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FINAL REPORT

M-55 Illinois-Gulf Marine Highway Initiative

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Prepared by:

The RNO Group, LLC
www.RNOGroup.com

In Cooperation with:

Reeve & Associates

Environmental Advisors & Engineers, Inc.

National Maritime Enhancement Institute

Prepared for:

MoDOT

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FINAL REPORT

THIS REPORT CONSISTS OF SIX SECTIONS

GLOSSARY OF TERMS

Air draft –The vertical distance between the water surface and the highest point on the front facing surface of a vessel. Also applicable to inland navigation when referring to the clearance between the highest point on a vessel and the underside of the lowest bridge/crossing over a specific waterway.

Barge – A non-mechanical vessel pushed/pulled by a tug boat and used for transporting goods on inland waterways, rivers, canals, lakes, etc. Typically flat bottomed, and capable of moving high volumes of cargo, while operating at a relatively shallow draft and slow speed.

Block coefficient – Used to interpret the hydrodynamic shape of a hull; a hull with a block coefficient close to 1 is shaped like a block and is the least hydrodynamic (e.g. barge). A V shaped hull is comparatively more hydrodynamic and would have a block coefficient closer to 0.5 (e.g. speed boat).

Capex – The abbreviation for capital expenditures.

Contestable cargo – A specific segment/share of a cargo/freight market that is highly probable/likely to be converted from one mode/carrier/service provider to another, if specific cost and service requirements are met.

Containers-on-barge (COB) – Intermodal containers carried on an inland barge, a practice which is more common in other parts of the world.

Deadweight – The amount (in tons) that a vessel can carry, including its cargo, fuel, crew, equipment, power plant, provisions, etc.

Deck barge – A barge with a flat deck commonly used for supporting marine construction activities and for transportation.

Displacement – The total weight of a vessel at any time or under any load. The measure varies depending on the amount (weight) of water it displaces. This amount is always greater than the deadweight of the same vessel.

Distiller grains (DDG) – A byproduct of the distilling process, historically associated with brewing plants, but recently also associated with ethanol production.

Draft – Refers to the depth that a vessel's hull submerges into the water when the vessel is floating.

Drayage – The transport of goods over a short distance, usually as part of a longer line-haul shipment.

Forty-foot equivalent unit (FEU) - Represents the cargo capacity of a forty-foot intermodal container.

Fleeting – The practice of staging fleets of barges at various points along an inland waterway, usually at main river junctures, where barge tows pick-up and drop-off barges on their way through; facilitates the process of building tows with more barges for moving on the Lower Mississippi River, and/or tows with less barges for moving on the Upper Mississippi River and other waterways where locks are prevalent.

Freight integrator – A transportation service provider that offers door-to-door services, handling/managing the entire transport and logistics process, often using its own equipment and resources to handle most/all of the transport process.

Gateway port – A port, typically located on a national coastline or river mouth, which acts as a port juncture where international shipments enter/depart a national market.

Genetically modified organisms (GMO) – Genetically modified organisms have had their DNA changed directly through genetic engineering practices. In this context, the term is applied to corn and soy products where the genetic materials have been altered for a variety of reasons, including boosting the yield, hardiness, resistance to pests/diseases, etc.

Gulf Intracoastal Waterway (GIWW) – The portion of the nation's navigable Intracoastal Waterway that spans the entire Gulf Coast from Florida to Texas.

High-cube cargo – Cargo with a high volume-to-weight ratio, which tend to cube-out before weighing-out when loaded into shipping containers, trailers or rail cars; meaning, they fill the cube space within a container before reaching the weight limit for the container.

Hook 'n haul – A term common to the transport field, but in this context, used to describe a process whereby a tugboat unhooks its inbound tow and immediately hooks an awaiting outbound tow so as to reduce the time the tugboat spends in-port.

Hopper barge – A barge with one or more compartments or bins used for holding and transporting bulk cargoes like grain, sand, coal, etc.

Hundredweight – A unit of weight equal to one hundred pounds (100 lbs.).

Identity preserved – Requirement to package and transport non-GMO grain separate from genetically modified (GMO) product, so as to preserve the identify of the non-GMO grain.

Knocked down (KD) – Refers to the process of breaking-down or disassembling a large unit of cargo into smaller pieces in order to facilitate shipment, or the break-down of consolidated parcels/shipments into individual units.

Lift-on/lift-off (lo/lo) – Refers to the process of using a crane to load or discharge cargo from a vessel. Can also be used to describe the vessel and/or the cargo.

Line-haul – The longest or primary segment(s) of a cargo move, typically between ports, cities, intermodal load-centers, distribution hubs, etc.

Lower Mississippi – The portion of the Mississippi River between the Gulf Coast and its confluence with Ohio River (Cairo, IL).

MAFI - The name of the manufacturer of the most widely used trailers and tractors for moving and shunting ro/ro cargo in-plants and ports, and their name has become the "XEROX" standard used in the industry since the 1960's.

