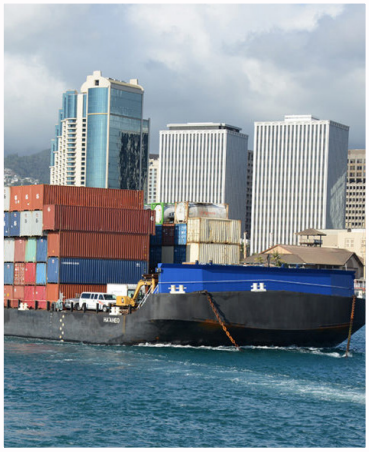
Port Planning and Investment Toolkit
Marine Highway Projects Module



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

Marine Highway Module Contributors

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

America's Central Port	Port Authority of New York & New Jersey
American Commercial Barge Line	Port of Davisville
American Waterways	Port of Everett
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Foss Maritime	Port of Hueneme
Illinois International Port District at the Port of Chicago	Port of Milwaukee
Ingram Barge	Port of New Orleans
Maine Port Authority	Port of San Diego
Matson Navigation Company	Port of Virginia
North Carolina State Ports Authority	Ports of Indiana
Northern Virginia Regional Commission	TOTE
Ohio-Kentucky-Indiana Regional Council of Governments	Young Brothers Ltd.
Paducah-McCracken County Riverport Authority	

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 obtaining capital for their projects in a variety of ways, including (1) improving the chances of getting port infrastructure projects into transportation plans developed by metropolitan and regional planning organizations and state agencies to qualify for formula funding; (2) better positioning port projects for federal aid; and (3) assisting ports in obtaining private sector investment.

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

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

For all other queries regarding the PP&IT, please contact Shannon McLeod, Vice President of Member Services, AAPA at smcleod@aapa-ports.org.

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Exhibits

List of Acronyms

AAPA	American Association of Port Authorities
BCA	Benefit-Cost Analysis
BEA	Business Economic Area
CCF	Capital Construction Fund
CMAQ	Congestion Mitigation and Air Quality
DERA	Diesel Emissions Reduction Act
DOT	Department of Transportation
EDA	Economic Development Administration
EPA	Environmental Protection Agency
FAF	Freight Analysis Framework
FHWA	Federal Highway Administration
LRTP	Long Range Transportation Plan
MARAD	Maritime Administration
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
MTS	Marine Transportation System
NAAQs	National Ambient Air Quality Standards
NAICS	North American Industry Classification System
NEPA	National Environmental Policy Act
NHFN	National Highway Freight Network
NHFP	National Highway Freight Program
NIT	Norfolk International Terminal
NOFO	Notice of Funding Opportunity
P_3	Public-Private Partnership
PANYNJ	Port Authority of New York and New Jersey
PIDP	Port Infrastructure Development Program
PM	Particulate Matter
PONO	Port of New Orleans
PP&IT	Port Planning and Investment Toolkit
RTPO	Regional Transportation Planning Organization
Ro/Ro	Roll-on/Roll-off
STBG	Surface Transportation Block Grant
STIP	State Transportation Improvement Plan
TIFIA	Transportation Infrastructure Finance and Innovation Act
TIP	Transportation Improvement Program
USDOT	United States Department of Transportation
USMH	United States Marine Highway
VPA	Virginia Port Authority

United States Marine Highway (USMH) Program

To develop new, and expand existing, U.S.-flag services that transport freight along America's navigable waterways

The Need for Domestic Marine Transportation

- **Surges in International Cargo Concentrated at Fewer Ports:** The international hub and spoke shipping network design is contributing to port concentration, in which large ports are encountering significant cargo volume surges and congested inland distribution corridors.

  Marine highway services offer an economic alternative to convey this cargo to second-tier ports with more efficient hinterland connections.

- **High Cost of Increased Landside Congestion:** The American Transportation Research Institute estimates that the annual cost of congestion to the U.S. trucking industry is more than $70 billion each year. In addition, the increasing number of trucks on highways and bridges are generating uncompensated infrastructure maintenance costs.

  America's waterways are an underutilized national resource with thousands of miles of uncongested capacity.

- **Truck Driver Shortages and Regulations:** The trucking industry has struggled with a shortage of drivers and hours-of-service regulations that can lead to reduced productivity and increased costs when multiple truckers move the same amount of freight.

  Qualified mariners and crew are readily available to operate vessels that can accommodate the heaviest of containers and trailers without adverse impact to landside infrastructure.

- **Disruptive Events Effects on Landside Infrastructure:** The U.S. is faced with an increased frequency and strength of disruptive weather events and natural disasters that impact the nation's highways, roads, rail lines and bridges.

  The marine transportation system offers redundancy benefits to support the continual supply of food, medicines, building materials and other essential goods.

- **Improved Environmental Sustainability:** Cargo owners are increasingly deciding to reduce their carbon footprint and striving to meet sustainability goals for their supply chain.

  Marine highway services have the lowest environmental and social costs per ton-mile of all transport modes.

Eligible Routes

Commercially navigable waterways between U.S. ports including non-contiguous U.S. ports, and between U.S. ports and Canadian and/or Mexican ports.

Eligible Cargo

Freight in containers or trailers, roll-on/roll-off cargo such as new automobiles, palletized or unitized freight such as machinery, freight vehicles carried on commuter ferries, and bulk, liquid, and loose cargo.

U.S. Eligible Projects

Eligible projects are Marine Highway Transportation Projects or components of Projects that 1) provide a coordinated and capable alternative to landside transportation; mitigate or relieve landside congestion; promote marine highway transportation; or use vessels documented under 46 USC Ch. 121; and 2) develop, expand, or promote Marine Highway Transportation or shipper use of Marine Highway Transportation.

U.S. Eligible Applicants

A State, a political subdivision of a State or a local government; a United States metropolitan planning organization; a United States port authority; a Tribal government or a United States private sector operator of marine highway Projects or private sector owners of facilities, including an Alaska Native Corporation, with an endorsement letter from the current Marine Highway Route Sponsor.

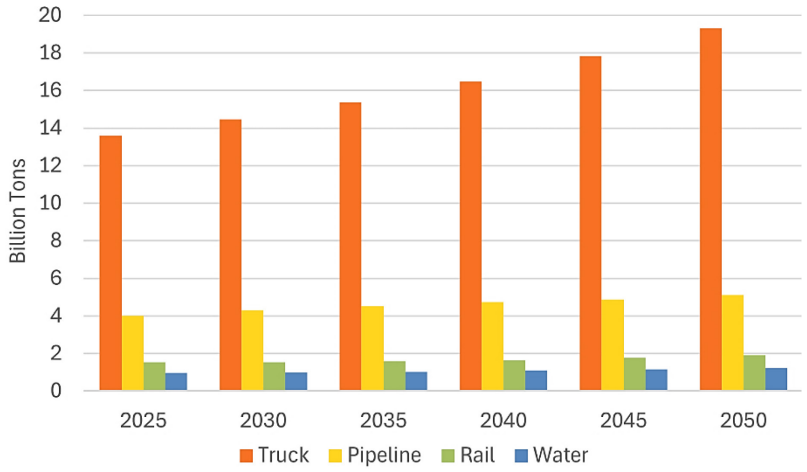
Introduction

The American Association of Port Authorities (AAPA) and the U.S. Department of Transportation (USDOT) through the *Maritime Administration* (MARAD) organized a team of U.S. port industry experts to assist in the development of the Marine Highway module of the Port Planning & Investment Toolkit. The module provides an overview of the *U.S. Marine Highway (USMH) Program* and educates readers on how marine highway services can receive USDOT support. It explains how to plan a new marine highway service, determine its feasibility, and identify possible funding mechanisms.

Purpose & Need

It is estimated that by 2050, trucks will carry 32 percent more freight, or 19.3 billion tons of cargo[1] on the nation's transportation network, placing a significant burden on the U.S. Interstate Highway system. Shifting a portion of this freight volume to other *transport modes* will help relieve traffic on congested highways and roadways throughout the U.S.

Exhibit 1: Projected Increases in Truck Freight Volumes



Domestic waterborne transport, or *Marine Highway Transportation,* can not only provide additional capacity to the freight transportation system, but can also move freight in a cost-effective and environmentally sustainable way. The increasing interest in expanding the use of the U.S. marine freight network to reduce landside congestion led to the development of the USMH Program.

The USMH Program works to incorporate America's *navigable waterways* into the greater transportation system. The vision of the program is the "full integration of reliable, regularly scheduled, competitive, and sustainable marine highway services into the surface transportation system that are a routine choice for shippers[2]." Goals of the program include relieving landside congestion, reducing harmful air emissions, providing new transportation options, reducing wear and tear on roadways, and increasing the efficiency, safety, reliability, and resiliency of the U.S. transportation system.

This module of the PP&IT has been developed to highlight existing marine highway services that illustrate, in a practical way, the promise and extensive capacity of the American domestic waterborne system and to integrate marine highways into the national, state, and local transportation planning process.

The module is intended to assist *port owners*, public agencies and private entities with the planning, evaluation, and financing of marine highway services that can alleviate landside transportation challenges.

[1] USDOT, Bureau of Transportation Statistics and Federal Highway Administration, Freight Analysis Framework, version 5.5.1, 2024, https://www.bts.gov/faf.

2 https://www.marad.dot.gov/

Outline

This module incorporates the primary phases presented in the ***General Projects Module*** of the PP&IT, as shown in Exhibit 2. These phases and seven elements provide a high-level structure that comprises best practices for planning and developing a marine highway service.

PLANNING

Initiate the effort by gaining an understanding of the goals and objectives, data that needs to be collected and stakeholders that should be involved in the process.

Quantify the existing or proposed operation, the competitive drivers that will lead to a sustainable marine highway service and the potential demand that could be met by the service.

Form alternatives for terminal locations, service routes, vessels, and operational characteristics.

FEASIBILITY

Assess alternatives based on physical, operational, market and financial performance metrics, as well as economic and environmental impacts.

Evaluate each alternative based on qualitative and quantitative criteria to identify the marine highway service that best meets the needs of the project stakeholders.

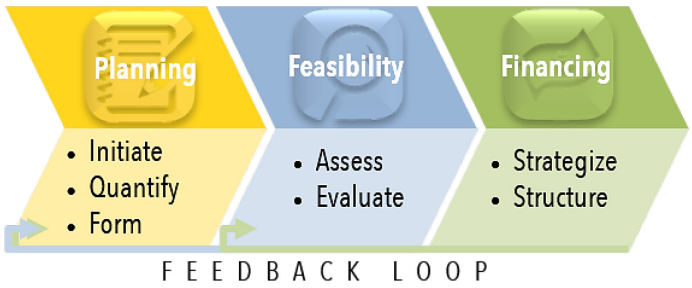
FINANCING

Strategize the investment approach to secure the necessary financing for terminals, supporting infrastructure, equipment, and/or marine highway operations.

Structure the financing to take advantage of the various available alternatives including federal, state and local funding sources, and private investment.

This module is not intended to provide step-by-step directions to be followed sequentially.

Exhibit 2: Module Elements



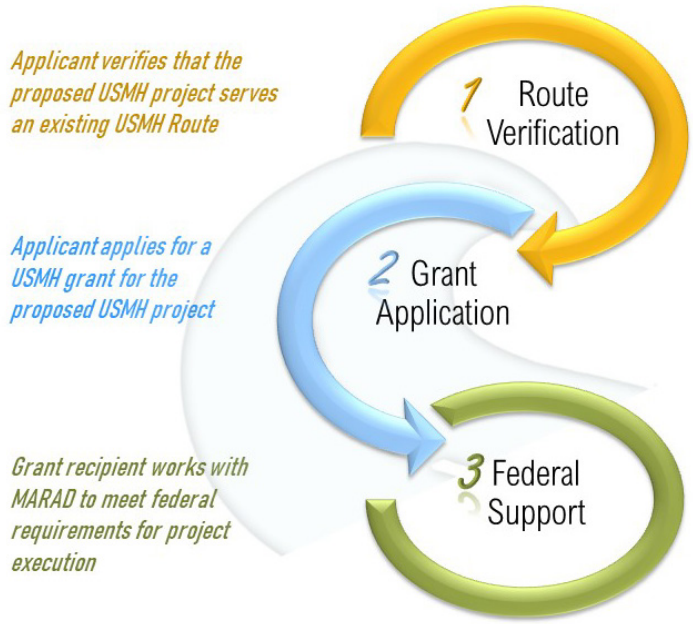
Instead, the module is organized around key elements that can be adapted to specific needs and circumstances. For example, there may be an underutilized marine terminal that is known to be well-suited from a physical standpoint for a marine highway service, and the main unknown is the level of demand a service would generate or require.

In other cases, the source of demand – a target "anchor customer" or "missing link" opportunity – may have been identified, and the main question is finding a site or an operational service design that meets customer requirements. Effective marine highway planning can start either way: by framing alternatives and then quantifying the demand associated with those alternatives, or by quantifying general demand and then forming alternatives to meet that demand. From that point, both paths lead to the Feasibility and Financing phases.

The activities occurring at each phase can be iterative and overlapping and might require reconsideration of previous conclusions if conditions change. For example, during the evaluation of a potential marine highway project, the cost of one component of the service may not return a high enough benefit and the project alternatives may need to be revisited.

Photo courtesy of TOTE

Exhibit 3: USMH Three-Step Approach



Context

In addition to guiding users on how to address a broad range of physical, operational, market and financial considerations for a marine highway service, this PP&IT module describes the process of obtaining support through the USMH Program.

Certain terms in this module like "project" and "marine highway service" describe broad concepts that apply across different contexts. For example, the term *project* throughout the Toolkit modules is defined as the acquisition, development, expansion or renovation of a single site, facility, infrastructure element, or operational resource to meet an identified or emergent need. In addition, a marine highway service is a generic term for any existing or future U.S. waterborne transportation service.

However, a *USMH Transportation Service* along a designated *USMH Route*, and grant funding for a *USMH Project* are specific terms directly related to the *USMH Program*.

A key differentiator of the USMH Program is the use of a 'route' designation as a precursor to federal assistance. Only projects that serve a USDOT-designated *USMH Route* are eligible to receive federal support.

Projects receiving USMH grant funding are typically components needed to develop, expand, or promote *Marine Highway Transportation* or *shipper* use of Marine Highway Transportation for a proposed or operational *USMH Transportation Service*. The term *USMH Project* used in this module describes the component(s) of the USMH Transportation Service that receive federal funding.

The USMH Program requires a three-step approach when supporting opportunities for marine highway services, as shown in **Exhibit 3.**

- Route Verification – Confirm that the proposed project serves an existing USMH Route. About 80% of the navigable waterways in the U.S. are designated USMH Routes. Refer to **Exhibit 4** in this module for a map showing the location of USMH Routes and MARAD's website for an updated list of ***Designated USMH Routes***. Refer to **Exhibit 5** for further details on how to apply for a Designated USMH Route.
- Grant Application – Submit an application to request funding for the proposed project through the discretionary transportation grant program when a *Notice of Funding Opportunity* (NOFO) is published in the ***Federal Register***. USDOT funds are awarded on a competitive basis to USMH Projects that provide a coordinated and capable alternative to landside transportation or that promote marine highway transportation. Refer to **Exhibit 6** for further details.
- Federal Support – Enter into a written grant agreement to receive funding for the USMH Project after meeting the applicable grant administrative requirements. Once an applicant is approved for funding, USDOT and MARAD resources are available for owners or operators of USMH Projects to promote their use, efficiency and public benefits. Refer to **Exhibit 7** in this module for further details on opportunities for USMH grant funding.

The audience for this module includes port owners, operators, state and local government agencies, and endorsed private sector operators of marine highway projects or private sector owners of facilities, including an Alaska Native Corporation, who are interested in planning and implementing a marine highway service between multiple U.S. *ports* or between U.S. ports and Canadian or Mexican ports. Readers may be early in the planning stages and trying to determine how to begin or operate an existing marine highway service and seeking USMH grant funding or other financing opportunities.

The module describes each step in the USMH Program in the following subsection. Readers are provided with more comprehensive guidance on the planning, feasibility and financing of marine highway services in the three primary sections of this module.

However, the USMH steps and the PP&IT phases are not intrinsically linked as this module is meant to provide broader direction on how to define and implement a marine highway project.

USMH Routes

The Marine Transportation System (MTS) consists of over 25,000 miles of the nation's navigable waterways including rivers, bays, channels, coasts, the Great Lakes, open-ocean routes and the Saint Lawrence Seaway System. The MTS currently includes more than 30 marine highway routes, as shown **Exhibit 4**, that serve as extensions of the surface transportation system.

USMH routes are typically identified by the landside highway or interstate they parallel (e.g., M-5 is the USMH Route that parallels Interstate 5).

The list of current USMH Routes throughout the U.S., including those in Alaska, Hawaii, and Puerto Rico, can be found on the MARAD's website at ***https://www.maritime.dot.gov/grants-finances/marine-highways/us-marine-highway***

Exhibit 4: Designated Marine Highway Routes

Exhibit 5: USMH Route Verification or Designation

The existing USMH Routes cover a vast majority of the Nation's navigable waterways. However, if a USMH Project cannot be verified as being located along a designated route, *route sponsors* can submit USMH Route designation applications through the *Program Office*. Eligible route sponsors are public entities such as state agencies, including departments of transportation (DOT), *metropolitan planning organizations* (MPOs), *regional transportation planning organizations* (RTPOs), port authorities, non-Federal navigation districts and tribal governments.

The Program Office will evaluate and recommend USMH Route designations to the Secretary based on an analysis and technical review of the application. USMH Route designation applications are accepted and reviewed throughout the year. See ***https://www.maritime.dot.gov/grants-finances/us-marine-highway-route-designation-process*** for more details.

REVIEW CRITERIA

- Physical description of the proposed route and connections to existing or planned transportation infrastructure
- Summary of benefits to transportation region served
- Summary of shipping routes or trade lanes that the USMH Route would benefit
- Entities involved (public and private partners)
- Estimate of cargo volumes that will shift to marine highway route
- Extent of congestion reduction
- Net savings in emissions, energy consumption, maintenance cost and system resiliency
- Capital and operational costs resulting from the route designation
- Known or anticipated obstacles and mitigation strategies

SUCCESS FACTORS

- Extends the national surface transportation network
- Develops multi-jurisdictional coalitions
- Fosters collaboration between public agencies and private entities (if applicable)
- Improves reliability and resiliency of a route
- Creates public benefits
- Identifies potential savings for shippers

Photo courtesy of the Columbia Group Holdings, LLC

Marine highway routes that are designated, or modified, by the *Secretary*:

- are a component of the Nation's surface transportation system;
- are commercially navigable waterways in the U.S. or in U.S. territories, that can include connections between U.S. ports and Canadian or Mexican ports;
- provide a coordinated and capable alternative to landside transportation; mitigate or relieve landside congestion; promote marine highway transportation or use *U.S. Documented Vessels*.

