION OF WAREHOUSE PROPERTY</li> <li>● MARINE TERMINAL FINANCIALS</li> </ul>
<b>PROJECT TERMS AND CONDITIONS</b>
<ul style="list-style-type: none"> <li>● BERTH CONSTRUCTION</li> <li>● FUNDING CONSTRUCTION</li> <li>● OWNERSHIP AND DEPRECIATION</li> <li>● LEASE AGREEMENT</li> <li>● LEASE PAYMENTS TO PORT AUTHORITY</li> <li>● BUSINESS DEVELOPMENT</li> <li>● EXISTING CONTRACTS</li> <li>● LABOR</li> <li>● ENVIRONMENT</li> <li>● SECURITY</li> </ul>
<b>EVALUATION PROCESS AND CRITERIA</b>
<ul style="list-style-type: none"> <li>● OVERALL PROCESS                             <ul style="list-style-type: none"> <li>– Responses to the Request for Qualification (RFQ)</li> <li>– Confidential Request for Proposals (RFP)</li> <li>– Evaluation Criteria</li> </ul> </li> <li>● SOLICITATION SCHEDULE</li> </ul>
<b>SUBMISSION REQUIREMENTS</b>
<ul style="list-style-type: none"> <li>● ADVISORS TO PORT OWNER</li> <li>● PROPRIETARY/CONFIDENTIAL INFORMATION</li> <li>● NO LIABILITY FOR COSTS</li> <li>● FORMAT</li> <li>● REQUIRED RESPONSES AND ORGANIZATION                             <ul style="list-style-type: none"> <li>– Organizational Information</li> <li>– Qualifications and Experience</li> <li>– Responder's Approach to the Project</li> </ul> </li> </ul>
<b>SUBMITTAL REQUIREMENTS</b>
<b>PORT OWNER'S RESERVED RIGHTS</b>
<b>APPENDIX A - TRANSMITTAL LETTER FORM</b>
<b>APPENDIX B - STATEMENTS OF QUALIFICATION AFFIDAVIT</b>



RFP contents tend to align materially with RFQ contents, with the inclusion of fine-tuned details as needed. For example, the RFP may require the submission of detailed documentation regarding the project, as listed in Exhibit 3-35.

**Exhibit 3-35 Incremental RFP Contents versus RFQ Contents**

Additional information regarding the proposer's qualifications and demonstrated technical competence
Feasibility of developing the project as proposed
Detailed engineering or architectural designs
Proposer's ability to meet schedules
Detailed financial plan, including costing methodology, cost proposals, and project financing approach
Any other information the port considers relevant or necessary

RFQ/RFP evaluation factors (Exhibit 3-36) for P3s are set by the port owners that issue them and their team of advisors. Considerations may be broadly defined in the RFQ/RFP in order to allow for a wide range of responses, and may include professional experience, technical competence, operating capability, and financial resources to complete a proposed project, among others.

**Exhibit 3-36 Sample RFQ/RFP Evaluation Criteria**

Safely, efficiently and productively manage and operate Marine Terminal during lease term, including, but not limited to: <ul style="list-style-type: none"> <li>• Providing a proven management team</li> <li>• Providing and operating a state-of-the-art effective Terminal Operating System</li> <li>• Adhering to Port Authority required operating standards, including, but not limited to, systems preservation, environmental, tenant alteration, security, policing and risk management standards</li> <li>• Working successfully with union labor ILA, particularly the ILA or ILWU</li> </ul>
Design and construct a safe and efficient Berth and cranes by 2017 capable of handling, at least, the New Panamax vessels during the lease term
Provide for total funding requirements, some of which may be facilitated by tax-exempt Private Activity Bond financing issued by the Port Authority, with private lessee payments backed by a private party guarantee
Provide a sound and profitable marketing plan for the Marine Terminal that results in ongoing economic benefit for the state

**3.2.6 Port Funding/Financing Opportunities**

Numerous federal, state and local agencies provide funding and financing assistance to ports in the form of grants, loans, cooperative agreements and cost shares. In addition to the information in this Toolkit module, the Build America Bureau and Environmental Protection Agency (EPA) Ports Initiative provide detailed information on the various financial resources available for port and transportation projects, tips and assistance in writing and submitting applications, and technical expertise on securing financing and funding for project sponsors. The Bureau at *BuildAmerica@dot.gov* focuses on Federal opportunities including the INFRA grant program, TIFIA, RRIF and PABs.

The EPA Ports Initiative includes a list of federal, regional and state funding opportunities including funding type, amount, deadlines and eligibility details at <https://www.epa.gov/ports-initiative/funding-opportunities-ports-and-near-port-communities>. Exhibit 3-37 summarizes many of the available Federal funding opportunities to support port projects.

**3.2.6.1 Federal Grant Programs**

Grant programs and funding levels change from year to year, as government revenue levels vary and federal appropriations fluctuate. There are many different federal, state and local grant programs available to port owners at any given time. The focus of this section is on USDOT programs available at the time of this module version of the PP&IT to fund port infrastructure, equipment or systems. Ports should investigate if their state has port grant programs available. Federal grant programs are organized into two categories: discretionary grant programs that are awarded directly by USDOT and Federal-aid grant programs that are managed at the local level.

Exhibit 3-37 Federal Programs to Support Port Projects

Govt. Program	Summary Description	Program Allocation and Project Size	Max. Federal Award	Port Project Elements			
				Planning	Equipment	Infrastructure	Dredging
<i>BUILD</i>	Competitive grant for enhancement of surface transportation infrastructure at local and regional level.	Variable – Yearly appropriation; Max. \$25M	80% urban, 100% rural				
<i>INFRA</i>	Competitive grant for highway and freight projects of national or regional significance.	Max. \$500M for freight through 2020; Min. \$25M large project, \$5M small project	60%				
<i>ATCMTD</i>	Competitive grant for deployment of advanced transportation and congestion management technologies.	\$60M /yr. through 2020; Max. Size \$12M	50%				
<i>AMH</i>	Competitive grant funding to establish or expand marine highway operations.	Variable – Yearly appropriation; ≈\$7M/yr.	80%				
<i>FERRY</i>	Competitive grant for projects that support existing or new passenger ferry systems in urbanized areas	\$30M/yr. through 2020	80%				
<i>ITS</i>	Funding for the development of ITS infrastructure, equipment, and systems; planning, research, studies, and deployment support. Refer to ITS Module of the PP&IT for further details.	\$100M/yr. through 2020	80%				
<i>STBG</i>	Formula funding for States and MPOs for priority transportation projects.	≈\$12B/yr. through 2020	80%				
<i>NHFP</i>	Formula funding for States to improve movement of freight on National Highway Freight Network.	≈\$1.4B/yr. through 2020; Max. 10% freight	80%				
<i>CMAQ</i>	Formula funding for States, MPOs and local governments for transportation projects and programs to help meet the requirements of the CAA.	≈\$2.45B/yr. through 2020	80%				
<i>TIFIA</i>	Financing assistance for surface transportation and ITS projects, certain freight rail projects, intermodal freight transfer facilities, and certain projects inside a port terminal.	\$300M/yr. through 2020 <sup>1</sup> ; \$15M ITS projects	49% (TIFIA max.)				
<i>RRIF</i>	Financing assistance for railroad equipment, facilities and infrastructure.	Up to \$35B in loans, up to \$7B for non-Class 1 carrier projects	100%				
<i>PABs</i>	Tax-exempt financing issued through a public conduit for privately developed infrastructure.	\$15B in total allocation; ≈\$6B remaining	100%				

<sup>1</sup>Historically, each dollar of funding has allowed TIFIA to provide approximately \$14 in credit assistance.



### Discretionary Grants

The USDOT awards discretionary grants through a competitive process based on set criteria in a national notice of funding opportunity or availability. Ports are eligible to compete for USDOT discretionary grants through the Better Utilizing Investments to Leverage Development (BUILD) grant program and through two discretionary grant programs established in 2015 in the Fixing America's Surface Transportation (FAST) Act. These programs are the Infrastructure For Rebuilding America (INFRA) and Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) initiatives.

#### **Better Utilizing Investments to Leverage Development Grant Program**

The BUILD grant program, previously known as the Transportation Investment Generating Economic Recovery (TIGER) program, supports multi-modal and multi-jurisdictional projects, which are difficult to fund through traditional federal programs. The BUILD discretionary grant program can also award funds to inside-the-gate port infrastructure projects.

Port owners should verify the specific terms that apply to each new round of BUILD grants, which may change from round to round. These are provided in the Notice of Funding Opportunity announcement for each BUILD grant round, which is published in the Federal Register. Projects generally eligible for BUILD discretionary grants are shown in Exhibit 3-38.

#### **Exhibit 3-38 Projects Eligible for BUILD Discretionary Grants**

Highway or bridge projects eligible under title 23, U.S. Code (U.S.C)
Public transportation projects eligible under chapter 53 of title 49, U.S.C
Passenger and freight rail transportation projects
Port infrastructure investments, including projects that connect ports to other modes of transportation and improve the efficiency of freight movement

**Source:** [www.dot.gov/BUILDgrants/about](http://www.dot.gov/BUILDgrants/about)

USDOT BUILD grants are awarded on a competitive basis for capital investments in surface transportation projects that will have a

significant impact on the nation, a metropolitan area or a region. Special consideration is given to projects in rural areas.

All projects requiring an action by the FHWA or the Federal Transit Administration (FTA) in accordance with 23 CFR part 450, must be in the metropolitan transportation plan, *transportation improvement program (TIP)* and *statewide transportation improvement program (STIP)*. Further, in air quality non-attainment and maintenance areas, all regionally significant projects, regardless of the funding source, must be included in the conforming metropolitan transportation plan and TIP. To the extent a project is required to be on a metropolitan transportation plan, TIP, and/or STIP, it will not receive a BUILD Grant until it is included in such plans. Projects not currently included in these plans can be amended by the state and MPO.

Port, freight and passenger rail projects are not required to be on the State Rail Plans called for in the Passenger Rail Investment and Improvement Act of 2008. However, applicants seeking funding for freight rail projects are encouraged to demonstrate that they have done sufficient planning to ensure that projects fit into a prioritized list of capital needs and are consistent with long range goals. To the extent possible, freight projects should be included in a state freight plan and supported by a state freight advisory committee.

Beyond basic project eligibility guidelines, specific selection criteria guide funding determinations. BUILD grants are awarded based on the following merit criteria:

- safety,
- economic competitiveness,
- quality of life,
- environmental protection,
- state of good repair,
- innovation,
- partnership, and
- additional non-Federal revenue for infrastructure investments.

For additional explanation of the criteria, refer to the BUILD Notice of Funding Opportunity announcement published in the Federal Register. The discussion and parameters of BUILD provide an introductory view of the program and are not all encompassing. Additional resources can be found on the USDOT's website <https://www.transportation.gov/BUILDgrants>.

### Infrastructure for Rebuilding America

The INFRA program was established in the FAST Act to fund critical freight and highway projects across the country. The program establishes broad, multi-year eligibilities for freight infrastructure, including intermodal projects.

The FAST Act authorizes billions of dollars in funding for the INFRA program over the next five-year period from 2016 to 2020. 25 percent of INFRA funds are reserved for rural projects, and 10 percent for smaller projects. Large projects (equal to the lesser of \$100 million or a certain specified statutory percentage of the project state's fiscal year apportionment) are eligible for a minimum award of \$25 million. Small projects, which consist of projects below the minimum large project size threshold, are eligible for a minimum award of \$5 million. For more information about the INFRA Grant program eligibility, refer to <https://www.fhwa.dot.gov/fastact/factsheets/infragrantfs.cfm>.

### Advanced Transportation and Congestion Management Technologies Deployment

The ATCMTD program awards grants to eligible entities to develop model deployment sites for large scale installation and operation of advanced transportation technologies to improve safety, efficiency, system performance, and infrastructure return on investment.

These model deployments are expected to provide benefits in the form of:

- reduced traffic-related fatalities and injuries;
- reduced traffic congestion and improved travel time reliability;
- reduced transportation-related emissions;
- optimized multimodal system performance;
- improved access to transportation alternatives, including for underserved populations;
- public access to real time integrated traffic, transit, and multimodal transportation information to make informed travel decisions;
- cost savings to transportation agencies, businesses, and the traveling public; or
- other benefits to transportation users and the general public.

The ATCMTD grant awards may be used for projects that use real-time traveler information, traffic data collection and dissemination, vehicle-to-infrastructure and an array of other dynamic systems and ITS technologies. The program is funded annually through the duration of the FAST Act. For more information about the ATCMTD Grant program eligibility, refer to <https://www.fhwa.dot.gov/fastact/factsheets/advtranscongmgmtfs.cfm>.

### Federal-Aid Grant Programs

Additional federal funding is available through federal transportation grants that are administered through state and local governments. Federal-Aid highway funds are authorized by Congress to assist states in

### Federal Policies - Buy America

Ports will need to comply with various federal policies when positioning a project to compete for U.S. government grant and credit assistance programs. One example would be any relevant Buy America requirement which, in general, stipulates that steel, iron, and manufactured products used in a federally-funded project must be produced in the U.S. A waiver of this requirement might be available under certain limited conditions. For general information on Buy America requirements, refer to <https://www.transportation.gov/highlights/buyamerica>.



## FINANCING



providing for construction, reconstruction, and improvement of highways and bridges on eligible Federal-Aid highway routes and for other special purpose programs and projects (including some port improvements).

Some of the primary federal-aid programs for ports

include the Surface Transportation Block Grant Program (STBG), the Congestion Mitigation and Air Quality Improvement Program (CMAQ) and the National Highway Freight Program (NHFP). For a complete guide on federal-aid projects, refer to <https://www.fhwa.dot.gov/federalaid/projects.cfm>.

Normally projects funded through these programs must be identified in the STIP/TIP and be consistent with the LRTP and the Metropolitan Transportation Plan(s) and most importantly for ports, the State's Freight Plan.

### Surface Transportation Block Grant Program

The FAST Act converted the long-standing Surface Transportation Program into the STBG Program, acknowledging that this program has the most flexible eligibilities among all Federal-aid highway programs and aligning the program's name with how the FHWA has historically administered it. The STBG promotes flexibility in state and local transportation decisions and provides flexible funding to best address state and local transportation needs. As under the Moving Ahead for Progress in the 21st Century Act (MAP-21), the FAST Act directs FHWA to apportion funding as a lump sum for each state and then divide that total among apportioned programs. Each state's STBG apportionment is calculated based on a percentage specified in law.

In general, STBG projects may not be on local roads or rural minor collectors. There are a number of exceptions to this requirement, such as the ability to use up to 15 percent of a state's rural suballocation on minor collectors. Other exceptions include: port terminal modifications.

More information about the STBG program can be found at <http://www.fhwa.dot.gov/fastact/factsheets/stbgfs.cfm>.

### National Highway Freight Program

The FAST Act established the NHFP to improve the efficient movement of freight on the National Highway Freight Network (NHFN) and support several goals, including—

- investing in infrastructure and operational improvements that strengthen economic competitiveness, reduce congestion, reduce the cost of freight transportation, improve reliability, and increase productivity;
- improving the safety, security, efficiency, and resiliency of freight transportation in rural and urban areas;
- improving the state of good repair of the NHFN;
- using innovation and advanced technology to improve NHFN safety, efficiency, and reliability;
- improving the efficiency and productivity of the NHFN;
- improving state flexibility to support multi-state corridor planning and address highway freight connectivity; and
- reducing the environmental impacts of freight movement on the NHFN.

As of December 2017, a state may not obligate NHFP funds unless it has developed a freight plan that is consistent with 49 U.S.C. 70202—though the multimodal component of that plan need not be complete by that time. For more information refer to <http://www.fhwa.dot.gov/fastact/factsheets/nhfpfs.cfm>

### Congestion Mitigation and Air Quality Improvement Program (CMAQ)

The FAST Act continued the CMAQ program to provide a flexible funding source to state and local governments for transportation projects and programs to help meet the requirements of the CAA. Funding is available to reduce congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards for ozone, carbon monoxide, or particulate matter (nonattainment areas) and for former nonattainment areas that are now in compliance (maintenance areas).

The FAST Act added eligibility for verified technologies for non-road vehicles and non-road engines that are used in port-related freight operations located in ozone, PM<sub>10</sub>, or PM<sub>2.5</sub> nonattainment or maintenance areas funded in whole or in part under 23 U.S.C. or chapter 53 of 49 U.S.C.

The Act also specifically makes eligible the installation of vehicle-to-infrastructure communications equipment. The FAST Act continues eligibility for electric vehicle and natural gas vehicle infrastructure and adds priority for infrastructure located on the corridors designated under 23 U.S.C. 151.

The FAST Act amended the eligible uses of CMAQ funds set aside for PM<sub>2.5</sub> nonattainment and maintenance areas. PM<sub>2.5</sub> set-aside funds may be used to reduce fine particulate matter emissions in a PM<sub>2.5</sub> nonattainment or maintenance area, including—

- diesel retrofits;
- installation of diesel emission control technology on nonroad diesel equipment or on-road diesel equipment that is operated on a highway construction projects; and

- the most cost-effective projects to reduce emissions from port-related landside nonroad or on- road equipment that is operated within the boundaries of the area.

Further details about CMAQ can be found at <http://www.fhwa.dot.gov/fastact/factsheets/cmaqfs.cfm>

### Other Programs and Opportunities

Other programs, such as the U.S. Department of Homeland Security's Port Security Grant Program, are also available to ports. Further, it is suggested that port owners and industry practitioners explore available state and local grant programs as potential funding sources. Such programs may have matching requirements, for example, the provision of grant monies to be applied towards half of the project cost if the port is able to find funding for the other half. Examples of the use of such grant programs are included in the Project Profiles Appendix of this Toolkit module. Discretionary allocations arising from state or local government budgets may also provide sources of funding - such allocations are specific to the relevant government of a port's locality.

### Positioning Ports for Grant Funding

Grant funding is competitive and so it is imperative that projects requesting funding:

- tell a succinct story in the grant application
- meet the grant requirements;
- achieve the priorities of the grant;
- demonstrate strong stakeholder support, particularly funding partners
- have a well-defined funding plan including a significant non-federal match; and
- provide a clear project scope, schedule and budget.



Port owners must approach the grant funding process using various positioning strategies to effectively compete for limited grant monies:

- Projects that compete well for grant funding are those that:
  - promote economic competitiveness,
  - generate significant public benefit,
  - leverage private investment, and
  - are ready to proceed in an expeditious manner.
- A comprehensive grant application must be developed that clearly addresses, among other things:
  - project eligibility
  - environmental impacts and permitting activities
  - project risks and mitigations,
  - plan of finance
  - an analysis of project benefits versus costs
- Application requirements vary across programs, so specific grant selection criteria must be adhered to in developing the application package. Applicants should look closely at the notice of funding opportunity or availability for each specific grant program to ensure that they are addressing all the requirements and criteria for the grant program in question.



Oftentimes, extraordinary infrastructure needs and reasons for funding and development are the overriding factors in winning project grant monies, as well as the delivery of projects that provide important public benefits (e.g. reduced noise, reduced emissions, reduced traffic congestion, improved safety, and other positive “externalities” for communities).

Further project strengths that may provide a competitive edge include: multimodal projects, including coordinated investment from other sources and programs; demonstrate improved connectivity between users and centers of employment, education, and services; new partnerships and multi-jurisdictional cooperation; problem statement and opportunity for plan clearly defined in application; plan should be actionable and include appropriate risk analysis, mitigation estimates, and NEPA requirements; public private partnerships and support.

The parameters for successful grant applications can often be applied across various funding programs. Combining grant funding with other investment options, port owners will be better equipped to position their projects for competitive grant funding while at the same time enabling port owners to leverage more innovative sources of investment capital.

#### 3.2.6.2 Government Loans

Government loan programs, particularly the USDOT TIFIA program but also various SIB programs, have become very important tools for U.S. infrastructure financing. TIFIA has become a key tool for many highway and transit projects, although there is some applicability for ports, especially with respect to intermodal rail connections, and also for highway access within and outside of ports (e.g. the Port of Miami Tunnel project financing included a \$341 million TIFIA loan as part of a comprehensive funding package – further information on the project is at [http://www.fhwa.dot.gov/ipd/project\\_profiles/fl\\_port\\_miami\\_tunnel.aspx](http://www.fhwa.dot.gov/ipd/project_profiles/fl_port_miami_tunnel.aspx)).

These programs require a formal application process, so as with grant funding, projects that compete well for loans and credit enhancement are those that promote economic competitiveness, are difficult to fund via other means, leverage dedicated revenue sources, and are ready to proceed in an expeditious manner. However, unlike with grants, these programs do require repayment and thus creditworthiness is a key eligibility factor. In this regard, the other sections of this Module with their focus on creditworthiness and attracting investment are also applicable to government loans.

### 3.2.6.3 Government Loan Programs

As with grant funding, government loan programs and funding levels change from year to year as government resource levels adjust. A port owner may have several federal, state and/or local loan programs available to fund infrastructure. The focus of this section is on the USDOT TIFIA program. However, other programs such as the RRIF program and the SIB program can also be used for port-related projects. Following the passage of the FAST Act, the TIFIA and RRIF programs are being managed through USDOT's Build America Bureau, which can be found at <https://www.transportation.gov/buildamerica>

Government loans are typically structured as "bonds" secured under a trust indenture. Loan negotiations require an understanding of the credit concerns of the specific loan provider/program. Given their features as debt obligations, ongoing rating agency surveillance may be required depending on program requirements, including for TIFIA and SIBs. In addition, certain programs such as TIFIA have ongoing reporting requirements, including an annual financial plan update, coverage compliance, and annual credit rating surveillance.

#### TIFIA

The TIFIA loan program provides federal credit assistance to nationally/regionally significant surface transportation projects including highway,

transit and rail, with some applicability to port intermodal projects. TIFIA offers flexible loan repayment at attractive interest rates, including for subordinate debt. In addition to direct loans, credit assistance offered through the program includes loan guarantees and lines of credit. TIFIA credit assistance may cover portions of total project cost as listed in Exhibit 3-39.

#### Exhibit 3-39 TIFIA Eligible Project Cost Percentages

TIFIA line of credit: up to 33%
TIFIA loan: up to 49% (or, if the secured loan does not receive an investment grade rating, up to the amount of senior project obligations)
TIFIA loan and TIFIA line of credit, combined: up to 49%
Total Federal assistance (grants and loans) to a project receiving a TIFIA loan: up to 80%

Source: <https://www.fhwa.dot.gov/fastact/factsheets/tifiafs.cfm>

To receive TIFIA assistance, a project must have costs that equal or exceed at least one of those in Exhibit 3-40.