Metric ton – The equivalent of 2,204lbs and/or 1,000kg. Increasingly being used as the measure of a vessel's displacement of water.

New-build vessel – A new and unique vessel design.

Non-Vessel Operating Common Carrier (NVOCC) - A transport service provider that functions like a carrier by issuing its own bill of lading or waybill, and assumes responsibility for the shipments, but does not own any vessels.

Over-the-road (OTR) – The transportation of goods over public highways.

Over-dimensional cargo – Cargoes that are too wide or too tall to fit onto regularly designed transport modes, requiring specialty transport vehicles, permitting and escorts for safe and legal transport.

Roll-on/roll-off (ro/ro) - Refers to the process of rolling cargo onto or off a vessel, including wheeled cargo such as automobiles, trucks, semi-trailer trucks, trailers or railroad cars. Can also be used to describe the vessel and/or the cargo.

Self-propelled barge – A barge used for inland transportation that has its own power plant, propulsion, navigation, steering, electronics, etc. They are more common in other parts of the world like Europe.

Tennessee-Tombigbee Waterway (Tenn-Tom) – An artificial and navigable waterway that runs from the Tennessee River on the border between Mississippi and Tennessee, to the junction of the Black Warrior and Tombigbee Rivers in Alabama.

Tow – A combination of barges lashed together, tied to a tugboat to push/pull the tow.

Tugboat (tug) – A boat specially designed to move other vessels by pushing or pulling them. Commonly found in harbors to maneuver boats and ships, as well as along navigable waterways pushing/pulling barges (the latter also referred to as a towboat or pushboat).

Twenty-foot equivalent unit (TEU) - Represents the cargo capacity of a twenty-foot intermodal container. Typically used to describe the cargo handling or throughput capacity of a container ship, port, rail intermodal terminal, etc.

Cargo or truck turns – Refers to the number of times a trucker or cargo carrier is able to make a two-way trip between two points, during a given time.

Upper Mississippi – The portion of the Mississippi River, north of its confluence with the Ohio River.

Vessel cut-off times – Refers to the latest possible time or date for getting cargo through the port gate, and on the port, allowing for adequate time to prepare the cargo and to clear documentation prior to loading onto a specific ocean vessel.

Yellow goods/machinery/equipment – Heavy industrial, construction and agricultural machinery and equipment, for which the color of choice used by the more well known producers, is yellow.

ABSTRACT

M-55 Marine Highway Corridor Study: The Heart of Illinois Regional Port District and Missouri Department of Transportation jointly sponsored the M-55 Marine Highway Corridor Initiative in order to develop marine intermodal transportation services on the United States' Mississippi and Illinois Rivers. As a part of that Initiative, a study was commissioned to identify regionally significant industries in the Peoria, Illinois area that would consider shifting their freight transportation providers from trucks to container or roll-on roll-off (Ro/Ro) marine vessels. Local equipment manufacturing firms and agricultural producers were identified as potential customers for a Ro/Ro or container-on-barge service, as their cargoes have dimensions or weights that are relatively expensive to ship over the road and may not fit with dimensions allowed on rail.

The study team developed a business and operational plan for a Ro/Ro and container-on-barge service with weekly departures that meets those shippers' service requirements. That business plan appears financially feasible if its vessel utilization forecasts are met. However its prospects for success would be improved by securing return cargoes for transport to the Peoria area (i.e., backhaul), developing a purpose built container vessel (i.e., self-articulated barges), and financing needed port equipment. Governmental assistance in designing and financing those vessels, as well in funding the needed port equipment, could expedite the deployment of a service along the M-55.

DISCLAIMER AND LIMITATIONS

This document is disseminated under the sponsorship of the M-55 Illinois-Gulf Marine Highway Initiative, through a cooperative agreement formed between the Missouri Department of Transportation and the Heart of Illinois Regional Port District. The cooperative agreement was funded by the U.S. Maritime Administration. The statements, findings, conclusions, and recommendations in this report are those of the researchers and staff, and do not necessarily reflect the views of any government agencies or organizations that funded the study. This report does not constitute a standard, specification, or regulation.

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Questions regarding this report or its contents should be directed to:

Arno Hart, RNO, ahart@rnogroup.com .

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Introduction

This section summarizes findings of the M-55 Marine Highway Corridor (M-55) Initiative study. The M-55 Initiative is a program to develop marine intermodal transportation services on the United States' inland waterway system involving the Mississippi and Illinois Rivers, and the Gulf Intracoastal and Tennessee Tombigbee Waterways. The objective of the initiative is to develop a cost-effective alternative to ground-based transportation for cargo movements that may be well served by marine intermodal transportation.