There are two distinct types of USMH Routes: 1) conventional routes that are extensions of the national surface transportation system in the contiguous U.S., and 2) non-conventional routes that support surface transport between or among U.S. non-contiguous states, territories and/or the continental U.S.

The non-conventional USMH Routes include waterways serving Alaska, Hawaii, Puerto Rico, U.S. Virgin Islands, Guam and American Samoa. Since it is infeasible to quantify benefits associated with a modal shift for non-conventional marine highway routes, applicants can discuss direct benefits to customers, including:

- transportation efficiency gains for the U.S. public;
- operational cost savings such as fuel costs;
- decreased freight costs;
- environmental sustainability such as fewer pollutants;
- maintenance time savings when repairs can be completed locally;
- increased safety and supply chain resiliency; and
- barge or ferry rate savings versus other means of transportation.

Exhibit 6: Applying for a USMH Grant

The U.S. Congress periodically appropriates funding for discretionary grants under the USMH Program. Applications for grant funding for USMH Project elements are accepted yearly after the NOFO is published on the Grants.gov website at ***https://www.grants.gov/.*** Further details on how to apply for USMH Program grants can be found on the MARAD website at ***https://www.maritime.dot.gov/grants-finances/how-apply-us-marine-highway-program-grants.***

APPLICATION CONTENTS

- USMH Project name and primary point of contact information
- Requested amount of grant funding, sources and uses of all project funds, and total project costs
- Project parties, their Unique Entity Identifier Number and current registration in ***System for Award Management (SAM)***
- ***Standard Form 424*** (Application for Federal Assistance)
- A narrative addressing the success factors listed below, as well as any additional requirements listed in the NOFO
- Evidence of compliance with NEPA and other environmental laws
- Description of any federal, state, or local actions needed, such as permits, waivers, etc.
- For private-sector applicants, additional information is needed, including:
  - Written certification that funds will be spent efficiently and effectively, and applicant will provide information and reports as required;
  - Written endorsement letter from a USMH route sponsor;
  - Statement regarding relationship between applicants, parents, subsidiaries, and affiliates;
  - Description of applying entity such as location, assets, years in operation, etc.
  - Most recent year-end audited financial statements and pro-forma financial statements;
  - Evidence of applicant's ability to make matching requirements;
  - Statements indicating whether applicant, or related company, has been in bankruptcy or reorganization in the last 5 years.

SUCCESS FACTORS

- Satisfy, in whole or partially, 46 U.S.C. 55601(b)(1) and (3) and any of the following criteria found at 46 U.S.C. 55601(d):
  - Financial viability
  - Effective and efficient expenditure of funds
  - Evidence of a need for the project
  - Identification of project performance measure(s)
  - Availability of sufficient funding to meet non-Federal share
  - Demonstration that project can be completed without unreasonable delay

ADDITIONAL CONSIDERATIONS (SUBJECT TO CHANGE)

- Applicant provides at least 20 percent of the project costs from non-federal sources. Rural projects and tribal applicants can request an increase in the federal share up to 100 percent.
- The Build America, Buy American requirements apply to funds made available under this grant. Depending on other funding streams, the project may be subject to "Buy America" requirements.
- Application narrative is in standard academic format and should not exceed 20 pages.
- Grant applications are submitted electronically to ***Grants.gov***.
- Applicant is an eligible project applicant, and the Project element(s) is part of an eligible USMH Project.
- Award recipients submit quarterly reports to the MARAD Program Officer.
- Awards are administered according to the "Uniform Administrative Requirements, Cost Principles and Audit Requirements for Federal Awards".

USMH Grant Application

The MARAD *Administrator* announces *NOFO* periods for *project applicants* to submit USMH grant applications each year. The NOFO outlines deadlines, eligibility, and application requirements. Further details are provided in **Exhibit 6**. In general, the applicant demonstrates that the project is financially viable; the funds received will be spent efficiently and effectively; and a market and project need exist for the Marine Highway Transportation Service.

USMH grant applicants can receive assistance and answers to any questions from MARAD's regional ***Gateway Offices***.

Examples of marine highway projects are provided in Project Profiles in **Appendix C**.

USMH Program Support

The USMH Program provides competitive grants to:

- establish new marine highway services or enhance existing services;
- use *U.S. documented vessels*, registered by the U.S. Coast Guard, and owned and crewed by U.S. citizens;
- transport marine highway *cargo*.
- serve a designated USMH route; and
- has *project sponsor*(s) that include at least one public entity, such as a *port authority*.

USMH Routes and Projects are supported in several additional ways, including reports and publications from government and academia, and through USDOT non-funding assistance as described in **Exhibit 7**.

Exhibit 7: Federal Support for USMH Routes and Projects

In addition to providing federal funding to eligible USMH Project elements, the USMH *Program Office*, supported by the Gateway Offices, offers further assistance to USMH Routes and Projects. Support could include any of the following, as appropriate and within MARAD's resources:

- Promote the USMH Project with appropriate governmental, state, local and tribal government transportation planners, private sector entities or other decision-makers.
- Coordinate with ports, state DOTs, RPOs/MPOs, localities, other public agencies (including Tribal governments) and the private sector to support the USMH Project. Efforts can be aimed at obtaining access to land or terminals, developing landside facilities and infrastructure, and working with federal, regional, state, local, and tribal governmental entities to remove barriers to self-supporting operations.
- Pursue memorandums of agreement with other federal entities to transport, federally-owned or generated cargo using waterborne transportation along the USMH Route and/or Project, when practical or available.
- Assist with collection and dissemination of data for the designation and delineation of Marine Highway Routes as available resources permit.
- Work with federal entities and regional, state, local and tribal governments to include USMH Routes and Projects in transportation planning.
- Bring specific impediments to the attention of the advisory board chartered to address such barriers.
- Conduct research on issues specific to USMH Routes and Projects as available resources permit.
- Communicate with designated coalitions that align with USMH Routes and Projects to provide ongoing support and identify lessons learned and best practices.

Frequently Asked Questions

Are existing domestic marine transportation services eligible under the USMH Program?

Yes, U.S. flagged carriers that are already operating on designated USMH route(s) are encouraged to partner with an eligible public sponsor to apply for USMH grant funding to expand their service or to offer public benefit, such as reduced emissions, energy savings, infrastructure maintenance savings, economic competitiveness, safety improvements, or system resiliency and redundancy.

Can a private company receive USMH funding?

Yes, a private-sector entity is an eligible applicant for grant funding for USMH project elements if the current marine highway route sponsor provides an endorsement letter. Grant applicants must have operational or administrative areas of responsibility that are adjacent to or near the relevant designated USMH Project.

What is the role of the USMH Route Sponsor?

The USMH Route Sponsor is a public agency that supports a USMH project by providing an endorsement letter. Only one endorsement letter is required for a private sector entity applying for a grant even if the service runs across multiple Marine Highway Routes or if the U.S. Marine Highway Route has multiple co-Sponsors. The Route Sponsor does not have any additional responsibilities.

Who can be a USMH Route Sponsor?

Authorizing legislation currently requires USMH route designation applications be sponsored and submitted to USDOT by a public entity, such as a State DOT, MPO, RPTO, or Port Authority. Public-private partnerships (P_3) are encouraged; however, a private entity cannot be an USMH Route Sponsor.

What are some helpful tips for the grant application?

- Demonstrate regional impacts by describing how the project addresses regional transportation challenges, such as highway congestion, freight delays, or limited intermodal connectivity.
- Highlight environmental and economic benefits by providing data on emissions reductions, fuel savings, and cost efficiencies compared to alternative transportation modes.
- Engage stakeholders early and collaborate with public and private partners to strengthen your application, particularly for letters of support and matching contributions.
- Focus on Readiness: Projects that are "shovel-ready" or have advanced planning and permitting tend to score higher. Include timelines and evidence of project readiness.
- Use MARAD Resources by reaching out to your MARAD gateway office for technical assistance or guidance on preparing a competitive application. A listing of the Gateway Offices can be found on the MARAD website at ***https://www.maritime.dot.gov/about-us/gateway-offices/gateway-offices***

What are the reporting requirements for USMH grant recipients?

Grant recipients are required to provide regular updates on project progress, including financial reports documenting how grant funds are spent; performance metrics, such as cargo volumes, emissions reductions, and congestion relief achieved; and status reports on construction, procurement, or other funded activities. Recipients must comply with federal grant management standards and may be subject to audits to ensure accountability.

Planning

Marine highway project planning involves operational and financial analyses and stakeholder engagement to implement a service in a realistic, profit-oriented manner. Marine highway service customers such as freight shippers and receivers consider price, speed, reliability, safety and security, and in-transit visibility and control. These service characteristics also contribute in some degree to supply chain costs incurred by freight shippers. It is therefore essential to understand these service characteristics and costs for existing modes and meet or exceed these parameters for a marine highway service to be feasible in the near-term and sustainable in the long-term.

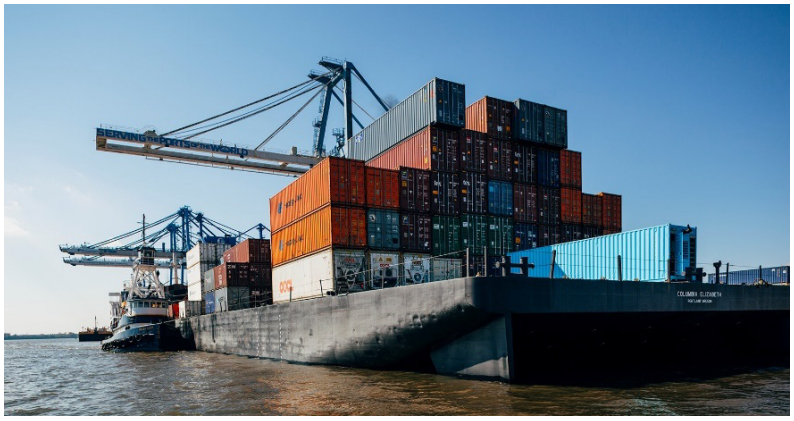


Photo courtesy of the Columbia Group Holdings, LLC

1.1 Initiate

Determining project goals and expectations, collecting data that provides insight into the modal and supply chain requirements of shippers, and identifying stakeholders that may benefit from marine highway services are the first steps in the planning process.

1.1.1 Project Goals & Objectives

Clearly defined goals and objectives, reflecting consensus on the part of local, regional, and state partners, is part of a successful public engagement program. Further details on involving key stakeholders are discussed in **Section 1.1.3**.

Typical goals include:

- Reduce congestion and emissions from landside transportation of freight
- Reduce cost, including warehousing expenses
- Improve service reliability
- Improve speed of service in areas with highly congested roadways or circuitous routes
- Reduce wear and tear on roadways
- Improve public safety and security
- Improve utilization of existing or legacy marine infrastructure and *assets*
- Retain or create jobs in marine transportation industries
- Improve regional economic attractiveness and competitiveness

1.1.2 Data Collection

Gathering information from previous research and site visits informs the planning effort and helps identify topics relevant to marine highway service development. Reviews of existing and/or defunct services and their characteristics offers insight on what worked and what did not work. This includes ports served, commodities/cargo handling offered, service characteristics, funding arrangements, organizations involved; marketing done prior and during service; and shipper response to the service.

Exhibit 8 provides a list of data that is often needed for marine highway project planning and assessment efforts. Some of this information may already be known at the outset of the project. The planning process outlined in this module is designed to help the project team fill in any gaps.

Key considerations in implementing a marine highway service from private and public sector perspectives can also be obtained through stakeholder outreach efforts.

Exhibit 8: Sample Types of Marine Highway Project Data

Strategic/ Legislative	Infrastructure	Operational	Market	Financial
• Ports' Planning Documents • Multi-jurisdictional/ Multi-agency Arrangements • Public-Private Partnership Opportunities Enabled in Law • Regional Economic and Business Data • State/Local Freight Plans • Legislative Requirements	• Facility Requirements (e.g., Dredging, Marine Structures, Upland Sitework, Remediation, Structures) • Site Plans, Condition Assessment Surveys and Reports • Waterside Access • Truck and Rail Access, Inland Rail and Highway Networks • Environmental Site Assessment Reports	• Domestic *Carrier* Schedules and Fleet (e.g., Vessel Types, Capacities, Fuel Types) • Route Characteristics (e.g., Distances, Navigation Restrictions) • Cargo Handling Equipment Inventory and Requirements • Modal Differences (e.g., Emissions, Safety, Maintenance Costs) • Terminal Operating Characteristics • Labor Agreements and Relationships	• Freight Origins-Destinations Surveys and Statistics and Domestic Commodity Flow Data • Shipper Preferences (e.g., Service Frequency, Cargo Visibility) • Ports' Historical Cargo Volumes and Types (e.g., Import, Export, Empty) • Cargo Attributes (e.g., Size, Refrigeration, Seasonality) • Market Forecasts • Competitor Port Documents (e.g., Strategic Plans)	• Operating Costs (e.g., Crew, Fuel, Cargo Handling, *Drayage*, Management, Taxes) • Capital Expenses (e.g., Vessels, Cranes, Marine Structures) • Competitive Truck and Rail Rates • Revenue Forecasts • Funding Programs and Opportunities (Federal, State, Regional, Local, and Private) • Contracting Requirements

1.1.3 Stakeholder Engagement

Stakeholders, decision-makers, and potential customers alike, need to understand the economic, environmental and energy benefits of expanding domestic water transportation services to relieve landside congestion. This information is valuable in moving both infrastructure projects and marine freight-friendly initiatives forward.

Marine Highway Project Stakeholders

The list of potential stakeholders can be extensive, but it is critical to understand the key players and their roles at the outset of the process.

Customers

Potential customers generally include major freight-generating industries active in a region. This includes resource extraction industries, processing and manufacturing companies, food services, construction services, fuel services, transportation equipment, and wholesale/retail businesses. Typically, a local or regional economic development agency maintains a list of the largest regional industries, and it is generally not difficult to determine which of these are freight dependent. Another means to identify key industries is through inexpensive commercial databases like InfoUSA, which provide lists and addresses of industries by North American Industry Classification System (NAICS) code.

Operators

Marine service operators and terminal operators can include those already active in the region and can be expanded to those operating in surrounding regions, or nationally. Consider whether the marine service operator provides inland, coastal, or open-ocean services, based on the project service concept, and whether the terminal operator is experienced in handling the kinds of commodities and equipment likely to be utilized in the service.

Government

Many different levels of government are involved in planning, permitting, and in many cases funding marine highway services. This can include representatives from local governments, MPOs/RTPOs, state-level departments (transportation, economic development, environmental protection), and federal-level departments (e.g., MARAD, U.S. Army Corps of Engineers, Department of the Interior, U.S. Customs and Border Protection, Homeland Security). Typically, the engagement process begins with clearly known local, regional, and state participants, and expands to include federal agencies as needed depending on the permitting and implementation requirements associated with the project. However, there is value in engaging the broad range of federal partners at an early stage in the process, for input and guidance towards the most feasible and implementable project.

Coordination with your State DOT, MPO and/or RTPO

By facilitating marine highway services, states, MPOs and RTPOs can take advantage of the benefits associated with the USMH Program including reduced landside congestion and maintenance costs and improved public safety and security. USMH Route and Project sponsors can work with their state DOTs, MPOs and RTPOs to incorporate marine highway services (including ferries) in state, multi-state and regional transportation plans.

State DOTs, MPOs and RTPOs produce a *Long Range Transportation Plan* (LRTP) and/or *Metropolitan Transportation Plan* (MTP) for a 20-year planning horizon and a *Statewide Transportation Improvement Program* (STIP) and/or *Transportation Improvement Program* (TIP) for a shorter planning period. These plans involve the planning and programming of surface transportation assets, including port and intermodal facilities. State DOTs, MPOs and RTPOs are responsible for distributing federal transportation funds to their area of responsibility.

Incorporating marine highway projects in local, regional and state planning documents is a first step in securing funding through the federal government. Rudimentary information about the proposed marine highway project would first be listed in a long-range plan such as an LRTP or MTP. Once the project is better defined and funding has been allocated, the project may be included in shorter-range plans such as a STIP or TIP and a city or county capital improvement program. Refer to **Section 3.2.3** for additional details.

Port Users

Most regions with ports have active port user groups, regional freight stakeholder groups, or similar groups comprised of public representatives, truckers, railroads, marine operators, customers, and community representatives. These groups are good forums to share information and generate interest and feedback.

Outreach Activities

Outreach activities, such as performing surveys, interviews, and site visits, and/or conducting industry workshops or webinars, provide the project team with the opportunity to reach:

- Shippers, carriers, and distributors of goods who can identify the principal drivers of their freight modal choices.
- Potential customers and users of marine highway services to understand their supply chain requirements and ability to benefit from the service. Large freight shippers and receivers often have professional logistics managers who can provide this insight.
- Potential marine transportation service providers – vessel and barge operating companies – who can describe their ability to provide services, and at what levels of cost, speed, availability, and reliability, given their current or potential future vessel fleet and other assets.
- Shipping lines or carriers who can commit to providing bills of lading to/from the marine highway ports.
- Port owners or terminal operators who can explain the physical and operational marine highway assets available and those that may be required.
- Local, regional, state, and federal government partners who can assist with permitting, funding, and overall implementation.

- Local interest groups, such as established port user groups, and the residents that could be impacted by the service, can provide their perspective on the potential advantages and disadvantage to the community.

The importance of reaching out early in the process to each of these stakeholders cannot be overstated. Immediate outreach ensures that all realistic opportunities and potential fatal flaws are considered, and helps form the funding, permitting, environmental, operational, and community partnerships that are essential to implementing and sustaining a service.

1.2 Quantify

In the planning process, the first phase of technical work is to quantify demand and combine information about commodity flows with ports' suitability based on geographic relevance, existing operational capabilities, and capacity and connectivity to acceptable infrastructure.

As previously noted, it is also reasonable to take another approach that starts by framing potential alternatives based on known opportunities for specific sites and then address capabilities and demands.

1.2.1 Existing Conditions

Ports vary in size, commodities and cargo types handled, and organizational structure. Facility and operational considerations at a hub container port will be considerably different than at a small general cargo port. Assess each port's current physical assets and operational capabilities with respect to the proposed potential project.