#### Exhibit 3-40 TIFIA Minimum Project Costs

\$50 million, or 1/3 of the most recently-completed fiscal year's formula apportionments for the State in which the project is located
For a rural infrastructure project or capitalization of a rural project fund, \$10 million
For a local infrastructure project, \$10 million
For an ITS project, \$15 million

Source: <https://www.fhwa.dot.gov/fastact/factsheets/tifiafs.cfm>

Additionally, TIFIA includes the key guidelines shown in Exhibit 3-41.



**Exhibit 3-41 TIFIA Key Guidelines**

Repayment via dedicated revenue sources that secure project obligations, such as tolls, other user fees, or payments received under a public-private partnership agreement <ul style="list-style-type: none"> <li>• Repayment must begin by five years after substantial project completion</li> </ul>
Interest rates no less than yields on U.S. treasuries rate of final term (e.g. 20 or 30 years) applies to entire loan <ul style="list-style-type: none"> <li>• Loans to rural infrastructure projects are at 1/2 the Treasury interest rate</li> </ul>
Maximum maturity is 35 years after project's substantial completion
A project's senior debt obligations must receive an investment grade credit rating
Eligible costs are defined to include development phase activities, construction and
Right of Way acquisition, capitalized interest, reserve funds and cost of issuance expenses

Source: <http://www.fhwa.dot.gov/map21/factsheets/tifia.cfm>

Projects generally eligible for TIFIA credit assistance are shown in Exhibit 3-42.

**Exhibit 3-42 TIFIA Eligible Projects**

Projects eligible for assistance under title 23 or chapter 53 of title 49
International bridges and tunnels
Intercity passenger bus or rail facilities and vehicles, including those owned by Amtrak
Public freight rail projects
Private freight rail projects that provide public benefit for highway users by way of direct highway-rail freight interchange
Intermodal freight transfer facilities
Projects providing access to, or improving the service of, the freight rail projects and transfer facilities described above
Surface transportation infrastructure modifications necessary to facilitate direct intermodal interchange, transfer and access into and out of a port

Source: [www.fhwa.dot.gov/map21/factsheets/tifia.cfm](http://www.fhwa.dot.gov/map21/factsheets/tifia.cfm); <http://www.fhwa.dot.gov/fastact/factsheets/tifiafs.cfm>

TIFIA eligibility requirements and selection criteria guide funding determinations. Successful TIFIA applications are supported by a capital market acceptable and creditworthy project plan of finance, among other considerations. The TIFIA application requires the eligibility factors listed in Exhibit 3-43.

**Exhibit 3-43 TIFIA Eligibility Requirements**

Creditworthiness (rate covenant, coverage requirements, investment grade rating(s))
Foster Partnerships that Attract Public and Private Investment
Enable Project to Proceed at an Earlier Date or with Reduced Lifecycle Costs
Reduce the Contribution of Federal Grant Assistance
Environmental Review (NEPA)
Permits and Approvals
Transportation Planning and Programming Process Approvals (STIP and TIP)
Construction Contracting Process Readiness
Project Schedule
Other title 23 or chapter 53, title 49 requirements, as applicable

Source: <https://www.transportation.gov/tifiatifia-credit-program-overview>

Under USDOT guidance, transportation projects are required to submit a Major Project Financial Plan if any of the following applies: 1) Recipient of Federal financial assistance for a Title 23 project with a minimum cost of \$500 million, 2) identified by the USDOT Secretary as a major project and 3) applying for TIFIA assistance. Thus with any application for a TIFIA loan, a port owner would need to submit a Major Project Financial Plan. The detailed information required includes the following:

- Separate financing/debt discussion including issuance costs, interest costs, and other financial details of the bonds
- Detailed pro forma cash flow to demonstrate sufficiency of cash available to cover all

project costs including debt service and related reserves

- In the case of TIFIA, long term credit ratings are required for both the project obligations as well as the TIFIA loan itself
- P3 Assessment

The TIFIA application and credit process needs to be incorporated into the overall project schedule to ensure that a port can meet its time schedule for project delivery and financial close. The TIFIA and RRIF application and credit process is generally outlined in Exhibit 3-44.

This discussion and parameters of TIFIA provide an introductory view of the program and are not all encompassing. Additional resources for TIFIA as well as project delivery, project finance, and P3 can be found on FHWA’s Innovative Program Delivery website at <http://www.fhwa.dot.gov/ipd/>

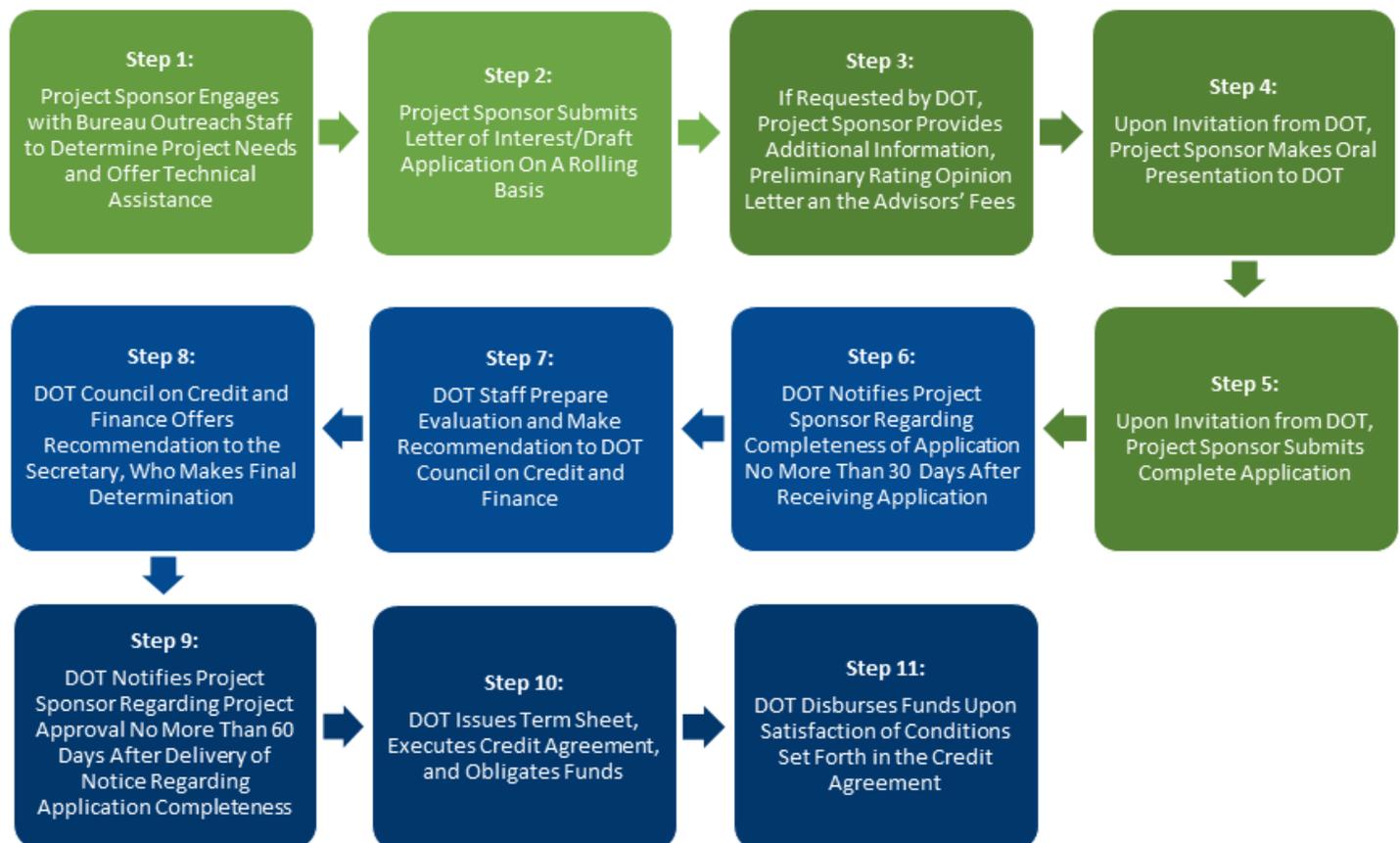
Railroad Rehabilitation and Improvement Financing (RRIF)

The *RRIF* program provides direct loans and loan guarantees up to \$35 billion to finance development of railroad infrastructure, of which \$7 billion is reserved for non-Class I freight railroads. Rail projects within the boundaries of a port are eligible to apply for assistance.

The funding may be used to:

- Acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track, components of track, bridges, yards, buildings and shops;
- Refinance outstanding debt incurred for the purposes listed above; and
- Develop or establish new intermodal or railroad facilities

**Exhibit 3-44 TIFIA and RRIF Financing Process**





Direct loans can fund up to 100 percent of a railroad project with repayment periods of up to 35 years and interest rates equal to the cost of borrowing from the government.

Eligible borrowers include railroads, state and local governments, government-sponsored authorities and corporations, joint ventures that include at least one railroad, and limited option freight shippers who intend to construct a new rail connection.

**State Infrastructure Bank (SIB)**

Several states have recognized the need for a transportation *SIB* program funded at a greater level from state-only sources and with more flexibility relative to a SIB receiving Federal funding.

A non-Federal or state-only SIB can expedite project completion times, and provide for other specific advantages such as:

- Enhanced senior lien debt service coverage for project bonds by financing a portion of a project on a long-term subordinate basis
- Provide low cost pre-construction financing on a short-term basis. The SIB loan could be repaid from the proceeds of the permanent construction financing and then be loaned again
- Pay the interest on other project indebtedness during construction and the early years of operations. That is, the SIB loan could fund capitalized interest
- A SIB program is continuously re-capitalized by loan repayments and can be leveraged to increase overall transportation funding

**Exhibit 3-45 SIB Program Structure**

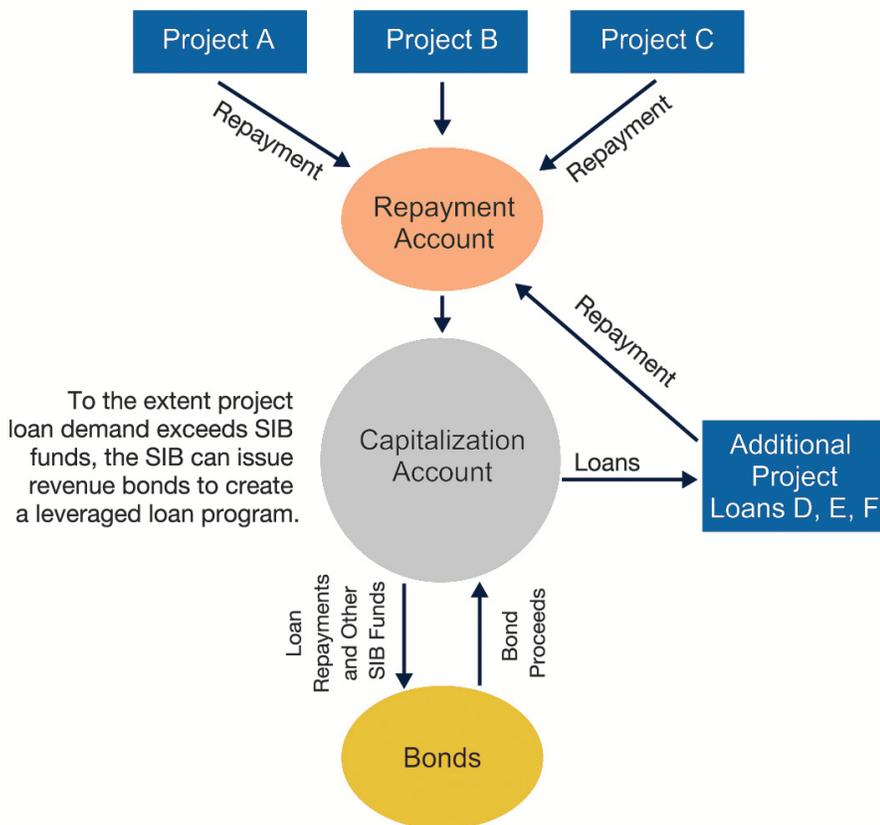


Exhibit 3-45 gives a general overview of how a direct loan program would work (i.e. excluding the “Bonds” portion of the graph), and how a leveraged loan program would work (i.e. including the “Bonds” portion of the graph).

SIBs generally operate as revolving loan funds to alleviate, in part, a critical need for additional funding for the design and construction of roads and highways and other transportation facilities, such as port infrastructure. Direct loans are made to public entities with eligible transportation improvement projects; SIBs may also make grants to projects with no other viable source of funding. Over time additional capitalization could be derived from the repayment of loan principal and interest, investment income on SIB fund balances, and any other revenues appropriated. The specific characteristics and eligibility requirements of any SIB program vary from state to state.

### 3.2.6.4 Positioning Ports for Government Loans

Government loan programs can be competitive and so it is imperative that port owners requesting funding provide a succinct story in the loan application and also to the various stakeholders of the project. For state and local loan programs, competitiveness and eligibility requirements vary. As such, it is important for port owners to have an understanding of how the particular government loan fits into the overall project plan of finance. For the TIFIA program, the requirements can be demanding and the process lengthy.

Therefore, before embarking on a path to procure a TIFIA loan, and dedicating extensive time and resources to the process, it is prudent to be aware of a project’s likely chances of being approved for credit assistance.

Many of the project strengths discussed in this section that help in soliciting grant funding also apply to government loans. Projects that have been successful in gaining TIFIA assistance have generally exhibited the strengths in Exhibit 3-46.



Aside from the specifics of the TIFIA program, other more general factors that can help port owners to position projects for government funding include experienced management team and technical advisors, reputation of private partners, public support of the project, and legislation and regulations in place to accommodate the project and private investment.

#### Exhibit 3-46 TIFIA Project Strengths

<b>Significance:</b> The extent to which the project is nationally or regionally significant, in terms of generating economic benefits, supporting international commerce, or otherwise enhancing the national transportation system
<b>Private Participation:</b> The extent to which assistance would foster innovative public-private partnerships and attract private debt or equity investment
<b>Environment:</b> The extent to which the project helps maintain or protect the environment
<b>Project Acceleration:</b> The likelihood that assistance would enable the project to proceed at an earlier date than the project would otherwise be able to proceed
<b>Creditworthiness:</b> The creditworthiness of the project, including a determination that any financing for the project has appropriate security features, such as a rate covenant, to ensure repayment
<b>Use of Technology:</b> The extent to which the project uses new technologies, including intelligent transportation systems, that enhance the efficiency of the project
<b>Consumption of the Budget Authority:</b> The amount of budget authority consumed in funding the requested Federal credit instrument
<b>Reduced Federal Grant Assistance:</b> The extent to which assistance would reduce the contribution of Federal grant assistance to the project



## Appendix A: Glossary of Terms

**Additional Bonds Test** - The financial test, sometimes referred to as a “parity test,” that must be satisfied under the bond contract securing outstanding revenue bonds or other types of bonds as a condition to issuing additional bonds. Typically, the test would require that historical revenues (plus, in some cases, future estimated revenues) exceed projected debt service requirements for both the outstanding issue and the proposed issue by a certain ratio.<sup>1</sup>

**Advance Refunding** - For purposes of certain tax and securities laws and regulations, a refunding in which the refunded issue remains outstanding for a period of more than 90 days after the issuance of the refunding issue.<sup>1</sup>

**Alternative Minimum Tax (AMT)** - Taxation based on an alternative method of calculating federal income tax under the Internal Revenue Code. Interest on certain private activity bonds is subject to the AMT.<sup>1</sup>

**Amortization** - The process of paying the principal amount of an issue of securities by periodic payments either directly to bondholders or to a sinking fund for the benefit of bondholders.<sup>1</sup>

**Arbitrage Rebate** - A payment made by an issuer to the federal government in connection with an issue of tax-exempt or other federally tax-advantaged bonds. The payment represents the amount, if any, of arbitrage earnings on bond proceeds and certain other related funds, except for earnings that are not required to be rebated under limited exemptions provided under the Internal Revenue Code. An issuer generally is required to calculate, once every five years during the life of its bonds, whether or not an arbitrage rebate payment must be made.<sup>1</sup>

**Asset** - Any item of economic value, either physical in nature (such as land) or a right to ownership,

expressed in cost or some other value, which an individual or entity owns.<sup>2</sup>

**Asset-Backed Debt** - Debt having hard asset security such as a crane lease or property mortgage, in addition to the security of pledged revenues.

**Availability Payment** - A means of compensating a private concessionaire for its responsibility to design, construct, operate, and/or maintain an infrastructure facility for a set period of time. These payments are made by a public project sponsor (a port authority, for example) based on particular project milestones or facility performance standards.<sup>2</sup>

**Best and Final Offers (BAFO)** - In government contracting, a vendor’s response to a contracting officer’s request that vendors submit their last and most attractive bids to secure a contract for a particular project. Best and final offers are submitted during the final round of negotiations.<sup>3</sup>

**Bond Indenture** - A contract between the issuer of municipal securities and a trustee for the benefit of the bondholders. The trustee administers the funds or property specified in the indenture in a fiduciary capacity on behalf of the bondholders. The indenture, which is generally part of the bond contract, establishes the rights, duties, responsibilities and remedies of the issuer and trustee and determines the exact nature of the security for the bonds. The trustee is generally empowered to enforce the terms of the indenture on behalf of the bondholders.<sup>1</sup>



**Better Utilizing Investments to Leverage Development (BUILD)** - USDOT BUILD discretionary grants are awarded on a competitive basis for capital investments in surface transportation projects that will have a significant impact on the nation, a metropolitan area or a region.

**Call Date** - The date on which bonds may be called for redemption as specified by the bond contract.<sup>1</sup>

**Capacity (Maximum Practical)** - Throughput volume which, if exceeded, would cause a disproportionate increase in unit operating cost or business delay, within the context of a facility's land use, layout, and uncontrollable commercial drivers.

**Capital Expenditure (CapEx)** - Expenditure on capital items either at the commencement of the project or the cost of their renewal and replacement ("R&R") over the life of the project.

**Capital Appreciation Bonds (CABs)** - A municipal security on which the investment return on an initial principal amount is reinvested at a stated compounded rate until maturity. At maturity the investor receives a single payment (the "maturity value") representing both the initial principal amount and the total investment return. CABs typically are sold at a deeply discounted price with maturity values in multiples of \$5,000.<sup>1</sup>

**Capital Improvement Program (CIP)** - A schedule, typically covering a period of less than ten years, which outlines expenditures for capital projects on an annual basis and corresponding funding sources.

**Capital Structure** - The mix of an issuer's or a project's short and long-term debt and equity, including the terms of such financing and repayment requirements.

**Capitalized Interest** - A portion of the proceeds of an issue that is set aside to pay interest on the securities for a specified period of time. Interest is commonly capitalized for the construction period of a revenue-producing project, and sometimes for

a period thereafter, so that debt service expense does not begin until the project is expected to be operational and producing revenues.<sup>1</sup>

**Concession** - An alternative method for a public sector entity to deliver a public- purpose project through long-term contracting with a private sector entity. A concession agreement typically covers the objectives of the asset concession, compensation, and duration of concession. A port concession is a contractual agreement in which a port owner conveys specific operating rights of its facility to a private entity for a specified period of time.

**Convertible Capital Appreciation Bonds (CCABs)** - CABs with a convertibility feature at a future date to CIBs. CCABs can be used to defer interest and principal payments, with conversion to Current Interest Bonds so that debt service requirements begin, thus reducing the cost of funds relative to traditional, non-convertible CABs.

**Coupon** - The periodic rate of interest, usually calculated as an annual rate payable on a security expressed as a percentage of the principal amount. The coupon rate, sometimes referred to as the "nominal interest rate," does not take into account any discount or premium in the purchase price of the security.<sup>1</sup>

**Covenants** - Contractual obligations set forth in a bond contract. Covenants commonly made in connection with a bond issue may include covenants to charge fees sufficient to provide required pledged revenues (called a "rate covenant"); to maintain casualty insurance on





the project; to complete, maintain and operate the project; not to sell or encumber the project; not to issue parity bonds or other indebtedness unless certain tests are met (“additional bonds” or “additional indebtedness”

covenant); and not to take actions that would cause tax-exempt interest on the bonds to become taxable or otherwise become arbitrage bonds (“tax covenants”).<sup>1</sup>

**Credit Rating** - An opinion by a rating agency of the credit-worthiness of a bond.<sup>1</sup>

**Current Interest Bonds (CIBs)** - A bond on which interest payments are made to the bondholders on a periodic basis. This term is most often used in the context of an issue of bonds that includes both CABs and CIBs.<sup>1</sup>

**Current Refunding** - A refunding transaction where the municipal securities being refunded will all mature or be redeemed within 90 days or less from the date of issuance of the refunding issue.<sup>1</sup>

**Debt Profile** - A detailed description of an issuer’s overall debt portfolio and credit profile that is updated as changes in capital structure occur. A debt profile typically includes all of the relevant information about an issuer’s debt including but not limited to current ratings, debt service requirements, debt service coverage ratios and eligibility for refunding.

**Debt Service Coverage Ratio** - The ratio of available revenues available annually to pay debt service over the annual debt service requirement. This ratio is one indication of the availability of revenues for payment of debt service.<sup>1</sup>

**Debt Service Reserve** - A fund in which funds are placed to be applied to pay debt service if pledged revenues are insufficient to satisfy the debt service requirements. The debt service reserve fund may be entirely funded with bond proceeds at the time of issuance, may be funded over time through the accumulation of pledged revenues, may be funded with a surety or other type of guaranty policy (described below), or may be funded only upon the occurrence of a specified event (e.g. upon failure to comply with a covenant in the bond contract) (a “springing reserve”). Issuers may sometimes authorize the provision of a surety bond or letter of credit to satisfy the debt service reserve fund requirement in lieu of cash. If the debt service reserve fund is used in whole or part to pay debt service, the issuer usually is required to replenish the fund from the first available revenues, or in periodic repayments over a specified period of time.