Overall Philosophy and Approach - The approach taken with this study, specifically the approach to the market and operational tasks, was to determine what the customer wants, and to define an operations plan that meets these needs. Conventional transportation studies have an end product in mind, and then determine what portion of a defined market would use the product. These types of studies are referred to as "modal diversion" studies, whereby macro based models are used to estimate market/modal diversion given specified mode shift assumptions and percentages in response to the predefined product. The methods used for this study represent a paradigm shift away from diversion studies. Potential customers located in and around Peoria, Illinois, were asked what it would take to win over their freight transportation business to a barge service. Moreover, a specific effort was made to estimate the number of weekly shipments that would be directly contestable if the desired container-on- barge service was put in place. These customer specific service requirements, and associated contestable cargo volumes, were used as a basis for defining a specific operational plan.

Summary of Results – The results of the M-55 study indicate that the prospect of operating a successful marine highway intermodal transportation service ("M-55 service") between Peoria, Illinois and the Gulf Coast is positive:

- The market analysis conducted as part of the study identified a specific set of niche market opportunities, specifically heavy construction, mining and agriculture equipment and containerized grains and soy (further referred to collectively as "grain").
- The operational analysis defined a network of three routes, the need for two types of services, specifically roll-on/roll-off ("Ro/Ro") and containerized, and barge equipment requirements.
- The environmental analysis identified sufficient information as a basis for conducting a full environmental impact statement, if needed during subsequent project efforts.
- The business plan determined that a Ro/Ro based service can be financially feasible if a lowest cost service is deployed to meet the customer's service requirements, and if it is targeted at the over-dimensional market niche. An unfavorable pricing environment and tight transit requirements currently undermine the feasibility of a container specific service.

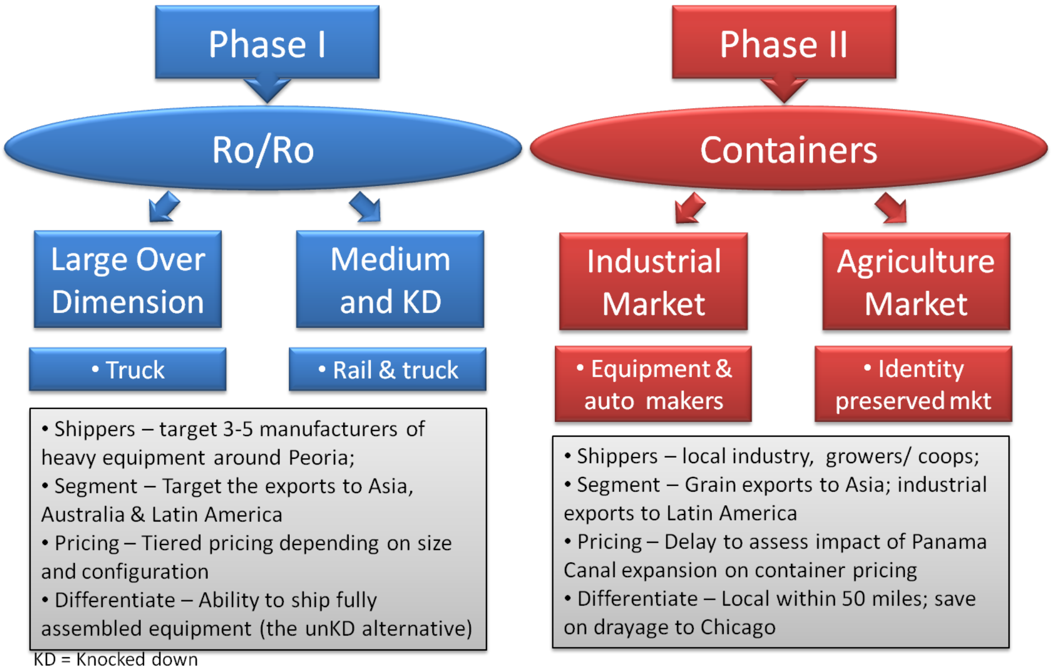
This document lays out a specific set of recommendations toward implementing the M-55 study findings.

Market Penetration and Development

Market penetration and development should be phased.

- **Phase I: Roll-on/Roll-off Market** – The Ro/Ro market presents the most immediate opportunity because of the concentration of a dominant group of Ro/Ro shippers in and around Peoria. Moreover, these shippers are increasingly exporting to overseas markets, particularly Asia, where pricing competitiveness is critical to their success. Transportation costs from Peoria are considered expensive, and since these costs impact the shippers' ability to compete in export markets they have sufficient motivation to cut these costs. The Ro/Ro transportation market presents unique pricing opportunities based on the size and configuration of the product being shipped, with the larger over-dimension cargoes presenting significant upside. The opportunity for success can be bolstered by differentiating from other modes as the "unKD" alternative, alluding to Ro/Ro shipments currently being knocked-down to be shipped, which would not be necessary with the barge service.
- **Phase II: Container Market** – The container market consists of a broader group of more diverse shippers, dominated by exporters of identity preserved grains and soy. The container-on-barge service will differentiate itself by directly serving customers within a 50-mile radius who will benefit from drayage savings over Chicago based rail intermodal operations. Pursuit of this market should be delayed until a more favorable container pricing regime evolves for transpacific container rates from the Gulf Coast to Asia. Introduction of a faster vessel (mono-hulled self-propelled barge) is introduced to reduce transit times, particularly northbound.

