

EAST COAST MARINE HIGHWAY INITIATIVE M-95 STUDY FINAL REPORT



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PREPARED FOR:

East Coast Marine Highway Initiative Awarding Authority
New Bedford Harbor Development Commission
Maryland Port Administration
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Canaveral Port Authority
I-95 Corridor Coalition

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EXECUTIVE SUMMARY

In less than ten years, an estimated three billion more tons of freight will be carried by 1.8 million more trucks on roadways in the United States.



Truck and rail freight volumes will continue to grow along with the rising U.S. population and economy, and a strengthening global trade market.¹ Reliance on an overburdened U.S. land-based freight transportation system with limited additional capacity will impact the future movement of goods in domestic and global supply chains, productivity and competitiveness of the U.S. economy, and sustainability of the environment.

Domestic marine transportation services can play an important role in enhancing the capacity and performance of the U.S. freight transportation system. The growing recognition of the need to expand the marine freight network to relieve landside congestion has led to the development of the America's Marine Highway (AMH) Program. The AMH Program promotes the development of Marine Highway services, or short sea shipping, as an integral component of a broader multimodal network and an even larger continental transportation system that can deliver a variety of potential benefits, including:

- **Mobility** – relief from congestion and bottlenecks on roads and bridges and a reduction in vehicle miles traveled (VMT) on the nation's transportation system.
- **Environment** – lower air emissions and noise pollution from reduced VMT and train-miles and more modern, fuel-efficient vessels, as well as reduced fossil fuel consumption.
- **Public safety** – greater safety for the traveling public, stemming from fewer hazardous materials transported on roadways and less vehicular accidents as a result of reduced VMT.
- **Maintenance savings**– less need for maintenance of marine services and infrastructure relative to other modes. Diverted traffic also reduces the need for highway maintenance.

¹ AASHTO Unlocking Freight Report. July 2010, <http://ExpandingCapacity.transportation.org>.

- **Efficiency** – cross utilization of available transportation resources and system capacity for the betterment of the entire freight system.
- **Jobs** – new business to the nation's commercial shipyards in the construction of Marine Highway vessels and more high paying jobs in the shipbuilding, stevedoring, warehousing and service industries.
- **Resiliency** – reduced vulnerability to major supply chain disruptions from human or natural incidents by ensuring that more alternative routes exist for carrying cargo within the domestic distribution system.
- **Security** – additional U.S. flagged vessels and crews in commercial shipping to support the nation's merchant marine force and ready reserve fleet.

To realize the benefits associated with domestic marine transportation services and as part of the AMH program, the Ports of New Bedford, MA; Baltimore, MD; and Canaveral, FL; the New Jersey Department of Transportation (NJDOT); and the I-95 Corridor Coalition formed a cooperative East Coast Marine Highway Initiative Awarding Authority (ECMHIAA) and, with support from the U.S. Department of Transportation (DOT) and its Maritime Administration (MARAD), sponsored the East Coast Marine Highway Initiative (ECMHI) using FY2010 Marine Highway Grant funds.

The ECMHI seeks to advance services on the DOT-designated M-95 Corridor, which parallels Interstate 95. The Corridor (Figure ES-1) is intended to serve as a competitive, reliable and environmentally-responsible alternative to existing surface transportation modes carrying freight on the corridor.



The ECMHIAA commissioned the Parsons Brinckerhoff team to assess opportunities for services in the four representative port areas along the M-95 Corridor (New Bedford, MA; New Jersey; Baltimore, MD; and Port Canaveral, FL), in addition to investigating the opportunity for other services and logistics platforms along the East Coast.

FIGURE ES-1: MARINE HIGHWAY 95 CORRIDOR



Source: Parsons Brinckerhoff

While there have been numerous studies that assess the potential coastal shipping freight market in the Atlantic region, the ECMHIAA recognized the importance of defining the prospective costs, rates and service parameters of an emergent East Coast Marine Highway system that would ideally employ new and, in some cases, faster vessels.