Existing capacity, work rules, types of vessels, highway and rail connectivity, and interaction with other port operations should be considered. Emphasis can be placed on each port's availability of suitable physical sites and facilities and the nature and extent of improvements necessary for a marine highway service to capture potential demand.

1.2.2 Market Demand

Potential demand is the basic determinant of whether marine highway services can succeed. Potential demand can include collective goods flows such as international containerized cargo moved through major international ports that could be transported relatively long distances to and from coastal areas via water rather than by truck. However, demand for marine highway services can also include very commodity-specific and/or more regional niche markets with unique origins and destinations. Successful marine highway development may depend on combining various niche markets that may not be able to stand alone into services that are viable when put together.

Hence there are different approaches to quantifying freight demand for potential marine highway services. Ideally, time and planning budget will allow for various analyses, although one approach may suffice if resources are constrained.

The Commonwealth of Virginia's Barge and Rail Usage Tax Credit incentivizes companies to use an alternative method of transportation instead of moving cargo volume over Virginia's highway system. A company can receive $25 credit per TEU (or 16 tons of non-containerized cargo) in excess of the amount of cargo shipped by barge or rail during the preceding year.

The program has provided tax credits to companies who move cargo by the "64 Express" marine highway service through the Port of Virginia. Refer to ***https://law.lis.virginia.gov/vacode/title58.1/chapter3/section58.1-439.12:09/*** *for additional details.*

Freight Data Analysis

One approach is to use national level commodity flow data from the USDOT Freight Analysis Framework (FAF). FAF is a freight flow model that incorporates a variety of national datasets, including the U.S. Census Bureau's Commodity Flow Survey. FAF provides estimates of tonnage, value, and ton-mileage, according to:

- general commodity codes aggregated into over 40 classifications,
- moving between 132 regions (defined Business Economic Areas [BEAs]) and 50 states,

- by defined modes: truck, rail, water, air, 'multiple modes', pipeline, and other/unknown.

The domestic legs of import and export moves are captured and linked to international origins, destinations, and gateways including seaport, airport, and border crossing BEAs. Importantly, FAF also provides future year forecasts that can be used to estimate changes in flow volumes. A FAF tabulation tool can be found at ***https://faf.ornl.gov/faf5/dtt_total.aspx***

An example use of FAF for marine highway planning would be as follows:

1. User identifies the BEA where the proposed marine highway facility will be established. This is the core of the market to be served. In some cases, the user may want to specify multiple BEAs, if the intent is to serve a larger market region.
2. User identifies candidate BEAs at the other end of a potential marine highway service. The other ends may be known, or the user may be interested in testing multiple possibilities. In any case, the other ends should be meaningful freight-generating and freight-receiving regions, served directly by marine freight facilities or within close proximity to them via inland transportation.
3. User specifies the commodities of interest. Marine highway services are not ideally suited for time sensitive or perishable high value goods, where delivery speed is at a premium.
4. User specifies the modes of transportation to be examined. Commodities moving by air can be eliminated. This leaves trucking, rail, and 'multiple modes' (combinations involving truck-rail, truck-water, etc.) as the key modes of interest.
5. User extracts FAF domestic flow data for the core BEA, other end BEAs, commodities of interest, and modes of interest, for current and future years. Note that the data extraction is performed twice – once with the core BEA as the origin, and again with the core BEA as the destination – to capture two-way flows. The direction of flows, and differences between inbound and outbound flow volumes, are critical considerations. A sample FAF data extraction is given in Exhibit 9.

Exhibit 9: Example FAF Data Extraction

From	To	Year	Mode	Commodity	Tons (from Total Flows)	Container EQ[3]
Pittsburgh PA	St. Louis MO	2050	Truck	43 Mixed Freight	11,000	611
Pittsburgh PA	St. Louis MO	2050	Rail	43 Mixed Freight	0	
Pittsburgh PA	St. Louis MO	2075	Truck	43 Mixed Freight	15,000	833
Pittsburgh PA	St. Louis MO	2075	Rail	43 Mixed Freight	0	
St. Louis MO	Pittsburgh PA	2050	Truck	43 Mixed Freight	15,000	833
St. Louis MO	Pittsburgh PA	2050	Rail	43 Mixed Freight	0	
St. Louis MO	Pittsburgh PA	2075	Truck	43 Mixed Freight	22,000	1,222
St. Louis MO	Pittsburgh PA	2075	Rail	43 Mixed Freight	0	

[3] Note that FAF does not provide container equivalents. For FAF commodities that are known to be handled in containers, the analyst can assume 15-23 tons per container. For analysis purposes, 18 tons per container is a useful rule of thumb. However, because FAF commodity groups are very broad, even for commodity groups that are containerized, some share of tonnage will not be in containers; similarly, groups like 'transportation equipment' include a combination of ro-ro, project cargo, and containerized moves. Handling types for target commodities are best determined through direct input by potentially interested users.

Interviews with Potential Users

Another approach is to directly contact and survey potential service users. Typically, this starts with a candidate list of industries and commodities known to be associated with a region. For example, in one region that has been studied, it was well known that a local producer of bottled water is distributing to other coastal regions, and that producer was therefore a potential anchor for a marine highway service. In another, it was known that a set of deep-water port users could benefit from a marine highway connection to an inland river port facility. When potential users are not known at the outset, comprehensive candidate lists can be compiled from various sources, including:

- Existing port customers, who may be interested in expanded service options provided by a marine highway.
- Other local and regional industries, identified by economic development agencies and/or commercial databases such as InfoUSA or Moody's, which provide lists of industries sorted by NAICS code and ranked by employment and output.

An initial examination of FAF data can be used to screen certain types of commodities and origin-destination flows that offer potential. The analyst may, for example, find good potential for palletized lumber movements but not for food product movements. This provides useful guidance in filtering the list of potential industries to contact. In this example, the analyst would look for industries in NAICS codes related to lumber, and not food products.

Once a candidate list is developed, the project proponent conducts one-on-one interviews to understand the industry's overall supply chain and major flows by commodity, origin-destination pair, and modes. If there are significant flows between the project region and other regions that could be served by the marine highway, the interviewer may probe further to determine the general service requirements in terms of cost, availability, reliability and speed that a service would have to provide in order to meet customer needs. The analyst should make informed estimates of the share of volumes that might utilize a marine highway service. In some cases, the candidate list is short and focused on a few key commodities; in others, it is long and diverse.

Considerations for Marine Highway Stakeholder Interviews

- Criteria in modal choice (speed, reliability, service frequency, consignment sizes, rates);
- Perceived "risk" in trying a new modal option;
- Adequacy of transportation infrastructure related to the route/project;
- Willingness to shift to waterborne transportation and determining factors;
- Possibilities for induced demand based on the availability of waterborne transportation;
- Concerns regarding waterborne transportation (e.g., speed, connections, costs related to making mode shifts, service reliability, regulation, etc.);
- Characteristics of the commodities/shipments that they feel are best suited for marine highway services;
- Views on ports, terminals and/or locations best suited for maritime highway service nodes.

1.2.3 Competitive Position

Every freight shipper has, for every commodity, a set of supply chain performance targets for cost, reliability, and speed, with the assumption of minimum loss or damage. If the marine highway service offers better performance metrics for a specific shipper and commodity, it is a strong candidate to attract that shipper's business.

Determining how competitive a proposed marine highway service will be versus other potential freight transportation modes is therefore a critical step in the analysis process.

As previously noted, marine highway services are not competitive with time sensitive air cargo. That leaves truck, rail, and intermodal combinations involving truck and rail, as the modes where a marine highway can compete on cost, reliability, and speed.

- Cost and Price. The clearest benefit a marine highway service can offer is price. On a ton-mile basis, water movements are significantly less expensive than truck or rail. However, any price advantage of the marine highway service should be considered in the context of the overall logistics cost. The end-to-end price paid by a shipper includes many different logistics components; the water move is only one of them. Every component needs to be considered and included. This is also true for reliability and speed analyses.
- Reliability. Marine highway services can run on fixed schedules, and apart from weather events they are resistant to disruption. Rail services for premium intermodal customers tend to be very reliable, but for other customers reliability can vary. In some cases, a marine highway may have the advantage. Trucking has the benefit of offering door-to-door, on-demand service, with generally high reliability, but that reliability can erode quickly in highly congested urbanized regions.
- Speed. Marine highway services are almost always slower than trucking, except in cases where the water route is short and direct, and the land route is extremely circuitous or highly congested. Examples of this are the New York Harbor crossings and the Cross Sound Ferry in Connecticut. Marine highway services are also typically slower than rail on a point-to-point basis, although train scheduling and railcar handling delays in the national system can significantly reduce this disadvantage.

Exhibit 10 provides examples of end-to-end logistics components for the various modes.

These are the most common logistics patterns, but there are many other combinations. For example, intermodal rail often includes a consolidation/ deconsolidation step, where the international-dimension containers (typically 20', 40', and 45') are trucked to transloading centers and the

Exhibit 10: Examples of End-to-End Logistics Components

Option	Truck	Direct Service Rail	Rail-Truck	Marine Highway
1	• Drive loaded truck from customer origin to customer destination • Drive empty truck to next pickup	• Load railcar at customer origin • Move loaded railcar from origin terminal to destination terminal • Unload railcar at customer destination • Return empty railcar and / or empty container	• Drive loaded truck from customer origin to rail terminal • Load railcar at origin terminal • Move loaded railcar from origin terminal to destination terminal • Unload railcar at destination terminal • Drive loaded truck from destination terminal to customer destination • Drive empty truck to/from rail terminals, move empty railcars, return empty containers	• Drive loaded truck from customer origin to MH terminal • Load MH barge at origin terminal • Move loaded MH barge from origin terminal to destination terminal • Unload MH barge at destination terminal • Drive loaded truck from destination terminal to customer destination • Drive empty truck to/from MH terminals, move empty MH barge, return empty containers
2	• Drive loaded truck from customer origin to intermediate handling (warehouse/ distribution center, consolidation or deconsolidation) • Drive empty truck to next pickup			

contents reloaded into 53' domestic containers before moving to rail. Marine highway services can include moves to and from rail, not just trucks. Any analysis should consider the logistics components that are most representative of a potential marine highway service and its truck and rail alternatives.

In all cases however, it is vitally important to consider the end-to-end nature of freight movement services across the elements that impact performance (cost, reliability, speed). This includes addressing the movement of empty equipment – trucks, railcars, vessels, and empty container returns – as these moves are important in determining not only the cost to provide freight service, but also the price charged to shippers. These costs are generally based on cost plus profit divided by the number of loaded revenue units handled.

Assuming one or more regions that could potentially be served by a marine highway has been analyzed, a matrix or model can then be developed to compare the performance characteristics of different freight transportation options to serve these regions. **Exhibit 11** provides an example of such a matrix.

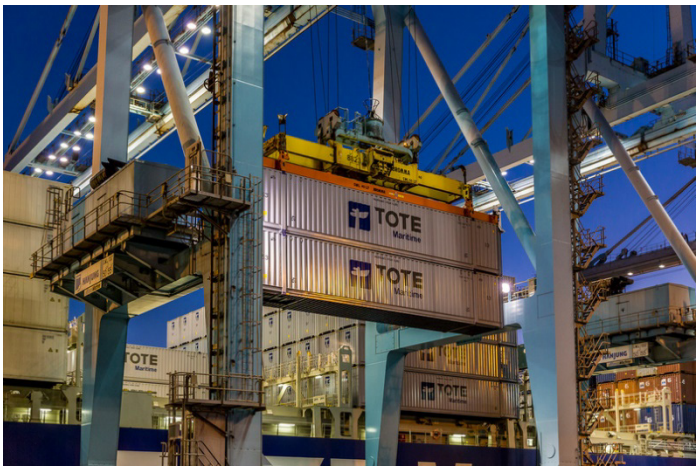


Photo courtesy of TOTE

At this stage of planning, the analyst is concerned with 'apples to apples' comparisons of basic metrics. In practice, each of these factors will vary based on operational service design. Door-to-door performance factors for a marine highway service include:

- schedule frequency,
- the number of intermediate route stops,
- total demand,

Exhibit 11: Example of a Competitive Performance Matrix

Service Pair	Truck	Direct Service Rail	Rail-Truck	Marine Highway
New Freight City to Freightville	• Truck miles • Cost per loaded mile; empty backhaul and container return factors; total cost and consumer price per loaded unit • Time to load, travel, unload • Probability of meeting schedule delivery window	• Rail miles • Cost per loaded mile; empty backhaul and container return factors; total cost and consumer price per loaded unit • Time to load, travel, unload • Probability of meeting schedule delivery window	• Rail and truck miles • Rail cost and price, time, reliability for linehaul component • Truck cost and price, time, reliability for drayage components at both ends	• Vessel and truck miles • Vessel cost per loaded mile; empty backhaul and container return factors; total cost and customer price per loaded unit • MH terminal handling cost • Time to load, travel, unload • Probability of meeting schedule delivery window • Truck cost and price, time, reliability for drayage components at both ends
New Freight City to Freight Beach	…	…	…	…
New Freight City to Fort Freight	…	…	…	…

- the utilization of vessel space in the headhaul direction, and
- the amount of unutilized backhaul capacity and empty container returns, amongst other factors.

There is substantial interaction between schedule, utilization, cost, and price, which should be clearly understood even at the cost of some analytical effort. Before making that effort, however, a simple comparison of basic performance metrics can inform the analyst whether further research is warranted. Two simple tests are:

- For any service pair, if a potential marine highway service offers a per-unit price advantage over truck, rail, or rail-truck, with comparable reliability, it is worth considering in more detail.
- For any service pair, if a potential marine highway does not offer a per-unit price advantage, it can be dropped from consideration unless it offers clear and substantial advantages with respect to speed or reliability.

A typical situation facing the analyst involves distance. Looking back to **Exhibit 11**, assume that New Freight City is 50 miles from Freightville and 500 miles from Freight Beach.

Photo courtesy of Port of Greater Baton Rouge

On a per-mile basis, the marine highway vessel operation is far less expensive than the all-truck option.

However, the marine highway also incurs costs for customers to dray to and from the terminals and for terminal handling. At 500 miles, the linehaul advantages of the marine highway services outweigh the effects of its additional costs, and it is more cost-effective than trucking. At 50 miles, there is not enough linehaul mileage for the advantage to matter, and trucking beats the marine highway. Distance considerations are also important when considering truck moves to and from marine highway terminals. The service is more attractive for customers located at, or close to, the terminals, because their trucking distances and associated costs will be significantly lower.

It may not be possible to specify precisely the physical locations of customers and terminals within origin and destination regions, or route miles, or costs per mile, or empty factors, or any of the other performance metrics called for in **Exhibit 11**. In such cases, some basic rules of thumb can be used to make initial determinations of the potential competitiveness of a marine highway service, and subsequently perform more careful investigations for services that appear to offer potential.

Some simple analysis processes and rule of thumb factors that have proven useful in previous analyses are listed in **Exhibit 12**. Of course, if rules of thumb are applied at this stage of the planning process, the analyst is urged to confirm and validate them through further investigations at later stages of the analysis.

Perhaps the most important figure in the Competitiveness Analysis matrix is the customer price for the marine highway service. Many factors determine pricing, for that reason a rule of thumb is not offered.

Exhibit 12: Rules of Thumb for Preparing an Initial Competitiveness Analysis

Factor	Truck	Direct Service Rail	Rail-Truck	Marine Highway
Route Miles	Centroid of origin BEA to centroid of destination BEA or known industry cluster, calculated using web-based mapping	Take distance from maps or apply circuity factor of 1.1x to 1.3x trucking distance	Rail distance, plus trucking distance from rail terminal to centroid of BEA or known industry cluster	Water travel mileage, plus trucking distance from marine terminal to centroid of BEA or known industry cluster
Travel Time (excluding schedule effects)	Web-based mapping, plus 1-4 hours at each end for gate processing and load/unload	Varies widely, but generally between 2x and 4x trucking time; add 1 day or more if interchanging between railroads	Varies widely, but generally between 2x and 4x trucking time; add 1 day or more if interchanging between railroads	Determine vessel operating speeds based on types of vessel that could potentially be utilized and apply to mileage
Customer Price	Larger of $1.40 to $2.00 per unit mile (for longer delivery) or $75 to $150 (for shorter drayage trips)	60-70% of the per-mile trucking price, plus $50 to $75 charge for load and unload at each end	60-70% of the per-mile trucking price, plus $50 to $75 charge for load and unload at each end, plus $75 to $150 drayage cost at each end	See discussion below, plus $50 to $75 charge for load and unload at each end, plus $75 to $150 drayage cost at each end
Reliability / Availability	Reliability varies; available if user has passable road	Reliability varies; available if there are direct rail connections at both ends of trip	Reliability varies; available if there are passable roads	Reliability varies; available if there are direct water connections or passable roads, subject to closures from events (e.g., ice, high/low water), and infrastructure condition (e.g., locks)

Note: Customer price factor values are hypothetical and for illustrative purposes only. Load and unload charges and drayage costs can vary significantly, ranging from $50 to more than $400 depending on port location and other conditions.

The analyst can estimate marine highway service price as follows:

- Consider the range of marine highway vessel options: tug and barge tow, integrated tug and barge, lower-speed self-powered vessel, higher-speed self-powered vessel, ro/ro capability, etc. These choices impact service speed and may impact assumptions about service reliability and availability.
- Work with published data (e.g., other marine highway studies) and potential vessel operators to estimate representative vessel costs per one-way trip.
- Add 10 percent if vessel costs do not include operator profit.
- Test non-vessel costs assuming 100 percent, 75 percent, and 50 percent capacity utilization. The actual utilization will be estimated in later planning stages; for now, the goal is to establish a range of costs based on a range of utilization. For example, if the vessel holds 200 containers, test scenarios of 200, 150, and 100 containers, where each container incurs a charge of $50 to $75 for load and unload at each end, plus a $75 to $150 drayage cost at each end.
- Sum the costs for each scenario.

- Divide the summed costs by the number of revenue units for each scenario. This is different from the total number of units handled. Returning empty containers and equipment to a customer creates operating cost (load/unload and drayage) and generates little to no additional revenue. If a service is 100 percent utilized but has all its loaded traffic moving in the headhaul direction and none in the backhaul direction, its revenue loads are 50 percent of its utilized slots. It is more common to see 100 percent loaded traffic in one direction and 50 percent in the other, so revenue units represent 75 percent of total traffic. Getting 100 percent revenue loads in both directions is a theoretical best-case scenario, because it means a dollar return for every slot on the vessel, although this is rarely achieved.