**Defeasance** - Termination of certain of the rights and interests of the bondholders and of their lien on the pledged revenues or other security in accordance with the terms of the bond contract for an issue of securities. This is sometimes referred to as a “legal defeasance.” Defeasance usually occurs in connection with the refunding of an outstanding issue after provision has been made for future payment of all obligations related to the outstanding bonds, sometimes from funds provided by the issuance of a new series of bonds. In some cases, particularly where the bond contract does not provide a procedure for termination of these rights, interests and lien other than through payment of all outstanding debt in full, funds deposited for future payment of the debt may make the pledged revenues available for other purposes without effecting a legal defeasance. This is sometimes referred to as an “economic defeasance” or “financial defeasance.” If for some reason the funds deposited in an economic or financial defeasance prove insufficient to make future payment of the outstanding debt, the issuer would continue to be



legally obligated to make payment on such debt from the pledged revenues.<sup>1</sup>

**Demand & Revenue Study** - A professionally prepared forecast and report of the market demand for a port's cargo, and the ensuing revenue as a result of charging rates/fees for such cargo moving through a port. Demand & revenue data is used as input in developing plans of finance and evaluating investment opportunities.

**Design-Build (DB)** - A project delivery method that combines two, usually separate services into a single contract. With design-build procurements, owners execute a single, fixed-fee contract for both architectural/engineering services and construction. The design-build entity may be a single firm, a consortium, joint venture or other organization assembled for a particular project.<sup>4</sup>

**Design-Build-Finance-Operate-Maintain (DBFOM)** - A method of project delivery in which the responsibilities for designing, building, financing and operating are bundled together and transferred to private sector partners.<sup>4</sup>

**Design-Build-Operate-Maintain (DBOM)** - An integrated partnership that combines the design and construction responsibilities of design-build procurements with O&M. These project components are procured from the private sector in a single contract with financing secured by the public sector.<sup>4</sup>

**Enabling Act** - Legislation by which port authorities and other governmental agencies are created and granted powers to carry out certain actions. While enabling acts for port authorities vary widely; key aspects generally include establishment of the port entity; governance and procedures; powers such as ability to enter into contracts, construct projects, transact business, and enter into financing agreements; and reporting requirements.

**Equity** - A funding contribution to a project having an order of repayment occurring after debt holders in a flow of funds per the bond indenture securing such funding contribution.

**Escrow** - A fund established to hold funds pledged and to be used solely for a designated purpose, typically to pay debt service on an outstanding issue in an advance refunding.<sup>1</sup>

**Flow of Funds** - The order and priority of handling, depositing and disbursing pledged revenues, as set forth in the bond contract. Generally, pledged revenues are deposited, as received, into a general collection account or revenue fund established under the bond contract for disbursement into the other accounts established under the bond contract. Such other accounts generally provide for payment of the costs of debt service, debt service reserve deposits, operation and maintenance costs, renewal and replacement and other required amounts.<sup>1</sup>

**Forward Refunding** - An agreement, usually between an issuer and the underwriter, whereby the issuer agrees to issue bonds on a specified future date and an underwriter agrees to purchase such bonds on such date. The proceeds of such bonds, when issued, will be used to refund the issuer's outstanding bonds. Typically, a forward refunding is used where the bonds to be refunded are not permitted to be advance refunded on a tax-exempt basis under the Internal Revenue Code. In such a case, the issuer agrees to issue, and the underwriter agrees to purchase, the new issue of bonds on a future date that would effect a current refunding.<sup>1</sup>

**Independent Utility** - A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent





utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility. (72 FR 47, p. 11196).

**Intelligent Transportation Systems (ITS)** - An operational system of various technologies that, when combined and managed, improve the operating capabilities of the overall system.

**Interest Rate Swap** - A specific derivative contract entered into by an issuer or obligor with a swap provider to exchange periodic interest payments. Typically, one party agrees to make payments to the other based upon a fixed rate of interest in exchange for payments based upon a variable rate. The swap contract may provide that the issuer will pay to the swap counter-party a fixed rate of interest in exchange for the counter-party making variable payments equal to the amount payable on the variable rate debt.<sup>1</sup>

**Internal Rate of Return (IRR)** - The discount rate often used in capital budgeting that makes the net present value of all cash flows from a particular project equal to zero. Generally speaking, the higher a project's internal rate of return, the more desirable it is to undertake the project.<sup>3</sup>

**Investment-Grade** - A security that, in the opinion of the rating agency, has a relatively low risk of

default.<sup>1</sup> Alternatively, the level of comprehensiveness and market readiness for investment-grade security issuance in referring to a demand & revenue report or engineering report supporting such security issuance.

**Letter of Credit** - An irrevocable commitment, usually made by a commercial bank, to honor demands for payment of a debt upon compliance with conditions and/or the occurrence of certain events specified under the terms of the letter of credit and any associated reimbursement agreement. A letter of credit is frequently used to provide credit and liquidity support for variable rate demand obligations and other types of securities. Bank letters of credit are sometimes used as additional sources of security for issues of municipal notes, commercial paper or bonds, with the bank issuing the letter of credit committing to pay principal of and interest on the securities in the event that the issuer is unable to do so.<sup>1</sup>

**Liquidated Damages** - Present in certain legal contracts, this provision allows for the payment of a specified sum should one of the parties be in breach of contract.<sup>3</sup>

**Liquidity** - In the context project finance, the build-up of cash reserve balances which are viewed favorably given the ability to use such reserves to cover debt service and other obligations under a bond indenture should expected project cash flows not materialize for any given period.

**Long Range Transportation Plan (LRTP)** - A document resulting from regional or statewide collaboration and consensus on a region or state's transportation system, and serving as the defining vision for the region's or state's transportation systems and services. In metropolitan areas, the plan indicates all of the transportation improvements scheduled for funding over the next 20 years. The plan must conform to regional air quality implementation plans and be financially constrained.<sup>2, 4</sup>

**Major Project Financial Plan** - Under U.S. Department of Transportation (USDOT) guidance,





transportation projects are required to submit a Major Project Financial Plan if any of the following apply: 1) recipient of Federal financial assistance for a Title 23 project with a minimum cost of \$500 million, 2) identified by the USDOT Secretary as a major project and 3) applying for TIFIA assistance.

**Master/Land-Use Plan** - Port documents that guides a port's planning, development and management of land, infrastructure and facilities, with the goal of accommodating future growth and supporting the regional economy. These plans often include port owners' goals and policies; survey of existing conditions/facilities; stakeholder outreach activities; land use data; environmental considerations; analysis of future demand, capacity, and capacity requirements; CIP; and operating and financial performance of the port.

**Maximum Annual Debt Service** - Maximum annual debt service refers to the amount of debt service for the year in which the greatest amount of debt service payments are required and is often used in calculating required reserves and in additional debt tests.<sup>1</sup>

**Negative Arbitrage** - Investment of bond proceeds and other related funds at a rate below the bond yield.<sup>1</sup>

**Net Present Value (NPV)** - The difference between the present value of cash inflows and the present value of cash outflows. NPV is used in capital budgeting to analyze the profitability of an investment or project.<sup>3</sup>

**Net Revenue** - The amount of money available after subtracting from gross revenues such costs and expenses as may be provided for in the bond contract. The costs most often deducted are OpEx.<sup>1</sup>

**Off-Balance Sheet** - Assets or liabilities that do not appear on a company's balance sheet but that are nonetheless effectively assets or liabilities of the company. Assets or liabilities designated off balance sheet are typically ones that a company is not the recognized legal owner of, or in the case of

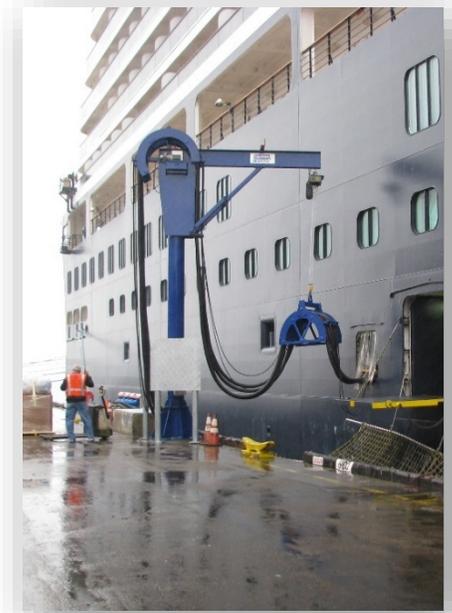
a liability, does not have direct legal responsibility for. Off-balance-sheet financing may be used when a business is close to its borrowing limit and wants to purchase something, as a method of lowering borrowing rates, or as a way of managing risk. This type of financing may also be used for funding projects, subsidiaries or other assets in which the business has a minority claim. An operating lease, used in off balance sheet financing, is a good example of a common off balance sheet item.<sup>3</sup>

#### **Operating & Use Lease Agreement -**

A contract that allows for the use of an asset, but does not convey rights of ownership of the asset. An operating lease is not capitalized; it is accounted for as a rental expense in what is known as "off balance sheet financing." For the lessor, the asset being leased is accounted for as an asset and is depreciated as such. Operating leases have tax incentives and do not result in assets or liabilities being recorded on the lessee's balance sheet, which can improve the lessee's financial ratios.<sup>3</sup>

**Operating Expenditures (OpEx)** – Non capital expenditures incurred on an ongoing basis for operating and maintaining a project asset. OpEx can include rent, equipment, inventory costs, administration, marketing, payroll and insurance. OpEx is a key input in determining project cash flows, often placed after gross revenues in the flow of funds of a bond indenture.

**Operation and Maintenance (O&M)** – The day-to-day activities and services that ensures an asset is in good working condition and operating at a target level of performance.





**Payment Bond –** Deposit or guaranty (usually 20 percent of the bid amount) submitted by a successful bidder as a surety that (upon contract completion) all sums owed by it to its employees, suppliers,

subcontractors, and others creditors, will be paid on time and in full.<sup>5</sup>

**Performance Bond -** A written guaranty from a third party guarantor (usually a bank or an insurance company) submitted to a principal (client or customer) by a contractor on winning the bid. A performance bond ensures payment of a sum (not exceeding a stated maximum) of money in case the contractor fails in the full performance of the contract. Performance bonds usually cover 100 percent of the contract price and replace the bid bonds on award of the contract. Unlike a fidelity bond, a performance bond is not an insurance policy and (if cashed by the principal) the payment amount is recovered by the guarantor from the contractor.<sup>5</sup>

**Port -** A single- or multiple-facility entity that facilitates the transfer of cargo and/or passengers between logistically-linked transport modes.

**Port Authority -** State or local government that owns, operates, or otherwise provides wharf, dock, and other investments at ports.

**Port Owner -** Port authorities, terminal operators, private companies, and project sponsors that own and/or operate a port.

**Price -** The amount to be paid for a bond, usually expressed as a percentage of par value but also sometimes expressed as the yield that the purchaser will realize based on the dollar amount paid for the bond. The price of a municipal security moves inversely to the yield.<sup>1</sup>

**Private Activity Bonds (PABs) -** A municipal security of which the proceeds are used by one or more private entities. A municipal security is considered a PAB if it meets two sets of conditions set out in Section 141 of the Internal Revenue Code. A municipal security is a PAB if, with certain exceptions, more than 10 percent of the proceeds of the issue are used for any private business use (the “private business use test”) and the payment of the principal of or interest on more than 10 percent of the proceeds of such issue is secured by or payable from property used for a private business use (the “private security or payment test”). A municipal security also is a PAB if, with certain exceptions, the amount of proceeds of the issue used to make loans to non-governmental borrowers exceeds the lesser of 5 percent of the proceeds or \$5 million (the “private loan financing test”). Interest on private activity bonds is not excluded from gross income for federal income tax purposes unless the bonds fall within certain defined categories (“qualified bonds” or “qualified PABs”). Most categories of qualified PABs are subject to the AMT.<sup>1</sup>

**Private Placement -** A primary offering in which a placement agent sells a new issue of municipal securities on behalf of the issuer directly to investors on an agency basis rather than by purchasing the securities from the issuer and reselling them to investors. Investors purchasing privately placed securities often are required to agree to restrictions as to resale and are sometimes requested or required to provide a private placement letter to that effect. The term Private Placement is often used synonymously with the term “direct loan,” which more specifically is a loan to a municipal issuer from a banking institution or another lender. Such obligations may constitute municipal securities.<sup>1</sup>

**Project -** A port owner’s acquisition, development, expansion or renovation of a single site, facility, infrastructure element, or operational resource to meet an identified or emergent need.



**Project Financing** - A non-recourse or limited recourse financial structure where project debt and equity used to finance the project are paid back from the cash flow generated by the project. While the loan structure relies primarily on the project's cash flow for repayment; the project's assets, rights and interests are held as secondary security or collateral.<sup>3</sup>

**Project Funding** - A financial structure where internal reserves, user charges and/or government investments are used to finance the project without a direct requirement for repayment.

**Project Sponsor** - The entity that provides financial resources to support the project.

**Public-Private Partnership (P3)** - A generic term for a wide variety of financial arrangements whereby governmental entities agree to transfer any risk of, or substantial management control over, a governmental asset to the private entity in the port sector this is typically in exchange for upfront or ongoing payments though those may only be sufficient to pay for the capital improvement.<sup>1</sup>

**Publicly Issued** - The sale of bonds or other financial instruments by an organization to the public in order to raise funds for infrastructure expansion and investment (contrast with privately placed financial instruments including directly placed loans with a financial institution/lender).

**Put Bond** - A bond that allows the holder to force the issuer to repurchase the security at specified dates before maturity. The repurchase price is set at the time of issue, and is usually par value.<sup>3</sup>

**Railroad Rehabilitation & Improvement Financing (RRIF)** - Under this program the Federal Railroad Administration Administrator is authorized to provide direct loans and loan guarantees up to \$35.0 billion to finance development of railroad infrastructure. Up to \$7.0 billion is reserved for projects benefiting freight railroads other than Class I carriers. The funding may be used to (a) acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track,

components of track, bridges, yards, buildings and shops; (b) refinance outstanding debt incurred for the purposes listed above; and (c) develop or establish new intermodal or railroad facilities. Direct loans can fund up to 100% of a railroad project with repayment periods of up to 35 years and interest rates equal to the cost of borrowing to the government. Eligible borrowers include railroads, state and local governments, government-sponsored authorities and corporations, joint ventures that include at least one railroad, and limited option freight shippers who intend to construct a new rail connection.<sup>6</sup>

**Rate Covenant** - A covenant to charge fees sufficient to provide required pledged revenues.<sup>1</sup>

**Renewal & Replacement (R&R)** - Funds to cover anticipated expenses for major repairs of the issuer's facilities or a project whose revenues are pledged to the bonds or for R&R of related equipment.<sup>1</sup>

**Return on Investment (ROI)** - A performance measure used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments. ROI measures the amount of return on an investment relative to the investment's cost. To calculate ROI, the benefit (or return) of an investment is divided by the cost of the investment, and the result is expressed as a percentage or a ratio.<sup>3</sup>

**Request for Letters of Intent (RLOI)** - Document used to solicit Letters of Intent, an interim agreement that summarizes the main points of a proposed deal, or confirms that a certain course of action is going to be taken. Normally, it does not constitute a definitive contract but signifies a genuine interest in reaching the final agreement subject to due diligence, additional information, or fulfillment of certain conditions. The language used in writing a letter of intent is of vital importance, and determines whether it is only an expression of intent or an enforceable undertaking.<sup>5</sup>



**Request for Proposals (RFP)** - Document used in sealed-bid procurement procedures through which a purchaser advises the potential suppliers of (1) statement and scope of work, (2) specifications, (3)

schedules or timelines, (4) contract type, (5) data requirements, (6) terms and conditions, (7) description of goods and/or services to be procured, (8) general criteria used in evaluation procedure, (9) special contractual requirements, (10) technical goals, (11) instructions for preparation of technical, management, and/or cost proposals or in the case of P3s, a full P3 contract. RFPs are publicly advertised and suppliers respond with a detailed proposal, not with only a price quotation. They provide for negotiations after sealed proposals are opened, and the award of contract may not necessarily go to the lowest bidder.<sup>5</sup>

**Request for Qualifications (RFQ)** - Document used in a procurement process to solicit qualifications of professional providers of goods or services for a given project. The objective of the RFQ is to pre-qualify bidding teams based on well-defined criteria.

**Security for Debt** - The specific revenue sources or assets of an issuer or borrower that are pledged or available for payment of debt service on a series of bonds, as well as the covenants or other legal provisions protecting the bondholders.<sup>1</sup>

**Senior Lien Debt** - Bonds having the priority claim against pledged revenues superior to the claim against such pledged revenues or security of other obligations.<sup>1</sup>

**Special Purpose Facility Bonds** - Bonds issued by a governmental entity to finance facilities supporting private sector activity, and secured by

payments of special purpose rent received by the port or the trustee pursuant to an agreement with lessee/ concessionaire. Such bonds are issued by the governmental entity as the conduit issuer to achieve tax-exempt (or AMT) status on the bonds.

**State Infrastructure Bank (SIB)** - A state or multi-state revolving fund that provides loans, credit enhancement, and other forms of financial assistance to transportation infrastructure projects.<sup>2</sup>

**State Transportation Improvement Program (STIP)** - A short-term transportation planning document covering at least a three-year period and updated at least every two years. The STIP includes a priority list of projects to be carried out in each of the

three years. Projects included in the STIP must be consistent with the long-term transportation plan, must conform to regional air quality implementation plans, and must be financially constrained (achievable within existing or reasonably anticipated funding sources).<sup>2</sup>

**Strategic Plan** - Port document outlining a port's market positioning and strategic direction. Strategic plans may include, among other topics, a competitive assessment relative to other ports; trends in regional, national and global economies; cargo/passenger analysis; growth strategies; and capital investment recommendations.

**Subordinate Lien Debt** - Bonds that have a claim against pledged revenues or other security subordinate to the claim against such pledged revenues or security of other obligations.<sup>1</sup>

**Terminal Operator** - A port authority or private company that operates a port facility and manages the movement of cargo and/or passengers.

**Transport Modes** - For each mode, there are several means of transport. They are: a. inland surface transportation (rail, road, and inland waterway); b. sea transport (coastal and ocean); c. air transportation; and d. pipelines.



**Transportation Improvement Program (TIP)** - A short-term transportation planning document, approved at the local level, covering at least a four-year period for projects within the boundaries of a MPO. The TIP must be developed in cooperation with state and public transit providers and must be financially constrained. The TIP includes a list of capital and non-capital surface transportation projects, bicycle and pedestrian facilities and other transportation enhancements. The TIP should include all regionally significant projects receiving FHWA or FTA funds, or for which FHWA or FTA approval is required, in addition to non-federally funded projects that are consistent with the MPO's LRTP.

**Transportation Infrastructure Finance and Innovation Act (TIFIA)** - The TIFIA of 1998 authorized the USDOT to provide three forms of credit assistance - secured (direct) loans, loan guarantees and standby lines of credit - to surface transportation projects of national or regional significance. A specific goal of TIFIA is to leverage private co-investment. Because the program offers credit assistance, rather than grant funding, potential projects must be capable of generating revenue streams via user charges or have access to other dedicated funding sources. In general, a project's eligible costs must be reasonably anticipated to total at least \$50 million. Credit assistance is available to: projects eligible for assistance under title 23 or chapter 53 of title 49; The TIFIA credit assistance is limited to 49 percent of eligible project costs.<sup>4</sup>

**Value for Money (VfM)** - A technique used to evaluate and quantify project risks. VfM "prices" risk by producing a discounted net present value amount that represents the aggregate impact of various sensitivities applied to the variable inputs of a project. An assessment of VfM for P3 procurements is a comparative concept, and as such most delivery agencies seek to use a "public sector comparator" approach to evaluating VfM.

**Yield** - The annual rate of return on an investment, based on the purchase price of the investment, its coupon rate and the length of time the investment is held. The yield of a municipal security moves inversely to the price.<sup>1</sup>

**Yield Restriction** - A general requirement under the Internal Revenue Code that proceeds of tax-exempt bonds not be used to make investments at a higher yield than the yield on the bonds. The Internal Revenue Code provides certain exceptions, such as for investment of bond proceeds for reasonable temporary periods pending expenditure and investments held in "reasonably required" debt service reserve funds.<sup>1</sup>

Note: Sources for the glossary include (1) [www.msrb.org](http://www.msrb.org), (2) [www.transportation-finance.org](http://www.transportation-finance.org), (3) [www.investopedia.com](http://www.investopedia.com), (4) [www.fhwa.dot.gov](http://www.fhwa.dot.gov), (5) [www.businessdictionary.com](http://www.businessdictionary.com), and (6) [www.fra.dot.gov](http://www.fra.dot.gov).





## Appendix B: Project Profiles

These project profiles represent a range of port projects which have utilized various financing techniques to move projects towards successful completion. The profiles included are not meant to be an exhaustive list, rather a sampling of the myriad of port projects that have been implemented at ports across the U.S. While each project and port has unique attributes, the efforts and strategies used to perform planning, assess feasibility and acquire project funding follow the principles outlined in this Toolkit.

### 1. PORTMIAMI CRUISE TERMINAL D EXPANSION AND IMPROVEMENTS

#### Cruise Terminal Expansion for Dedicated Operator

**Location:** Miami, Florida

**Project Owner:** PortMiami

#### Description

PortMiami needed to expand its cruise passenger terminal to support Carnival Cruise Lines' larger Dream-class vessel. The Cruise Terminal D

Improvements project consisted of a new, approximately 19,800 square feet, two-story addition adjacent to the east entrance of the terminal; modifications to the existing intermodal, a remote baggage screening and passenger/crew access at the west end of the terminal intermodal; two new passenger access doors on the third level concourse; and interior improvements at the ground and second level to increase the passenger seating capacity. The project also achieved a LEED Silver Certification.

**Cost:** \$15 million

#### Project Stakeholders

- Partners: Carnival Cruise Line
- Consultants/ Contractors: Bermello Ajamil & Partners / MCM Construction Contractors
- Advisors: Miami Dade County Legal and PortMiami Finance, Planning and Capital Development

#### PLANNING

#### Goals and Objectives

- Increase passenger queuing space at ground floor security lobby
- Increase security screening area at ground level to maximize passenger flow
- Add seating capacity to accommodate increase in passenger count from the Carnival Breeze and other Dream-class vessels
- Add two passenger access doors at third-level concourse to allow the terminal to be more flexible and accommodate a wider range of vessel door configurations





### Existing Conditions/Assets

This project was an expansion to an existing 121,319 sq. ft. terminal facility completed on January 28<sup>th</sup>, 2008.

