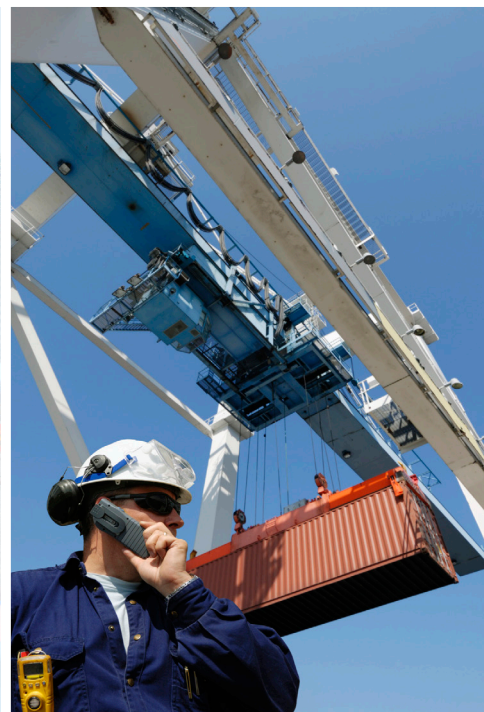
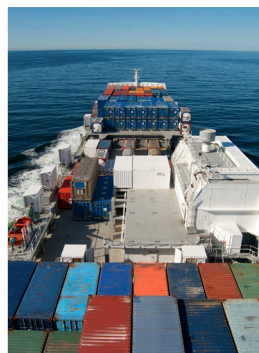
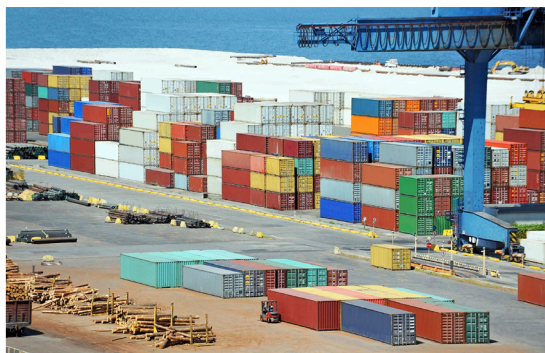




Port Planning and Investment Toolkit

MODULE 2: Feasibility



U.S. Department of Transportation

Maritime Administration

AAPA



**American Association
of Port Authorities**

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



Preface

The American Association of Port Authorities (AAPA) and the U.S. Department of Transportation (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. 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 programs 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 Toolkit 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.

All material included in the Toolkit is copyrighted, 2017 by AAPA. The materials may be used for informational, educational or other non-commercial purposes. Any other use of the materials in this document, including reproduction for purposes other than described above, distribution, republication and display in any form or by any means, printed or electronic, is prohibited without the prior written permission of the AAPA.

This Toolkit 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/empowering/content.aspx?ItemNumber=21263> and the MARAD website at - <https://www.marad.dot.gov/ports/strongports/port-planning-and-investment-toolkit/>

For all other queries regarding the Port Planning and Investment Toolkit, please contact Jean Godwin, Executive Vice President and General Counsel, AAPA at 703-684-5700.



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FEASIBILITY MODULE



Feasibility Module

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 Toolkit Module 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 Modules 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 assessing the feasibility of project alternatives, the outcomes of which may prompt modifications to the alternatives.