An example calculation is shown in **Exhibit 13**. The vessel characteristics are hypothetical, not rules of thumb, but the process is similar for any set of vessel characteristics. In this example, the estimated marine highway service price ranges from $175 to $440 per container, based on the vessel type, utilization, and revenue-load share. Looking at these cost ranges versus the cost of competing truck or rail services provides an indication of whether a marine highway service has the potential to meet customer needs, capture market share, and either perform sustainably or require operating subsidies.

1.2.4 Market Capture

Once a basic sense of market demand and competitive metrics for potential marine highway service pairs has been quantified, the estimates of market capture and volume, service pricing, vessel requirements, and related information can be refined. Assume, for example, that the following information is known from planning efforts so far:

- **Demand Analysis:** FAF analysis indicates New Freight City ships 20,000 containers of mixed freight southbound to Freight Beach under current conditions, growing to 25,000 containers per year by 2040; Freight Beach, in turn, ships 10,000 containers of machinery northbound to New Freight City under current conditions, with no growth through the year 2040. Interviews identify several freight shippers with a potential interest in marine highway service, but the volumes they control are less than the tonnages estimated by FAF.
- **Competitive Analysis:** Rail service between New Freight City and Freight Beach is not available because a stretch of track in Transit City, located between the two, has been sold to a commuter railroad. For the 500-mile haul, trucking offers customers a price of $700 to $1,000 per loaded container including the effects of empty moves, at a travel time of eleven hours including hook and drop, with service on-demand.

Exhibit 13: Example Calculation of Hypothetical Marine Highway Price per Loaded Container

Vessel Options	Vessel Utilization	Revenue Loads as Share of Utilized Slots		
		100%	75%	50%
Conventional tug and barge with capacity for 100 containers and one-way vessel cost (including profit) of $2500; $150 fixed cost per unit at each end	100%	$175	$233	$350
	75%	$183	$244	$ 367
	50%	$200	$267	$400
Large, fast self-powered vessel with capacity for 500 containers and one-way vessel cost (including profit) of $17,500; $150 fixed cost at each end	100%	$ 185	$247	$370
	75%	$197	$262	$393
	50%	$220	$293	$440

- Assume that the marine highway service cost example (**Exhibit 13**) is applicable, in which case marine highway customers would be offered a price of $175 to $440. However, the service time is longer, at four days for door-to-door delivery excluding vessel schedule effects, and ice blockages restrict operations for one month of the year. This kind of split decision – where marine highway outperforms other modes on price, but not on other factors – is common. In cases where the marine highway does not prevail at least on price, there should be other compelling reasons to proceed further with the analysis.

There are various methods to determine the share of demand that might be attracted to a marine highway service based on the competitive analysis factors. Examples include:

- **Method #1:** Develop a comprehensive Stated Preference Survey, in which shipper preferences for cost, reliability, speed, and other factors are translated into a set of choice equations that reflect the *elasticities* for each of these variables. The performance attributes associated with current service options and the potential marine highway service become inputs to equations that estimate how much demand could shift from other modes to the marine highway. Stated Preference Surveys can be time-consuming and expensive, but they are undoubtedly the preferred method in cases where the population of potential customers is not fully known.

Photo courtesy of Crowley Maritime Corp.

***Example application**: Multiple scenarios are evaluated using Stated Preference Survey results. The least favorable for the marine highway service ($700 per loaded unit by truck, $440 by marine highway) yields an estimated diversion rate of 5 percent; the most favorable for marine highway ($1,000 per loaded unit by truck, $175 by marine highway) yields an estimated diversion rate of 10 percent. Applying 5 percent and 10 percent diversion rates to FAF service volume yields a demand estimate of 10,000 to 20,000 loaded containers southbound and 5,000 to 10,000 loaded containers northbound.*

- **Method #2:** If the marine highway service is expected to serve just one user, or one or two major anchor users, comparable information may be obtainable, to some extent, through interviews.

***Example application:** Two potential southbound anchor shippers are identified. They indicate an interest in using the marine highway, provided there is once weekly service at a cost discount of 25 percent versus truck, and that marine highway travel time and reliability characteristics align with their logistics needs. The shippers would each move 100 loaded containers southbound per week if these conditions are met. One potential northbound anchor shipper is identified but expresses no interest in a marine highway service due to special handling requirements for its products. The marine highway satisfies the price requirement, so southbound demand can be estimated at around 10,000 loaded containers per year, while northbound demand is not quantified. To account for other potential users beyond the anchor users, apply a percentage increase – for example, adding 20 percent to the southbound volumes (another 2,000 containers) and assuming 2,000 loaded containers northbound – although shipper-sourced information is of course preferable. This example points out the strong value of developing the Competitiveness Assessment before interviewing potential uses, so detailed preference questions can be posed.*

- **Method #3:** For a quick 'what if' analysis, or if budget and time are extremely constrained, some rules of thumb can be applied for interim planning purposes, provided they are appropriately validated by more rigorous analysis at a later time.

Example application: *It is not unusual to assume a 10 percent capture rate in cases where the marine highway holds a clear and extremely strong price advantage – for example, $175 per loaded unit for marine highway versus $1000 per loaded unit for truck. The reason such an overwhelming price advantage yields only a 10 percent market capture is because many supply chains cannot take advantage of marine highway services due to travel time and service frequency, reliability/availability, and special handling needs. The assumption here is that the marine highway does extremely well among that sub-sector of the market that makes logistics decisions primarily on price and is amenable to other marine highway service factors. In cases where the marine highway price advantage is clear but not overwhelming, for example where the high end of the marine highway price range is below but close to the low end of the truck or rail price range, consider using a capture rate of 2.5 percent. Capture rates in between these values can, of course, also be tested.*

Once the market capture is determined, the information can be used to fine tune the vessel utilization estimates. For example, if a vessel carries 250 containers, and operates one round trip per week, then the annual vessel capacity is 26,000 containers. If the market capture is 10,000 loaded containers southbound and 5,000 loaded containers northbound, the utilization is 58 percent (calculated as 15,000/26,000). Note that service capacity is a function not only of the vessels size, but also of the number of weekly sailings. These factors have a strong effect on the price per loaded unit and therefore the competitiveness of the service.

1.3 Form

The examples given so far have dealt with simple point-to-point services as a way to explain the basic planning tools and how they are developed. With these in hand, more complex market capture parameters that incorporate service design considerations can be formed.

The project team can develop project alternatives that provide more specificity in marine highway service routings and operational characteristics to facilitate the measurement of impacts and performance of each alternative in the feasibility stage. The feasibility analysis may require adjustments such that plans will need to be iteratively revised in the planning stage.

1.3.1 Alternatives Development

A range of reasonable marine highway service alternatives can be developed to include service schedules, vessel types and sizes and associated costs, alternative origin/destination pairs and prospective vessel itineraries. During the process, prepare several iterations to identify the operational and market aspects that lead to the most viable marine highway project.

Service schedule. Generally, marine highway services should aim to offer at least one scheduled sailing per week, to ensure a minimum level of service. Consider, for example, a 500-mile trip, which a truck can do in one day. A marine highway service might take two to three days for this trip due to slower linehaul travel time, transfers at marine terminals, and drayage between marine terminals and customers. With a 7-day sailing schedule and a randomized pattern for outbound marine highway traffic arriving by truck at the marine terminal, the average in-terminal wait time is 3.5 days – which, on top of the 2 to 3 days for the trip itself, means the marine highway service is really 5.5 to 6.5 days. Twice-weekly service is better, and daily service ideal. To analyze schedule effects, consider just the movement of the vessel(s) – in-transit time plus in-port time. This is distinct from the end-to-end service time, which

includes truck moves through the gate and between marine terminals and customers. If, for example, the vessel travel time between New Freight City and Freight Beach is 2.5 days, and the vessel takes ½ day to load at the origin and ½ day to unload at the destination, it can perform a complete one-way trip cycle in 3.5 days, and a complete round-trip cycle in seven days. To provide one weekly departure from each terminal, only one vessel is needed; two vessels would allow for twice-weekly service.

Note: *Adding vessels to a service increases the service operating costs, but it might also increase the market capture in cases where schedule frequency is important. In 'rule of thumb' planning, if the market capture for a once-weekly marine highway service is 2.5 percent, the market capture for a twice-weekly marine highway service might be twice as high, since the more frequent service will presumably be better suited to the logistics needs of more potential users. Doubling the number of vessels (and therefore doubling the vessel operating cost), may also double the market capture which means the price per loaded unit remains constant and marine highway competitiveness versus other modes remains unchanged.*

Choice of vessels. There are many kinds of U.S. documented vessels potentially available for marine highway services. The choice of vessels should reflect the desired service schedule, underlying demand, and price per loaded unit associated with each option.

Assuming a range of choices have been incorporated into the Competitiveness Analysis, develop initial estimates of price per loaded unit. Conventional tug and barge services offer the lowest vessel operating costs, but also the lowest speeds and (generally) smallest vessel loading capacities. However, lower capacity vessels can be an advantage in cases where demand is low, but a regular and frequent schedule is required. Self-powered vessels have higher operating costs (for fuel, maintenance, crew, etc.), but because of their faster travel speeds, they offer the ability to provide more trips per year, and to serve multi-stop routes effectively. Self-powered vessels tend to have higher capacities, making them well suited for high demand routes. High speed vessels offer the fastest service, but also have the highest operating costs. Some of the most modern self-powered vessels are designed to run on natural gas or are dual-fuel capable. **Exhibit 14** shows pictures of some vessel types that could be considered.

Multiple stops and complex routes. Once the market demand, service competitiveness, and market capture rates have been examined for a simple 'hub and spoke' service network (e.g., services between New Freight City and Freight Beach (500 miles), and between New Freight City and Fort Freight (another 100 miles past Fort Freight), examine the benefits of a more complex multi-stop 'triangulation' service. For example, a service from New Freight City to Freight Beach, continuing to Fort Freight before returning to New Freight City. Alternatively test a pendulum service running from New Freight City to Freight Beach to Fort Freight to Freight Beach to New Freight City.

Exhibit 14: Types of Marine Highway Vessels

Tug & barge — Photo courtesy of Port of Virginia

Self-powered vessel — Photo courtesy of Matson Navigation

Multi-stop services offer the potential to serve more origin-destination pairs – in this case, the multi-stop service allows for freight to move between Freight Beach and Fort Freight, which is not possible when both services travel directly to/from New Freight City – and hopefully, greater demand, assuming the marine highway service between Freight Beach and Fort Freight is competitive with alternative modes.

The primary tradeoffs are time and cost: adding a stop between New Freight City and Fort Freight means more travel time between the two points and additional cargo handling costs. More vessels may need to be added to keep the desired service schedule from a given location, and additional cargo volumes will need to be captured to offset the increased costs. If price, speed, or availability and reliability parameters change compared to direct service, the market capture rates should be re-estimated. More stops may not necessarily be better. Adding another stop may be detrimental, particularly if it requires adding another vessel without generating enough additional revenue loads to cover the added cost. On the other hand, there may be significant untapped demand between two 'other end' cities, which would not be captured without a multi-stop service. In this case, adding the stop means better performance for the service as a whole.

1.3.2 Refinement of Reasonable Alternatives

At this point, it is time to test many different alternatives and variations. A spreadsheet model is often used to incorporate the numerous factors – underlying market demand, cost and price, vessel speed and service time including the impacts of intermediate stops on the route, availability and reliability, target schedule, and anticipated market capture – and calculate the various outputs interactively. The model may also include capital expenses and revenue streams, which are addressed in later sections.

***Note:** In modeling different alternatives for schedule, vessel type, and route combinations, the analyst can optimize for different variables. The suggested order of priority is:*

- *Providing a competitive schedule (minimum once-per-week sailings),*
- *Maintaining competitive prices per loaded unit versus alternative modes,*
- *Market capture rate and total demand.*

Maximizing demand is important, but it should not be the primary consideration unless that is an established policy goal. For market-type services, the main considerations are schedule and price competitiveness.

Through iterative modeling, the marine highway terminal locations to be addressed in the final stages of analysis can be identified: the core location, plus one or more 'other end' locations to be served. By this point, the project team should be focusing on a limited number of service and vessel options.

1.3.3 Terminal Suitability, Capital Cost, and Operating Cost

Terminal suitability is sometimes the starting point for marine highway analyses. A port owner may control a facility with known capability and available capacity and seek opportunities for increased throughput and economic activity. A particular waterfront site, vacant or underutilized, may be targeted as a redevelopment opportunity, with marine highway service being one potential use.

In these cases, the port owner's goal to generate throughput and revenue is typically best achieved by focusing on providing a competitive logistics service to freight shippers.

For operating marine terminals, the following basic questions should be considered:

- Does the facility offer sufficient channel and berth depth and dimensions for the target marine highway vessels?
- Does the facility offer sufficient storage (open acres, covered square footage), cargo transfer equipment (container cranes, stick cranes, ro-ro ramps, etc.), and terminal handling equipment?
- Does the facility offer adequate landside connections (truck, rail)?
- Is the facility well located in relation to potential customers, and can it accommodate increased activity consistent with its surrounding community?
- Would a marine highway service negatively impact existing terminal users or activities?

For undeveloped sites and redevelopment sites, the following elements should be considered:

- Site acquisition and remediation if necessary
- Marine improvements including deepening and marine structures such as piers, wharves, and fender systems
- Upland improvements – open and covered storage, pavement, flood and stormwater control, maintenance and administrative facilities, gate operations, wharf transfer equipment, and terminal handling equipment
- Landside access improvements – rail connections, rail loading/unloading tracks, road improvements, etc.

Where improvements to existing terminals are needed, or where new terminals need to be developed, capital cost estimates and implementation timelines may be prepared, with particular sensitivity to permitting timelines for marine and environmental work.

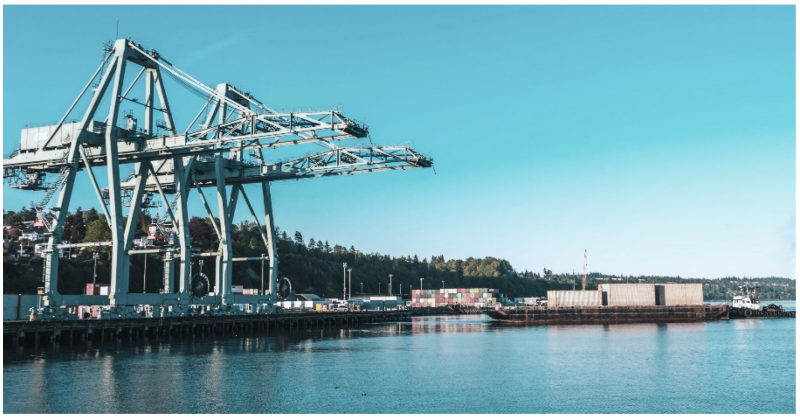


Photo courtesy of Port of Everett

Several alternative sites may be available, and comparisons can be made based on:

- Suitability for anticipated demand and cargo type
- Community and environmental impacts or challenges
- Date of expected availability for service
- Capital costs for required improvements

Vessel acquisition costs are also an important factor. Depending on the service model, the vessels may be:

- Existing and owned by the service provider
- Existing and owned by the service developer, and leased or contracted to an operator
- New builds to be owned by the service provider, with self-funding or public assistance
- New builds to be funded by the service developer

Finally, for purposes of financial analysis, any costs for capital improvements or vessel acquisition should be documented, and any portion of costs to be recovered from operating revenues should be identified.

Operating costs are of course extremely important as well, but these costs are addressed and quantified in previous planning steps. Any new or revised analytics necessary to firm up prior operating cost estimates can be performed at this point.

Feasibility

It is critical to the success of a marine highway project to understand how a customer or investor will determine the viability and economic return criteria for a successful service business plan. The key indicator of long-term service viability and sustainability is whether the defined service attributes are competitive with other currently available transportation modes. Marine highway services occupy a service niche more comparable to intermodal rail than to trucking.

Marine highway services' principal advantage is price, which can be even more cost-effective than rail; their main disadvantage is speed (slower than rail). This makes marine highway services a potential option for less time-sensitive commodities, where the logistics cost of the additional transit time is of less importance (or out-of-pocket cost) to the shipper.

2.1 Assess

At this point, an assessment of the revenue stream potential from the service will identify whether it covers costs to the desired or required degree.

In the example calculation under the Market Capture discussion, hypothetical service prices per loaded unit were $700 to $1000 for truck and $175 to $440 by marine highway. Remember the marine highway price represents not only the vessel move but also terminal transfer and truck drayage.

Assume that further research refined the hypothetical trucking price to $800 and the marine highway price to $400. Experience with modal diversion between truck and rail suggests that a 10 percent to 20 percent price discount is sufficient to move shippers from truck to rail, provided they can tolerate the longer travel times and generally lower reliability provided by rail. For marine highway, a 30 percent to 40 percent discount versus trucking has a similar effect.

Using the hypothetical prices from the previous example, the marine highway could charge between 60 percent and 70 percent of the $800 trucking price ($480 to $560) and still be highly competitive. A marine highway price of $400 represents a break-even price for the service developer, covering operating costs and profits to transportation service providers across the total move. The additional $80 to $160 per loaded unit could represent profit to the service developer or be used to retire debt from capital costs. The amounts potentially available can be calculated simply, as the additional increment of target price per unit times the number of units handled annually. The analyst can then run a time-series model reflecting future growth in throughput.

The case described above represents a best-case scenario. The next best-case scenario is one where trucking service prices are $700 per loaded unit and the marine highway break-even price is $440. The marine highway could charge between 60 percent and 70 percent of the $800 trucking price ($420 to $490). In this scenario, achieving the break-even price for the marine highway seems likely, but recovering substantial additional revenues that could be used to cover capital costs seems unlikely. Those capital costs would need to be covered by another funding source. Potential funding sources are discussed in **Section 3.2**.

As a worst-case scenario, consider a hostile competitive landscape. For example, assume that New Freight City opens an intermodal rail terminal that introduces a new rail service to Freight Beach at a service cost of $500 per loaded unit. In response, trucking companies lower their rates to $550 per loaded unit. Now, the benchmark targets drop to $330 to $385 per loaded unit. At those prices, the marine highway does not hit its break-even operating price target of $440 per loaded unit. In this scenario, additional operating and capital funds would be needed.

In practice, marine highway proponents may advance projects even knowing at the outset that cost competitiveness is challenging and revenue streams may not be positive. This is because there are other compelling economic or policy reasons to pursue the project, such as road maintenance savings; reduced congestion; improved transportation capacity; reduced air emissions; system resiliency; and improved safety.

The key is to understand the types and magnitudes of mismatches between revenue streams and costs, so they can be appropriately addressed through sources and methods that allow for a sustainable service.