### Market/Opportunities

The additional capacity, generated by this project, would allow larger vessels to continue to berth at this terminal, continuing to grow the Port's cruise industry.

### Needs and Requirements

- Roughly 7,000 square feet of land for the expansion
- New chiller unit
- Additional seating for the newly expanded second floor
- Energy efficient systems and plumbing fixtures to achieve the LEED requirement

### FEASIBILITY

#### Physical/Operational Performance

The expansion accommodates the estimated additional 250,000 passengers visiting the Port annually as a result of the larger vessel.

#### Financial Performance

Carnival Corporation agreed to home port a larger vessel at PortMiami that would increase revenues by an estimated \$1.15 million to \$2.1 million each year. Modifications to the cruise terminal were estimated to cost \$15 million in order to accommodate the larger vessel. Over the term of a 30-year loan, the average annual principal and interest payments equaled approximately \$875,000, totaling \$26.3 million over 30 years. The average additional annual revenues earned from the increase in passengers were estimated to total approximately \$79 million over 30 years. The anticipated return on investment merited the long term agreement with the Carnival Corporation.

#### Impacts

- Economic: Carnival is headquartered in Miami-Dade County and employed 3,800 shore side employees at the time the agreement was executed in 2011. At this time

it was estimated that Carnival has a total economic impact of more than \$1 billion annually in Miami-Dade County. This sizable impact makes Carnival an extremely valuable business partner.

- Environmental: The project obtained a LEED Silver Certification and there was very little impact to the environment.

#### Risk Assessment

- \$2 million liquidated damages
- Double shifts during construction
- Construction materials being procured from different sources to assure proper availability

### FINANCE

#### Approach

Funding was obtained from Florida Department of Transportation (FDOT) grants and Seaport Revenue Bonds issued in FY 12/13 as part of a major bond issuance that also rolled in with previous debt and resulted in a lower fixed interest rate (3%).

#### Funding Sources

- \$1.7 million FDOT grants
- \$14 million seaport revenue bonds

#### Project Delivery/Contract Method

The terminal improvements were delivered via an expedited traditional design-bid-build delivery mechanism. The architect/engineer and the contractor were hired in accordance with county processes that are guided by the Competitive Negotiation Act and the competitive construction contractor procurement processes of Florida Statutes 287 and 255 respectively. County/Seaport requirements for the inclusion of small business and the adherence to sustainability were also part of the delivery and contracting methods.

#### Duration/Status

Improvements and expansion to Terminal D have been completed.

#### Related Links/Articles:

- <http://www.miamidade.gov/portmiami/>



## 2. FRANCE ROAD TERMINAL BERTH 4 REDEVELOPMENT

### Repurposing a Condemned Wharf Using Tenant Financing

**Location:** Port of New Orleans, New Orleans, Louisiana

**Project Owner:** Port of New Orleans (Port NOLA or the "Port")

**Description:** The Port's original container terminal located in the Inner Harbor, the France Road Terminal, was already an aging facility when it was heavily damaged during Hurricane Katrina. Subsequently, the main channel leading to the terminal, the Mississippi River-Gulf Outlet (MR-GO), was de-authorized and closed. Both the physical damage and the navigation changes resulted in a need to repurpose many of the Port's facilities on the Inner Harbor-Navigational Canal (IH-NC), with a focus on shallow draft or small, handy-sized vessels. Most of the Inner Harbor's deep draft activities were moved to Port NOLA facilities on the Mississippi River.

In late 2013, the Port was contacted by Boh Bros. Construction Co., which was looking to modernize its asphalt plant, with a focus on efficient logistics of its raw materials. France Road Terminal Berth 4 was identified as the ideal site. While the Port's capital investment focus is on its deep draft and cruise activities, the project offered the possibility to work with the tenant to provide tenant-financed improvements, which are amortized through credits on the market rent of the property as improved.

**Cost:** \$2.25 Million

#### Project Stakeholders

- Partners: Boh Bros. Construction Co.
- Advisors: Volkert, Inc., and the Port's Legal, Port Development (engineering & construction management), Internal Audit and Industrial Real Estate Teams



#### PLANNING

##### Goals and Objectives

- Stabilize damage of the wharf to prevent future maintenance, liability and/or removal costs
- Generate revenue from a facility that had become a non-core asset
- Improve domestic logistics costs for asphalt production
- Leverage tenant investment so that the Port can continue to focus its limited capital on areas that have greater strategic importance

##### Existing Conditions/Assets

After the closure of the MR-GO, the navigational constraints of the Port's Inner Harbor changed drastically. The MR-GO allowed 36 feet of draft, and since it was an open channel, it had virtually no limit on ship length or beam. The new navigational constraint was driven by the dimensions of the IH-NC lock (30.5 ft. x 640 ft. x 75 ft.). Although the Inner Harbor is no longer suitable as a location for container terminals, the Port has pursued adaptive re-use, mostly focused on warehousing and logistics activities.

From a navigational standpoint, the site is ideal for barge traffic since it is located along the route of the Gulf Intracoastal Waterway (GIWW). The property is served by the New Orleans Public Belt Railroad,

providing access to six U.S. Class 1 railroads. The site also has excellent truck connectivity to Interstate 10 and U.S. 90. Prior to the project, only 830 of the wharf's 3,230 feet were capable of supporting cargo-related loads. Corrosion of the steel pipe pile substructure made what had once been a valuable asset to the Port a potential liability. As the wharf substructure continues to corrode, the Port continues to monitor the ability of sections of the wharf to hold its own weight. One of several access ramps leading to the wharf, not associated with this project, has collapsed because the degraded substructure.

**Market/Opportunities**

- Warehousing opportunities
  - The Kearney Companies has repurposed several buildings that were part of the terminal for storing port-related cargo.
- Transloading Opportunities
  - The Kearney Companies uses rail spurs for transloading both international and domestic cargo.
  - The Port unsuccessfully pursued a crude oil transload facility on the site.

- Manufacturing Opportunities
  - Atlantic Metrocast uses some of the open storage area for manufacturing pre-cast concrete pipe-piles.
  - The Port unsuccessfully pursued a window manufacturing for the site.
- Stevedoring
  - Berth 1 remains open for ships to use on a tariff basis; however, demand for the wharf has been limited.
  - A container line specializing in small ships investigated using Berth 1 for its New Orleans service, but had to shift its operations to the Port's container terminal on the Mississippi River when growing demand caused it to deploy larger vessels that wouldn't fit through the lock.
- Barge Fleeting
  - Although most of the wharf cannot support heavy weights of cargo without significant re-investment, it can support the lateral loads needed for barge fleeting. This use was ruled out, however, because of the inability to tier barges into the navigational channel.

**Exhibit B-1 New Orleans Inner Harbor**





- Domestic Cargo Opportunities
  - Boh Bros. is an example of domestic cargo opportunities.

**Needs and Requirements**

The needs were identified as 20-30 acres with 300 to 600 linear feet of restored wharf. The Port wanted to bring the facility as close as possible to design load capacity, even though this exceeded Boh Bros.’ needs. The reasoning for doing so was that the Port wanted the wharf to have value and flexibility if Boh Bros. use were to cease. The final leased area is approximately 22 acres with 300 linear feet of restored wharf.

**Stakeholder Engagement**

The area where the development occurred is in an industrial area and has no impact on residential neighborhoods. The lease was discussed and approved at public meetings.

**Recommended Project/Plan/Approach**

Initially, Volkert had designed repair methods that required removing existing, damaged pile wrap, replacing segments of pipe pile as needed, wrapping each pile and encasing it in a polyethylene jacket to prevent further corrosion. However, at the start of construction, it was determined that there was no efficient way to remove the existing wrap, which contains asbestos, without encountering additional environmental risks.

A new repair method was designed that essentially used the existing steel pipe pile as a form for concrete pile located inside the pile. The deck of the wharf was cored on top of each pile requiring repair. A threaded steel rod was inserted into the pile to provide reinforcement. Then, concrete was pumped into the pipe pile.

**FEASIBILITY**

**Project Strategy**

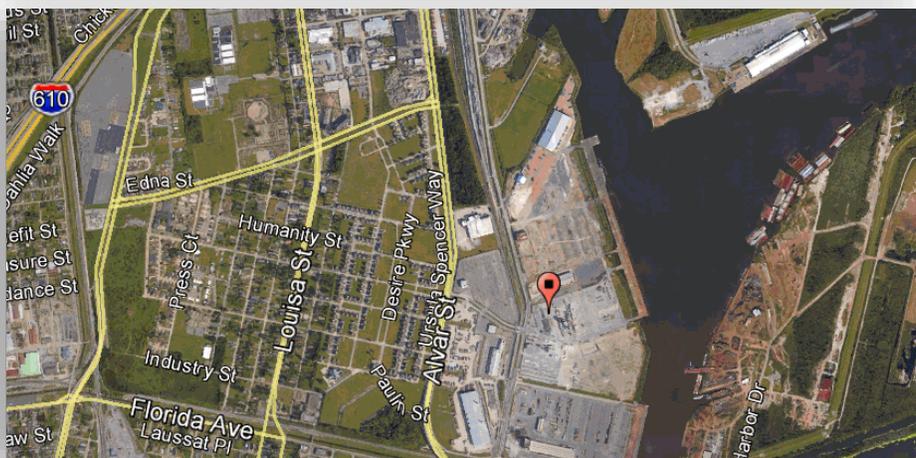
The Project Strategy is the redevelopment of a facility where the Port had invested heavily over the course of a century but where the improvements had essentially reached the end of the useful life. As such, the previous expenditures were considered sunk costs that had been recovered by the past use of the container terminal and other terminals and lease sites. The Port acquired more than 1000 acres in Eastern New Orleans in the early 20<sup>th</sup> Century.

In the 1920s, the Port dug the IH-NC, building a lock where it intersects with the Mississippi River and extending north to Lake Pontchartrain. In the 1950s, the federal government decided to route the shallow draft GIWW through the IH-NC. Further federal investment in a man-made outlet called the Mississippi River-Gulf Outlet connected the GIWW and the IH-NC to the Gulf of Mexico allowing vessels up to 36 feet deep to reach the Inner Harbor. In the 1960s, this area was

considered the future of the Port of New Orleans since the MR-GO was shorter route than the winding route up the Mississippi River. The France Road Terminal Complex was built in the 1960s and 1970s.

As the size of container ships grew in the subsequent decades and erosion of the channel made it a controversial public works, the Port started planning a new container terminal at the Napoleon Avenue Wharf, where 45 foot drafts are available. The Corps

**Exhibit B-2 France Road Terminal**





has now placed a rock dyke at the Gulf end of the MR-GO and the Lake Borgne Storm Surge Barrier on the Northern end of the MR-GO. The deauthorization of the MR-GO has caused the Port to seek adaptive reuse of the France Road Terminal and other properties. Its strategy post-Katrina is to try to create reliable revenue streams to the extent possible without having to devote capital that could otherwise be used on more strategically located properties. Therefore, the idea of tenant financing was a good fit for a project to redevelop 20 acres of the terminal.

### Physical/Operational Performance

The transportation infrastructure had ample capacity to absorb the development because of its previous use as a container terminal.

### Financial Performance

The approximate NPV values are listed as the incremental value of each 10 year term since Boh Bros. is not obligated to exercise the Options. However, Port staff believes that there is a high probability that the tenant will exercise its options and if it does not, it is likely that Port staff will find other tenants to lease the property for similar values.

Primary Term- \$700,000

Option Term 1- \$2.1 million

Option Term 2- \$1.7 million

### Impacts

- Economic: The project employs 62 jobs and helps make the production of asphalt for local construction projects more efficient through improved access to barge loads of quality aggregate materials.
- Environmental: The project's construction method had to be changed in mid-stream due to an unexpected environmental issue. See Recommended Project for further details.

### Risk Assessment

- Construction cost overrun risks were considered and handled by placing a cap on

the amount of capital costs that would be amortized by the tenant over the course of the primary term of the lease.

- Construction delay risks were considered and handled by placing a deadline on when lease payments would start, even if the rent credit for improvements had not been approved.
- Risks related to the accounting of eligible costs were considered and handled by including an exhibit on eligible costs to the lease, hiring Volkert to oversee construction and evaluate receipts for reasonableness, and including a provision in the lease that allows the Port's internal audit team to audit construction costs.
- Risks were considered related to Boh Bros. not exercising options for years 11-30, when the rent credits have expired and the Port will realize a higher cash flow. These were mitigated by repairing the wharf to a specification that had value and flexibility for other potential uses. Boh Bros.' position as a local and regional leader in highway construction was also considered, in that it will have a long-term need for an efficiently-run asphalt plant. It was also considered that because of the tenant's large capital investment in the site that it will be motivated to maximize its length of occupancy at the site.

## FINANCE

### Approach

The lease has a gross rent that is based on the market value of the property as improved with a working wharf capable of handling loads. These rent values were based on the Port's assessment of the value as compared to similarly-situated, leased facilities elsewhere in its real estate portfolio. The investment that Boh Bros. has made to Port-owned improvements, which does not include the specialized equipment and plant for the asphalt operation, is deducted from the lease in equal monthly installments over the 10-year primary



term of the lease. A budget for wharf repairs was developed by Volkert, and the lease includes a cap on the value of the rent credit based on the budget. The transaction provides a positive cash flow to the Port throughout the primary and option terms of the lease on a facility that had experienced a cataclysmic drop in its strategic value. While the Port forgoes the value of the rent credit in the primary term, it reaps the cash flow benefit of the investment with ramped up net rent payments in the option terms. It also has preserved its capital for other, more strategic investments in container and cruise facilities. The Port has also reduced its future liability and maintenance costs on the wharf.

### Financing Analysis

A cash flow analysis was performed to evaluate the tenant- financed improvement that the lease contemplates and an alternative analysis in which the Port would make the upfront investment. The purpose of this analysis was to compare and contrast the financial implications of the tenant financed improvements that were used, with a similar scenario in which the Port could have paid the upfront cost to have the dock repaired. In the tenant financed model, the NPV of the cash flow in the 10 years of the primary term is approximately \$701,000. If the Port would have invested more than \$2 million in the dock, during the primary term it could have received the annual gross rent of \$286,860 instead of the \$80,610 of annual net rent. However, the rent credit arrangement actually results in a higher net present value for the primary term of the lease when the upfront investment of \$2.25 million is deducted. In both the tenant financed and the Port financed scenarios, much of the value of the lease is harvested in the option terms (lease years 11-20 and 21-30) after the initial investment has been amortized.

### Funding Sources

- Boh Bros. Construction Co.

### Project Delivery/Contract Method

Because of its capabilities as a major maritime construction firm, Boh Bros. conducted most of the repairs itself and was reimbursed for the actual cost of construction, not including profit. The lease includes a cost methodology to further define the actual cost of construction. Volkert served as the design and engineering firm and construction manager. The problems removing the existing pile wrap caused a hiccup that required a complete re-design of the repair method. However, the new method was delivered without any additional increase in the rent credits that are deducted from the primary term rent.

### Financial Management Strategy

Following completion of the work, cost documentation was submitted to the Port and Volkert. It was reviewed and in January of 2015, the Port formally accepted the work completed by Boh Bros. and issued rent credits to the lease in the amount of \$2,062,500. The rent was set accordingly with this amount being amortized over the primary term of the lease as a rent credit.

### Financial Status/Financial Performance

The project is complete and in use. In addition to the jobs and activity generated by the project, Port NOLA staff now has a repair method and a cost model for redeveloping other areas of the wharf. While none of the market opportunities to pursue other repairs of the wharf for alternate use have come to fruition yet, Port Industrial Real Estate staff continues to pursue opportunities related to the adaptive reuse of France Road Terminal.

### Related Links/Articles:

- [www.portno.com](http://www.portno.com)
- [www.bohbros.com](http://www.bohbros.com)
- <http://www.mvn.usace.army.mil/Portals/56/docs/PAO/FactSheets/IHNC-LakeBorgneSurgeBarrier.pdf>

### 3. NIT NORTH GATE COMPLEX PROJECT

#### Gate Complex / Intermodal Transportation Project Supported by TIGER Grant Funding

**Location:** Norfolk International Terminals (NIT), Norfolk, VA

**Project Owner:** Virginia Port Authority (VPA or Port of Virginia)

**Description:** The NIT North Gate Complex will complete the I-564 Intermodal Connector, directly connecting the world's largest Navy base, Naval Station Norfolk, and the Port of Virginia's largest terminal, NIT, to the U.S. system of interstate and defense highways. The project will divert 740 trucks per day off congested local roads such as Hampton and Terminal boulevards.

**Cost:** \$31 Million

#### Project Stakeholders

- Partners: VPA, Virginia International Terminals, MARAD
- Advisors: Clark Nexsen, Quinn Consulting Services, Inc.
- Agencies: U.S. Army Corps of Engineers, Virginia Department of Transportation (VDOT), Virginia Department of Environmental Quality, U.S. Customs & Border Protection, Virginia Department of Rail and Public Transit
- Industry: Hampton Roads Shipping Association – International Longshoremen's Association, Local Motor Carriers, Local Rail Lines, Ocean Carriers, Virginia Pilots Association
- Community: City of Norfolk, U.S. Navy, U.S. Coast Guard, Hampton Roads Transportation Planning Organization, Old Dominion University



#### PLANNING

##### Goals and Objectives

The NIT North Gate Complex project is the last element in a comprehensive multi-agency regional intermodal transportation initiative to address the heavy traffic volumes generated by both port operations and Naval Station Norfolk. The I-564 Intermodal Connector is the centerpiece of this initiative and is complemented by the NIT North Gate Complex (planned), \$500 million in capacity improvements at NIT (complete), a new Port rail yard outside the north gate (complete), a new rail grade separation project at Hampton Boulevard that will eliminate traffic stoppages when trains depart NIT (nearly complete), and a Navy Base Gate (planned).

##### Existing Conditions/Assets

The recent record growth at NIT has led to increased truck traffic at the terminal's single truck gate and increased congestion on the terminal, as well as on Hampton and Terminal Boulevards. Once on terminal, trucks traveling to the north container yard must use a single road and then return south to exit through the same truck gate.



**Market/Opportunities**

- The NIT North Gate Complex project is a critical last-mile connection between the East Coast’s 3rd largest port and USDOT’s Primary Freight Network and Interstate Highway System. The project will increase the total gate capacity of the terminal by 1.2 million TEUs for the terminal’s truck-served customers, reduce heavy truck traffic on the congested city streets by 60% (740 round trips per day), and reduce total truck-highway miles by over 91.9 million through avoided cargo diversions.
- This project enhanced many other projects already completed by the port, allowing the port to continue its annual growth in container volumes.

**Exhibit B-3 NIT North Gate Complex Project**



- The NIT North Gate Complex’s connection to I-564, I-64, I-95, I-85, and I-81 are shown in the regional existing transportation infrastructure map in Exhibit B-4.
- The exhibit depicts the gate complex’s supporting road, rail, and DoD projects that are aimed at rerouting freight, defense, and commuter traffic

**Exhibit B-4 Project Connections to Existing Transportation Infrastructure**



around the presently affected communities and business districts. These projects include:

- VDOT’s \$169 million I-564 Intermodal Connector to directly link Port and Navy traffic to I-64.
- VDOT’s \$38 million Hampton Boulevard Grade Separation to eliminate traffic delays by Port-generated rail traffic.



- VPA’s \$31million North Gate Project to directly link port traffic to the I-564 Connector (\$15 million TIGER request / \$16 million VPA).
- U.S. Navy’s Gate 6 Relocation Project to directly link naval station traffic to the I-564 Connector.
- VDOT’s future \$3 billion+ Patriot’s Crossing Project to construct a new cross-harbor bridge-tunnel to the Cities of Portsmouth, Suffolk, and Newport News.
- Constructing the North Gate Complex so that it opens with the I-564 Connector is paramount to each project immediately realizing its full benefits.

### Stakeholder Engagement

The Port of Virginia worked with the U.S. Navy, the VDOT, the City of Norfolk, Norfolk Southern, Virginia Department of Rail and Public Transit, and others to plan and invest in projects that will create an improved intermodal transportation system — of which the NIT North Gate Complex is the final component.

Significant regional collaboration with the Hampton Roads Transportation Planning Organization (HRTPO) and the Hampton Roads Planning District Commission (HRPDC) was critical in terms of data gathering and planning studies to determine project needs.

Agencies and stakeholders such as the HRTPO, the HRPDC, the City of Norfolk, and the Lochhaven Civic League have collaborated with the port, the Navy, and VDOT on this project.

The NIT North Gate Complex project is fully supported by the state and the region, and is included in the VPA’s Master Plan document.

### Recommended Project/Plan/Approach

The NIT North Gate Complex is included in the VPA 2040 Master Plan and is fully supported by

state and regional planning bodies. The project is the last step in a long-planned regional strategy to mitigate traffic around the terminal and the Navy Base that includes the I-564 Intermodal Connector, the Hampton Boulevard Grade Separation, and \$500 million in infrastructure improvements and permitting at NIT. These improvements are part of a larger regional and state transportation improvement plan to construct a new cross-harbor bridge tunnel that will improve connectivity between the cities of Hampton Roads and provide greater access to and from the region.

The project will be built in two phases. The first phase will be to construct the 5.7 acre container yard expansion, which also includes the roadway for truck access to the container yard. Phase 1’s plans were 100% complete at the time of application. Phase 2, which includes final design and permitting of the gate complex, began after award of the TIGER Grant.

### FEASIBILITY

#### Physical/Operational Performance

The NIT North Gate will be utilized by approximately 800-1,000 over-the-road trucks accessing the terminal on a daily basis. The North Gate will connect motor carriers with the weekly vessel services provided by 30 contracted international steamship line customers.

#### Impacts

Social: The reduced vehicle miles traveled as a result of the project directly reduces highway maintenance costs, accidents, air pollution, fuel consumption, and congestion. Providing a second gate greatly reduces queuing delays and improves on-terminal traffic flow. Finally, the advanced technologies that will be incorporated into the gate will greatly enhance personnel safety by removing inspection personnel from the truck lanes.

**Economic:**

- Benefit-Cost Ratio: Over 3:1
- National Impact: \$98.5 million in national long-term benefits

**Environmental:** Unexpected soil contamination discovered during early phases of construction resulted delays to the schedule but has been fully mitigated by the port.

**FINANCE****Approach**

The Port of Virginia's new construction, system preservation, and maintenance projects are funded primarily from terminal operating revenue. This project was funded using those revenues, as well as a TIGER Grant from USDOT.