Figure 1: Market Development Phasing



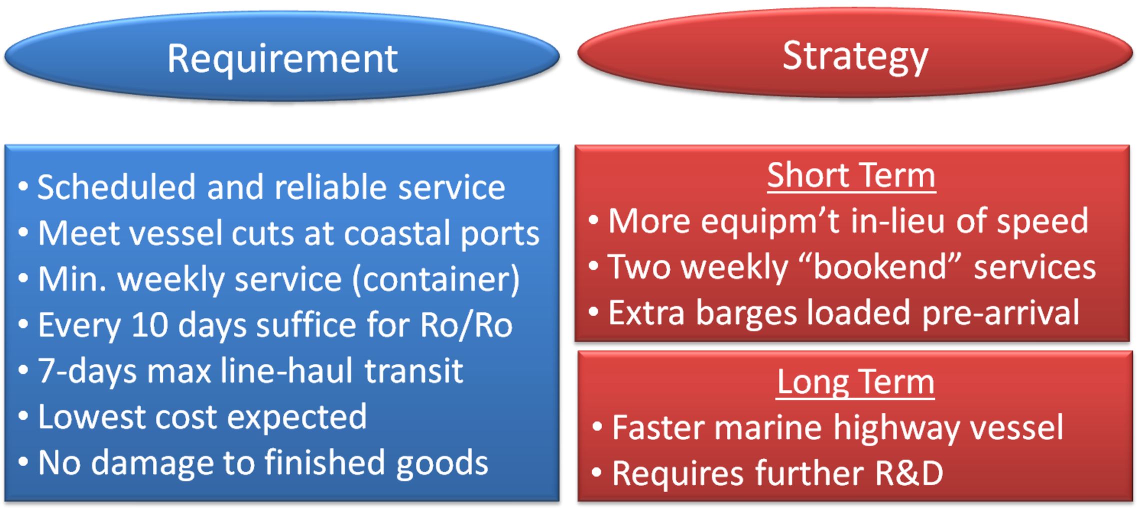
Service Requirements

Peoria shippers have specific service requirements that must be met before they will consider changing their transportation choice. The shipper requires a service that is scheduled to meet the vessel cut-off times in conjunction with ocean vessel sailings, with transit time of 5-7 days for containers and up to 14 days for Ro/Ro, while remaining the lowest cost alternative to truck and rail. Meeting these requirements is particularly difficult given the distance and the lack of a fast vessel designed to transport high-cube cargoes in the United States.

- **Short Term Strategy: Hook-'n-Haul** – Implement a service using the current bulk state-of-the-technology in waterway transportation. This will require a hook-'n-haul approach that over-capitalizes the amount of barge equipment – using three-times more equipment than what is normally used, so as to meet the service requirements. Deploy two weekly dedicated barge tows from either bookend of the route, with extra barges loading/discharging at each of the ports while the tows are in-transit. Tugs do not wait at the port while cargo is being loaded/discharged. They simply hook-'n-haul and keep moving so as to meet the once-a-week service window.
- **Long Term Strategy: New-Build Mono-Hulled, Self- Propelled Barge/Vessel** – A faster marine highway vessel should be designed for use on inland waterways. The hook-'n-haul approach using an unnecessarily high level of traditional bulk equipment unnecessarily penalizes the profitability and increases the working capital requirements of the service. The business plan analysis demonstrates that a service meeting Peoria's shippers' requirements can be financially viable and should be able to pay for

a new-build vessel. Given that this is a new market area, with uncertainty around the opportunity for a mass production version of a new-build vessel, the U.S. government might need to play a role in the initial design and construction of the new-build vessel.

Figure 2: Strategies for Meeting Service Requirements



Definition of the Network

The M-55 network consists of three routes.

- **Peoria to Galveston** – Because the Port of Galveston is the leading Ro/Ro port along the Gulf Coast, this route is the most suited for Ro/Ro service. Moreover, this is a major port-of-call for the leading Ro/Ro operator in the world, Wallenius Wilhelmsen Logistics (WWL) which is the preferred provider to essentially every one of the Ro/Ro shippers in and around Peoria.
- **Peoria to Houston** – Although the Ports of New Orleans and Mobile are geographically closer to Peoria, the Port of Houston is better suited for a container service because it is the largest container port along the Gulf Coast. Moreover, there may be synergies from combining the Galveston and Houston services, something that can only be confirmed once the service is in operation.
- **Peoria-New Orleans-Mobile Loop** – This route is analyzed as an alternative container service, because New Orleans and Mobile are closer to Peoria. The loop is also identified by barge pilots as convenient and easy to navigate northbound, especially with smaller tow configurations such as the M-55's hook-'n-haul tow.