For federal grant applications, a formal Benefit-Cost Analysis (BCA) may be required, based on the specific program and NOFO. Even in cases where a formal BCA is not required or federal funding is not being sought, the analysis structure is extremely useful and can provide valuable information for project stakeholders and the public. Procedures for conducting BCAs are published and periodically updated by the Federal Highway Administration (FHWA) (see ***https://www.transportation.gov/office-policy/transportation-policy/benefit-cost-analysis-guidance)***.

Current federal BCA guidance involves analysis of:

- Safety impacts (reductions in surface transportation crashes versus increases in marine incidents)
- State of Good Repair (reductions in surface transportation maintenance costs versus increases in marine system maintenance costs)
- Economic Competitiveness (reductions in transportation system operating costs, but specifically excluding shipper cost savings associated with modal diversion)
- Environmental Quality (reductions in fuel consumption and emissions of carbon, particulate material, nitrogen oxides, sulfur oxides, and volatile organic compounds from surface transportation, versus increases from marine operations)
- Quality of Life (reduced surface transportation congestion, noise, vibration, and related effects, versus impacts from marine operations)

2.2 Evaluate

To succeed in the marketplace, a marine highway service should be perceived as stable and sustainable by its users. It costs shippers time, money, and effort to adjust their supply chains. If potential customers think the service will come and go within a few years due to weak planning, insufficient capitalization, or ambiguous public or political support, they are not likely to use it even if it offers a strong price advantage.

Planners should structure services that have the resources – financial, community, and political – to operate for an initial period of time (e.g., three to five years) as logistics practices adapt and business develops. It is very common, in both freight forecasting and passenger ridership planning, for new services to fail to achieve target demand in the first year or two or longer, and then recover in the out years. Surviving the start-up period and giving users confidence that the service will last is a critical priority.

A project sponsor may, or may not, use self-sufficiency as a target. The planning process laid out in this Toolkit module is designed to address this question head on and should allow analysts to develop the metrics to make clear determinations of whether self-sufficiency can, or cannot, be anticipated.

Ultimately, all transportation investments are risks. Marine highway services are designed to fill gaps in the nation's freight transportation network – relatively small ones, in the context of the nation's total freight activity, but real gaps nonetheless. Mining niche markets is inherently riskier than betting on sure things at low odds. As discussed in **Section 1.2**, project sponsors and stakeholders begin the planning process with a clear understanding of the types and amounts of risk they are willing to accept, and the specific outcomes that constitute a successful marine highway service.

Financing

It is critical to the success of a marine highway project to develop an investment strategy that is not limited to just one potential solution, but instead takes advantage of the full range of potential *financing* structures and *funding* opportunities.

A first step often involves determining what resources are available for necessary planning and investment and agreeing on what constitutes a successful return on investment. The project team should understand:

- The amount of funding needed versus what is available from all sources – themselves, other public or private partners, and federal/ state/regional assistance programs – for a wide range of potential expenditures including planning, engineering, environmental, facility construction, equipment procurement and installation, and operating support.
- Expectations or requirements for the operation to be profitable or self-sustaining within a certain time period, if applicable.
- Ability and willingness to accept risk, and for how long, if capital investment needs are higher than anticipated, or if operating costs are not fully supported by revenues.

3.1 Strategize

Typically, the financial arrangements to establish a marine highway service are not fully known at the outset. Identifying and financing those costs – for planning and permitting, physical improvements and equipment, and operations – is one component of an investment strategy. It is equally important to address the revenue side of the equation: determine how much revenue the service is expected to generate, and whether that revenue can meet or exceed costs for operations, debt service on investments, etc. If there is a gap, identify the size of the gap, and how long it is expected to last. Finally, and critically, consider how to manage possible risks – to cover unmet capital costs and possibly operating costs (in the form of subsidy payments) – and for what duration. There may be significant public investment that is not fully recovered from service revenues, and there may also be an initial period when the service is growing its volumes and revenues, but cannot cover its operating costs. In such cases, it is important to understand how long the service will be supported and continued.

Some services operating today rely on subsidies; others were discontinued because subsidy requirements were seen as too high, or were required over too long a period. An investment strategy can help project sponsors understand the likely costs, revenues, and funding gaps if any. It is up to the project team to determine whether it can take on the associated financial and risk commitments.

Different structures have different investment requirements and different levels of risk depending on how the marine highway service will be developed and operated. The three primary options include:

- All-public: port authority/administration or local/regional agency is responsible for planning, investment, and operations, either directly or via contractors.
- All-private: private partner is responsible for all planning, investment, and operations, with public agencies participating in a limited, primarily regulatory role.
- P3: port authority/administration or local/regional agency is responsible for planning and investment, possibly sharing responsibility with private partners; private partner is typically responsible for operations.

The P3 model is the most common and has many variations. For example, the two port authorities at either end of the service may self-identify as strong partners, invest in terminal facilities and/or equipment, contract for terminal operating labor, and negotiate a service agreement with a private vessel operator. The vessel operator, in turn, may be responsible for operating and maintaining the vessels, and for providing service volumes and frequencies as specified by the port authorities. This model is well-suited to marine highway services where development and operating costs and risks are moderate, and profit potential is known and relatively stable.

The all-public model is the next most common and is seen primarily in conditions of highest risk and lowest profit potential, where private partners are more difficult to engage.

All-private models are extremely common in the movement of bulk materials on coastal and inland waterway routes. Most marine highway services have featured some level of private involvement.

If a project stakeholder is unsure of the financial options and trade-offs, or open to different options, more information is available in Section 3.2 of the ***General Projects Module*** of the PP&IT.

3.2 Structure

Identifying and securing adequate funding for the planning, development, and execution of a marine highway service is critical to its success. A range of federal, state, local, and private sector funding sources are available to foster marine highway initiatives.

3.2.1 Federal Funding and Financing Sources

A marine highway project team seeking federal funding should tell a compelling, succinct story. The project should meet stated eligibility requirements and achieve the priorities of the financing resource.

Competitive applicants demonstrate strong stakeholder support, particularly from funding partners. Applicants often include letters of support from a variety of stakeholders to show that their project is important to their community and that stakeholders are aware of and supportive of the project. Project applications typically include a well-defined funding plan that includes a significant non-federal match. Lastly, competitive applications include a clear scope, schedule, and budget for the proposed project.

Federal grant programs and funding levels change from year to year, depending on government priorities, revenue levels, and appropriation amounts. A brief summary of the main programs and a list of grant awards for marine highway projects is provided in the following section to give a sense of the types of projects that receive funding. Access further details by clicking on the title of the government funding program. The most applicable grant opportunities for a marine highway project are the USMH Program and the Port Infrastructure Development Program, both run by USDOT/MARAD.

Photo courtesy of Port of Virginia

MARAD's USMH Program

The USMH Program provides competitive grants to USMH Projects to support the creation of new marine highway services or expand existing services. Project elements proposed for funding support the development and expansion of documented vessels or port and landside infrastructure and any associated planning efforts. Under current program authorities, MARAD gives preference to those project elements that present the most financially viable transportation services and require the lowest percentage of federal share of the costs.

It is the goal of the USMH program to have funds obligated within three years, and grant funds to be expended within five years after obligation.

Examples of elements of USMH Projects supported with USMH grant funding are listed in **Exhibit 15.** A complete list is available at ***https://www.maritime.dot.gov/grants-finances/marine-highways/us-marine-highway-program-grant-awards***. More information about applying for USMH Grants is provided in **Exhibit 6** and on MARAD's website at ***https://www.maritime.dot.gov/grants-finances/how-apply-us-marine-highway-program-grants***

Port Infrastructure Development Program (PIDP)

The PIDP is administered by MARAD to improve facilities within, or outside of and directly related to operations of coastal seaports, inland river ports, and Great Lakes ports. The grant funding is available to public agencies on a competitive basis for a variety of port improvements, including marine highway infrastructure projects directly related to port operations or to an intermodal connection to a port. Among possible project outcomes, MARAD seeks projects that will:

- improve the safety, efficiency or reliability of the movement of goods through a port or intermodal connection to a port;
- leverage federal funding with non-federal contributions to expand the total resources being used to build and restore infrastructure;
- maximize net benefits such as savings in travel time costs, vehicle and port operating costs, safety costs; and
- improve economic vitality including promoting exports, creating jobs, and improving overall well-being.

More information at PIDP grants can be found at ***https://www.maritime.dot.gov/PIDPgrants***

Photo courtesy of Port of New Orleans

Exhibit 15: Example USMH Project Elements Supported by USMH Grants

Primary USMH Route(s), Location(s) *USMH Project Name*	Element Description	Total Amount (# of Grants)
M-84, Morrow, OR; Portland, OR; Vancouver, WA; Longview, WA *Port of Morrow Barge Service Extension*	Purchase new barge and enhance two marine terminals including dredging, cargo handling equipment and crane improvements for expansion of barge service	$4.82M (2)
M-64, Hampton Roads, VA; Richmond VA *James River Barge Expansion Project*	Purchase new barges, generators and other equipment to expand an existing service and support the transport of refrigerated/frozen cargo.	$4.04M (5)
M-95, NY and NJ Terminals *New York Harbor Container and Trailer-on-Barge Service*	Provide infrastructure improvements, cargo handling equipment, and a training center to support existing service and fund planning studies to expand marine highway services throughout the Northeast region from New York Harbor to other points.	$2.39M (4)
M-95, Cape May, NJ *Cape May – Lewes Ferry*	Improve ferry terminal facilities, enhance vessel maintenance capabilities, and bolster operational efficiency by designing new electric ferries and charging infrastructure.	$600K (1)
M-5, Seattle, WA; Bainbridge, WA *Seattle-Bainbridge Island Ferry Service*	Support the conversion of one of the two ferries used in the freight and passenger ferry service from diesel to hybrid	$1.50M (1)
M-H1, Honolulu Harbor, Hawaii *Hawaii Commercial Harbors System Shipping Services Project*	Purchase of new forklift scales to improve safety and processing time, while reducing traffic at Hawaiian ports.	$200K (1)
M-90, Monroe, MI, Colborne, ON and Cleveland, OH *Lake Erie Shuttle Service*	Purchase of cargo handling crane and training for its use at Port of Monroe to support carrying cargo for Ford Motor Company and other shippers.	$1.1M (1)
M-90, Lake Michigan, MI *Planning for the SS Badger's Low Carbon Future Project*	Project to support a zero-emission/carbon capture feasibility analysis to convert the SS Badger from a coal-fired steamship to a zero-emission ferry vessel.	$600K (1)
M-65 and M-55, Paducah, KY; Mobile, AL; Baton Rouge, LA *Paducah-McCracken Riverport Service*	Lease and/or purchase shoreside container handling equipment to support the container-on-barge service located at the confluence of five inland waterways.	$732K (2)
M-70, Ohio, Kentucky *Barge Service in the Ports of Cincinnati, Northern Kentucky and Beyond*	Purchase a bridge crane at a new marine terminal at Gallatin, KY to transport steel products by inland river barge.	$1.4M (1)
M-69, M-146, and M-10, Houston, TX and other Gulf Coast ports *Houston Gateway & Gulf Container-On-Barge*	Study and develop an operational plan to establish a business case to support shipping container movements by barge between terminals.	$180K (1)
M-GNM1, Piti, Guam *Guam Marine Transportation Enhancement Initiative*	Expand the Port's fleet of specialized container yard equipment including two loaded container handlers, three empty container handlers, five forklifts, one boom lift, nine yard tractors, and two 40-plug mobile reefer generators.	$5.7M (1)

The USDOT offers additional discretionary grant programs to fund transportation projects that demonstrate significant national or regional benefits. These grants may be used to support marine highway initiatives that contribute to improved freight mobility, economic competitiveness, and environmental sustainability. More information can be found at the DOT Discretionary Grants Dashboard: ***https://www.transportation.gov/grants/dashboard***

CMAQ: Congestion Mitigation and Air Quality Program

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

Eligible marine highway projects under the CMAQ program include projects on a marine highway corridor, connector, or crossing designated by the (including an inland waterway corridor, connector, or crossing). A State may not obligate more than 10 percent of the funds apportioned to the State for these projects. Eligible uses of CMAQ funds set aside for PM2.5 nonattainment and maintenance areas, include:

- diesel retrofits,
- installation of diesel emission control technology on nonroad diesel equipment or on-road diesel equipment that is operated on highway construction projects, and
- the most cost-effective projects to reduce emissions from port-related landside nonroad or on-road equipment that is operated within the boundaries of the area.

Further details about CMAQ can be found at ***http://www.fhwa.dot.gov/environment/air_quality/cmaq/***

STBG: Surface Transportation Block Grant Program

The STBG program promotes flexibility in state and local transportation decisions and provides flexible funding to best address state and local transportation needs.

FHWA apportions funding as a lump sum for each state and then divide that total among apportioned programs. Each state's STBG apportionment is calculated based on a percentage specified in law. Eligible marine highway projects under the STBG program include rural barge landing, dock, and waterfront infrastructure projects in a rural community or a Native village. A State may not obligate more than 5 percent of the funds apportioned to the State for these projects.

More information about the STBG program can be found at ***https://www.fhwa.dot.gov/specialfunding/stp***

NHFP: National Highway Freight Program

The NHFP supports several goals, of which the following pertain to marine highway projects:

- Investing in infrastructure and operational improvements that strengthen economic competitiveness, reduce congestion, reduce the cost of freight transportation, improve reliability, and increase productivity;

- Improving the safety, security, efficiency, and resiliency of freight transportation in rural and urban areas;
- Improving the efficiency and productivity of the NHFN;
- Improving state flexibility to support multi-state corridor planning and address highway freight connectivity; and
- Reducing the environmental impacts of freight movement of the NHFN. (23 U.S.C. 167(a) and (b).

NHFP funds contribute to the efficient movement of freight on the NHFN and should be identified in a freight investment plan included in the state's freight plan. A State may obligate not more than 30 percent of the total apportionment of the State for freight intermodal or freight rail projects, including projects on a marine highway corridor, connector, or crossing designated by the Secretary (including an inland waterway corridor, connector, or crossing), -Eligible uses of NHFP funds as they pertain to the planning and development of marine highway projects include:

- Development phase activities, including planning, feasibility analysis, revenue forecasting, environmental review, preliminary engineering, and design work, and other preconstruction activities;
- Efforts to reduce the environmental impact of freight movement;
- Additional road capacity to address highway freight bottlenecks; and
- Conducting analyses and data collection related to the NHFP, developing and updating freight performance targets to carry out section 167 of Title 23, and reporting to the FHWA Administrator to comply with the freight performance target under section 150 of Title 23.

Generally, a marine highway project, or related marine highway route, can be eligible for NHFP funding if it demonstrates that it makes freight movement more efficient, environmentally friendly, and reduces highway congestion.

More information about the NHFP can be found at ***https://www.fhwa.dot.gov/infrastructure-investment-and-jobs-act/nhfp.cfm***

Transportation Infrastructure Finance and Innovation Act (TIFIA)

The TIFIA program is managed through the USDOT's Build America Bureau. TIFIA is a *financing* program, not a grant. TIFIA offers three types of financial assistance: secured loans, loan guarantees, and lines of credit.

- Secured loans are direct federal loans to project sponsors with flexible repayment terms and providing combined construction and permanent financing of capital costs.
- Loan guarantees provide full-faith-and-credit guarantees by the federal government to institutional investors, such as pension funds, that make loans for projects.
- Lines of credit are contingent sources of funding in the form of federal loans that may be drawn upon to supplement project revenues, if needed, during the first ten years of project operations.

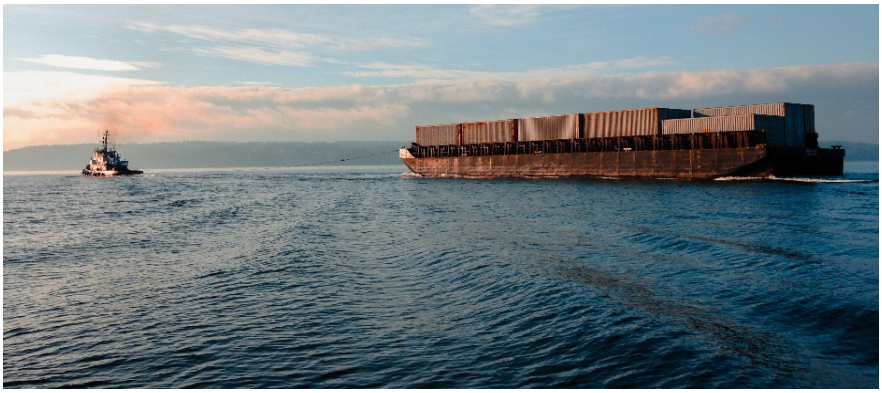


Photo courtesy of Port of Everett

The Port of Everett's USMH Project allows the port to ship containerized freight via the marine highway from Everett to the ports of Seattle and Tacoma, removing as many as 300 containers per month from the I-5 corridor. The I-5 corridor through Everett leads the nation in traffic congestion.

Photo courtesy of Crowley Maritime Corp.

The TIFIA loan program provides federal credit assistance and financing options to nationally and regionally significant surface transportation projects including highway, transit and rail, which may have some applicability to port intermodal projects. In general, projects receiving TIFIA credit assistance cost at least $50 million or 1/3 of the most recently completed fiscal year's formula apportionments for the state in which the project is located.

Some project types have a lower cost threshold for TIFIA. For example, rural and local infrastructure projects both have a $10 million minimum. A rural surface transportation infrastructure project is located outside of an urban area with population greater than 150,000 people.

For a local project, the applicant is a local government or public authority, the project is located on a facility owned by the local government, and the USDOT Secretary has determined that the local government is substantially involved in the development of the project. Certain marine highway projects may qualify as either rural or local.

Projects are evaluated on environmental impact, significance to the national transportation system, the extent to which they generate economic benefit, leverage private capital, and promote innovative technologies. TIFIA recipients should be aware of reporting requirements, including an annual financial plan update, *major project financial plan*, coverage compliance, and annual credit rating surveillance.

Additional resources for TIFIA can be found on the USDOT Build America Bureau website at ***https://www.transportation.gov/buildamerica/financing/tifia***

Railroad Rehabilitation and Improvement Financing (RRIF)

The RRIF program provides direct loans and loan guarantees to finance development of railroad infrastructure. Rail projects within the boundaries of a port are eligible to apply for assistance, including rail-to-barge marine highway projects.

The funding may be used to:

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

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

Eligible borrowers include state and local governments, railroads, 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.

The RRIF program differs from the TIFIA program in that loan recipients pay a credit risk premium, which offsets the risk of default.

The risk premium helps the program comply with a congressional requirement, which states that the federal loan assistance program operates at no cost to the federal government.