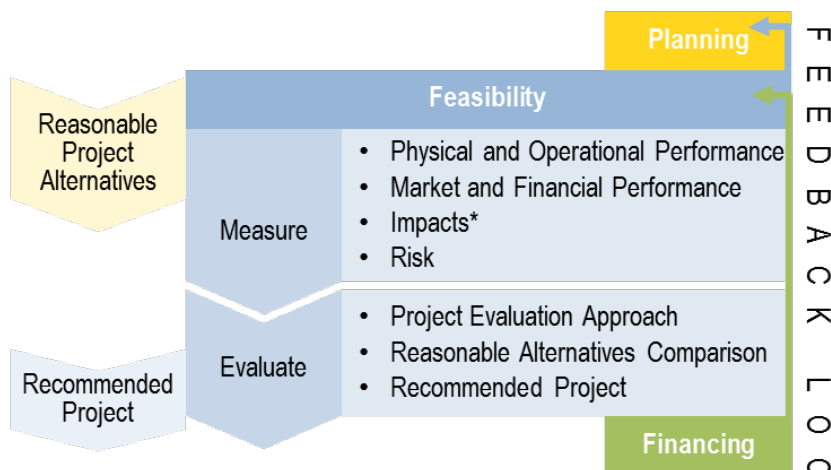
The general approach focuses on two major efforts: 1) measuring the quantitative and qualitative performance, impacts and risk of each reasonable project alternative, and 2) comparing the project alternatives using an evaluation process that will result in the selection of the optimal project solution.

2.1 Measure

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. Determine 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 (EBITD/EBITDA), 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 phased implementation plan developed as part of the Alternatives Refinement stage 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,

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

length of wharves or the number of berths at a given wharf, and the number of vessel-service 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
- 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/DC operators, and other logistics service providers – make a port a more attractive place to conduct business and support sustainable revenue streams (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,

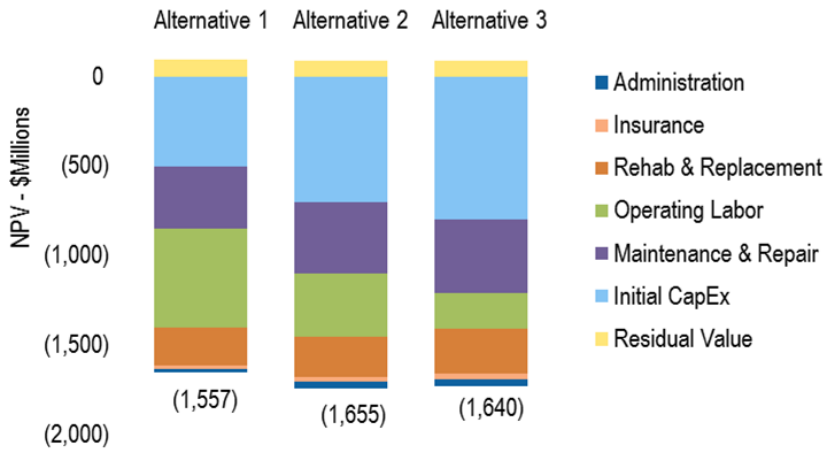
number and duration of ship calls, and days of storage. Project revenue forecasts are developed, in part, from the predicted increase in activity generated by a project. Project revenues can also vary widely depending on:

- 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.





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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 (CapEx)

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 stages 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 stages 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.

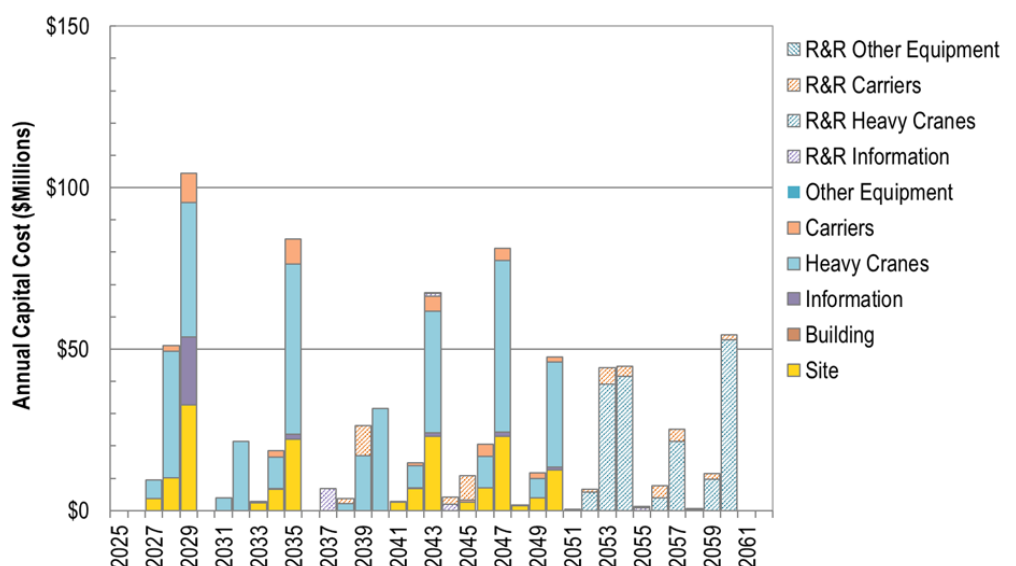
- Equipment:** Acquisition of port equipment such as quay cranes, bulk loading arms (liquid and dry), conveyors, gangways, Container Handling Equipment (CHE), fork lifts, trucks, vehicles and locomotives are examples of Equipment CapEx items. Contingency for the acquisition, delivery and installation 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 (R&R)/ 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