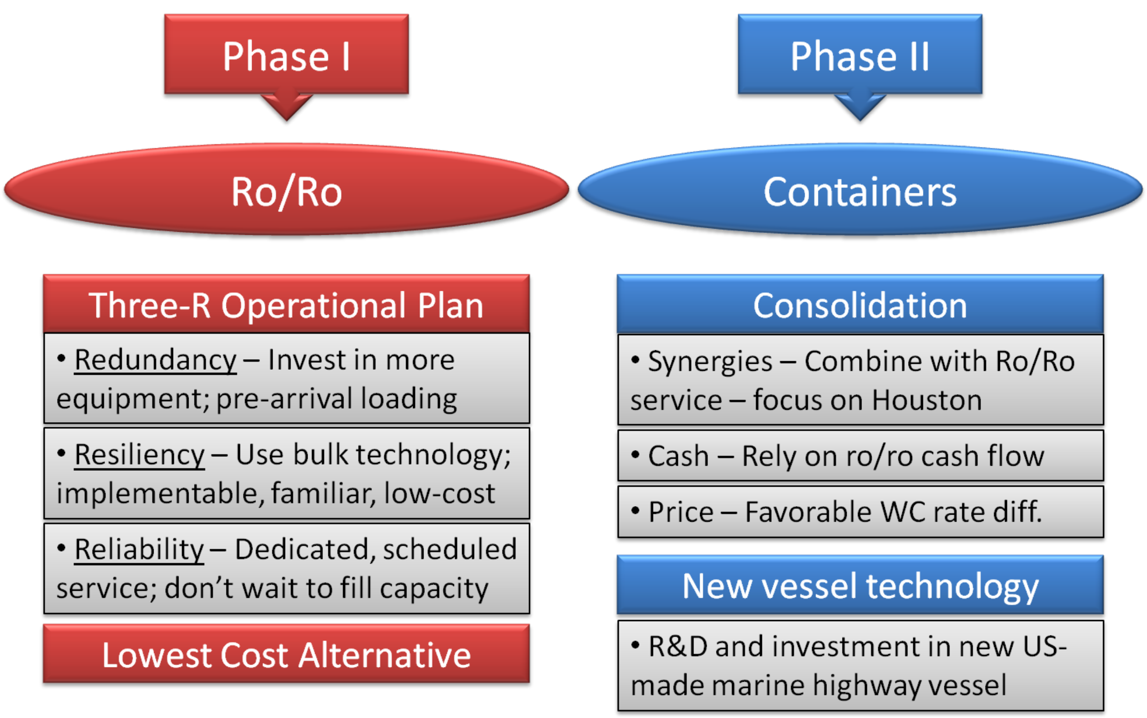
Figure 3: The Three Recommended Routes

Operational Development and Staging

The start of the M-55 barge operation should be phased as outlined in the market development strategy, starting with a Ro/Ro service, followed by a container service.

- **Phase I: Ro/Ro** – Based on the market development strategy, the first phase should be a Ro/Ro service. As the first mover, this phase will have to rely on existing equipment. The hook-'n-haul approach over-invests in more equipment than is normal, thereby increasing redundancy, uses resilient technologies that are familiar to the industry, is implementable and low cost, and is reliable by using dedicated equipment to run a scheduled service.
- **Phase II: Container** – The container operation should be timed to consolidate into the Ro/Ro service once the latter has reached positive cash flow. Consolidation with the Galveston Ro/Ro service has synergies with a Houston container service because of the proximity the two ports. The container service could also be launched in conjunction with the development of a pilot version of the new-build vessel.