Thus, the intent underlying this study was not primarily to derive a Marine Highway service from demand, but to provide the foundation for educated dialogue between stakeholders that will lead to the creation of a financial and operational environment under which services can thrive.

LITERATURE REVIEW

From the more than 250 documents and data sources reviewed by the study team to identify issues related to service development in the M-95 regional freight network, the following key conclusions emerged:

- Perception** - Domestic marine transportation operations have been viewed, generally, as uncompetitive to serve the U.S. intermodal freight market. Overcoming that perception is

part of the challenge facing the companies and entrepreneurs of new services.

- Comparative advantage** – The benefits and weaknesses of marine transportation should be acknowledged and addressed if the Marine Highway System is to become a more common element in American intermodal transportation.
- Market factors** – High volume freight flows are not the sole determinant in judging whether there is a market for Marine Highway services. Logistics decisions emerge from evaluating a number of crucial market and operational factors.
- Commercial viability** - Marine Highway operations need to provide reliable, cost competitive, financially sustainable, and modally integrated service that meets the frequency needs of a market accustomed to trucking and rail transportation service characteristics.
- Cabotage requirements** – U.S. laws such as Section 27 of the Merchant Marine Act of 1920, often referred to as the Jones Act, require services between U.S. ports to use U.S.-built, U.S.-owned, and U.S.-crewed vessels. Sources in the literature suggest the cabotage requirements offer clear benefits as well as possible challenges for startup services.²
- Government policy** - Public policy has a role to play for successful U.S. Marine Highway System development.

STAKEHOLDER OUTREACH

The team extensively interviewed shippers, transportation providers, and agencies to gather informed opinions regarding potential opportunities, considerations and obstacles for services. These stakeholders play key roles in the nation's supply chain, as well as the decision making processes required for services to occur.

The key findings from these discussions included:

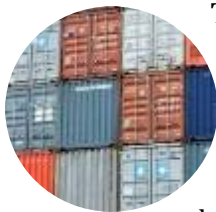
- Shippers and transportation providers need to be kept up-to-date and involved in the current state of thinking and modal development as it relates to the Marine Highway system.

² This study does not examine the merits of the Jones Act or suggestions that have been made to alter it. Rather this study assumes no change in the U.S. cabotage policy framework.

When informed about emerging vessel designs, the “dual use” concept,³ and federal studies, private companies became more engaged in discussions regarding potential uses of Marine Highway services.

- Early adopters/initial customers are likely to be those transporting less time sensitive, lower value, heavier products and/or hazardous materials.
 - These shippers focus on the cost, which must equal or be better than intermodal rail rates.
- Customers with more time sensitive and higher value commodity movements will consider services as they become more established. Key parameters that will influence their use of Marine Highway services include:
 - Frequency of service (twice weekly service is the minimum for most shippers)
 - Transit times (must be the same or better than intermodal rail)
 - Reliability (on-time, predictable service was paramount)
 - Service (the responsiveness of carriers and their ability to integrate their services with local pickups and deliveries)
 - Track record (established record of on-time and consistent service)
- Certain shippers of very high value, time sensitive products (e.g., pharmaceuticals) are unlikely to use Marine Highway services.
- While some form of public subsidy may be needed during the start-up phase, services should be self-sustaining.

MARKET ANALYSIS



The M-95 Corridor serves as a major conduit of international and domestic cargo flows between and among East Coast regions. The wide range of cargos that move through this corridor are influenced by a

variety of economic drivers, industry

³ Dual use is defined as ships in the U.S. domestic commercial marine shipping service that have defense features that qualify the vessels to be called into government service in times of a national defense emergency.

developments and service factors. In order to identify potential cargo volumes for future Marine Highway services, domestic commodity flows along the Atlantic Coast were filtered by:

- **Commodity type** – composed of potential containerized and/or trailerized goods.
- **Distance** - transported more than 400 miles to/from ports and market centers.
- **Density and balance** – higher volume cargo flows that are relatively balanced between regions and the identified ports.

Using these filters, the market analysis concluded that roughly 4.7 million tons of cargo could potentially be diverted to a Marine Highway service. This accounts for approximately 4,500 container or trailer loads per week of highway and intermodal rail freight moving along the I-95 corridor.