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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.

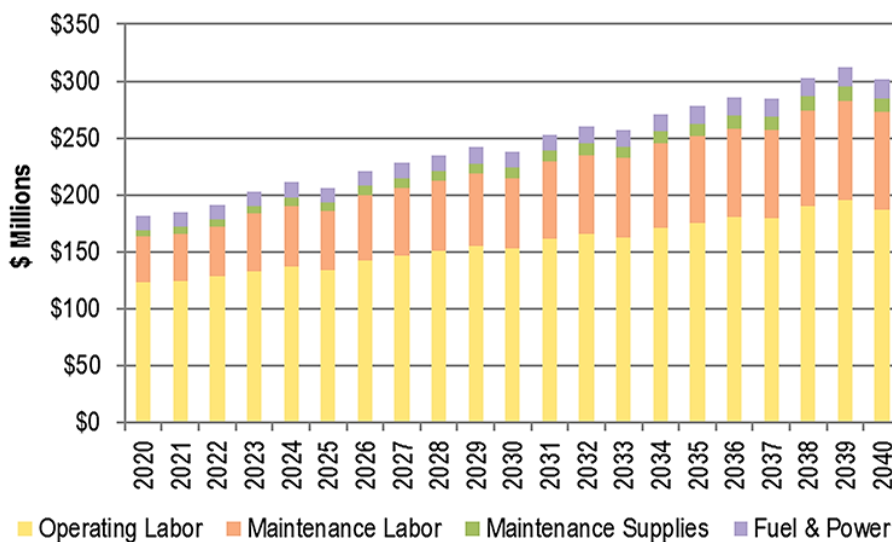
2.1.2.4 Operating Expenditures (OpEx)

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 stages of planning, 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 at an early stage, 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 beneficial cargo owners. 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.

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

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

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, requiring the port owner to respond with the deployment of mitigating resources.

Exhibit 2-9 Examples of Port Institution Influences

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



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The port's customers and users will have an influence on the competitive attractiveness of any project. A quantitative and/or qualitative assessment, based on discussions with the Port's stakeholders, should be undertaken to assess project influences.

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 **Benefit Cost Analysis** section (2.2.1.2)

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

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
- Operations and maintenance cost 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 the Financing 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 Module 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 (NPV):** 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 (IRR):** 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.

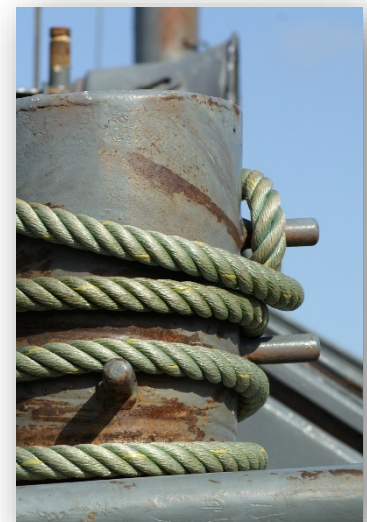




Exhibit 2-13 illustrates the risks of using simple metrics like pay back that ignores the cash flows after “pay back” is achieved. The three curves displayed represent the NPV of the cash flows through the analysis period (assumed in this case to be equal to the term of a lease) for three development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