**Funding Sources**

- \$16 million Virginia Port Authority Bonds
- \$15 million FY2014 TIGER Grant

**Project Delivery/Contract Method**

Invitation for Bid (IFB)

**Duration/Status**

This project began construction in July 2015 and is scheduled for completion in June 2017.

**Innovations/Special Features**

The NIT North Gate Complex project will deploy proven state of the art automated gate technology currently in use at Virginia International Gateway

terminal in Portsmouth, Virginia. The VIG terminal is operated by the VPA and is the first automated container handling facility operating in North America. The technology that will be used at the North Gate Complex includes RFID to monitor truck appointments, biometric security verification, line scan imaging portals for remote scanning and storage of container maintenance and repair conditions, and an appointment system to meter traffic flow to the terminal. This same technology is also being deployed at the existing NIT Main Gate as part of a separate advanced technology project.

The technology improvements proposed for the North Gate Complex are critical components of the advanced Terminal Operating System currently being implemented that will more efficiently coordinate on-terminal activity and provide port customers with increasingly responsive service they need to hone their competitive edge in the international marketplace. Additional performance-enhancing technology improvements planned for the near future, such as real time location tracking and advanced container handling equipment will further rely on the technology and processes being implemented at the gate.

**Related Links/Articles:**

- [www.portofvirginia.com](http://www.portofvirginia.com)



#### 4. GARDEN CITY TERMINAL MULTI-MODAL CONNECTOR

##### International Multi-Modal Connector Project

**Location:** Garden City Terminal,  
 Savannah, Georgia

**Project Owner:** Georgia Ports  
 Authority (GPA or the "Port")

**Description:** To accommodate growth and handle future traffic projections, the International Multi-Modal Connector (IMMC) project will reconfigure both of the GPA's on-dock intermodal container transfer facilities (ICTFs) to bring rail switching activities inside the Port. The project will shift cargo traffic away from the surrounding community and neighborhoods, where current switching on existing rail infrastructure causes traffic backups on two state highways, and prevents all of the containers loaded onto railcars each day from leaving the Port the same day by train. Additionally, local surface roads rail blockages will be reduced by up to 6 hours / day, 26 at-grade rail crossings can be eliminated, and protection of the 21,000 acre drainage basin from flooding with the canal realignment and widening.

**Cost:** \$128 million

**Project Stakeholders:**

- Partners: Georgia DOT (GDOT), Chatham County, Georgia, Genesee & Wyoming (G&W) and Savannah Port Terminal Railroad (SP)
- Advisors: HDR, Inc.



- Agencies: Dept. of Transportation (DOT), MARAD
- Industry: CSX
- Community: The IMMC project is strongly supported by a broad range of partners, including local municipalities and cities, Chatham County, the State of Georgia, and the participating railroads as well as private industries and citizens.



**PLANNING**

**Goals and Objectives:** The lost productivity from the current inefficient yard arrangement is GPA’s single biggest chokepoint, and a significant threat to the region’s future economic competitiveness. The IMMC will eliminate this bottleneck, improve the way containerized cargo is transported between the Port of Savannah and cities across the United States, and add enough capacity to handle GPA’s growth projections well into the next decade. Trains up to 10,000 feet long will be able to be assembled within GPA’s GCT providing financial incentive to the rail lines to pull more trains more frequently from the GCT.

**Existing Conditions/Assets**

The GPA has two existing on-dock, intermodal container transfer facility rail yards servicing two Class I railroads, CSX and Norfolk/Southern that are insufficient to handle future growth. Additionally, there are up to 6 hours of surface road blockages at various at-grade crossings due to the need to break trains in to smaller sections to fit in the CSX ICTF. The 21,000 acre drainage basin needs improvements at GA Hwy 21.

**IMMC Project Components**

Component	Outcome
Build two 7,800-foot arrival/departure tracks at Chatham Yard	Provides additional train arrival/departure capacity to add 85,000 new lifts per year at Chatham Yard
Extend one pad track east from Chatham Yard to new arrival/departure tracks	Moves Chatham Yard switching activity onto terminal and out of neighborhood, cutting SR 25 and SR 21 grade crossing delays by 4-6 hours per day
Rebuild SR 25 bridge over new yard tracks, Pipemakers Canal	Protects 21,000-acre drainage basin from flooding, while creating space beneath the widened bridge for extended arrival/departure tracks
Extend Chatham Yard arrival/departure tracks into Mason Yard as working tracks	Moves all lift activity to Mason Yard, eliminating all switching moves across SR 25
Construct two additional 10,000-foot arrival/departure tracks from Mason Yard to Chatham Yard	Moves all Mason Yard switching onto terminal and out of neighborhood, cutting grade crossing delays on Foundation Lead by up to 2 hours per day
Build 2 new working tracks at Mason Yard, add high-capacity cranes	Adds 135,000 lifts per year
Build 5 new storage tracks at Mason Yard	Maintains yard efficiency as lift volumes increase
Relocate NS Foundation parallel to arrival/departure tracks between Mason and Chatham	Removes Foundation Lead from neighborhood, eliminating 6 grade crossings and an additional 1 hour per day of crossing delays
GPA lift capacity increase	220,000 lifts per year



**Market/Opportunities**

The IMMC will provide a way for GPA to realize a long-standing goal of using rail intermodal service to extend the Port of Savannah’s market reach to destinations such as Atlanta, Memphis, St. Louis, Chicago, Columbus, and the Ohio Valley. We refer to these market areas as the GPA Mid-American Arc. Serving more destinations at greater distances demands reliable, cost-effective rail service.

The improvements from the IMMC project will make rail a more attractive option for shippers and will handle the projected growth through 2026.

**Needs and Requirements**

Project land is currently owned by GPA or Chatham County with potential for minimal cost-to-cure issues.

**Stakeholder Engagement**

GPA engaged with the local community, surrounding cities, counties, and the State as well as the rail lines of CSX, G&W, and SP. These partnerships comprise an important part of the IMMC project, since the improvements constitute work that will occur inside and outside of GPA property, and will deliver benefits to the public not realized by traditional GPA capital improvement projects. Over 45 letters of support were received from a broad base of municipal, political, and industry entities in support of the project.

**Recommended Project/Plan/Approach**

This project had been studied for several years to develop the plan in this constrained area. After formal DOT award and approval to move forward on the project, GPA will follow its governmental procurement processes to implement the project program.

**FEASIBILITY**

**Physical Performance**

The Chatham ICTF was nearing capacity and trains for this ICTF were required to be broken into several pieces as it is not long enough for unit trains causing many hours of at-grade surface road blockages. This project overcomes many obstacles in the constrained footprint to allow the projected multimodal growth to 2026. The IMMC also allows Chatham County to improve the canal that services the 21,000 acre drainage basin in conjunction with the improvements needed for the rail multimodal increase.

**Uses of Project Funds**

Item	Funds Allocated
Description	Cost
▪ Ballast / Ties / Rail / OTM	\$ 31,000,000
▪ Rail Bridges over Pipemakers Canal	\$ 14,500,000
▪ State Route 25 Grade Separation	\$ 12,000,000
▪ Canal Realignment	\$ 1,700,000
▪ Utility Relocations	\$ 3,000,000
▪ RTG Runways	\$ 1,700,000
▪ Other Infrastructure	\$ 900,000
▪ RMGs	\$ 57,200,000
▪ Crane Rail	\$ 2,500,000
▪ Crane Power	\$ 3,500,000
<b>Total</b>	<b>\$ 128,000,000</b>

The project will cut container handling times at the terminal, increase rail service, and add 220,000 new lifts per year to meet GPA’s growth projections into the next decade.



**Impacts**

Social: The project will deliver changes to the Port and the surrounding community and neighborhoods by:

- expanding the Port’s rail capacity, reducing traffic and commuter delays at local bottlenecks and on the regional roadway network system by eliminating several congested rail crossings;
- improving local flood control infrastructure;
- enhancing economic competitiveness and opportunities for global trade;
- strengthening regional employment opportunities; and
- combining efforts by local, state, and regional stakeholders to improve the overall multi-modal transportation system.

Environmental: There should be little to no impact during the construction of this project. Much of the work will be on a previously developed port terminal and roadway along with other previously disturbed soil.

Economic: The Economic Impact of Georgia's Deepwater Ports on Georgia's Economy in FY 2014 by the University of Georgia, Terry School of Business provides the most current data available and is as follows:

- 369,193 full- and part-time jobs (8.4% of Georgia's total employment)
- \$20.4 billion in income (5.3% of Georgia's total personal income)
- \$84.1 billion in sales (9.6% of Georgia's total sales)
- \$33.2 billion in state GDP (7.2% of Georgia's total GDP)
- \$1 billion in local taxes
- \$1.3 billion in state taxes
- \$4.5 billion in federal taxes
- 

**Financial Performance**

Project Evaluation Metric	Undiscounted	3% Discount Rate	7% Discount Rate
<b>Total Discounted Benefits</b>	\$934,793,729	\$561,594,810	\$321,887,824
<b>Total Discounted Costs</b>	\$132,421,450	\$117,176,838	\$101,271,859
<b>Net Present Value</b>	\$802,372,279	\$444,417,972	\$220,615,965
<b>Benefit / Cost Ratio</b>	7.06	4.79	3.18
<b>Internal Rate of Return (%)</b>			18.5
<b>Payback Period (years)</b>			7.8



**Risk Assessment**

Project risks and mitigation strategies include the following:

Risk Category	Risk Name	Description	Mitigation Strategies
<b>Financial</b>	Loss of Private Funding	Loss of funding due to unforeseen circumstances	Highly unlikely. GPA and its funding partners are committed to completing the project.
<b>Financial</b>	Loss of Public Funding	Loss of funding due to unforeseen circumstance.	Additional funds would have to be obtained; the project would be delayed significantly.
<b>Management</b>	Stakeholders	Stakeholders providing significant contributions to the project may have varying procedures and objectives to ensure proper project execution	GPA has successfully worked numerous times with the groups involved, and feels all obstacles could be overcome with stakeholder communication to address potential concerns.
<b>Technical</b>	Flood Control	Conditions prove to be different than model results	Matches existing improved cross section of the canal with the Hwy. 25 chokepoint eliminations.
<b>Contracting and Procurement</b>	Administrative Burden	GDOT will administer the Hwy 25 and bridge portion, while GPA will manage the rail contracting	GPA will coordinate/collaborate with GDOT to help ensure timely completion as consistent with past practice. GPA will administer the rail contracts, and has successfully completed many capital projects of this size and larger to include rail projects.
<b>Construction</b>	Traffic	Traffic congestion during construction of rail crossing and site infrastructure	Close collaboration between GPA and GDOT to identify potential detour routes.
<b>Environmental</b>	NEPA	Historic/Archaeological/cultural resources discoveries	GPA owns most of the land required for this project. The area of proposed construction is located on previously disturbed soil.
<b>Environmental</b>	Wetlands	Project impact on existing wetlands	Preliminary investigation suggests this is not a problem. Adequate suitable area exists to construct replacement wetlands and/or circumvent areas of concern.
<b>Environmental</b>	Endangered Species	Impact to any endangered species within the project area	Preliminary investigation suggests this is not a problem. If encountered, design measures will be taken to circumvent and/or phasing measures to minimize impact during construction.
<b>Right of Way</b>	Property ownership	The entire project area is owned by the public authorities. There are not likely to be right of way issues	Right of way issues, if any, will be addressed during the final engineering phase and addressed if necessary. Potentially, there will be cost-to-cure issues, which GDOT handles expeditiously within the GDOT process.



**FINANCE**

**Approach:** The GPA cost share is being provided over a seven-year period by internal capital funds.

**Funding Sources**

Funding Partner	Description	Funding Amount
Georgia Ports Authority	Applicant	\$82.875 million
Genesee & Wyoming	Partner - Investment in this Project	\$0.5 million
Chatham County	Partner - Investments in Regional Flood Control Program and SR 25 Bridge Design	\$0.625 million
U.S. Department of Transportation	FASTLANE Grant Funds Administrator	\$44.0 million

**Project Delivery/Contract Method**

GPA's governmental bidding procedures along with innovative contracting approaches such as the potentially more cost effective method of Design-Build to promote accelerated project delivery will be utilized.

**Financial Management Strategy**

GPA internal capital funds, as needed over the years, will be provided by revenue from port operations while grant funds will be requested on a reimbursement basis. Grant funds will be requested for reimbursement at 34.73% of work expenditures to draw down the appropriate grant funding in relation to project cost share of participating partners. The GPA enterprise accounting system of SAP has a "Project Systems" module. This module segregates projects under an account code with sub codes to segregate items within this code. This allows for invoices to be split for the proper cost share and federal grant funds. Further, it lets a project be broken down into whatever components need to be tracked.

**Duration/Status**

GPA is beginning grant project processes and work. Work will be complete in seven years; however, GPA will attempt to compress this timeline for earlier utilization.

**Innovations/Special Features**

The two on-dock, Class 1 railroads with the project improved ICTFs along with the Savannah Harbor Expansion Project (SHEP), improved road systems to include last mile projects near GPA as well as Georgia areas around Macon and Atlanta, and the Georgia inland ports in Cordele and Chatsworth (Appalachian Regional Port or ARP) will combine to significantly increase GPA's frequency and reach in the region and the Mid America Arc.

**Related Links/Articles**

**GPA Website:** <http://www.gaports.com/Home.aspx>

**GPA Press Releases**

<http://www.gaports.com/Media/PressReleases/TabId/379/ArtMID/3274/ArticleID/87/Lynch-GPA%E2%80%99s-Mid-American-Arc-to-expand-target-market.aspx>

<http://www.gaports.com/Media/PressReleases/TabId/379/ArtMID/3274/ArticleID/88/GPA-marks-record-August-for-container-volumes.aspx>

**Other Related Articles**

<http://www.ledger-enquirer.com/opinion/opn-columns-blogs/article103007612.html>

<http://savannahnow.com/opinion-editorial/2016-09-16/editorial-healthy-expansion-georgia-ports-us-heartland>

<http://www.customstoday.com.pk/georgia-ports-on-the-move/>

<http://abcnews.go.com/US/wireStory/savannah-port-targets-midwest-128m-rail-expansion-42118018>

<http://finance.yahoo.com/news/savannah-port-targets-midwest-128m-rail-expansion-182309723.html>

## 5. CONLEY TERMINAL INTERMODAL IMPROVEMENTS AND MODERNIZATION

### Container Terminal Modernization Project Supported by FASTLANE Grant Funding

**Location:** Boston, Massachusetts

**Project Owner:** Massachusetts Port Authority (Massport)

**Description:** Conley Terminal is the region’s only deep-water, full-service container terminal capable of serving large ships in the Port of Boston. The project includes a series of intermodal improvements and equipment upgrades that together will enhance intermodal freight movement and efficiency and mitigate freight bottlenecks in the Northeast. The improvements include:

- Repairs and strengthening at Berth 11 to support shore-side deepening;
- Backland and fender repairs at Berth 12 to maintain a continuous state of good repair condition on two functional berths;
- Refrigerated container storage racks to improve energy efficiency and increase capacity;
- Terminal technology and equipment upgrades that will expedite container processing and increase reliability for trucks transporting goods on the National Highway Freight Network; and,
- New gate processing facilities that will rehabilitate severely deteriorated portions of the terminal backlands and reconfigure terminal flow.

#### Cost

- \$47.3 million for repairs and strengthening to restore Berth 11 as a second functional berth



- \$55.6 million for intermodal terminal enhancements, including refrigerated container storage, terminal technology and equipment upgrades, and new gate processing facilities

#### Project Stakeholders

- **Agencies:** These projects are fully supported by the Commonwealth of Massachusetts, which is contributing \$75 million toward the Boston Harbor Dredging Project.
- **Industry:** The International Longshoremen’s Association (ILA), The Boston Harbor Association and local industry in discussions regarding these projects to assure that the needs of all involved parties are being adequately met.



## PLANNING

### Goals and Objectives

The Conley Terminal Intermodal Improvements and Modernization project is a packaged set of infrastructure improvements that will create a modern intermodal gateway for New England freight, provide a continuation of global business connections, and support jobs and economic impacts for Boston and New England, while also improving the performance of America's freight system, particularly in the Northeast region.

### Existing Conditions/Assets

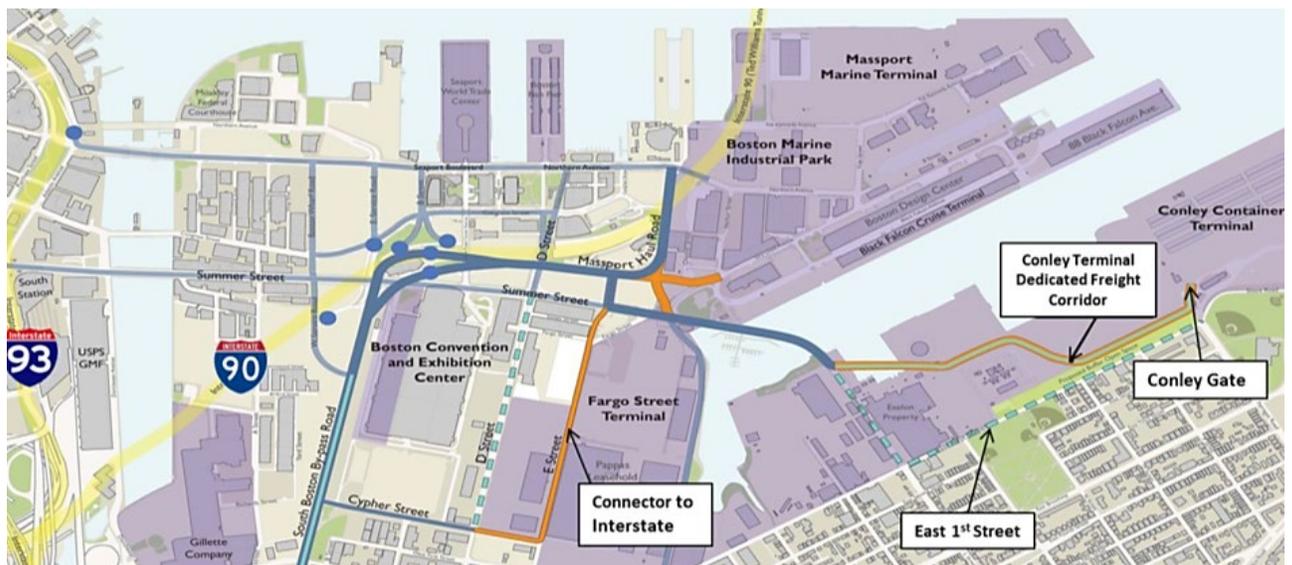
Conley Terminal is a vital intermodal transportation asset that diversifies and promotes the resiliency of the nation's international freight system by providing an alternative to other congested Northeast ports for serving the New England market. While currently successful, Conley Terminal is in need of major capital improvements to remain competitive in the face of significant changes in the container industry.

The project is necessary to ensure the continued relevance and functioning of the Port of Boston in the face of these changes and to leverage investments made to date and continue toward completion of the ultimate Master Plan.

The project leverages the Boston Harbor Dredging Project, the dedicated freight corridor and the new SmartScan 3D automated container screening technology by restoring redundancy and enhancing operational efficiency with an improved state of good repair and modern technology to serve users.

### Needs and Requirements

Berth 11 must be repaired and deepened to handle the Ultra-Large container vessels that are calling on Conley Terminal. Without these improvements the shift in the global fleet to larger container vessels limits Conley Terminal's ability to serve as a viable resource for container shipments. As a result, the more than 237,000 TEUs currently moving through Conley to or from New England will shift from the Port of Boston to the Port of New York/New Jersey or to the Port of Halifax, Nova Scotia. Such a shift would have significant impacts on traffic congestion and emissions generated throughout the Northeast.





### Stakeholder Engagement

The project improvements are all fully contained within Massport owned lands, are consistent with existing use of the site, and therefore are not subject to any state or local planning regulations. Because Massport is independently funded and does not rely on state or local funding for its operations, projects are not normally programmed in the TIP or Long Range Transportation Plan. Should grant funds be awarded, the Boston Region MPO can mobilize to amend the TIP to include the projects within 45 days. Massport has been fully coordinating with the Massachusetts Department of Transportation (MassDOT) with regards to these improvement projects. All relevant agencies, including MassDOT, the Boston Region MPO, and the City of Boston are fully aware and supportive of the proposed improvements.

### FEASIBILITY

The estimated rate of return for the project is 22 percent. The non-discounted capital costs of the

entire FASTLANE Project are \$102.9 million. The Project will also generate a net operating cost savings of \$52.5 million at the terminal over the analysis period through avoided maintenance of heavily deteriorated assets that are replaced. At a seven percent discount rate, this investment is expected to generate \$291.9 million in benefits, resulting in a benefit to cost ratio of 4.2. At a three percent discount rate, the same investment generates \$512.2 million in benefits and a benefit to cost ratio of 8.0. Individual analyses of several project components were also conducted to show independent utility.

At present, Massport spends approximately \$2.5 million per year in “patching” maintenance of the facilities that will be replaced through this project. Upon completion, the Berth 11 and 12 improvements, refrigerated container storage, terminal technology improvements, and new gate processing facilities will reduce annual OpEx costs by an average of \$1.75 million per year.