OPERATIONAL DEVELOPMENT

Vessel itineraries and service parameters, such as vessel speed, voyage time, service frequency, and terminal location were identified for nine potential Marine Highway services along the East Coast, connecting Mid-Atlantic ports with New England, Florida and/or South Atlantic ports.

Conceptual vessel designs prepared for MARAD under a separate AMH project were evaluated for potential M-95 services. The vessels are intended to be U.S. built, U.S. crewed and serve commercial trade in peacetime and able to support the military’s sealift needs in time of national emergency (dual-use).

The service costs associated with cargo handling, service management, the Harbor Maintenance Tax (HMT), and owning and operating suitable vessels that could provide regular service on the selected routes were calculated and evaluated in relation to the estimated potential cargo volumes. Four of the nine service options were selected for further assessment of viability based on the estimated average cost per load:

- **Option 1** – a short-haul loop linking New England and Mid-Atlantic ports, with a focus on New Bedford and Baltimore.
- **Options 2 and 3** – two long-haul East Coast routes linking New York or Delaware River markets with Port Canaveral and Miami, FL.

- **Option 5** – a “pendulum” serving both short and long-haul markets, linking New England, Delaware River/Chesapeake Bay, and South East ports.

Order of magnitude costs per mode (marine, rail, and truck) were developed for the four services to determine the competitiveness of proposed service alternatives. The costs for different transportation modes varied relative to one another depending upon distance traveled and specific port pairs involved in the service.

- While there were some exceptions to this trend, marine transit tended to be more cost effective than trucking for longer hauls (such as NY/NJ to Miami), with the opposite being the case for shorter hauls.
- Where rail transportation was available, it was typically provided at a cost less than the marine mode. However, rail and marine modal costs for routes greater than 1,000 miles were comparable.



BUSINESS PLAN AND VIABILITY

The business plan and viability analysis evaluated the prospective financial performance of the Marine Highway services by examining and quantifying:

- Competitive rates currently offered for truck and/or intermodal rail service,
- Minimum discount from those rates that would likely be required by M-95 shippers to justify switching to a new transportation mode,
- Corresponding rates an M-95 service could charge, and
- Weekly revenue an M-95 service could achieve predicated on volume and vessel utilization assumptions and sensitivity analysis factors.

A high-level profit and loss summary was created for each of the four service options, under a “base case” and alternative “favorable” and “unfavorable” sensitivities to test the financial impact of cargo handling fees, HMT exemptions, drayage costs, fuel charges, interest rates, etc. on profitability. Three levels of vessel capacity utilization were also considered for each alternative (25 percent of market share up to 90 percent vessel utilization, 65 percent vessel utilization and 90 percent vessel utilization).

The revenue to cost ratio per load for the selected best performing services ranged from 48 to 88 percent depending on the service, volume (utilization) and sensitivity case. Using fully utilized vessels and a favorable sensitivity, the weekly revenue was projected to be 48 percent of the service costs for the relatively short-haul New England – Mid Atlantic service and 49 percent for the extended East Coast pendulum service. The longer-haul services between New York/New Jersey or Delaware River to Florida had projected revenues that represented between 75 percent to 88 percent of costs depending on the vessel, upon applying favorable sensitivity and the highest utilization level.

These findings indicate that the identified M-95 services face challenges to become financially self-sustaining. However, services that are sustainable and commercially-viable (defined as having a revenue to cost ratio of 100 percent or better) may present themselves upon further analysis of the following characteristics:

- Encompasses a wider geographic scope (e.g. East and Gulf Coast),
- Transports heavier weight and/or hazardous cargos that garner higher rates for existing transport modes,
- Provides service between a maximum of three ports, and
- Employs dual-use vessels partially funded by the U.S. government.

The dual-use concept has both national defense benefits and cost-related benefits that would be valuable for developing Marine Highway services.