Figure 4: Phased of Operational Development

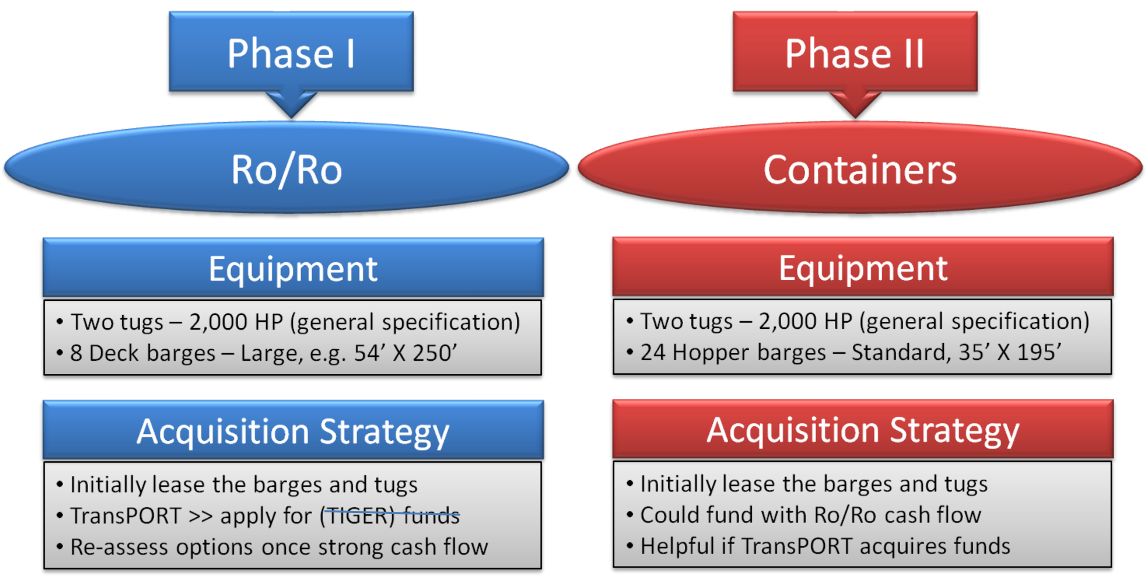


Vessel Acquisition Needs

The acquisition of vessels should be phased consistent with the market and operational strategies.

- **Phase I: Ro/Ro** – The barge equipment requirements include two 2,000 hp tugs(one in each direction,) and eight large deck barges, (54 feet wide by 250 feet long.) The equipment should be leased to reduce up front capital costs. Options for purchasing equipment should be re-assessed once the operation's cash flow situation stabilizes, and also in terms of potentially contributing toward the acquisition of a new-build vessel.
- **Phase II: Container** – In the absence of a new-build self-propelled barge, the container operation will need to be equipped with traditional bulk barges, like the Ro/Ro service. Two 2,000 hp tugs(one in each direction) and 24 standard hopper barges (35 feet wide by 195 feet long) should be leased. If a new-build vessel is available, the container service will be ideal for deployment. Ro/Ro
- **Port Equipment** – Addressed as part of the infrastructure investment requirements.

Figure 5: Phasing of Equipment Acquisition

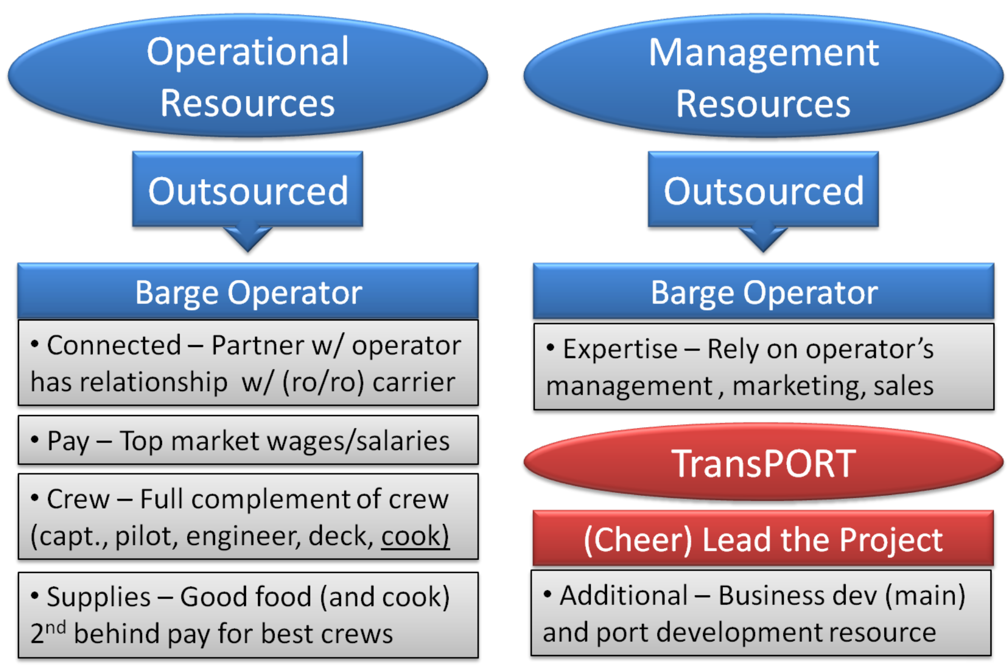


Resource Development Plan

The M-55 service should be managed and operated by an established barge transportation company.

- **Operational and Management Resources** – The M-55 service should be operated by an existing barge operating company with an established base of operations to help reduce the overhead associated with startup. The candidate must provide the management, marketing, sales, logistics and administrative staff to manage the service. The candidate operator should have the requisite expertise, a strong balance sheet and existing equipment (quicker ramp-up from startup). It will need to have existing relationships with major players throughout the supply chain (ocean carriers, trucking companies, port operators, freight forwarders and third party logistics service providers). In order to be reliable and cost-effective, the candidate operator should have a history of paying top-market salaries for crew. A full crew should include captain, pilot, engineer, deckhands and cook (many operators don't hire a cook, which impacts morale, and the reliability of service).
- **Business and Port Development Expertise** – The local project sponsor should consider hiring staff with additional business development capabilities, preferably personnel with a background in port development/management. Such a resource will be critical in managing the partners involved in operating the M-55 service, including relationships with the port operator, barge operator, local truck dray companies and ocean carriers.