More information about RRIF can be found on the USDOT Build America Bureau website at ***https://www.transportation.gov/buildamerica/financing/rrif/railroad-rehabilitation-improvement-financing-rrif***

Private Activity Bonds (PABs)

PABs are issued by a government agency to provide debt financing for private projects that are developed for a public purpose and to provide opportunities for private sector investment and P3s. The program is geared towards increasing private sector investment in domestic transportation infrastructure.

PABs funding is directed to nationally and regionally significant surface transportation projects including freight transfer facilities, and rail and intermodal projects that receive federal assistance. Providing private developers and operators with access to tax-exempt interest rates lowers the cost of capital significantly, enhancing investment prospects. Increasing the involvement of private investors in marine highway and freight projects generates new sources of money, ideas, and efficiency.

The law limits the total amount of such bonds to $15 billion and directs the Secretary of Transportation to allocate this amount among qualified facilities. The $15 billion in exempt facility bonds is not subject to the state volume caps. Qualified highway or surface freight transfer facilities include:

- Any surface transportation project which receives Federal assistance under Title 23, U.S. Code (as in effect on August 10, 2005, the date of the enactment of section 142(m)
- Docks and wharves, but although these facilities may be leased to private businesses, they are owned by a governmental unit. These facilities are also exempt from the State ceiling for the volume cap.

More information about PABs can be found at ***https://www.transportation.gov/buildamerica/financing/private-activity-bonds-pabs/private-activity-bonds***

Title XI Federal Ship Financing Program

The Federal Ship Financing Program provides a loan guarantee to U.S. ship owners for financing U.S.-flagged vessels being constructed or worked on in U.S. shipyards and to U.S. shipyards for modernization and expansion. The purpose of the program is to promote U.S. shipyards and the U.S. Merchant Marine fleet by encouraging ship owners to obtain new vessels or modernize/reconstruct at U.S. shipyards cost effectively. The repayment terms are generally much longer and the interest rates lower than those offered by the commercial lending market.

To be eligible for guarantees, the applicant should demonstrate that they have adequate resources to meet the following criteria:

- Minimum of 12.5 percent *equity* funded or committed prior to approval
- Positive working capital
- Long-term debt to equity ratio of 2:1 or less
- Maintain a minimum net worth

Applicants should show that there is a need or potential in their market for new capacity or replacement of existing capacity for new construction; if reconstruction, that there is a need for technical improvements to the ship such as better fuel efficiency or improved safety and such work is not needed because of inadequate maintenance.

More information about the Federal Ship Financing Program can be found at ***https://www.maritime.dot.gov/grants/title-xi/federal-ship-financing-program-title-xi***

Capital Construction Fund

The Capital Construction Fund (CCF) program, administered by MARAD, assists owners and operators of U.S. flagged vessels in accumulating the large amounts of capital needed to modernize and expand the U.S. Merchant Marine fleet. The primary mechanism is deferring federal income taxes on money or other property placed in a CCF. This addresses the disadvantage that operators of U.S.-flagged vessels face when competing with foreign-flagged vessel operators who do not have to pay tax on shipping income. A stated goal of the program is to assist in the modernization and expansion of vessels in domestic trade, hence its applicability to the USMH program. CCF vessels are built in the U.S. and documented for operation in the U.S. domestic trade.

More information about the CCF can be found at ***https://www.maritime.dot.gov/grants/capital-construction-fund***

In addition to the USDOT, other federal government agencies offer funding opportunities for marine highway-related projects, including:

Passenger Ferry Services

While services for the carriage of passengers *and* cargo may be eligible for funding under the USMH program, passenger-only ferry services are not eligible for funding under the program. There are various federal programs under the USDOT available to support passenger ferry services. The Federal Transit Administration (FTA) and FHWA offer formula funding and discretionary grants that support passenger and vehicular ferry services. Grant programs and funding levels change from year to year, as government revenue levels vary, and federal appropriations fluctuate.

Information on FTA's Passenger Ferry Grant Program at ***https://www.transit.dot.gov/passenger-ferry-grants*** and FTA's Urbanized Area Formula Program is available at ***https://www.transit.dot.gov/funding/grants/urbanized-area-formula-grants-5307*** . Information on FHWA's Ferry Boat Program is available at ***https://www.fhwa.dot.gov/specialfunding/fbp/*** and FHWA's National Highway Performance Program, which includes funding for ferry boats and facilities is available at ***https://www.fhwa.dot.gov/specialfunding/nhpp/***

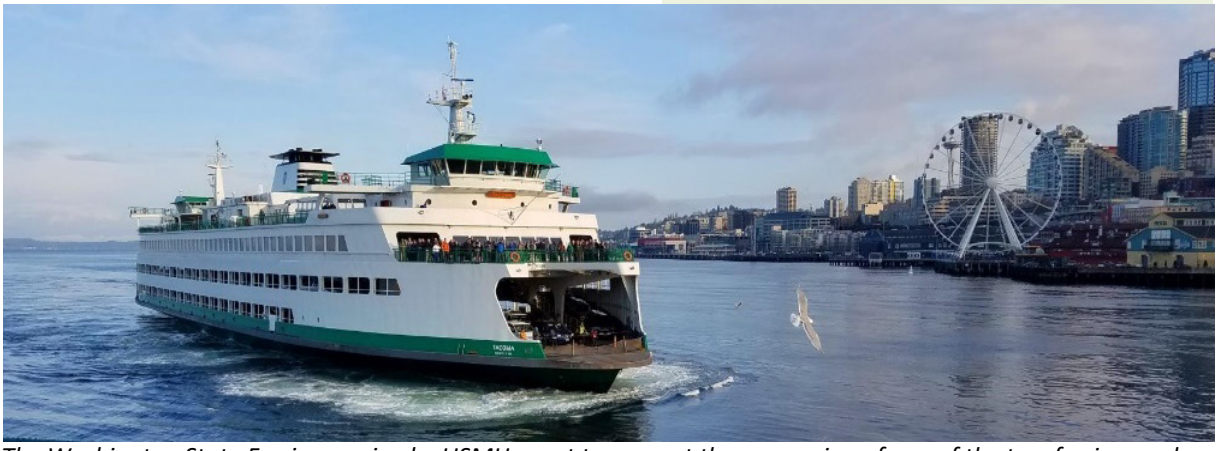


Photo courtesy of Washington State Ferries

The Washington State Ferries received a USMH grant to support the conversion of one of the two ferries used in the Seattle-Bainbridge Island Ferry Service from diesel to hybrid, resulting in a significant reduction in emissions. The ferry service qualified for USMH funding because it carries freight vehicles aboard the vessels, and it had received an USMH project designation.

- **Economic Development Administration (EDA) Programs:** Funding for a variety of project elements including infrastructure and facilities, as well as for planning services in economically distressed areas. More information about EDA grants can be found at ***https://www.eda.gov/funding/funding-opportunities***
- **Environmental Protection Agency (EPA) Diesel Emission Reduction Act (DERA) Grants:** Grant funding for upgrades that reduce diesel emissions through verified retrofit technologies; engine and vehicle replacements; idling reduction technologies; shore power; and electrified parking spaces. DERA grants cannot be used to fund federally mandated projects. More information about DERA grants can be found at ***https://www.epa.gov/dera***
- **Federal Emergency Management Agency (FEMA) Port Security Grants Program (PSGP):** Grant funding for maritime transportation infrastructure security activities. More information about PSGP grants can be found at ***https://www.fema.gov/port-security-grant-program***
- **United States Department of Agriculture (USDA) Rural Development Programs:** Loans, grants and loan guarantees to support essential services in rural areas. More information about the USDA Rural Development Program can be found at ***https://www.rd.usda.gov/***

3.2.2 Public-Private Partnerships

The USMH Program affords opportunities to the private industry to receive federal funding. A United States private sector operator of marine highway projects or private sector owners of facilities, including an Alaska Native Corporation, can apply directly to the USDOT for USMH grant funding, but require an endorsement letter from the current marine highway route sponsor.

Marine highway projects provide natural opportunities for P3s due to their inherent connection between public ports and private shipping companies and barge and tug operators.

Photo courtesy of Young Brothers

The typical private partner is a domestic carrier with vessels that comply with the Jones Act. Start discussing and forming these potential partnerships early in the planning process. Stakeholder interviews offer an opportunity to connect with private entities that may be interested in a mutually beneficial partnership.

For example, the following U.S. flagged carriers have previously partnered on USMH-funded projects:

- Coastal Transportation ***http://www.coastaltransportation.com/***
- Foss Maritime ***https://www.foss.com/***
- Ingram Marine Group ***www.ingrambarge.com/***
- National Shipping of America ***http://www.natship.us***
- Norfolk Tug Company ***https://www.norfolktug.com/ntc-tugboats***

Benefits of P3s

- They provide a mechanism to attract private capital to public projects.
- Private companies may be able to examine the full life-cycle cost of investments whereas public agencies are often tied to short-term budget cycles.
- Private companies may be able to build and operate transportation facilities more efficiently.
- Many project risks can be transferred to the private sector, providing the public with greater certainty.

- Seatac Marine ***https://www.seatacmarine.com/***
- Stevens Towing Co ***https://www.stevens-towing.com/services/ocean-freight/***
- Tidewater ***https://www.tdw.com/***
- Young Brothers ***https://htbyb.com/***

An example of a P3 effort is Tidewater M-84 Barge Service Expansion. The America's Marine Highway Grant extended $3.2M for the purchase of an electric dock crane at the Port of Vancouver, WA as well as procurement of a new barge capable of handling a combination of containers that will ultimately alleviate area traffic by diverting freight to the underutilized M-84 corridor. This allowed for the commencement of Tidewater Barge Lines' new container barge. This equipment will help meet the demand for additional barge shipments of municipal waste and other waste through the Columbia River Marine Highway M-84.Further details on how to evaluate P3 opportunities and execute P3 transactions can be found in Section 3.2.5 of the ***General Projects Module*** of the PP&IT.

3.2.3 Local Funding Sources

In addition to state investment in marine highway services, which are offset by savings in state highway maintenance expenses, local funding is an important component of a successful marine highway service. Among other things, it demonstrates local support, which is critical for project success and for obtaining federal funding. Additionally, a prerequisite for USMH grants is that the project has at least 20 percent funding from non-federal sources. This can, of course, come from private entities, but funding from local public sources is helpful.

A good starting point for local public funding is the MPO or RTPO of the region where either of the marine highway service endpoints is located.

There are currently about 500 MPOs in the U.S., the exact number changes after each census. A searchable database of MPOs and their websites is available on the USDOT web site at ***https://www.planning.dot.gov/mpo/***

More than 30 states in the U.S. have established some form of rural transportation planning and there are currently more than 300 RTPO-type entities. Information about the various types of RTPOs and a listing of them by state is available at ***http://ruraltransportation.org/about-rtpos/***

Each MPO and RTPO is required by federal law to develop a TIP covering a period of at least four years. The TIP contains a list of regionally significant transportation projects, which should include marine highway services since they directly affect the landside transportation network. Similarly, each state is required to develop a STIP in cooperation with MPOs and RTPOs.

It is important to engage with the local MPO or RTPO early because they can advise on the project and connect the project team with other agencies and stakeholders whose interests are aligned.

It is also important because the local MPO is the gatekeeper for inclusion in the TIP and STIP and subsequent dispersal of government funding.

Another potential source for local support is the regional health and environmental agency. Every state has at least a Department of Health, and

Core Functions of an MPO/RTPO

- Establish a public forum for regional decision making
- Identify existing and future transportation deficiencies and opportunities
- Evaluate transportation alternatives
- Maintain a long-range transportation plan for the efficient and safe mobility of people and goods
- Develop or update a TIP every four years
- Engage and involve the public, especially minority and low-income populations
- Ensure the region complies with federal planning requirements and NAAQs

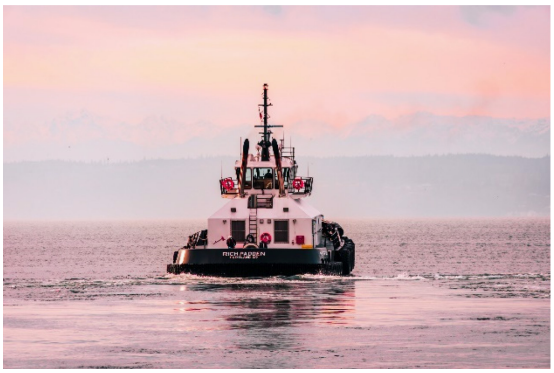
many states also have one or more environmental protection agencies.

States with air quality issues may also have air resource boards that govern the entire state, or smaller air quality management districts with a purview over individual air sheds. The U.S. EPA keeps a list of links to each state's health and environmental agencies, at ***https://www.epa.gov/aboutepa/health-and-environmental-agencies-us-states-and-territories*** This can be a useful starting point for initiating contact with relevant local environmental agencies.

The U.S. EPA maintains NAAQs, a set of air quality standards for pollutants that are harmful to public health and the environment. If a county or part of a county in the U.S. is not meeting one or more of the standards, it is designated as a "non-attainment" area for that pollutant. The agency overseeing air pollution in that area submits a state Implementation Plan to the EPA outlining the steps they are taking to reach attainment. Once an area reaches attainment, its status changes to "maintenance."

If a marine highway project is located in a non-attainment area or maintenance area for, say particulate matter or ozone, the project team could obtain funding for the project if it reduces diesel particulates or nitrogen dioxide. This could come in the form of repowering a tug boat with a newer engine, installing emission reduction devices, or a subsidy for buying better, more expensive, fuel.

The EPA keeps a Green Book with information about NAAQS. It includes a database and maps of each state showing which counties are in non-attainment for each pollutant. These maps are updated quarterly and can be found at ***https://www.epa.gov/green-book/green-book-map-download.***



Appendix A – Glossary of Terms

Administrator – The Maritime Administrator of MARAD at the USDOT. The Administrator is responsible for administering the U.S. Marine Highway (USMH) Program and making route and funding recommendations to the Secretary.[1]

Alaska Native Corporation – Any Regional Corporation, any Village Corporation, any Urban Corporation, and any Group Corporation, as those terms are defined under Section 3 of the Alaska Native Claims Settlement Act (43 U.S.C. 1602). [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]

Cargo – Goods that are 1) contained in intermodal containers and loaded by crane on the vessel; 2) loaded on the vessel by means of wheeled technology, including roll-on roll-off cargo; 3) shipped in discrete units or packages that are handled individually, palletized, or unitized for purposes of transportation; 4) bulk, liquid, or loose cargo loaded in tanks, holds, hoppers, or on deck; or 5) freight vehicles carried aboard commuter ferry boats. Neither weight nor proportionality are considered under this definition. The term as used in this context is generally interchangeable with the term "Freight".[1]

Carrier – A firm that transports goods or people via land, sea or air.[6]

Documented vessel (or "U.S. Documented Vessel") – A vessel documented under 46 U.S.C. chapter 121

Drayage – Transporting of rail or ocean freight by truck to an intermediate or final destination; typically, a charge for pickup/delivery of goods moving short distances (e.g., from marine terminal to warehouse).[6]

Elasticities – Ratios of performance advantage to change in market share capture.

Endorsement letter – A letter that merely indicates support for a proposed project; it does not impart any further responsibility or involvement of the Route Sponsor in the project.

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.

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 *Metropolitan Transportation Plan (MTP*) indicates all of the transportation improvements scheduled for funding over the next 20 years**.** The plan conforms to regional air quality implementation plans and be financially constrained.[2]

Marine Highway Project or USMH Project – The project for which the applicant is seeking USMH program funding. Eligible projects or elements include equipment, infrastructure and *U.S. Documented Vessels*. The project must be part of an existing or proposed *Marine Highway Service* and must serve a designated *Marine Highway Route*. A USMH project should 1) provide a coordinated and capable alternative to landside transportation; mitigate or relieve landside congestion; promote marine highway transportation; or use vessels documented under Chapter 121; and 2) develop, expand, or promote *Marine Highway Transportation* or *shipper* use of Marine Highway Transportation.[1]

Marine Highway Route or USMH Route – A Marine Highway Transportation Route previously designated by the Secretary.

Marine Highway Transportation – The carriage by a documented vessel of cargo (including such carriage of cargo and passengers), if such cargo is: 1) contained in intermodal cargo containers and loaded by crane on the vessel; loaded on the vessel by means of wheeled technology, including roll-on roll off cargo; shipped in discrete units or packages that are handled individually, palletized, or unitized for purposes of transportation; bulk, liquid, or loose cargo loaded in tanks, holds, hoppers, or on deck; or freight vehicles carried aboard commuter ferry boats; and 2) is loaded at a port in the United States and unloaded either at another port in the United States or at a port in Canada or Mexico; or loaded at a port in Canada or Mexico and unloaded at a port in the United States.

Marine Highway Transportation Route Sponsor – The requester of a Marine Highway Transportation Route designation or modification of a designated route approved by the Secretary.

Marine Highway Transportation Service or USMH Transportation Service – The overall Marine Highway Service and operation that is proposed, expanded, or promoted by the *USMH Project*. The service must have a point of origin or destination on a designated *USMH Route*.

Maritime Administration (MARAD) – The agency within the USDOT responsible for America's waterborne transportation system. Its programs promote the use of waterborne transportation and its seamless integration with other segments of the transportation system, and the viability of the U.S. merchant marine. The MARAD works in many areas involving ships and shipping, shipbuilding port operations, vessel operations, national security, environment, and safety. [1]

Metropolitan Planning Organization (MPO) – Regional planning body, required in urbanized areas with a population over 50,000, and designated by local officials and the governor of the state. MPOs are made up of representatives from local government and governmental transportation authorities. The purpose of the MPO is to serve as the region's transportation policy-making organization. MPOs are responsible for distributing federal transportation funds to their regions. [2]

Metropolitan Transportation Plan (MTP) – The official multimodal transportation plan addressing no less than a 20-year planning horizon that the MPO develops, adopts, and updates through the metropolitan transportation planning process.[2]

Navigable Waterways – Over 25,000 nautical miles of navigable waterways including rivers, bays, channels, the Great Lakes, the Saint Lawrence Seaway System, coastal, and open-ocean routes. These passages are deep, wide, and slow enough for a vessel to pass. [1]

Notice of Funding Opportunity (NOFO) – A formal announcement notifying applicants the U.S. DOT and MARAD are accepting grant application submissions for a designated period.

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.[6]

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

Pre-Development Phase – All the preparatory work necessary before the actual development or construction of a project begins. It lays the groundwork by addressing regulatory requirements, assessing environmental impacts, evaluating technical feasibility, and creating initial design concepts. This phase includes planning, feasibility analysis, revenue forecasting, environmental review, permitting, preliminary

engineering and design work, and other preconstruction activities.