### Financial Performance

Millions of \$2015; 7% Discount Rate			
Benefits	Berth 11 & 12 Improvements	Terminal Enhancements	Total Project
▪ Transportation Cost Savings	\$72.4	\$0.6	\$78.7
▪ Travel Time Savings	\$0.0	\$1.3	\$3.1
▪ Accident Savings	\$39.9	\$3.0	\$46.4
▪ Non-Carbon Emission Savings	\$7.8	\$0.1	\$8.3
▪ Carbon Emission Savings	\$35.4	\$0.1	\$40.6
▪ Pavement Maintenance Savings	\$60.3	\$0.1	\$65.3
▪ Congestion Savings	\$45.4	\$0.0	\$49.0
▪ Residual Value	\$0.4	\$0.2	\$0.6
<b>TOTAL BENEFITS</b>	<b>\$261.5</b>	<b>\$5.5</b>	<b>\$291.9</b>
Costs			
Capital Costs	\$39.9	\$47.0	\$86.9
Operating & Maintenance Costs	-\$4.2	-\$13.7	-\$17.9
<b>TOTAL COSTS</b>	<b>\$35.7</b>	<b>\$33.3</b>	<b>\$69.1</b>
<b>Net Present Value (NPV)</b>	<b>\$225.7</b>	<b>-\$27.9</b>	<b>\$222.8</b>
<b>Benefit-Cost Ratio (BCR)</b>	<b>7.31</b>	<b>0.16</b>	<b>4.23</b>



**Impacts**

Qualitative Benefits	Berth 11 & 12 Improvements	Terminal Enhancements			Full Project
		Refrigerated Container Storage	Terminal Tech & Equipment	New Gate Facilities	
<b>Economic Outcomes</b>					
<b>Increase Reliability</b>					
▪ Provides a second functional berth	✓				✓
▪ Adds container capacity		✓		✓	✓
▪ Implements current communication technology			✓	✓	✓
▪ Reduces National Freight Highway Network congestion	✓				✓
<b>Increase Efficiency</b>					
▪ Reduces processing time by up to 5 minutes				✓	✓
▪ Reduces terminal operating time by 5 minutes			✓		✓
▪ Provides redundancy and ability to serve 2 ships	✓				✓
▪ Creates efficient and modern Conley Terminal	✓	✓	✓	✓	✓
<b>Improve connectivity between freight modes</b>					
▪ Improves ship to truck movements	✓		✓	✓	✓
<b>Mobility Outcomes</b>					
<b>Maintain freight infrastructure in state of good repair</b>					
▪ Repairs degraded and outdated infrastructure	✓	✓	✓	✓	✓
<b>Increase Resiliency</b>					
▪ Enhances reliability of intermodal freight system	✓			✓	✓
<b>Reduce Congestion and Bottlenecks</b>					
▪ Eliminates truck traffic on congested Northeast corridor interstates	✓				✓
▪ Prevents worsening bottlenecks at PONYNJ	✓				✓
▪ Alleviates in-terminal bottlenecks		✓	✓	✓	✓
<b>Safety Outcomes</b>					
<b>Reduce the likelihood of high consequence events</b>					
▪ Improves in-terminal traffic flow and upgrades pavement condition	✓	✓	✓	✓	✓
<b>Improve Interactions between Roadway Users</b>					
▪ Avoids additional vehicle miles	✓		✓	✓	✓
<b>Community &amp; Environmental Outcomes</b>					
<b>Avoid Harm to communities and environment</b>					
▪ Crane painting enhances terminal aesthetics			✓		✓
<b>Improve Environmental Quality</b>					
▪ Increases energy efficiency and reduces emissions	✓	✓	✓		✓
▪ Reduces light pollution			✓		✓

Social: A benefit-cost analysis was conducted to quantitatively assess the merits of the Conley Terminal Intermodal Improvements and Modernization project as part of the overall cost-effectiveness analysis. In addition to the quantified benefits, a summary of the many qualitative benefits is included at the end of this section. All

project components are expected to be completely constructed by the end of first quarter 2019. Annual costs and benefits were computed and summarized over a 30-year period.

Economic: Conley Terminal contributes to the local, regional and national economies by providing employment and income to individuals,



tax revenues to local, state and federal governments, customs fees to the federal government, and revenue to businesses engaged in handling, shipping, and receiving cargo via the port. The jobs provided by Conley are well-paying, blue-collar jobs that support families in the Boston area.

**Environmental:** Since 2010, Massport has held more than a dozen meetings with neighboring community groups to discuss the dedicated freight corridor and park, the purchase of the Coastal Oil site, and other Conley Terminal projects. Additionally, Massport has implemented a comprehensive environmental management system to actively improve air quality, reduce hazardous material and wastes, and conserve water, electricity and fuel usage to minimize impacts to the community.

#### **Risk Assessment**

The Conley Terminal Intermodal Improvements and Modernization project is a very straightforward project with very few foreseen risks. The investment will restore existing infrastructure to a state of good repair and allow for the continued long-term operations and expansion of the facility. Massport already fully owns the land under consideration and the improvements do not extend beyond the existing footprint in any way that would materially impact the environment. There are no additional real estate needs to pose delays to the project, and none of the materials required for construction have long-lead times.

Additionally, many previous studies in the area have addressed and mitigated potential risks associated with this project. These include the master planning effort, the preparation of the Environmental Notification Form for the related dedicated freight corridor project, and the detailed Boston Harbor Deep Draft Navigation Improvements Project (BHDDNIP) Study. The primary risks associated with improvements at

Conley Terminal have already been addressed and mitigated.

One potential risk that has been identified is the presence of contamination in the excavated material at Berth 11 or the fill removed from the backlands for Berths 14-17. The upper layers of material in the harbor are likely to contain some level of contamination that may not be suitable for open water disposal. This issue was identified during the BHDDNIP Study and it was determined that this material would be suitable for disposal in the Confined Aquatic Disposal (CAD) cell that is included as a component of the Berth 11 deepening project. This technique has been successfully used for disposal of similar materials in previous Boston Harbor marine excavation projects. Should contaminated materials be encountered during excavation for the installation of the new steel sheet pile bulkhead, Massport has hazardous material management plans in to address any disposal needs.

#### **FINANCE**

##### **Project Delivery/Contract Method**

As a traditional design-bid-build project, the construction contractor procurement process will take place upon completion of final design.

##### **Duration/Status**

Massport has completed site inspections and preliminary investigations of the impacted areas for other terminal projects. Supplemental geotechnical investigation will be required to confirm the findings of these previous efforts.

The permitting process for Berth 11 and 12 improvements will begin as soon as the design has progressed to the necessary stage, anticipated to be third quarter 2016. Procurement and construction award for the Berth 11 project are anticipated for third quarter 2017. Construction of the initial Berth 11 improvements is expected to begin immediately upon contract award and to last for 18 months with completion foreseen in early 2019.



Berth 11 deepening would commence upon receipt of all remaining permits and is not expected to extend the overall construction schedule for Berth 11 improvements. Berth 12 Fender and Backland Pavement, Refrigerated Container Storage, and Terminal Technology & Equipment Improvements components are anticipated to be complete by the end of 2018. The new gate facilities are anticipated to be completed by early 2019.

**Innovations/Special Features**

With funding from the DHS, the Commonwealth of Massachusetts and Massport, Passport Systems, Inc. is currently constructing and testing its SmartScan 3D automated cargo inspection system at Conley Terminal. This system, which can non-intrusively detect nuclear materials and other contraband, will be used by Customs and Border Patrol to screen containerized cargo at Conley Terminal, making the Port of Boston the first in the nation to use this technology.

The broadband Wi-Fi network and other operational improvements within the terminal will help fully leverage this cutting-edge technology aimed at keeping these hazardous materials off of the nation’s roadways and out of our communities.

Additionally, Massport recently launched a new mobile application called Forecast Mobile Lite, making Conley among the first in the industry to make this technology available. The application provides customers, primarily trucking companies and drivers, access to container availability information in real time on their smartphones, saving time and avoiding potential issues at the terminal gate.

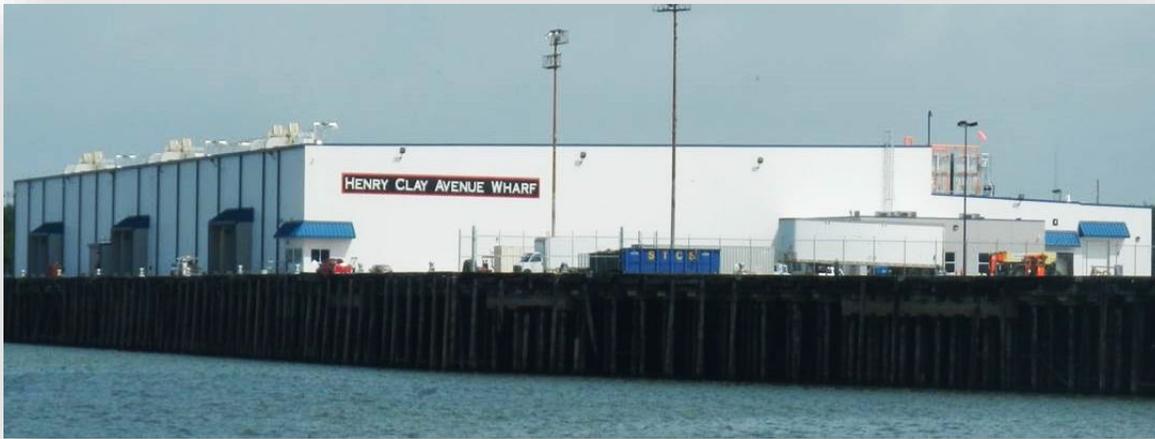
**Related Links/Articles**

- [https://www.massport.com/media/2914/Conley\\_Terminal\\_Environmental\\_Notification\\_Form\\_Report.pdf](https://www.massport.com/media/2914/Conley_Terminal_Environmental_Notification_Form_Report.pdf)
- <https://www.massport.com/news-room/news/port-of-boston-welcomes-largest-cargo-ship-to-date/>

**Funding Sources**

Project Component	Massport Funding	Other Federal Funding	FASTLANE Funding	Total Project Cost	% of Project Segment Cost	% of Full Project Cost
<b>TOTAL PROJECT COST (ALL COMPONENTS)</b>	<b>\$41,604,500</b>	<b>\$333,185</b>	<b>\$60,953,768</b>	<b>\$102,891,453</b>		<b>100%</b>
<b>BERTH 11 &amp; 12 IMPROVEMENTS</b>	<b>\$21,890,150</b>	<b>\$0</b>	<b>\$25,378,800</b>	<b>\$47,268,950</b>		<b>45.9%</b>
<b>Berth 11 Repairs</b>	<b>\$11,000,000</b>	<b>\$0</b>	<b>\$19,795,800</b>	<b>\$30,795,800</b>	<b>65.2%</b>	<b>29.9%</b>
▪ Pier and Apron	\$4,200,000	\$0	\$10,990,000	\$15,190,000	49.3%	14.8%
▪ Bulkhead	\$2,200,000	\$0	\$4,405,800	\$6,605,800	21.5%	6.4%
▪ Backlands	\$2,000,000	\$0	\$3,000,000	\$5,000,000	16.2%	4.9%
▪ Fender	\$2,600,000	\$0	\$1,400,000	\$4,000,000	13.0%	3.9%
<b>Berth 11 Strengthening</b>	<b>\$4,000,000</b>	<b>\$0</b>	<b>\$2,383,000</b>	<b>\$6,383,000</b>	<b>13.5%</b>	<b>6.2%</b>
<b>Berth 11 Deepening</b>	<b>\$2,490,150</b>	<b>\$0</b>	<b>\$0</b>	<b>\$2,490,150</b>	<b>5.3%</b>	<b>2.4%</b>
<b>Berth 12 Fender &amp; Backlands</b>	<b>\$4,400,000</b>	<b>\$0</b>	<b>\$3,200,000</b>	<b>\$7,600,000</b>	<b>16.1%</b>	<b>7.4%</b>
▪ Backlands	\$3,000,000	\$0	\$2,000,000	\$5,000,000	65.8%	4.9%
▪ Fender	\$1,400,000	\$0	\$1,200,000	\$2,600,000	34.2%	2.5%
<b>TERMINAL ENHANCEMENTS</b>	<b>\$19,714,350</b>	<b>\$333,185</b>	<b>\$35,574,968</b>	<b>\$55,622,503</b>		<b>54.1%</b>
<b>Refrigerated Container Storage</b>	<b>\$6,007,896</b>	<b>\$0</b>	<b>\$4,005,264</b>	<b>\$10,013,161</b>	<b>18.0%</b>	<b>9.7%</b>
<b>Terminal Technology &amp; Equipment</b>	<b>\$6,876,877</b>	<b>\$333,185</b>	<b>\$4,251,400</b>	<b>\$11,461,462</b>	<b>20.6%</b>	<b>11.1%</b>
▪ Broadband Network	\$936,877	\$0	\$624,585	\$1,561,462	13.6%	1.5%
▪ LED Terminal Lighting	\$360,000	\$0	\$240,000	\$600,000	5.2%	0.6%
▪ Yard Tractors	\$1,080,000	\$0	\$720,000	\$1,800,000	15.7%	1.7%
▪ RTG Drive Replacement	\$2,160,000	\$333,185	\$1,106,815	\$3,600,000	31.4%	3.5%
▪ Structural Crane Painting	\$2,340,000	\$0	\$1,560,000	\$3,900,000	34.0%	3.8%
<b>Gate Processing Facility</b>	<b>\$6,829,576</b>	<b>\$0</b>	<b>\$27,318,304</b>	<b>\$34,147,880</b>	<b>61.4%</b>	<b>33.2%</b>
▪ Berths 14 to 17 Rehabilitation	\$3,400,800	\$0	\$13,603,200	\$17,004,000	49.8%	16.5%
▪ New Gate Processing	\$3,428,776	\$0	\$13,715,104	\$17,143,880	50.2%	16.7%

## 6. RIVERFRONT COLD STORAGE FACILITY



### Largest Blast-Freeze, Cold Storage Facility in the Northern Hemisphere

**Location:** New Orleans, Louisiana

**Project Owner:** Port of New Orleans

**Description:** The Port of New Orleans planned to construct a new cold storage facility at Henry Clay Avenue for temperature-sensitive products to arrive via trucks. The products required blast-freezing and/or cold storage warehousing in an insulated on-dock building until exported via dockside handling directly into refrigerated ships or refrigerated containers.

**Cost:** \$40.5 million

#### Project Stakeholders

- Partners: McDonnell-Primus Joint Venture, Metairie, La. (Developer)
- New Orleans Cold Storage LLC (Operator)

#### PLANNING

##### Goals and Objectives

To replace and expand cold storage and blast-freeze capacity lost on the Inner Harbor Navigation Canal, due to the closure of the Mississippi River Gulf Outlet following Hurricane Katrina.

#### Existing Conditions/Assets

- Port of New Orleans Existing 187,081 SF Cold Storage Facility at Jourdan Road Terminal (JRT) in New Orleans East
- Blast freeze capacity - 1.2 million lbs. daily
- Storage capacity - 52 million lbs.

The Port's existing facility at JRT was served by the Mississippi River Gulf Outlet, which was congressionally closed following Hurricane Katrina, limiting deep-water access to the existing facility. The only access following the closure was through the Inner Harbor Navigation Canal (IHNC) Lock, which limited the size and draft of ships accessing the existing facility:

- IHNC lock placed in service in 1921
- 75-ft wide X 640-ft long
- 31.5 foot draft
- Average delay is 11 hours
- Maximum delay is 24-36 hours

The Port first had to identify a suitable available site for the project. Through a series of exercises, the Port determined the existing Henry Clay Wharf was best suited for the project.



The site at the time was leased by Ports America and consisted of two ship berths and a transit shed. The Port renegotiated Ports America's lease to obtain the site for the development of the new terminal.

#### Market/Opportunities

- 420 commercial broiler farms in market region
- 3 poultry processors
- 1 billion+ pounds grown annually
- Annual economic impact: \$1.24 billion in Louisiana alone
- Port of New Orleans cold storage business handles worldwide export of frozen products, exporting 44% of Louisiana poultry
- Construct the largest blast-freeze facility in Northern Hemisphere

#### Needs and Requirements

Operational capacity needs include the ability to blast freeze 2.4 million lbs. of product in 48 hours or less and warehousing capacity to store 38 million lbs. of frozen product.

- Shipping and Receiving Dock
- Self-polishing seamless floor, automatic tip tables and stretch-wrap stations to reduce loading time
- Rack freezing system
- 40 truck bays
- Battery Stations and Washer



- Leadership in Energy and Environmental Design (LEED) Standards
  - Light-emitting diodes (LED) lighting with centralized control and motion sensor systems
  - Intricate sequence of systems that reduce energy demand such as:
    - Wider doors that allow trucks to open directly into the building
    - Air doors to reduce warm air infiltration
    - Dehumidifiers

#### Stakeholder Engagement

- Engaged the terminal operator, New Orleans Cold Storage LLC
- Poultry producers for needs and volume forecasts
- Community Outreach to project neighbors such as:
  - Audubon Nature Institute
  - New Orleans Children's Hospital
  - Ports America
  - Neighborhood Associations

#### Recommended Project/Plan/Approach

The former 50-year-old dockside transit shed at Henry Clay was demolished and the substructure strengthened in preparation for the new facility. The berths were stabilized and dredged to a minimum 35-foot draft. The warehouse incorporates energy-saving technology and state-of-the-art operational efficiencies.

There are two break bulk vessel berths at the Henry Clay dockside facility, with direct access to the global vessel trade via the Mississippi River. In addition to break bulk access, the close proximity to the Port's Napoleon Avenue Container Terminal will create additional efficiencies for the growing refrigerated container trade.



## FEASIBILITY

### Physical Performance

The refrigeration processes can freeze up to 1.25 million pounds of product daily and store 38 million pounds of frozen goods between -15 and 40 degrees F, making it the largest blast-freeze operation in the Northern Hemisphere.

Henry Clay also has direct access to rail, with switch services by the New Orleans Public Belt Railroad, giving NOCS and its customers access to the North American rail network (US, Canada, and Mexico) via the Union Pacific, Burlington Northern Santa Fe, Norfolk Southern, Canadian National, Kansas City Southern, and CSX railroads.

### Economic Impacts

- Added 124 new direct jobs
- Generates \$126 million in annual spending
- Supports the Louisiana poultry industry which is valued at more than \$1.6 billion.

### Risk Assessment

- Riverfront Cold Storage Facility was originally planned for the Gov. Nicholls Street/ Esplanade Ave. Wharf downriver near the French Quarter. Those plans received push back from the neighborhood and hospitality community, despite the fact the wharves were historically cargo docks and continue to operate today as a maritime facility.

## FINANCE

### Approach

The project's investment for all improvements totaled \$40.5 million, of which \$35.13 million went to the construction of the facility. Louisiana's Office of Community Development-Disaster Recovery Unit provided \$23.5 million in Community Development Block Grant (CDBG) Disaster Recovery funds with the remaining funds coming from the Federal Emergency Management Agency (FEMA) and the Port of New Orleans. The Port of New Orleans, which is a state agency, owns the terminal and leases it to New Orleans Cold Storage to operate.

### Funding Sources:

- \$23.5 million State of Louisiana Reimbursement through CDBG
- \$2.8 million FEMA Funding
- \$14.2 million Port of New Orleans

### Project Delivery/Contract Method

The Riverfront Cold Storage Facility is the first design-build project undertaken by the Port of New Orleans. The Board authorized its first design-build ordinance in 2009 and awarded the contract in May of 2010 to McDonnell-Primus Joint Venture of Metairie, La.

### Financial Status

The Riverfront Cold Storage Terminal has met its revenue guarantees in its leases with the Board of Commissioners of the Port of New Orleans. However, the Port has realized diminished returns from dockage due to increased containerization of poultry exports and decreased breakbulk handling of the refrigerated cargo.

### Duration/Status

A 10-month design period was required prior to a 24-month construction term for the Riverfront Cold Storage Terminal. Construction began in June of 2010 and was completed in June of 2012. Included in the construction term was substructure and foundation reinforcement for the changed-use of the terminal from a traditional breakbulk facility to a blast-freeze, cold storage terminal.

### Innovations/Special Features

Project Management Institute Atlanta Chapter 2012 Project of the Year Award

### Related Links/Articles:

- <http://portno.com/henry-clay-avenue-wharf>
- <http://www.nocs.com/henry-clay-wharf>
- <http://www.cattlenetwork.com/cattle-news/New-Orleans-Cold-Storage-opens-new-warehouse-163078586.html>
- <http://www.areadevelopment.com/newsItems/7-24-2012/new-orleans-cold-storage-facility-dedication-161615.shtml>
- <http://portno.com/CMS/Resources/press%20releases/prsrel071912.pdf>



## 7. MITSUI/TRAPAC PROJECT

### New Container Terminal for a Dedicated Carrier

**Location:** Jacksonville, Florida

**Project Sponsor/Borrower:** Jacksonville Port Authority (JaxPort or JPA)

**Description:** A long term concession-like Operating Lease & Use Agreement with Mitsui MOL and Trans Pacific Container Corp for the development and financing of a new container terminal expected to eventually throughput 800,000 containers per year. The Agreement sets forth the business and financing terms for the new terminal including a multi-tiered plan of finance and a 30-year operating lease. Because Mitsui is directly or indirectly responsible for all debt service, the project forecast improved JPA's net operating revenues and overall financial position.



Some relevant terms and attributes of the Agreement include:

- JaxPort will own the facility during and after construction. Both parties have representatives on a construction committee to oversee the planning and construction of the project.

- Mitsui/TraPac will lease the premises from JaxPort and operate the container terminal. The term of the lease is 30 years from date of beneficial occupancy of the facility.
- Mitsui/TraPac will have exclusive right to use the facilities during the lease.
- Mitsui/TraPac will pay JaxPort a throughput fee per container.
- Additional Rent under the lease will equal amounts payable to JaxPort for the various components of the financing arranged by JPA.
- The Operating and Lease Agreement constitutes a "full net lease" which means that Mitsui/TraPac, during the lease term, is responsible for keeping the facilities in good working order at its own expense, including insurance, repairs, security, etc.

**Cost:** \$220 million

#### FINANCE

##### Funding Sources

- \$25 million State of Florida PRPA/Commonwealth grants
- \$45 million JPA Revenue Bonds secured by net operating revenues and highly rated given additional revenue support by the City of Jacksonville pursuant to an Interlocal Agreement
- \$50 million Florida PRPA/Commonwealth state infrastructure bank (SIB) loan secured on a subordinate lien basis by JPA
- \$100 million Special Purpose Facility Revenue Bonds issued by JPA but secured and paid by Mitsui

**Project Delivery/Contract Method:** Design-Build-Finance-Operate-Maintain

**Private Partner:** Dedicated Carrier (Mitsui/TraPac)



**Project Advisors/Consultants**

- Office of General Counsel of the City of Jacksonville – Issuer’s counsel
- Foley & Lardner LLP – Bond & disclosure counsel
- Public Financial Management - Financial advisor
- Martin Associates – Demand & revenue consultant

**Lenders:** Bondholders, FDOT SIB

**Duration/Status:** Terminal opened January 12, 2009

**Financial Status/Financial Performance**

All three debt financing components have been completed. The \$100 million Special Purpose Facility Revenue Bonds, which were sold as variable rate demand bonds and swapped back to a fixed rate at 3.90%, closed April 11, 2007. The SPFR Bonds are guaranteed by Mitsui which helped to attract a low cost Letter of Credit from Sumitomo Mitsui Bank.