Figure 6: Resource Plan - Outsource

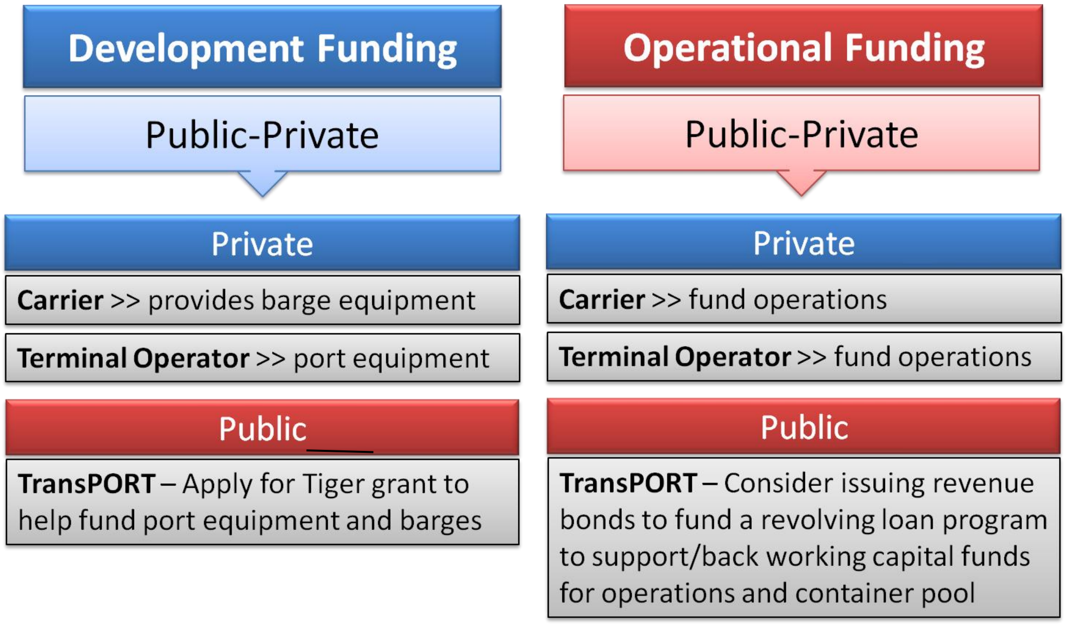


Sources of Funding

There are two areas involving funding, with shared roles for the private and public sectors.

- **Development Funding –** Since the operation is to be run by an established barge operating company, the private sector operator should take the lead in providing, or acquiring the necessary barge equipment. The business plan analysis, which includes the cost of leasing the tugs, barges and crews, concludes that the operation generates enough revenue to cover the vessel financing/lease costs associated with the operation. Likewise, the port terminal operator should take the lead in providing or acquiring the necessary port equipment such as cranes, etc. The business plan analysis includes a port capital funding program through receipts from a portion of the port handling fees, which was found to be sufficient to cover the cost of financing the port capital needs. The government may help fund the acquisition of barges, although it is uncertain whether discretionary grants such as the DOT TIGER grants will still be available at that time, or whether Peoria will be eligible for Congestion Mitigation and Air Quality funding by then.
- **Operational Funding –** The barge carrier partner should take the lead in funding working capital needs related to the operations. The business plan estimates this to be $2.5 million for the Ro/Ro service. While the Federal government typically will not fund working capital for private companies, there may be a role for the local project sponsor to consider issuing revenue bonds to fund a revolving loan program to support working capital needs associated with the barge operation. The port terminal operator should take the lead in securing operational funding to run the port, including the use of port handling fees.

Figure 7: Shared Funding Role for Public and Private Sector



State and Federal Policy Recommendations

There is a role for the Federal and State governments to provide policy driven support.

- **Federal – New-Build Monohull Self-Propelled Barge/Vessel** – As stated previously, there is a need for policies to support the design and construction of a monohull self-propelled barge/vessel for use on inland Marine Highway services. There are two aspects to this recommendation. The first is a research and development program aimed at the design, development and testing of a new vessel design, and the second is the creation of a program to facilitate the funding and construction of that vessel. The vessel design project should result in a hull design adept at moving high cube cargoes at relatively higher speeds through shallow draft water for inland waterways, the use of more efficient power plants (engines), and potentially the use of alternative fuels.
- **State – Tax Credit** – The local sponsor should consider promoting adoption of a state tax credit similar to the Virginia export port tax credit to local shippers who use local ports for shipping exports.