ENVIRONMENTAL ANALYSIS

An environmental screening of key issues that would need to be addressed in a programmatic National Environmental Policy Act (NEPA) analysis under MARAD’s AMH Program was performed for the potential M-95 services. Environmental laws applicable to the establishment and operation of M-95 services are aimed at managing and minimizing adverse impacts to resources such as air and water, to protect rare and important species and habitats, to manage development in potentially hazardous areas, to safely manage hazardous substances and cargos, and to protect to human population. The movement of cargo from land-based routes to coastal routes would have beneficial effects, but

may also have potentially adverse effects on the coastal marine environment. The key corridor-wide issues associated with M-95 services included traffic, underwater noise, air emissions, collisions with marine mammals, dissemination of invasive species and pollutant releases from accidents or routine maintenance.

The following measures could be used to minimize or mitigate adverse impacts resulting from M-95 services:

- **Noise** – Operational and engineered controls can mitigate noise impacts at port communities.
- **Air quality** – Low sulfur fuels and engineered controls (e.g. cold ironing) to reduce air emissions.
- **Threatened and endangered species** – Observance of speed restrictions and reporting requirements would mitigate impacts to threatened and endangered species.
- **Nonindigenous species** – Adherence to federal ballast water management regulations would minimize the dissemination of nonindigenous species.
- **Vessel collisions/accidental releases** - Vessel collisions and subsequent impacts to water quality could be minimized through compliance with ship reporting procedures, International Maritime Organization (IMO) traffic separation schemes and port plans.
- **Wetlands** – Impacts from increased wave action from ship traffic could be minimized/mitigated with speed restrictions.

CONCLUSION AND FINDINGS

Historically, each emerging freight mode in the U.S. has been conceived from necessity and vision, and then established with some degree of financial investment of public agencies. These initial investments in existing freight modes (rail freight, trucking, air cargo) and favorable governmental policies ultimately led to robust private sector supported operations.

Currently, the Marine Highway system in the U.S. is at a nascent stage of development, having significant potential to address social, economic, and environmental challenges faced by the nation's transportation network.

This report demonstrates that the potential M-95 services examined as part of this study face challenges to implementation at present. Service operating costs exceeded expected revenues by a minimum of \$150-200 per load on average along the highest performing routes, under the favorable sensitivity and highest utilization level.

In order to realize the full potential of the ECMHI, Marine Highway services must be cost competitive with existing goods movement options. No single strategy will accomplish this goal; rather the effort will require a comprehensive approach that involves multiple targeted strategies.

The following are cost reduction and/or revenue generating measures that, if implemented, could influence the financial viability of an M-95 service. The percentage allocation of costs is derived from the base case with 90 percent vessel capacity utilization.

- **Reduce cargo handling costs as a share of total operating costs.** Cargo handling accounted for 23-44 percent of total operating costs for the evaluated M-95 services. If these costs were lowered by roughly 25 percent, total service costs could be reduced by about \$35 to \$75 per load.
- **Reduce vessel capital costs through government cost sharing-** Vessel costs range from 13-25 percent of total service costs depending on the service pattern and vessel. A governmental cost share of one form or another equating to a 50 percent reduction in vessel capital costs would result in a reduction in overall M-95 service costs of 7-13 percent.
- **Increase rates as fuel costs rise over time.** Trucks are at least 70 percent less fuel efficient than domestic waterway vessels and trains are at least 25 percent less fuel efficient based on revenue ton-miles per gallon.⁴



⁴ Texas Transportation Institute, Center for Ports and Waterways, A Modal Comparison of Domestic Freight Transportation Effects on the General Public, prepared for the U.S. DOT, MARAD, and National Waterways Foundation, December 2007, p. 42.

If fuel prices increased by 30 percent, shipping rates could be increased by about eight percent, while still remaining competitive with rail and truck.