The \$50 million FDOT SIB loan agreement is secured by JaxPort on a subordinate lien basis with loan repayments reimbursed to JaxPort by Mitsui. The SIB loan closed in July 2007. The final financing component, \$45 million of JaxPort Revenue Bonds, were issued April 2008 as part of a larger JaxPort bond offering, again with debt service reimbursed to JaxPort by Mitsui.

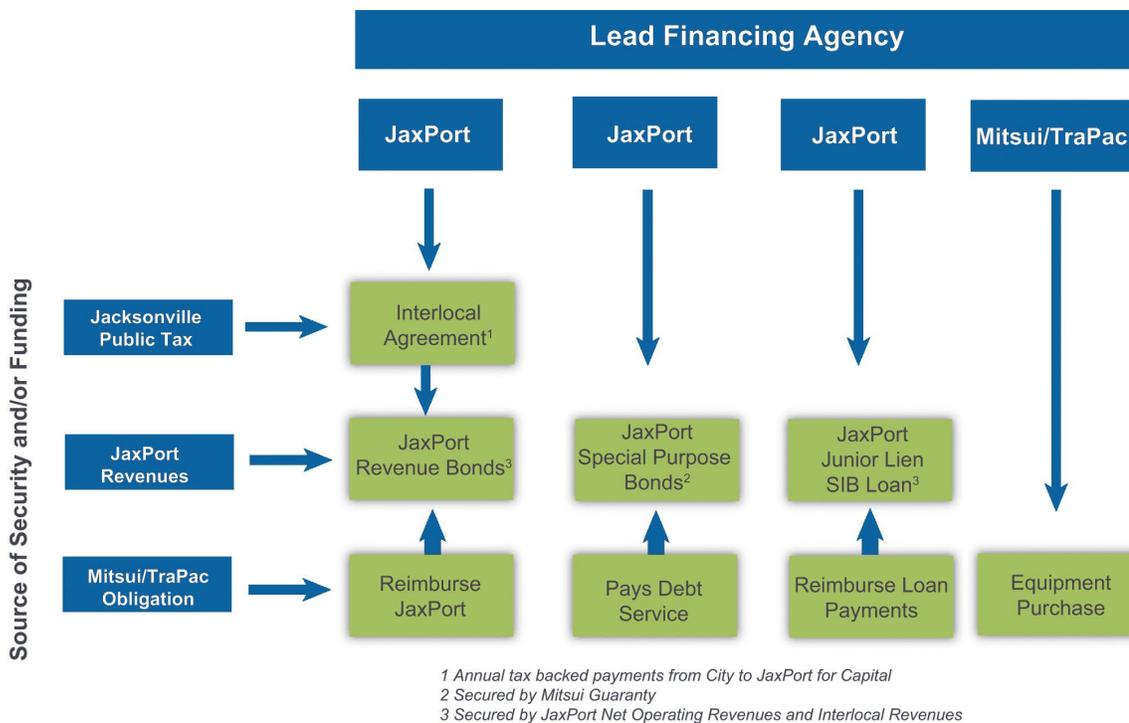
**Innovations/Special Features**

- Typical concession financing using bank debt was replaced with public finance structure providing high credit quality, low cost, tax exempt debt which Mitsui could not obtain on its own
  - JaxPort willing to serve as conduit issuer, and Mitsui used a parent corporate guaranty

**Related Links/Articles:**

- [www.jaxport.com](http://www.jaxport.com)

**Exhibit B-5 JaxPort Funding Sources**





## 8. SEAGIRT MARINE TERMINAL CONCESSION

### Single Marine Terminal Concession by 3<sup>rd</sup> Party Operator

**Location:** Baltimore, Maryland



**Project Sponsor:** Maryland Port Administration (MPA)

**Description:** MPA, a department of the Maryland DOT, sought a P3 arrangement related to the existing Seagirt Marine Terminal and expansion thereof. This was the first project in Maryland to be undertaken as a P3 project. As a first task, the different forms of concession, lease and financing arrangements were laid out so that MPA could determine the basic transaction framework with which to proceed. Using this framework, a financing structure and project valuation was developed working with the cargo forecasting and engineering consultants. This financial analysis helped to show MPA and the Maryland Transportation Authority (MDTA), which owns Seagirt and leases it to MPA, that they could meet their collective business and economic goals for the P3.

The framework to enable a proper and competitive P3 solicitation process for the project was then

developed. The next steps were to begin the solicitation process. A request for qualifications was drafted for the project, which was made available to interested parties in April 2009 with responses due back June 2009. The data room for the project was managed in-house by the financial advisor, saving MPA a significant project expense and providing better control of data room content. Statements of Qualifications were received and evaluated, with two teams being shortlisted. The request for offers was then drafted that was released to firms shortlisted from the RFQ process. The RFO included all concession/lease terms considered of material importance to MPA and MDTA, as well as a full description of Seagirt, its operations, its physical condition, and the terminal expansion project.

In September 2009, the RFO produced a bid from Ports America with an upfront offer that was vigorously negotiated using financial analysis. The analysis showed that if MPA assisted Ports America with a tax-exempt financing, the overall value of the concession would increase. After negotiations were completed, the offer was \$245 million including a \$140 million upfront payment and \$105 million for an additional berth at Seagirt. The offer also included both fixed and volume based payments to MPA over time as well as capital improvements to Seagirt Marine Terminal, both of which significantly increase the total value of the transaction. The Lease and Concession Agreement ("Concession") has a term of 50 years and includes the upfront payment, the expansion of Seagirt, ongoing fixed and variable payments to MPA, a commitment by Ports America to invest in the capital needs of Seagirt, and the return of leased property to MPA that Ports America holds at the adjacent Dundalk Marine Terminal. The upfront payment was negotiated up to \$140 million from \$110 million, a significant increase from the original offer, contingent on a tax-exempt financing.

**Cost:** \$245 million



**FINANCE**

**Exhibit B-6 MPA Funding Sources**

**Approach**

MPA facilitated the tax-exempt financing through the Maryland Economic Development Corporation (MEDCO). MEDCO issued two series of bonds, the \$167 million Revenue Bonds Series A that were used to reimburse MDTA for tax-exempt qualified projects and the \$82 million Revenue Bonds Series B, tax-exempt private activity bonds that were used to pay for a portion of the Seagirt expansion. Equity contribution of \$75 million was provided by Highstar Capital.

**Funding Sources**

- \$249 MEDCO
- \$75 Million Highstar Capital

**Project Delivery/Contract Method:** Design-Build-Finance-Operate-Maintain

**Private Partner:** Third party operator (Ports America)

**Project Advisors/Consultants**

- Cleary Gottlieb Steen & Hamilton LLP – General counsel
- Orrick, Herrington & Sutcliffe - Bond counsel
- Laurene B. Mahon - Financial advisor to MPA
- Public Financial Management - Financial advisor to MPA
- Martin Associates – Demand & revenue consultant
- AECOM – Engineering consultant

**Lenders:** Bondholders

<b>Sources and Uses</b>				
<b>Sources</b>	<b>Series A Bonds</b>	<b>Series B Bonds</b>	<b>Equity Contribution</b>	<b>Total</b>
Par Amount of Series 2010 Bonds	\$ 166,920,000	\$ 81,755,000	\$ -	\$ 248,675,000
(Original Issue Discount)	(2,496,249)	(1,223,653)	-	(3,719,902)
Equity Contribution	-	-	75,000,000	75,000,000
<b>Total Sources</b>	<b>\$ 164,423,751</b>	<b>\$ 80,531,347</b>	<b>\$ 75,000,000</b>	<b>\$ 319,955,097</b>
<b>Uses</b>				
Authority Project Costs	\$ 140,151,028	\$ -	\$ -	\$ 140,151,028
Terminal Project Costs	-	66,412,602	39,542,766	105,955,367
Debt Service Reserve Requirement	15,048,225	7,487,100	-	22,535,325
Capitalized Interest	5,022,018	5,022,018	-	10,044,037
Capital Reserve Account	-	-	7,750,000	7,750,000
Operating Reserve Account	-	-	4,750,000	4,750,000
Deposit to Start-up Operations	-	-	12,525,682	12,525,682
Costs of Issuance and Other	4,202,479	1,609,627	10,431,553	16,243,658
<b>Total Uses</b>	<b>\$ 164,423,751</b>	<b>\$ 80,531,347</b>	<b>\$ 75,000,000</b>	<b>\$ 319,955,097</b>

**Duration/Status:** Concession in effect as of January 12, 2010

**Financial Status/Financial Performance**

MEDCO sold the project revenue bonds on January 6, 2010 and closing was on January 12, 2010, at which time the Concession went into effect. Bonds received a rating of Baa3 from Moody's.

**Innovations/Special Features**

Concession financial model used tax-exempt debt to lower costs and increase the upfront value to MPA as well as the ROI to the private partner

**Related Links/Articles:**

- [www.mpa.maryland.gov](http://www.mpa.maryland.gov)



## 9. CRANE FINANCING

### Crane Lease Financing

**Location:** Wilmington, North Carolina

**Project Sponsor/Borrower**

North Carolina State Ports Authority (NCSPA or the "Authority")

**Description:** NCSPA sought financing to refinance certain port facilities improvements including container cranes. In an effort to maintain competitive advantage and proactively plan for future development, the Authority upgraded and improved the capacity of its current container yard at the Port of Wilmington. The first phase of the improvements were broken down into 2 categories: 1) the purchase of four (4) new 100-foot gauge ship to shore container handling cranes and 2) the improvements to the capital infrastructure to accommodate these new cranes. Improvements to the capital infrastructure as part of phase two included: the installation of the 100-foot gage landside crane rail, repairs and improvements to Berth 9, and the installation of the power distribution system for the new 100-foot gauge container cranes (Phases 1 and 2 collectively referred to as, the "Project"). The Project was acquired / constructed at a cost of approximately \$42 million including engineering, design certification, and quality control. The acquisition /

construction were initially financed through the use of NCSPA's short-term line of credit, and NCSPA desired to refinance such equipment on a long-term basis. The reasonably expected useful life of the Project is at least 30 years.

**Cost:** \$32 million (cranes)

**FINANCE**

**Funding Sources**

- \$32 million equipment lease financing issued via four schedules (one for \$10 million; three for \$7.3 million each) under Master Lease Agreement

**Project Delivery/Contract Method:** Master Lease Agreement

**Private Partner:** N/A

**Project Advisors/Consultants**

- Office of State Attorney General – Issuer counsel
- Womble Carlyle Sandridge & Rice - Lease counsel
- Public Financial Management - Financial advisor

**Lenders:** SunTrust Equipment Finance and Leasing Corp.

**Duration/Status:** Operational

**Financial Status/Financial Performance:** Lease financing closed April 2008

**Innovations/Special Features**

Legal and security structures include a subordinate lien on the net revenues of the Authority's Port Facilities pursuant to the terms of a Subordinated Trust Agreement, and a security interest in the cranes / equipment

**Related Links/Articles:**

- [www.ncports.com](http://www.ncports.com)



## 10. JAXPORT CAPITAL IMPROVEMENT PROGRAM (FY 2013)

### CIP Funding with Port System Revenue Bonds and Grants

**Location:** Jacksonville, Florida

**Project Sponsor/Borrower:** Jacksonville Port Authority (JaxPort” or “JPA)

**Description:** The FY 2013 Capital Program consists of the following projects:

- Blount Island Projects: primarily the “Wharf Rehabilitation and Upgrade Project” consisting of structural rehabilitation and upgrades to approximately 5,200 linear feet of the existing marginal wharf structure, bulkhead, and associated structures in order to replace or otherwise repair ballasted deck, pile caps, bulkhead, and other structural members and to restore the cargo terminal to fully operational status
- Dames Point Projects: primarily includes completion of the Intermodal Container Transfer Facility (ICTF)
- Talleyrand Projects: rehabilitation of wharf structures and other improvements
- Improvements to Bartram Island Dike
- Acquisition of Land for expansion purposes
- Mile Point: harbor project to improve the flow of the St. Johns River at Mile Point, where intra-coastal and river currents pose navigational hindrances for deep draft vessels during certain tidal conditions

**Cost:** \$117 million

#### FINANCE

#### Funding Sources

- \$19 million Series 2012 port system revenue bonds
- \$5 million JPA operating funds
- \$4 million JPA line of credit



- \$73 million State of Florida grants
- \$16 million Federal grants

**Project Delivery/Contract Method:** Traditional Public Contracts

**Private Partner:** N/A

#### Project Advisors/Consultants

- Office of General Counsel of the City of Jacksonville – Issuer’s counsel
- Foley & Lardner LLP - Bond & disclosure counsel
- Public Financial Management - Financial advisor

**Lenders:** Bondholders

**Duration/Status:** Ongoing capital improvement program

**Financial Status/Financial Performance:** Bond financing closed in 2012

#### Innovations/Special Features

- Port system revenue bonds additionally secured by Interlocal Agreement
- Revenues received from the City of Jacksonville

#### Related Links/Articles:

- [www.jaxport.com](http://www.jaxport.com)



## 11. CRANEY ISLAND EASTWARD EXPANSION

### Marine Terminal Expansion using State Port Fund Bonds



**Location:** Portsmouth, Virginia

**Project Sponsor/Borrower:** Virginia Port Authority (VPA or the "Authority")

**Description:** The 522-acre Craney Island Marine Terminal is expected to be constructed in four phases. Pursuant to the Authority's present plan, Phase I of the marine terminal is scheduled to become operational in 2026 and will consist of approximately 220 acres of terminal yard, 3,000 linear feet of wharf, 8 Suez-Class container cranes, an on-terminal Intermodal Container Transfer Facility and a capacity of approximately 1.3 million TEUs. Additional phases will be completed between 2030 and 2038 in response to growth in demand. Road and rail access will be provided through a dedicated corridor to Route 164. The Craney Terminal has also been designed to accept an interchange from the proposed Third Harbor Crossing, which is a major transportation goal for the Hampton Roads region.

The proceeds of the Series 2011 Bonds were used to pay, either directly or indirectly through repayment of a Treasury Loan, the costs of the

Craney Island Eastward Expansion, including: South and Division Cross Dikes; real estate acquisition; environmental mitigation; utility relocation; road and rail connections; other related construction; and all associated engineering, testing, and management.

**Cost:** \$60 million (related to the Series 2011 Bonds)

#### FINANCE

##### Funding Sources

Debt service on the Series 2011 Bonds is payable from the Port Fund, a special non-reverting fund established as part of the Transportation Trust Fund of the Commonwealth of Virginia

**Project Delivery/Contract Method:** Various traditional public contracts

**Private Partner:** N/A

##### Project Advisors/Consultants

Related to Series 2011 Bonds issuance:

- Moffatt & Nichol – Consulting engineer
- Williams Mullen, P.C. - Bond counsel
- Public Financial Management - Financial advisor

**Lenders:** Bondholders

**Duration/Status:** Under construction

##### Financial Status/Financial Performance:

Financing closed in 2011

##### Innovations/Special Features

\$14 million borrowed from the Virginia Department of Treasury served as interim funding and was repaid with the proceeds of the Series 2011 Bonds.

##### RELATED LINKS/ARTICLES:

- [www.portofvirginia.com](http://www.portofvirginia.com)

## 12. SHORE POWER INSTALLATION AT B STREET AND BROADWAY TERMINALS

### Shore Power Installation at Cruise Ship Terminals

**Location:** San Diego, CA

**Project Sponsor/Borrower:** San Diego Unified Port District (Port of San Diego)

#### Description

- CA Air Resources Board (CARB) regulations on shore powering of cruise ships to begin in January 2014. Regulations required cruise ships with at least 5 calls to use shore power for at least 50% of their calls and if a ship had the shore power capability, they must 'plug in'.
- 2006 air inventory showed  $\frac{1}{2}$  air emission particulates were generated from ships. Of that,  $\frac{1}{2}$  were from cruise ships and  $\frac{1}{2}$  of those emissions were hoteling emissions.
- Regulations will increase to 70% in 2017 and 80% in 2020.
- When the project was completed, San Diego was 2nd in CA to install shore power. Only 5 had been installed globally.
- Port of San Diego received a 2008 Carl Moyer Program Grant (State program) award that provided a portion of funding for shore-side equipment. The project completion was three years ahead of regulations.
- Because of the high power demand and cost of infrastructure, the project was designed to power one ship at a time. Flexibility was built into the system by providing the infrastructure to power three berths. Additional power can be added in the future to allow simultaneous connection of 2 vessels.
- Obligations to grant for emissions reductions were based on volume of ship calls from 2006, when the cruise business was at its highest.



#### Challenges

- Because shore power was still a newer technology and the cruise ships required a system that was flexible in how it switched power, a proprietary system was chosen. This system was one that most cruise lines were using and comfortable with. Because a cruise ship is equivalent to a floating hotel, the switch from ship-power to shore power must be seamless and not affect the passenger's experience. The switch must be synchronized to not disrupt certain services or impact passengers.
- At time of installation and deployment, there were no set standards for ship or shore-side. Systems had to be flexible to accommodate connection location on the ship-side.
- Decline in cruise business caused a decrease in air reductions received from shore powering, which did not meet the grant obligation.
- In 2013, CARB granted a ten-year extension to the grant to meet air reductions.



- Meeting grant regulations over the next 10 years may be challenging due to slow return of cruise business
- Cruise growth projections show that by the 2017 increase to 70%, the ability to power two ships simultaneously will be required. This will necessitate another multi-million dollar investment.
- Because the Port of San Diego could only power one ship at a time, an additional operational expense is incurred each time the jib (connection) is moved to accommodate a ship at one of the three potential berths.
- At start up, the Port of San Diego and utility company had not come to an agreed upon shore power rate. San Diego has some of the highest utility rates in the country. The difference in utility rates at different ports results in different costs to vessel operators in different ports. Although the existing rate structure is acceptable to cruise lines, that rate structure will end in 2016. Increased rates are difficult for the cruise lines and the return of the cruise lines to San Diego.
- Port of San Diego is not part of a municipality, so does not qualify for reduced rates.
- Port of San Diego will work to develop a shore power rate and obtain California Public Utilities Commission approval.

**Cost:** \$7.1 million

#### **FINANCE**

##### **Funding Sources**

- \$2.4 million – Carl Moyer Grant Program
- \$4.7 million Port of San Diego's Capital Improvement Program

##### **Project Delivery/Contract Method**

Sole Source Contract – system was specific to cruise ships. Vendor designed, procured, installed and maintains equipment. Infrastructure was provided through traditional Public Works contracting.

**Private Partner:** N/A

##### **Project Advisors/Consultants**

- Cochrane Electric for equipment/system design and installation;
- Engineering Partners, Inc. for infrastructure design
- SDG&E (local utility) for infrastructure and power supply

**Lenders:** N/A

**Duration/Status:** 9 month construction/installation (2007 – 2009 planning and design). Completed December 2010.

##### **Financial Status/Financial Performance:**

Grant program performance period expired in 2010; however a ten-year extension has been granted for reporting of emissions. Because this was regulatory by the state, no ROI will be realized.

##### **Innovations/Special Features**

Cost for utility service supply design and infrastructure construction (\$2 million). Portion of this cost is planned to be refunded to the port of San Diego over 7 years if threshold use of power is met. The port received \$150,000 in the first year of use, but then decreased to approximately \$40,000 - \$50,000 per year due to the decline in cruise business. The cruise business decline was caused by the economic recession and perceived violence in Mexico, which is the primary market for San Diego's cruise business.

##### **Related Links/Articles:**

- [www.portofsandiego.org](http://www.portofsandiego.org)

### 13. SOUTH HARBOR

#### Construction of Inland River Harbor

**Location:** Madison, Illinois on the Mississippi River

**Project Sponsor/Borrower:** America's Central Port (ACP)

**Description:** The South Harbor project at ACP is the construction of a new, inset river harbor located on the left descending bank of the Mississippi River approximately three miles north of downtown St. Louis, Missouri. The project consists of several components including:

- Lease of property from the U.S. Army Corps of Engineers
- Clearing and grubbing of trees
- Excavation of 750,000 cubic yards of sand and clay material
- Placement of rip rap for bank stabilization
- Construction of a clay cutoff wall and clay blanket for levee protection
- Construction of 10 new levee relief wells for levee and flood protection
- Construction of 9,600 lineal feet of rail track that will serve the South Harbor
- Construction of a 400' long open cell sheet pile wall
- Construction of a 30' diameter closed cell, two 19' diameter closed cells and four mooring dolphins
- Construction of a rail/truck terminal, including conveyor and loadout, for handling dry bulk commodities
- Purchase of two captive deck barges for terminal operations
- Acquisition and mitigation of nearly 100 acres of land for wetlands mitigation purposes
- As added options, construction of dry bulk storage, liquid pipelines and liquid storage tanks.

**Cost:** \$50 million

#### Funding Sources

- \$5 million - Port operating and capital development funds
- \$26.5 million - loan funds
- \$4 million - State of Illinois grant
- \$14.5 million - Federal grant (TIGER I)



**Project Delivery/Contract Method:** Traditional public contracts, and design/build

**Private Partner:** N/A

#### Project Advisors/Consultants

Numerous rail and terminal design consultants, survey and geotechnical engineers

**Lenders:** Regions Bank

**Duration/Status:** Construction is being completed in stages; all construction is scheduled to be complete by September 2015

**Financial Status/Financial Performance:** Loan for \$16.5 million closed in July 2014

#### Innovations/Special Features

Only one of two inset harbors in the entire St. Louis metropolitan area: allows terminal operations to occur outside of the navigation channel. The most northerly ice-free and lock free port on the Mississippi River

#### Related Links/Articles:

- [www.americascentralport.com](http://www.americascentralport.com)



## Appendix C: Estimating Throughput Capacity Example

The models used to estimate port throughput capacity are either linear static models using spreadsheets or more sophisticated, dynamic simulation models that can show the impact of system dynamism and random events.

Static models support equation-based analyses to estimate throughput capacity and equipment requirements as a function of the site layout, physical characteristics, and current/anticipated operating practices. Spreadsheet models can also be used to examine isolated facility functions or specific demand versus capacity issues. A dynamic simulation model can be developed to gain a better understanding of the complexity and integrated multi-modal aspects of the entire port operation. These models should take into account many operational variables and random variations to analyze specific project alternatives.