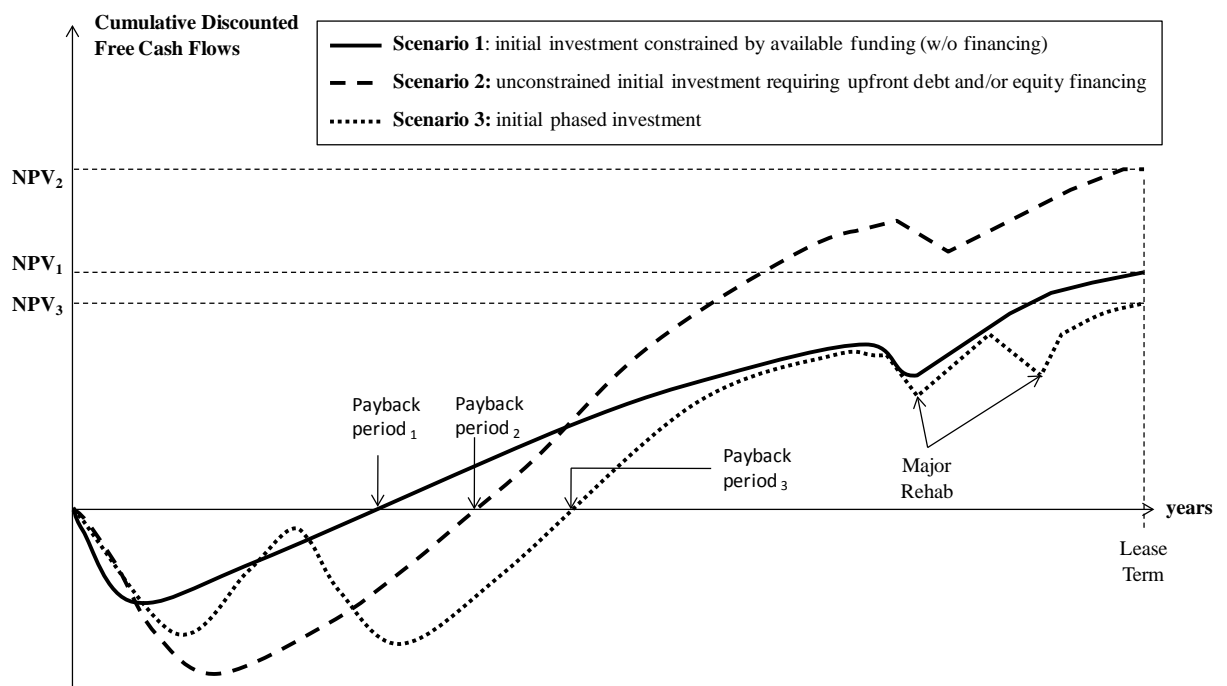
- The NPV of each scenario at the expiry of the lease. This value is equal to the sum of the

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 in scenario 2 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 (BCA)

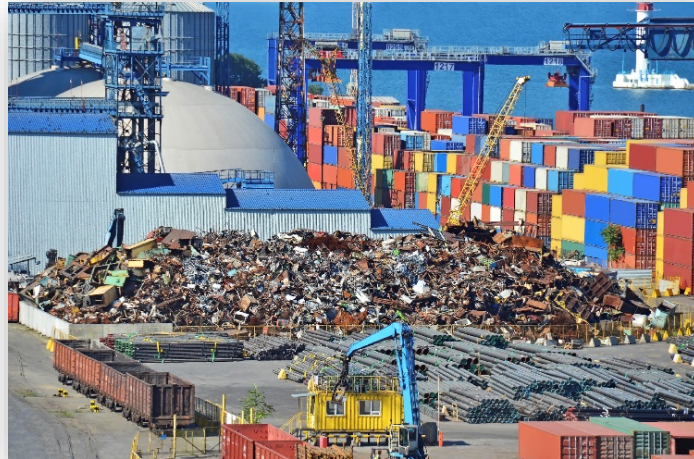
A formal BCA is frequently an essential step in gaining project funding from outside sources. A BCA is an evaluation framework to assess the economic advantages (benefits) and disadvantages (costs) of each project alternative. Benefits and costs are broadly defined and are quantified in monetary terms 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 Benefit Cost Ratio (BCR).