Program Office – Office of Ports and Waterways Planning.[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 Applicant – A public entity with operations, or administrative areas of responsibility, that are adjacent to or near the relevant route that applies for designation of a marine highway project pursuant to this part. Eligible applicants include state governments (including state departments of transportation), metropolitan planning organizations, port authorities, U.S. territories, local/tribal governments, and private sector Operators or Owners of facilities including an Alaska Native Corporation (private sector owners/operators must have endorsement letter from the current marine highway sponsor).[1]

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.

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.[5]

Regional Transportation Planning Organization – Also called Regional Planning Organization (RPO). An organization that performs planning for multi-jurisdictional areas. MPOs, regional councils, economic development associations, and rural transportation associations are examples of RPOs.[2]

Secretary – means the Secretary of Transportation.[1]

Shipper – The Beneficial Cargo Owner (BCO), i.e., the party that ultimately owns the product or cargo being shipped.[1]

Statewide 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 should be consistent with the long-term transportation plan, should conform to regional air quality implementation plans, and should be financially constrained (achievable within existing or reasonably anticipated funding sources).[2]

Transport Modes –The movement of freight by type of conveyance: a. inland surface transport (rail, road, and inland waterway); b. sea transport (coastal and ocean); c. air transport; d. pipeline; and e. space transport. The majority of dry bulk and containerized freight moves domestically via surface modes (truck, train and barge) to/from inland locations. Liquid bulk freight primarily moves via pipeline and high-value and/or time-sensitive freight is transported via air modes.

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 an MPO. The TIP is often developed in cooperation with state and public transit providers and should 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 MTP.

United States Marine Highway (USMH) Program – A "Marine Highway" transportation program authorized by Congress through 46 U.S. Code § 55601 that encourages the use of marine transportation to reduce freight and passenger travel delays caused by congestion, reduce greenhouse gas emissions, conserve energy, improve safety, and reduce landside infrastructure maintenance costs. The USMH Program promotes Marine Highway Transportation by designating marine highway routes and projects that relieve congestion on America's roads and railways. Marine highway designations are intended to assist the maritime industry in meeting national freight transportation needs. The key elements of the program include the use of marine highway routes and projects through the development and expansion of:

- U.S. documented vessels,
- shipper utilization,
- port and landside infrastructure, and
- marine transportation strategies by state and local governments. [1]

Note: Sources for the glossary include (1) www.marad.dot.gov, (2) https://ops.fhwa.dot.gov/publications/moguidebook/app_d.htm, (3) www.investopedia.com, (4) www.fhwa.dot.gov, (5) www.msrb.org, and (6) https://ops.fhwa.dot.gov/freight/fpd/glossary.

Appendix B – Project Profiles

These project profiles represent a range of marine highway projects, some of which are successful and others that were terminated or never initiated for various reasons. The profiles included are not meant to be an exhaustive list, rather a sampling of the myriad of marine highway projects that have been pursued at ports across the U.S.

JAMES RIVER BARGE EXPANSION

Inactive: Container-on-barge service expansion for a Marine Highway Project

Location: Norfolk and Portsmouth, VA to/from Richmond, VA

Marine Highway Route: M-64

Cargo Type: Containers

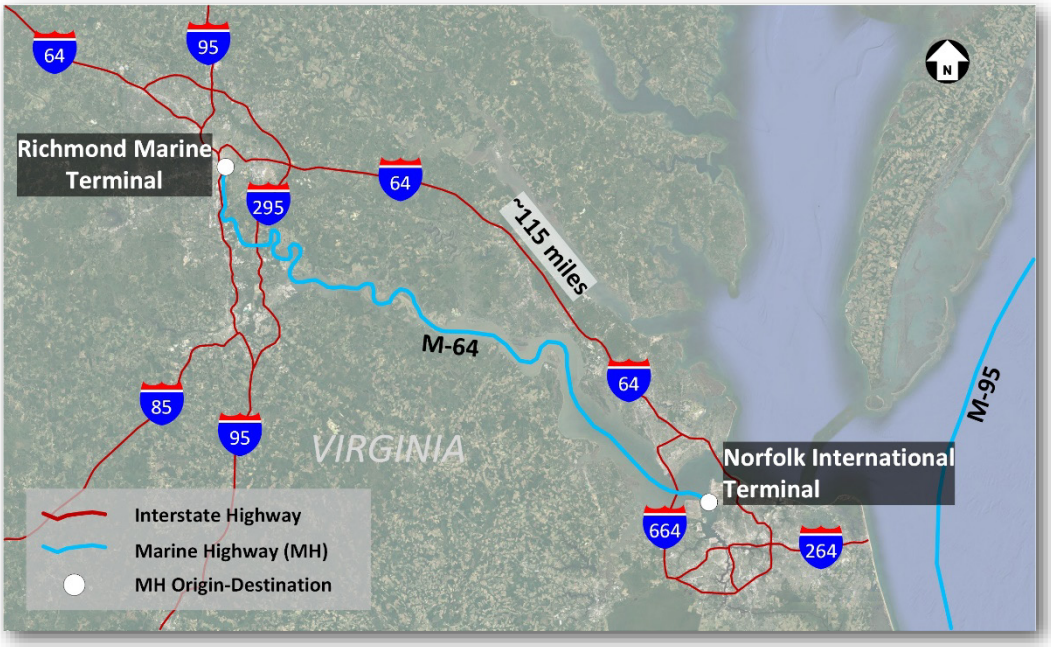
Frequency: Five sailings per week

Project Owner: Virginia Port Authority (VPA)

Description: The James River Barge Line, or M-64 Express, container-on-barge service moves containerized cargo between the marine facilities at Hampton Roads, specifically the Norfolk International Terminal (NIT), Virginia International Gateway (VIG) and Portsmouth Marine Terminal (PMT), and Richmond Marine Terminal (RMT) (formerly known as the Port of Richmond). The service is managed and operated by Virginia International Terminals, the terminal operations subsidiary for VPA.

The M-64 Express service started with only 5 containers in its first trip to RMT. The terminal was not generating enough revenue at that time, and it was proposed that the property should be converted to waterfront condominiums to generate revenue for the City of Richmond. Once the barge service started, various warehouses and distribution centers were developed around the property, which eventually led to increase in container volumes arriving to RMT via barge service.

There are two barges that service the route in opposite rotation. A barge is loaded with imports at NIT or PMT, on Mondays, Wednesdays, and Fridays and subsequently embarks on a 12-hour journey to RMT. When the barge arrives at RMT, it is unloaded and then loaded with export cargo. The barge full of export cargo departs from RMT on Tuesdays, Thursdays, and Saturdays, making its way back to Hampton Roads marine facilities.



There are several planned expansions to the M-64 Express container-on-barge service to help the M-64 express meet growing

demand. These projects fall under the purview of the VPA's James River Container Expansion Project. The project is geared towards increasing service frequency and initiating a container shuttle service between four terminals in the Hampton Roads vicinity. MARAD has recognized the James River Container Expansion Project as an USMH project.

Project Stakeholders (Entities Involved):

- VPA
- James River Barge Line (Norfolk Tug Co.)

Goals and Objective:

- Alleviate congestion from I-64 and local roads by transporting more containers via the James River
- Make use of existing, under-utilized waterfront asset and generate revenue

Study Condition:
The containers from Norfolk and Portsmouth, travelling to Richmond, use I-64 which is a major thoroughfare. In 2017, a Virginia Department of Transportation (VDOT) news release stated that the Hampton Roads Bridge Tunnel (HRBT), which connects Norfolk and Virginia Beach to Hampton and Newport News, serves about 100,000 vehicles per day. The HRBT was originally constructed to handle 70,000 vehicles per day. Hence, any reduction in truck traffic due to the marine highway project would help the already congested roadway network. The M-64 Express project became operational in 2008 and is now expanding to meet the growing demand.

Market/Opportunity:
The project increased container cargo handling at RMT, which attracted various warehousing and distribution centers near the terminal. This helped the City of Richmond, as it provided increased tax revenue and workforce development. It also reduced congestion on I-64 but shifting cargo off the road and on to the barge.

Needs and Requirements:

- Higher capacity barges are needed to carry more containers on a single trip.
- Additional barges should be added to the service to increase the frequency of service.
- Adequate cargo handling equipment at RMT will allow for faster and efficient operation.

Stakeholder Engagement:
Various public and private stakeholders collaborated to initiate the service and has kept it operational and one of the most successful USMH projects. VPA and RMT collaborated with Norfolk Tug Company in order to have a seamless operation of the barge service.

Public entities such as the Richmond Regional Transportation Planning Organization (RRTPO), MARAD, and VDOT were also involved in setting up the barge service.

Project Performance:
Service along the M-64 Express began in December 2008 and has since grown considerably. Initially, barges would only traverse the route once a week until service was eventually expanded to thrice a week and subsequently to five days a week to meet burgeoning demand. In its first year of operation, the M-64 express service moved more than 6,000 containers.[4] It is estimated that the service now moves 45,000 TEUs annually with an average of 800 container moves per week.

In 2017, new barges were added to the service which allowed containers to be spaced adequately such that loading/unloading does not scrape the sides. These new barges provided better operational configuration.

Impacts:
Social: The M-64 Express service is considered one of the most successful barge programs in the nation. The program has successfully reduced

[4] ***https://pilotonline.com/business/ports-rail/article_6241be4c-95d5-5143-b856-a513ed0edfef.html***

more than 12,000 truck trips in its first year. This helped reduce congestion and increased safety along the I-64 route.

Environmental: The service saves about 30 gallons of fuel for containers moved via barge compared to its truck trip via I-64. This account for emission reduction of about 14 percent in NOx, 45 percent in CO, 55 percent in PM10 and PM2.5, and 35 percent in CO2.[5]

Economic: The service, in 2016, reduced about 15,000 truck trips which translates to reduction in external costs such as highway maintenance costs due to pavement damage; value of time lost to traffic congestion; losses from injury, mortality, and property damage due to accidents.

Funding Approach and Sources:
The M-64 Express and James River Container Expansion Project receive funding from a variety of sources:

- In 2008, the program received a $2.3M grant from the RRTPO, which was provided over three years, to help the service get started. The grant was utilized to start the container-on-barge service and keep the service competitive by subsidizing its price.
- In 2010, the program received a $1.1M USMH Grant, which helped purchase new barges and material handling equipment.
- In 2016, the program received a $477K grant from MARAD for purchase of a generator and forklift to facilitate the transfer of refrigerated containers by barge.
- In 2018, the program received a $456K grant from MARAD. The grant was used to perform barge repairs and purchase a heavy forklift for improved container handling.

Duration/Status:

The project started in 2008 and currently undergoing expansion so that it can add more handling capacity for its growing demand.

Related Links/Articles:

- ***https://pilotonline.com/business/article_b62ece9a-d498-572d-9fa8-27b5be983573.html***
- ***http://www.ctb.virginia.gov/resources/2010/march/cm3_marinehighway_03172010.pdf***
- ***https://www.richmond.com/business/rollin-on-the-river/article_02f275be-c9fe-535a-aa19-126d52eccb71.html***

[5] ***http://www.p3virginia.org/wp-content/uploads/2016/02/High-Level-Screening-Report_Richmond-Marine-Terminal_2.1.2016_FINAL-FOR-POSTING.pdf***

NEW YORK HARBOR CONTAINER AND TRAILER-ON-BARGE SERVICE

Active: Container-on-barge service in New York Harbor marine highway project

Location: New York Harbor, NY/NJ

Marine Highway Route: M-95

Cargo Type: Containers and Trailers

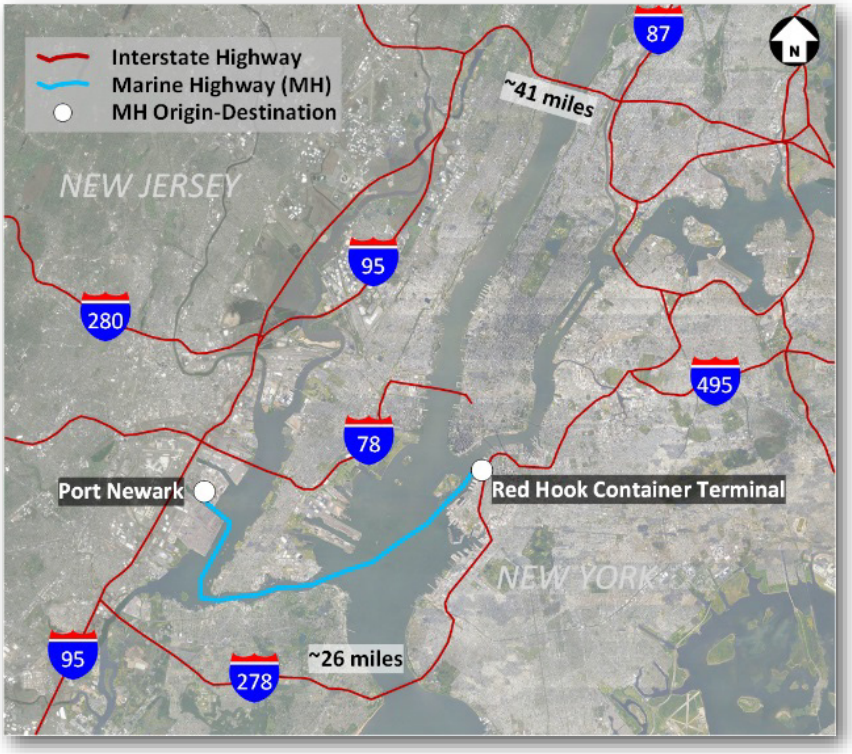
Frequency: 3-4 times per week, depending on volume.

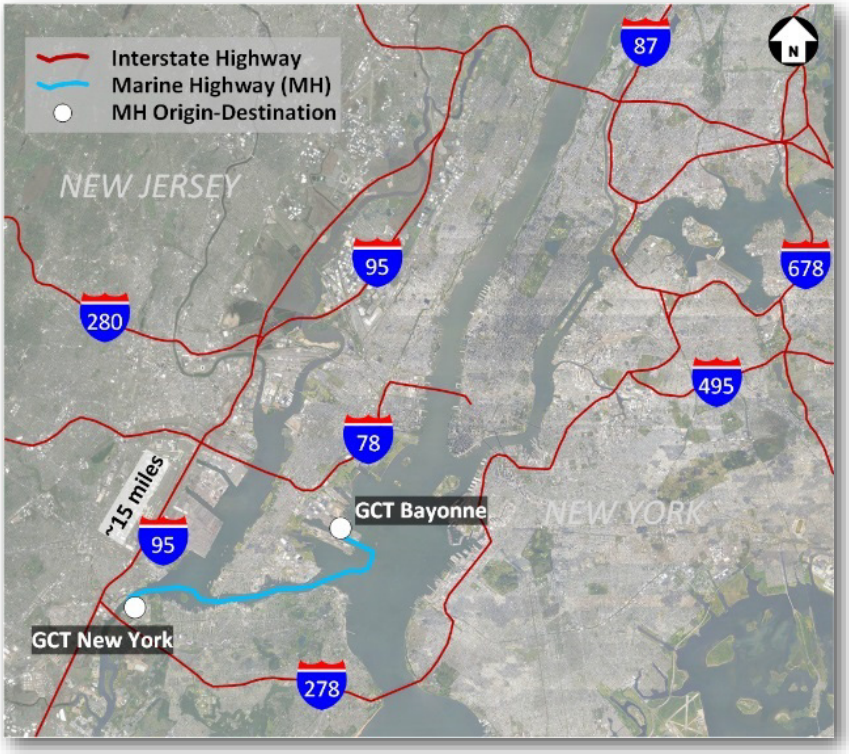
Project Owner: Port Authority of New York and New Jersey (PANYNJ)

Description: The two container-on-barge services in the New York Harbor are the Red Hook Cross Harbor Barge Service and the Global Container Terminal (GCT) Service. The Red Hook Cross Harbor Barge Service is a container-on-barge program that connects Red Hook Container Terminal (RHCT) in Brooklyn, NY, to the Red Hook Barge Terminal in Newark, NJ. The service operates three to four times a week depending on volumes and vessel schedules at Port Newark Container Terminal (PNCT).

The container-on-barge service between GCT in Bayonne, NJ, and the GCT in Staten Island primarily moves empty containers between the terminals to better utilize available storage area at GCT NY.

The New York Harbor Container and Trailer on Barge Service is an USMH Project. One of the recent expansions to this service is the inclusion of a new route that provides access to origins and destinations in the East Hudson River, particularly for freight arriving and departing from the PNCT.





Project Stakeholders:

- PANYNJ
- New York City Economic Development Corporation
- Columbia Coastal Transport

Goals and Objective:

- Alleviate congestion from highways and local roads around New York City boroughs.
- Reduce emissions caused by movement of trucks between New Jersey and New York for cargo transport.
- Reduce infrastructure maintenance cost for highways by taking trucks off the road.
- Provide faster and cheaper service to move cargo to Brooklyn, Queens and Long Island; rather than moving by road through New Jersey and New York.

Study Conditions: The container-on-barge service at RHCT became operational in 1991 and has been expanded. Recently, a new service between PNCT and RHCT was launched, which will move containers on barge between the two terminals and reduce truck traffic and pollution in and around them. The new service will provide a capacity up to 400 TEUs per barge.

Market/Opportunity: The partnership between Red Hook Terminals, MSC shipping line and PNCT will help in expanding the barge service in the NY harbor. The new expanded service is projected to move thousands of containers between Newark and Brooklyn.[6]

Needs and Requirements: The service, in order to stay efficient and competitive, will need to determine other possibilities of expansion in and around NY harbor.

Stakeholder Engagement: The service required multiple stakeholder to be involved prior to the start of the service in order to make the service a success. An agreement was signed between RHCT, MSC shipping lines and PNCT that assures availability of container volume.

An agreement was made with U.S. Customs and Border Protection so that the containers arriving at PNCT are loaded on to the barge and transported to Red Hook in Brooklyn where customs' inspection is performed at the destination rather than at PNCT.

Project Performance: The Red Hook Cross Harbor Barge Service started in 1991 as a diversion from the Gowanus Expressway – a major truck artery – which was under construction at the time. From 1991 to 2017, the barge service moved over a million containers and eliminated two million over-the-road truck trips.[7]

Impacts:
Social: The service, thus far, has removed thousands of containers off already congested interstate and city roads in greater NY metropolitan area. This has provided better quality of life and safer roads for public use.

Environmental: With fewer trucks moving between Newark to Brooklyn, the service has reduced emissions from those truck trips.