Although some project challenges require the use of simulation models, static models often provide results sufficient to readily examine a broad range of factors that influence port capacity. Regardless of the various spreadsheet and simulation models that are available or can be useful for port projects, capacity models should support basic computations and have a structure that allows for increasing level of details as the planning process progresses, and that are transparent in their assumptions and algorithms.

The throughput capacity of a facility is a function of the physical assets of the facility and the rate at which those assets are used. Physical assets can be identified from drawings or other resource descriptions. The rate of asset use generally has two components: physical space and time. With regard to physical space, the analysis must recognize that, in addition to physical space actually in use, the facility operators must reserve empty space that maintains fluidity and allows the facility to operate at adequate productivity. Operators must also allocate sufficient space to sustain accessibility to objects that must be

handled or processed. With regard to time, the analysis must recognize that demand is uneven over time, and that physical space must be reserved to allow efficient service of peak conditions.

For example, in the context of a freight terminal, analysis of the berth must allow for the physical lengths of vessels, as well as the gaps between vessels required for mooring and maneuvering. The berth analysis must also reflect the need to have berths available when vessels arrive, even if their schedule reliability is low. The berth analysis also needs to reflect seasonal variations in call durations caused by changes in vessel exchange rates. With this example, it can be seen that there is physical length, plus access space, plus reserve space, as well as physical call duration, plus variability reserve, plus peaking reserve.

This appendix includes an example of a robust approach and tools that can be prepared using a static model to estimate berth and storage yard capacity in a container terminal. Similar approaches can be used for auto/ro-ro, dry/liquid bulk, break bulk and passenger terminals.

### Berth-Constrained Capacity

A berth throughput capacity models typically contain the following major components:

#### Terminal Parameters:

- Specification of values for all terminal berths

#### Vessel Parameters:

- Specification of values for each class of vessel being considered
- Calculation of the relationship of each class of vessel to the berth space

#### Vessel Performance:

- Specification of vessel operating performance parameters
- Calculation of vessel performance for each class of vessel



**Berth Performance:**

Calculation of overall berth productivity for each class of vessel

**Mixed Fleet Performance:**

Specification of the mix of vessels across the classes

**Capacity for each Class:**

Calculation of each class's contribution to the capacity of the berth  
 Calculation of berth throughput capacity

**Berth Occupancy Graphics:**

A tool for visualizing and confirming how the fleet fits on the berth at capacity

Exhibit C-1 shows the general equation used to establish berth-constrained capacity of a terminal. Berth capacity is calculated by multiplying the maximum number of vessel calls in a week by the maximum cargo/passenger units transferred per call, annualizing the results, and then dividing by seasonal peaking factor. Seasonal peaking is the ratio of peak to mean month of vessel throughput. For cargo terminals, the maximum number of calls in a week is based on berth utilization, crane productivity, crane assignment, and unproductive time.

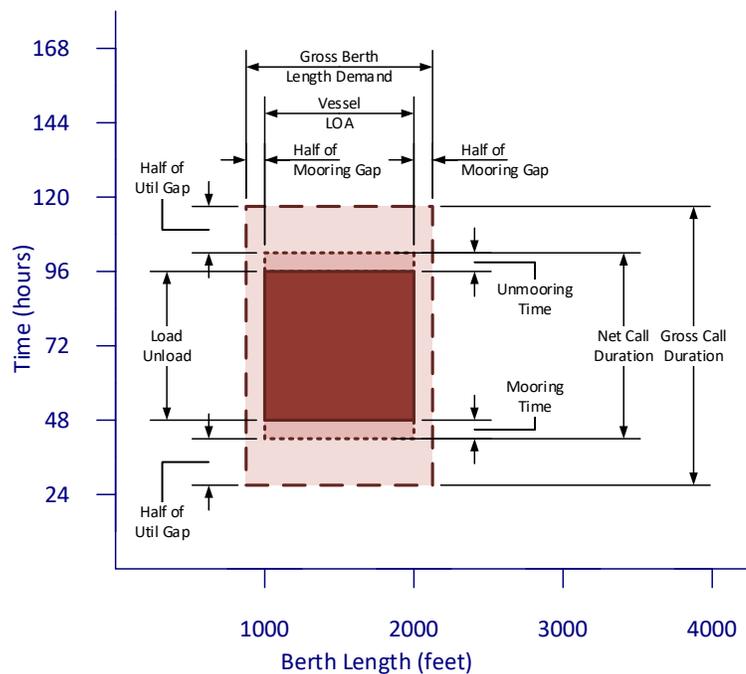
**Exhibit C-1 Essential Mathematics of Berth Capacity**

$$C_B = \text{Berth Capacity} = \frac{C_W \times T_C \times 52 \text{ wk/yr}}{P_S}$$

In which:

- $C_W$  = maximum number of calls in a week
- $T_C$  = maximum transfers per vessel call
- $P_S$  = seasonal peaking factor, the peak monthly volume divided by the mean monthly volume

**Exhibit C-2 Net and Gross Vessel Demand**



Berth utilization is limited by the need to allocate berth length in increments sufficient to accommodate variable vessel lengths, and by the need to assure that a berth space is available when a vessel calls, even if its arrival time is somewhat random. Given these constraints, the full gross capacity of a berth is never used. For instance, if a berth is 100 percent full and a vessel leaves, a vessel of exactly the same length would need to be standing by to take that space, in order to sustain 100 percent utilization. Berth utilization is expressed as net call duration demand multiplied by the gross berth length demand, as berth foot-hours or meter-hours.

Gross berth length demand consists of: 1) the vessel overall length (LOA); 2) the necessary gap between vessels to accommodate mooring lines. The mooring gap is applied evenly to either end of the vessel length.

Net call duration demand consists of: 1) time to moor the vessel; 2) time to unload and load the vessel; 3) time to unmoor the vessel and free the

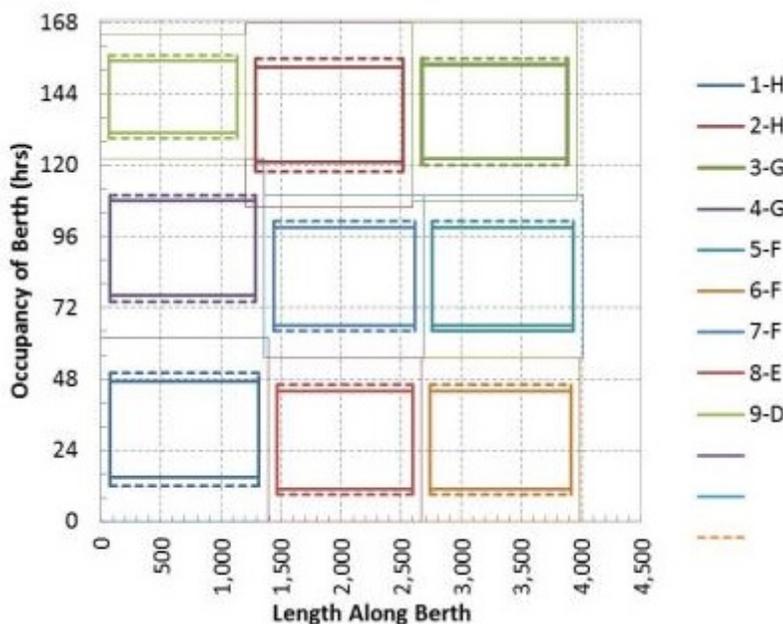


berth. The sum of these values is converted to gross call duration demand by dividing by allowable berth utilization. The gap between net and gross call duration is applied evenly to either end of the net duration.

Exhibit C-2 depicts these relationships between net and gross berth occupancy in space and time. With this approach, each vessel takes up an appropriate portion of the total space-time capacity of the berth.

A berth model should allow the modeler to consider a mix of vessel classes, each with its own potential impact on demand and capacity. For each vessel class, the model should calculate gross occupancy demand in terms of berth length and call duration. The number of vessels of each class that the berth can accommodate should be calculated based on total berth length and the gross berth length occupancy of the class. As such, the number berths in the available berth length is a function of classes of vessels that call at the berth. A sample output of berth occupancy demand is shown in Exhibit C-3.

**Exhibit C-3 Berth Occupancy**



**Storage-Constrained Capacity**

To calculate the capacity constraint imposed by a storage yard, a model typically includes the following major components:

Throughput Mix, for each Market:

- Specification of the mix of movements processed by the yard
- Specification of movements not directly tied to terminal throughput

Mean Dwell Times, for each Market & Movement:

- Specification of the mean storage dwell times
- Calculation of dwell times for key movement groups

Tactical Peaking Factors, for each Market & Movement:

- Specification of the ratio of peak to mean storage during a peak week

Storage Modes for each Market, Movement & Technology:

- Specification of the storage mode for key movement groups
- Specification of the technology deployed for key movement groups

Static Storage for each Market:

- Establishment of the maximum practical storage area available
- Establishment of the maximum practical stacking height

Capacity for each Layout & Market:

- Calculation of each class's contribution to the capacity of the yard
- Calculation of yard throughput capacity



Exhibit C-4 shows the general equation used to establish yard-constrained capacity of a terminal. Storage capacity for each movement is calculated by multiplying the static storage of the specific yard area with the mean dwell days, annualizing the results to determine storage turns per year, and then dividing by seasonal and tactical peaking. The capacity of the storage yard is the sum of the capacity of all flows passing through the storage yard per year. Static storage is based on maximum physical stacking area and stacking height, multiplied by storage utilization factors that depend on storage mode for each movement.

**Exhibit C-4 Essential Mathematics of Storage Yard Capacity**

$$C_s = \text{Storage} - \text{Constrained Capacity} = \frac{S_s \times 365 \text{ d/yr}}{T_D \times P_S \times P_T}$$

In which:

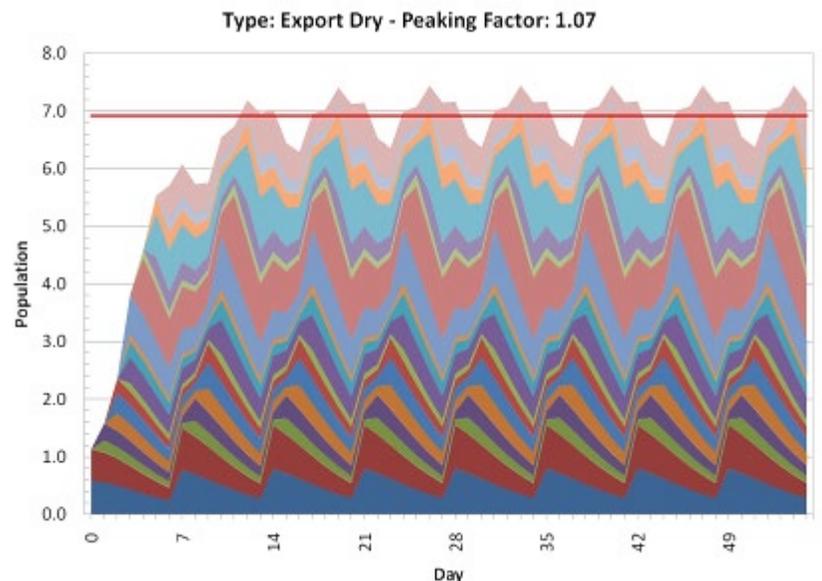
- $S_s$  = static storage capacity
- $T_D$  = mean dwell (days)
- $P_S$  = seasonal peaking factor
- $P_T$  = tactical peaking factor

The component with the least capacity is the 'bottleneck' or the component limiting the capacity of the terminal as a whole. The analysis should establish the overall capacity of each component at the terminal and identify which components are constraining the throughput.

A capacity model should take into account day-to-day flexibility to address peak occurrences, while allowing for long-term flexibility so plans can evolve over the life of the facility. A static capacity model can be used to analyze the short-term utilization of Port resources using a Tactical Peaking Factor (TPF or  $P_T$ ) Tool. The TPF identifies the relationship between peak inventory and mean inventory over the course of the typical work week. During this period, rapid changes in inventory – gains for inflows, losses for outflows– reflects a high TPF. However, as inventories from ships in multiple weeks are superposed, peaking patterns may be dampened.

Exhibit C-5 shows an example of a modeled variation in inventory over a multi-week span using a distribution of dwell times and vessel schedules. In the Exhibit, the horizontal axis is time, in days. Each colored area, plotted against the left axis, represents the relative inventory generated by a particular vessel service based on its pro forma arrival schedule and the mix of storage dwell times for the given movement type.

**Exhibit C-5 Sample Tactical Peaking Factor Tool Output**





While the model can estimate the gate and equipment requirements, these components are usually not considered constraining elements. For example, gate operating hours can be extended or lanes can be reconfigured, and additional equipment can be purchased in response to increased demand. The peak gate lane demand at each station is calculated from the mean gate flow for each transaction type, augmented by seasonal and tactical peaking factors, and divided by the maximum practical lane velocity. Similarly, the peak equipment demand is calculated from the mean berth and storage flow for each cargo type, augmented by the peaking factors, and divided by the maximum practical equipment productivities and utilization. Equipment quantities (quay cranes, storage yard cranes, chassis, yard trucks, etc.) can be estimated for each capacity level.

While certain capacity factors can be controlled by a port, such as terminal configuration and layout, equipment deployed, and capital resources invested; capacity is also strongly influenced by external factors such as trade volumes, shipping patterns, throughput mixes, dwell times, the size

and type of ships, rail/highway access, union work rules, customs regulations, and security.

As these factors evolve over the life of the facility, the planning effort should be able to take into account different capacity scenarios. This is particularly important since a facility's capacity can increase or decrease at any point in time without any changes to land use or infrastructure as a result of different external influences.

Exhibit C-6 shows an example of how varying factors can change throughput capacity based on future containership deployment patterns. As the planning effort advances to subsequent phases of the project, the scenarios can be blended to reflect intermediate states in a phased development.

The capacity analysis will identify the probability, magnitude, and timing of potential shortfalls in port capacity by comparing the existing practical capacities, calculated by the model, to forecasted projections. The comparison will provide a guide of future needs for the port.

**Exhibit C-6 Sample Scenarios in a Capacity Model**

Var	Variable	Unit	S1	S2	S3
L <sub>C</sub> , C <sub>V</sub>	Lifts per call	Lifts / vessel call	1,145	1,527	1,908
P <sub>S</sub>	Seasonal peaking factor	Peak week / Mean week	1.07		
R <sub>W</sub>	Weekly work rate	Hours / week	140		
U <sub>B</sub>	Berth utilization	%	65% for multiple berths		
C <sub>C</sub>	Average vessel size	TEU / vessel	6,000	8,000	10,000
R <sub>CA</sub>	Crane assignment ratio	Lifts / crane / call	360	400	440
N <sub>C</sub>	Mean cranes per ship	Cranes/ship	4.0	4.2	4.4
C <sub>B</sub>	Berth capacity	Ship lifts/year	<b>1,130,000</b>	<b>1,286,000</b>	<b>1,399,000</b>



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## Appendix D: Forecasting Trade Demand Example

Multiple approaches to forecasting trade demand are available. In order of complexity, these generally include:

- **Regression and Trendline Analysis.** A simple, common and generally useful technique for short-term projections and easily prepared by port staff.
- **U.S. Economic Indicator-Driven Forecasts.** Based on changes in key U.S. economic indicators. May be reasonably well suited for general cargo – particularly containerized consumer goods – but are less well suited for commodities where trade volumes are less dependent on U.S. economic forces, and have some important limitations.
- **Macroeconomic Forecasts.** Address changes in global production and consumption by country and commodity, and are generally purchased from third-party economic modeling firms. They provide excellent detail but typically do not address port infrastructure or competitiveness issues.

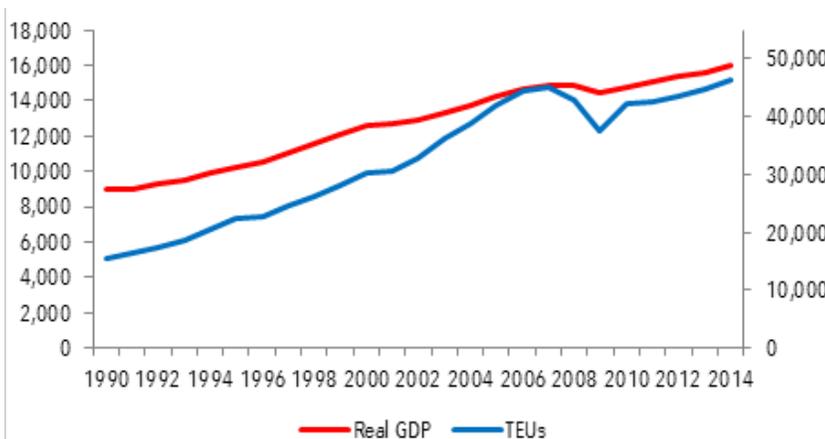
- **Supply Chain-Adjusted Macroeconomic Forecasts.** Provide the benefits of macroeconomic forecasts but additionally consider factors such as vessel sizes and carrier services, port infrastructure constraints, inland truck and rail connections and costs, and other competitiveness factors. This approach provides the best possible forecasts, but can be complex and costly.

U.S. economic indicator-driven forecasts, used properly, may provide useful information and can be developed relatively easily and inexpensively. They can meet near-term forecasting needs, bridging gaps between major forecasting efforts or suggesting whether more intensive forecasting efforts are warranted. However, there are some important considerations and limitations to this approach.

The most commonly cited U.S. economic indicator for port forecasts is Gross Domestic Product (GDP). It has been postulated by many in the past that increases in U.S. container volumes can reasonably be viewed as a multiple of GDP growth. As shown in Exhibit D-1, container trade volumes grew more rapidly than real GDP from 1990 through 2006, and this growth difference accelerated from 2001 through 2006. Container trade volumes grew at nearly twice the rate of real GDP from 1992 through 2001 and 2.8 times real GDP growth in 2002 to 2006.

This postulated relationship offers an appealing proposition, reducing the container trade volume forecasting process to simply taking real GDP forecasts available from a number of sources and applying an appropriate multiplier to produce a container volume forecast. Unfortunately, this simple approach has two fundamental shortcomings.

Exhibit D -1 U.S. Real GDP (\$Billions, left scale) and Containers (000, right scale)



Sources: U.S. Bureau of Economic Analysis, AAPA, port websites and Parsons Brinckerhoff analysis.



- First, the history of the past ten years shows that the previously suggested relationship is not valid (or has expired). Comparing the pre-recession container volume levels of 2006 to the volumes of the years during and since the Great Recession shows that volumes have not increased at a positive multiple of GDP. This suggests that a new theory of causal relationships between container volumes and real GDP is required.
- The second shortcoming of the postulated container trade/GDP multiplier is that there has been no causal relationship offered to explain it.

While there are certainly fundamental causal relationships between container volumes and real GDP, they are not with GDP as a single aggregate indicator. In particular, container trade volumes are closely correlated with, and directly related to, one of the major components of GDP, U.S. real import value. Container trade is heavily unbalanced, with imports significantly exceeding exports (imports were 2.8 times exports in terms of 2014 value and 1.4 times exports in weight). The strong correlation between container trade volumes and U.S. real import value can be seen in Exhibit D-2.

U.S. real import value is a subtraction in the GDP computation, representing the supply of goods and services sourced from outside the U.S. that are used by the demand components of GDP including personal consumption, investment, government and exports (C+I+G+X, in macroeconomic accounting). Therefore, attempting to positively correlate container trade volumes to the total of real GDP when volumes are so closely and logically tied to a large negative value in GDP suggests that the simple relationship between container volumes and real GDP requires a better formulation.

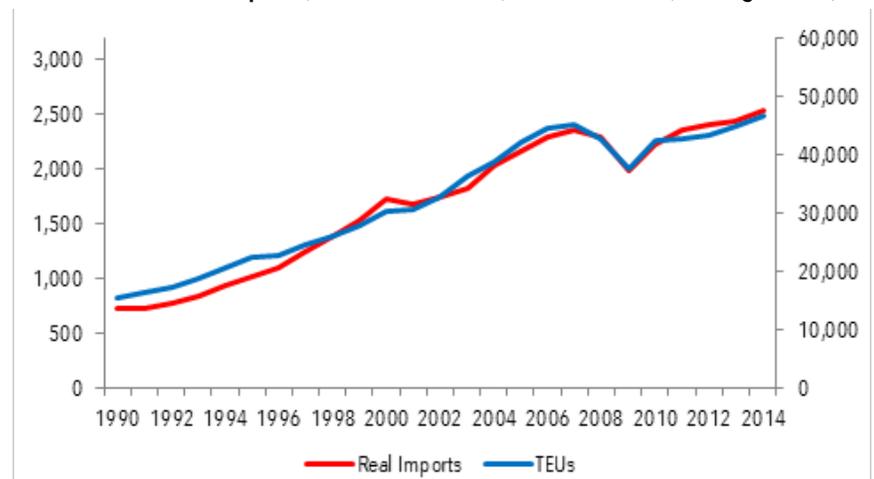
One simple solution would be to use forecasts of real imports as a way of projecting container trade. Unfortunately, this simple solution also has a fundamental limitation. Total real import value includes very large portions unrelated to container trade despite the apparent relationship.

These unrelated GDP components include:

- Imports of services (22% of import value in 2014)
- Imports of many goods that are carried in vessels but not in containers such as U.S. imports of oil and other bulk goods (18% of imported goods value).
- High-value imports of goods by air (23% of imported goods value)
- Very large volumes of imported goods by other than vessels or air, largely overland from major trading partners Canada and Mexico (27% of imported goods value in 2014)

After the above exclusions, containerized imports represented about 31% of total imported goods value in 2014 and about 25% of total import value.

**Exhibit D-2 U.S. Real Imports (\$Billions, left scale) and Containers (000, right scale)**



Sources: U.S. Bureau of Economic Analysis, AAPA, port websites and Parsons Brinckerhoff analysis

Major shifts in these categories' shares of real import value in the future (as have occurred in the past) would call into question any container volume forecast based on total real import value.

For U.S. container volume forecasts to be based on projections of U.S. real GDP, container volumes should be related to the demand components of GDP rather than GDP as a whole or to imports. This makes sense as many imports of goods can be directly related to goods consumed, used in physical investments or used in U.S. based production.

**U.S. Department of Transportation**  
**Maritime Administration**  
West Building  
1200 New Jersey Avenue, SE  
Washington, DC 20590

**American Association of Port Authorities**  
1010 Duke St.  
Alexandria, VA 22314



U.S. Department of Transportation

**Maritime Administration**



Alliance of the Ports of Canada, the Caribbean, Latin America and the United States