- **Reduce operating costs through use of liquefied natural gas (LNG) fuel** - The use of LNG fuel can reduce vessel-operating costs by about 30 percent, as well as benefit the environment.
- **Increase M-95 rates in relation to higher transportation rates for competing truck and rail modes** – As a result of truck driver shortages, highway/rail congestion and capacity constraints or other factors, an increase in the rates for competing modes would offer the potential for shipping rates to increase proportionally and still be competitive.
- **Create tax or other incentives to offset costs based on quantifiable public benefits** - M-95 user tax breaks, carbon credits, or other types of governmental funding could be offered to encourage shippers and logistics providers to opt for Marine Highway services. A tax credit of \$25 per load, such as the one applied in Virginia, would reduce total M-95 service costs by 2-5 percent.
- **Eliminate HMT on domestic moves of intermodal cargos** - This tax is estimated to represent about three to five percent of the cost of a service in this study, therefore the successful elimination of HMT applicability to cargos shipped aboard a Marine Highway service would result in an equivalent reduction in costs to the shipper.

The future value of services is not only contingent on cost; operational and policy factors also contribute to whether services could ultimately capture the necessary domestic volumes that will allow for viable services.

The criteria that can be used in identifying opportunities to improve freight system performance measures for M-95 include:

- **Volume and Capacity** - Cargo volumes should be sufficient to support frequent services and fully utilized vessels with both headhaul and backhaul cargo.

- **Cargo Type** - To support an initial customer base, service development should start by identifying niche markets and focusing on high weight and low value cargo that is less dependent on fast transit times and high frequency of service.
- **Frequency** – M-95 services should provide at least two published weekly vessel sailings, with three to five sailings being more favorable.
- **Reliability** - Cargo should move through the supply chain in a predictable and reliable manner regardless of weather conditions, seasonal peaks, and other variables.
- **Balance** - Balanced revenue moves contribute significantly to the viability of a service with headhaul cargo demand supported by return loads.
- **Distance** - The further the distance between port pairs, the more a service becomes a viable and cost-effective option. Longer haul services of 1,000 miles or more appear to have the greatest potential for success.
- **Location** - Terminals should be located to maximize service while minimizing costs and should be separate from international marine cargo operations.
- **Vessels** - Competitive coastal Marine Highway services will depend on new ships designed to meet present day and future efficiency and environmental requirements. The Defense and Transportation Departments are collaborating on an initiative that would address, in part, the need for recapitalizing the Ready Reserve Force fleet by encouraging dual-use vessel construction.
- **Partnerships** – Collaboration between federal, state and local public agencies and commercial stakeholders including Class I railroads and trucking companies will be invaluable toward defining common objectives and strategies and identifying appropriate policies to encourage Marine Highway System development.
- **Education** – A marketing/outreach program could educate public and private stakeholders on the AMH Program, the advancement of future vessels, the potential benefits and its significance as part of the future of freight movement.



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- **Environment** - The net environmental improvement, based on determinations of social benefit, will be a crucial issue for the development of services.
 - **Integrated Door to Door Service** - Marine highway services should be designed to integrate land and water modes.
 - **Customer Service** - Marine highway services should equal or improve upon the level of customer service provided by trucking and rail freight providers.

A self-sustaining Marine Highway service would contribute to the public benefits of reduced congestion on roads and highways, fewer greenhouse gas emissions, improved safety, and additional sealift military resources that support national defense. In addition, the initiative has the potential of stimulating the national economy and creating jobs from increased participation in domestic and international trade along Marine Highway Routes.

The advancement and integration of such a service is very much dependent on adjusting the financial conditions and interconnected operating and political environments that could positively affect Marine Highway System development.

To the same extent as it has provided developmental support in the past, the public sector has a vital role in ensuring the viability of domestic marine transportation to the point at which a service is feasible today or in the future.

The nation's transportation infrastructure and supply chain system is critical to the timely flow and continual supply of food, water, medicines, fuel and other commodities to U.S. citizens.

"Some seem to think that the nation is now built for all time and that we can continue to prosper without expanding our transportation system. They are wrong. ... We must invest to maintain and strengthen the American "Transconomy."
— 2010 AASHTO President Larry (Butch) Brown

In the face of the country's current and future transportation and freight mobility needs, domestic marine transportation has a promising role in an integrated and sustainable U.S. transportation system. However, its potential as a national resource is limited if it is not supported and strengthened by the nation's leadership.