Economic: Moving containers via barge reduced gate transactions at terminals in New Jersey. This reduced truck wait time outside the terminal, which ultimately benefits truckers and help them pick up additional cargo.

Funding Approach and Sources:
The New York Harbor container and trailer on barge services have received federal funding from the following sources:

- In 2016, the Red Hook Cross Harbor Barge Service received a $1.6M grant from the MARAD to help improve service along the route. The funds were used to buying three simulators and two sets of interchangeable controls modules for ship to shore and yard crane operators to use. The training units were

[6] ***http://redhookterminals.com/***

[7] ***https://www.workboat.com/news/coastal-inland-waterways/boxed-in/***

commissioned in late 2017 and a training curriculum is in development.

- In 2018, the New York Harbor Container and Trailer on barge service was approved for a $300K MARAD grant to be used for a planning study to determine how marine highway services can be expanded through the Northeast region.

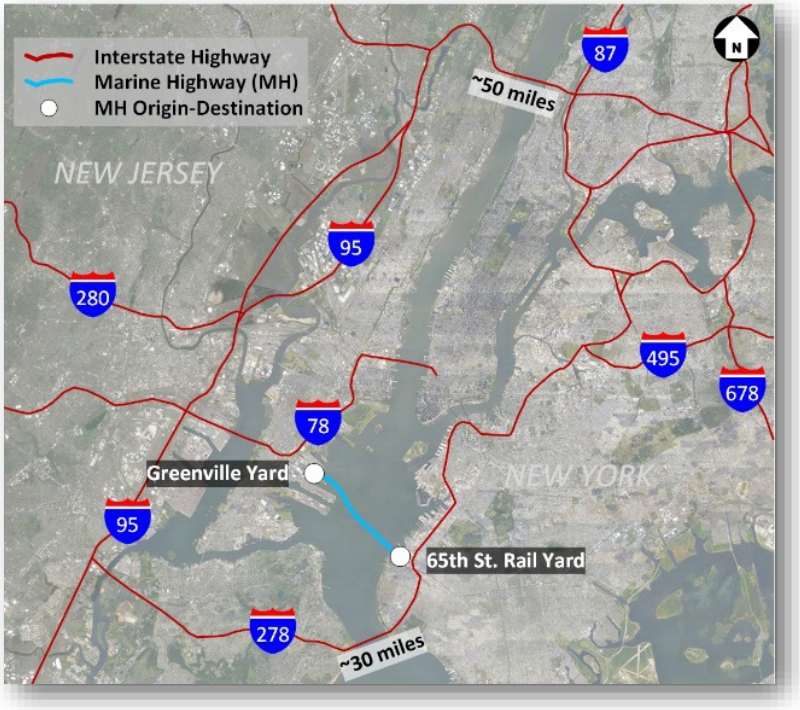
Duration/Status: The container-on-barge service in New York harbor started in 1991 with service between Newark and Brooklyn. An additional service was started between GCT Bayonne and GCT NY terminals. A new service was started in 2018 and is moving cargo between PNCT and RHCT in Brooklyn.

Related Links/Articles:

- ***https://www.workboat.com/news/coastal-inland-waterways/boxed-in/***
- ***https://www.joc.com/port-news/us-ports/port-new-york-and-new-jersey/container-barge-launches-across-ny-nj-port-harbor_20160914.html***
- ***https://www.maritime.dot.gov/newsroom/press-releases/maritime-administration-awards-48-million-grants***

TRANS-HUDSON FREIGHT CONNECTOR PROJECT

Active: Expansion for rail cars on barge service in New York Harbor marine highway project



Location: New York Harbor, NY/NJ

Marine Highway Route: M-95

Cargo Type: Rail Cars

Frequency: Twice a day

Project Owner: PANYNJ

Description: The Trans-Hudson Freight Connector is a cross-harbor rail float service that operates between the Greenville Yard in Jersey City, NJ, and the 65th Street Yard in Brooklyn, NY. The service primarily moves rail cars containing local lumber, building materials, food products, recycled materials, and other solid waste across the Hudson River. The service is operated by New York New Jersey Rail (NYNJR), which is a wholly owned subsidiary of the PANYNJ and operates twice a day all year.

Before a barge can depart on its journey across the harbor, it is prepared. This process starts when freight cars arrive at a rail yard. A conductor uses a locomotive to build a train and subsequently push it onto the rails on the barge. Barges are comprised of two parallel tracks and can hold up to 14 rail cars. In late 2017, the Port Authority received new floats with four tracks that can hold up to 18 rail cars. Once a barge is loaded, it is pushed by a tugboat to the receiving rail yard. This trip typically takes between 35 and 40 minutes.

Freight arriving at the 65th Street Rail Yard makes its way to the Fresh Pond Junction, on the New York and Atlantic Railway. From here it can either connect to the Long Island Railroad heading East, or to the CSX and Amtrak lines heading North into the Bronx. Freight arriving at the Greenville yard are put onto Conrail lines that provide a variety of freight connections in all directions.

The Trans-Hudson Freight connector project is an USMH project and is geared towards expanding the quality and capacity of its service.

Project Stakeholders:

- PANYNJ
- New York City Economic Development Corporation
- NYNJR

Goals and Objective:

- Alleviate congestion from highways and local roads around New York City boroughs.
- Reduce emissions caused by movement of truck between New Jersey and New York for cargo transport.
- Reduce infrastructure maintenance cost for highways by taking trucks off the road.

Study Conditions: The cross-harbor rail float service started in 1983 and was known as the New York Cross Harbor Railroad till 2006. The service has undergone a series of changes. Previously, the service ran from Greenville yard to the 51st Street Rail Yard in Brooklyn until operations at the latter were ended following super storm Sandy. Several

planned expansions and improvements to the program promise to increase service capacity.

Market/Opportunity: Congestion in and around NY-NJ bridges and tunnel, and regional dependency on trucking service provides opportunity to capture the freight bound to Brooklyn, Queens and Long Island, and help grow the rail car float service.

Needs and Requirements: For efficient and reliable operations, the service required upgrades to its landside infrastructure and new larger barges to hold more capacity.

Project Performance: In 2016, NYNJR moved about 3,400 railcars across the Hudson. It is estimated that once the expansions to the program are complete, the line will have a capacity of 24,000 railcars.

The project has received various federal and state grants that allowed repairs and upgrades to infrastructure and barges.

Impacts:
Social: The rail car float can handle 14 rail cars per barge trip (18 rail cars on new barges), which is equivalent to 56 semi-trucks (72 semi-truck for new barges) taken off the local roadway system. This helps lower the traffic from local congested street.

Environmental: NYNJR uses three Tier 4i SE10B locomotives for pulling and pushing rail cars on and off the barges. These locomotives have significantly reduced emissions compared to older locomotives.

Economic: The cost savings from the use of new locomotives and additional capacity of new barge can be transferred to customers and in turn provide economical alternate for moving cargo via the water route instead of trucks.

Funding Approach and Sources:
The cross-harbor rail float service has received the following funding:

- In 2016, PANYNJ received a FASTLANE grant of $3.9 million as part of 65th Street rail yard transload infrastructure improvement project, which includes extended dock, lighting, covered storage space and truck scale.
- In 2016, PANYNJ received a FASTLANE grant of $6.7 million to assist in construction of a lead track to improve yard efficiency at Greenville Yard.
- In 2017, NYNJR received a Passenger and Freight Rail Assistance Program grant of $1.6 million from NY State DOT as part of 65th Street Rail Yard improvement. The grant will assist in construction of a second lead track at the rail yard which will provide redundancy to current rail operations and will allow for increased throughput and operational flexibility.

Duration/Status: The barge service stated in 1983 and has undergone various expansion and enhancements. As part of the expansion project, in late 2017, NYNJR received first of the two barges that can carry up to 18 rail cars.

Related Links/Articles:

- ***https://untappedcities.com/2017/02/02/behind-the-scenes-at-the-floating-freight-rail-line-that-crosses-the-hudson-river-in-nyc/***
- ***http://aapa.files.cms-plus.com/SeminarPresentations/2015Seminars/2015FacEngineering/Pauling,%20John.pdf***
- ***http://www.railroadconstruction.com/projects/details/greenville-yard-float-bridge***
- ***https://gizmodo.com/a-rare-trip-on-the-floating-train-yard-of-hudson-harbor-1557809294***
- ***https://www.joc.com/port-news/us-ports/us-ports-set-receive-millions-improve-freight-fluidity_20160706.html***

GREEN TRADE CORRIDOR SERVICE

Inactive: Container-on-barge service from San Francisco Bay Area to California Central Valley

Location: Oakland, CA to/from Stockton, CA and West Sacramento, CA

Marine Highway Route: M-580

Cargo Type: Containers

Frequency: As needed

Project Owner: Port of Oakland and Port of Stockton

Description: The M-580 Green Trade Corridor container-on-barge service was initiated by the ports of Stockton, Oakland, and West Sacramento. The program was managed and operated by Savage Services. The route moved containerized cargo between the ports of Stockton and West Sacramento, and terminals at the Port of Oakland, specifically the Port of America Outer Harbor Terminal and Oakland International Container Terminal. The average transit time for a voyage between the Port of Oakland and the Port of Stockton was approximately 9.5 hours.

Project Stakeholders:

- Port of Oakland
- Port of Stockton
- Port of Sacramento
- Savage Services

Goals and Objective: Introduce a barge service between Oakland and the inland Port of Stockton could improve mobility, reduce congestion and emissions, create system redundancy/resiliency, allow for non-standard and heavier loads, create jobs, and spur the economy.

Study Conditions: The project started operations in May 2013 as a pilot project. It was discontinued after a year due to lack of cargo availability and high operations cost. The operational cost for barge was about $1,200 compared to $600-$700 for truck. This cost overrun was due to $20,000 berthing cost for the barge.[8]

Market/Opportunity: The weight limit on California highways does not allow movement of overweight containers on road. The loads have to split into multiple containers to fall under the weight limits. The Green trade corridor service can capture that cargo as barges can handle overweight containers and savings in shipping cost.

Needs and Requirements: The project needed specialized container barge, container cranes at the Port of Stockton and West Sacramento, construction of container staging area at Port of

[8] ***https://www.arb.ca.gov/gmp/sfti/sfpp/sfpp-035.pdf***

Stockton, transloading facility at the Port of West Sacramento, and installation of electrical connections at Port of Oakland for cold ironing.

Project Performance: While operational, the service provided 116 barge trips, moving 7,259 containers, and eliminating approximately 24,629 truck trips.[9]

Impacts:
Social: The green trade corridor service transported more than 7,000 containers and eliminated about 24,000 truck trips from I-580 making highway safer.

Environmental: The service reduced air emissions by 80 percent, which included elimination of about 6,000 tons of greenhouse gas emissions.

Economic: Freedom from weight limits allowed for more cargo to be stuffed in containers, which provides cost savings in terms of shipping cost. The pilot program also created about 45 maritime jobs.

Funding Approach and Sources:
The M-580 marine highway project was a $69.3M P3 that received federal funding through the following sources:

- In February 2010, the ports of Oakland, Stockton, and West Sacramento received a $30M TIGER grant to upgrade port facilities, and purchase the relevant equipment to transfer cargo

Duration/Status: Service along the M-580 started on the 16th of May 2013 to carry import and export cargo, specifically agricultural products and consumer goods, between the three ports. Initially, the service ran once a week until August 2014 when it was transitioned into an 'as needed' service due to poor demand. After over a year of operation, the service was essentially discontinued.

Lessons Learned:
Following the service's demise, the Program staff conducted a thorough after-action report. The findings from that report were called "Factors of Success." The lessons formed the basis of the 2014 Marine Highway Program Interim Rule in the Federal Register. The significant factors in the failure were the multiple terminal stops in San Francisco Bay and labor costs. The resultant cost per box was much higher than other modes.

Related Links/Articles:

- ***http://sjvpartnership.org/wp-content/uploads/2013/09/M580_Port-of-Stockton_villanuevajuan.pdf***
- ***http://dot.ca.gov/hq/tpp/offices/ogm/marine_hwy_project.html***
- ***http://www.dot.ca.gov/hq/tpp/offices/ogm/ports/Marine_Highway_Project_Fact_Sheet.pdf***

[9] ***https://maritime-executive.com/corporate/Port-of-Stockton-Transitions-M580-Marine-Highway-2014-08-11#gs.laxFrjM***

ALBANY EXPRESS BARGE SERVICE

Inactive: Container-on-barge service from New York Harbor to Albany, NY

Location: New York, NY to Albany, NY

Marine Highway Route: M-87

Cargo Type: Containers

Frequency: Twice a week

Project Owner: PANYNJ

Description: The Express-Barge service was a container-on-barge service that transported cargo from the Port of New York and New Jersey to the Port of Albany via the Hudson River. The service was operated by Columbia Coastal Transport and moved a variety of cargo including wood pulp, logs, and raw silicon. Imports accounted for 60 percent of cargo moved by this service while exports accounted for 40 percent.[10]

The service was a component of the PANYNJ proposed Port Inland Distribution Network that would include a series of multiple rail and marine highway transportation services between the Port of New York and New Jersey, and the Port of Albany. The Express-Barge service was not a designated USMH Project however it falls under the M-87 route description.

Project Stakeholders:

- PANYNJ
- Port of Albany
- Columbia Coastal Transport

Goals and Objective:
Reduce the travel distance for cargo transported between northeast Long Island, NY and New London, CT.

Study Conditions: The road congestion around the New York Metropolitan region and the state's capital, Albany, led to initiation of a container-on-barge service between the two ports.

Market/Opportunity: The shortage of truck drivers and increased congestion around both ports was an opportunity to gain market share for the express barge service.

Project Performance: During its three-year operational period, the express barge service handled about 8,500 containers, which is fewer than 30 containers per barge trip on a barge that could handle 240 containers. [11]

The primary reason was 100 percent of containers were returning as empty, compared to 10 percent container projected by the planners. Other reasons were non-commitment of shippers, and 50 percent to 75 percent higher transportation costs than what was projected.

The project, which started operations in 2003, started with twice a week service. Due to the lack of cargo, the service was reduced to once a week shortly after being operational.

[10] ***https://www.joc.com/maritime-news/whos-laughing-now_20040606.html***

[11] ***https://www.timesunion.com/business/article/Port-of-Albany-might-help-congestion-at-ports-5446973.php***

Impacts:
The project did not have any significant impact in terms of social, environmental and economics as it only averaged about 200 containers per month.

Funding Approach and Sources:
The Express Barge service has received the following funding:

- First two years of operation were subsidized by $3.3M grant from the federal CMAQ program.
- In 2003, PANYNJ contributed $1.2M that was used to pay a fee of $25 for each full container that the service would handle.

Duration/Status:
The Express-Barge service was first introduced in 2003 and operated only once a week until it was expanded to cater to demand twice a week. Despite heavy subsidization, the project faltered, eventually going out of service in 2006.

Lessons Learned:
This service, which connected the Port of NY/NJ to upstate New York, had significant freight volumes on the northbound leg but failed to develop a customer base for the southbound leg. Working with ocean carriers and beneficial cargo owners to develop freight may have provided the revenue needed to continue operations.

Related Links/Articles:

- ***https://www.timesunion.com/business/article/Port-of-Albany-might-help-congestion-at-ports-5446973.php***
- ***https://rosap.ntl.bts.gov/view/dot/8570/dot_8570_DS1.pdf?***

CHAMBERS COUNTY GREEN TRANSPORT TERMINAL PROJECT

Active: Texas container-on-barge service marine highway project

Location: Houston, TX to Cedar Port, TX

Marine Highway Route: M-146

Cargo Type: Containers

Project Owner: Chambers County

Description:
Jennings Short Sea Shipping and Green Transport Terminal Project is a container-on-barge service that moves cargo from the Barbours Cut container terminal at the Port of Houston, TX, to the barge dock terminals at the Cedar Port Industrial Park in Baytown, TX. The service primarily transports containerized exports of synthetic resins that are too heavy to carry by truck.

The service is operated by Richardson Stevedoring & Logistics. Richardson comprised of two tugs and six barges that services between Port of Houston terminals and company's barge docks near Baytown. The journey from the barge docks at Port Houston to the docks at Cedar Port, Baytown is typically two to three hours long. [12] The service moves approximately 2,000 containers per month.[13]

Project Stakeholders (Entities Involved):

- Chambers County
- Port of Houston
- Richardson Stevedoring & Logistics

Objective:

- Reduce the impact on roadways and communities due to anticipated increase in cargo with Panama Canal Expansion

Study Conditions: Container cargo arriving at Port of Houston's container terminals are destined to nearby major land-based distribution centers and industrial facilities. These containers, which are drayed by trucks, impact the road network in a negative manner and increase congestion and reduce service life.

Market/Opportunity: Major shippers such as Wal-Mart, Home Depot, Exxon Mobile, TBN Industries, steel manufacturing companies are located within 5-mile radius of Green Barge Terminal.

Needs and Requirements: Container handling equipment are needed at barge dock for efficient load and unloading of containers.

Stakeholder Engagement:
Richardson Group presented the case of marine highway transportation to a major shipper in the region that expressed a need of 1,000 containers per week.

A national retailer with warehousing in the Baytown area has also shown interest in the project.

Another major retailer is also seeking an all-water shipping alternative to exploit the Panama Canal Expansion.

[12] *http://www.nwk.usace.army.mil/Portals/29/docs/civilworks/navigation/annualmtg/US_DOT.pdf*

[13] ***http://aapa.files.cms-plus.com/SeminarPresentations/2015Seminars/2015MEDC/AMH%20Update%202%20pager%202_20_2015%20FINAL.pdf***

Project Performance: The project handles about 2,000 containers per month

Impacts:
Social: The project has reduced about 2,000 trucks per month from local and state roads allowing for less congested and safer highways.

Environmental: It is estimated that with reduction of 2,000 trucks per month, greenhouse gas emission has been reduced by about 1,500 tons per year.

Economic: With fewer truck trips, fuel savings of about 137,000 gallons per year has been achieved.

Funding Approach and Sources:
In 2021, the Chambers County-Houston Container on Barge Expansion Service was awarded a $3 million grant from the United States Marine Highway Program (USMHP). The grant was used to buy two barges to transport containers.

Duration/Status:
The project became operational in 2011.

Related Links/Articles:

- ***https://www.joc.com/maritime-news/resins-bolster-houston-container-barge-services_20170501.html***

U.S. Department of Transportation
Maritime Administration
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1200 New Jersey Avenue, SE
Washington, DC 20590

American Association of Port Authorities
1010 Duke St.
Alexandria, VA 22314

U.S. Department of Transportation

Maritime Administration

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