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

With the continuation of the **TIGER** 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

quantitative 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	Alt. 1	Values Alt. 2	Alt. 3
Operational Performance		32.0			
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		
Development		22.0			
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		
Financial		26.5			
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
Workforce		15.0			
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
Environmental		30.5			
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
Commercial		31.0			
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		



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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
Operational Performance		32.0				283	268	270
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
Development		22.0				193	168	148
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
Financial		26.5				225	235	241
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
Workforce		15.0				109	118	131
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
Environmental		30.5				217	259	250
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
Commercial		31.0				185	240	255
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
						1286	1345	1333

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.





APPENDICES



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.¹

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.¹

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.¹

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.¹

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.¹

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.²

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.²

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.³

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.¹

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



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 \$5,000.¹

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.¹

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.¹

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").¹





APPENDICES



Credit Rating - An opinion by a rating agency of the credit-worthiness of a bond.¹

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.¹

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.¹

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.¹

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.¹

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.⁴

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.⁴

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

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.¹

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.¹

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.¹

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.





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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.¹

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.³

Investment-Grade - A security that, in the opinion of the rating agency, has a relatively low risk of default.¹ 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.¹

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.³

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.^{2,4}

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 information on 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.¹

Negative Arbitrage - Investment of bond proceeds and other related funds at a rate below the bond yield.¹

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.³

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 and expenses most often deducted are O&M expenses.¹

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.³

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

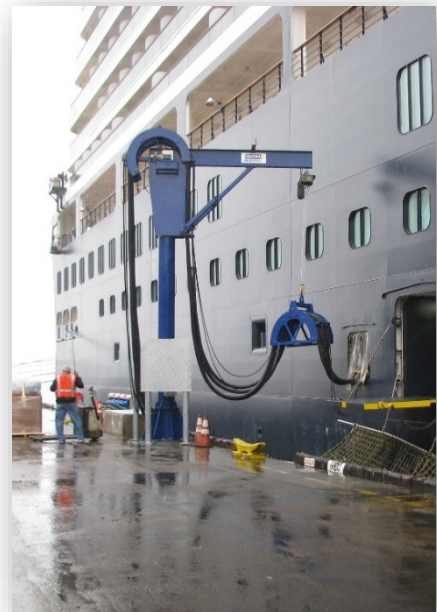
operating lease is not capitalized; it is accounted for as a rental expense in what is known as "off balance sheet financing." For the lessor, the asset being leased is accounted for as an asset and is depreciated as such. Operating leases have tax incentives and do not result in assets or liabilities being recorded on the lessee's balance sheet, which can improve the lessee's financial ratios.³

Operating Expenditure (OpEx) - Expenditure on operating and routine maintenance costs.

Operations & Maintenance (O&M) - Refers to expenses incurred for operating and maintaining a project asset. O&M is a key input in determining project cash flows, often placed after gross revenues in the flow of funds of a bond indenture.

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.⁵

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.⁵





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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.¹

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.¹

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.¹

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.³

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.¹



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.³

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.⁶

Rate Covenant - A covenant to charge fees sufficient to provide required pledged revenues.¹

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.¹

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.³

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.⁵

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.⁵





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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.¹

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

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.²

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).²

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.¹

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 Metropolitan Planning Organization (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 Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA) 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; 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 (a refinement of the SAFETEA-LU eligibility criterion); intermodal freight transfer facilities; projects providing access to, or improving the service of, the freight rail projects and transfer facilities described above; and surface transportation infrastructure modifications necessary to facilitate direct intermodal interchange, transfer and access into and out of a port. The TIFIA credit assistance is limited to 49 percent of eligible project costs.⁴

Transportation Investment Generating Economic Recovery (TIGER)

- USDOT TIGER 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.

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.¹

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.¹

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



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