Figure 8: Examples of Potential State and Federal Policy Initiatives

Federal

Cargo Vessel

R&D >> to develop new class vessel designed for needs of customers likely to use next gen marine highway system

Build >> provide a loan program targeted at building a next gen US-made marine highway vessel

Links to Gulf/Caribbean Hubs

Policy >> identify barriers to direct links from interior ports to emerging transload hubs in the Carib./Gulf

State

Tax Credit

For Port Users >> consider a tax credit similar to the Virginia credit to local shippers (non-carriers) who use local ports for shipping export – export port credit

Port Infrastructure Investment Requirements

There are numerous port related investment requirements to be considered by the local project sponsor.

- **Port Operating and Cargo Handling Equipment** – The Port of Peoria will need to acquire equipment to handle the cargo associated with the M-55 services. These include reach stackers, terminal tractors and trailers, a straddle crane, grain to container bulk transfer equipment and fork lift trucks. The total estimated cost for acquiring this equipment is $3.5 million[1], based mainly on used prices. While the port terminal operator should take the lead in defining capital needs, as well as procuring the capital, there is a role for the local project sponsor to shepherd the process, and to provide funding assistance.
- **Other On-port Investments** – While the local project sponsor does not currently own or operate a port, it appears to be in the process of evaluating potential public/private port partnerships. During this process, several key on-port requirements need to be considered. The berth and water frontage must be designed to handle container, general cargo and Ro/Ro vessel operations. A paved access road, as well as adequate on-port paving for stacking and staging cargo, is recommended. Rail access onto the port, as well as onsite track, will be essential for the Ro/Ro cargo operation. Security related investments such as gates, fencing, and lighting are critical.
- **Access Constraints to the Port** – Ensuring access to the port for large over-dimension Ro/Ro cargo is critical. Specifically designated routes with unobstructed access for fully assembled Ro/Ro cargoes will need to identified, and these routes must coordinate with local and state levels of transportation and law enforcement agencies.

[1] Note that this estimate is significantly lower than the $18 million capex estimate developed as part of the Operational Analysis, for three reasons: 1) The $3.5 million estimate is based on prices for used equipment. 2) The Operational Plan was designed to serve the full extent of the contestable cargo forecasts, while the Business Plan revised the estimates to serve a targeted share (39 percent of containers and 65 percent of Ro/Ro). 3) The hook 'n haul operation eliminates port operational surges and spreads the loading/discharge of barges across an entire week, hence reducing equipment requirements.

Figure 9: Port Infrastructure Investment Needs

Port Operating Equipment

See list on next page.

Other On-Port Investments

Security >> gate, fencing, lighting, etc. (needs further study)

Paving >> access to port, on port paving, apron area (needs further study)

Berth>> ensure adequate berth space (needs further study)

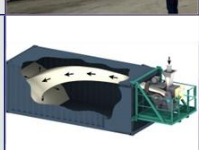
Rail>> access to short line, on port rail for loading/staging (needs further study)

Off-Port Investments

Access >> rail access to nearby customers - height/width (needs further study)

Figure 10: Proposed Peoria Port Equipment Plan

($3.5 Million)

	Illustration	Description	Key characteristics	Required number	Typical life (years)	Est. Capex per unit
Reach Stackers		• Flexible CY handling system • Stacking capable • Versatile: empty or loaded containers • Suited to small to medium size ports	• Lifting capacity: up to 45 tons • Stacking: 5 high • Sufficient reach to load containers in hopper barge	4	15	$250,000 (used)
Terminal Tractor and Trailer		• Used to move containers within the CY – e.g. from stack to shipside	• Move containers within terminal • Also used for Ro/Ro loading with MAFI trailers	6	10	$160,000 (new)
Straddle Crane		• Load/discharge Ro/Ro cargo from trucks or rail to MAFI trailers side-by-side • Load/discharge containers to/from trucks	• Require a high load capacity - approx. 200,000 pounds • Key for transferring between modes	1	20	$500,000 (used)
Grain to Container Bulk Transfer Bins and Belts		• Load grain into containers • Hopper bottom bins feed variable speed belts that "spray" corn into container	• 1 bin and belt thrower per line • 6 containers/hour per line • 48/day/line	4	10	$125,000 (new)
Fork Lift Trucks		• Used for small misc. movements	• Lifting capacity: 2.5 MT • Diesel / LPG power	4	10	$120,000 (used)

Action Plan for the Local Sponsor

This Executive Summary and Recommendations report includes a number of next steps and actions for the local project sponsor. This is a summary of the next steps, in no particular order.

- **Find and Engage a Barge Operating Partner** – This study, and particularly the business plan, presents a clear enough picture of the feasibility of a Ro/Ro service as the first phase deployment. The data provided is compelling enough to begin "courting" various potential partners, and to encourage them to investigate the potential for launching and operating such a service. Careful attention should be paid to the level of Ro/Ro experience and expertise, the strength of their balance sheet, and their relationship with major ocean carriers and coastal ports. An integrated freight service provider that arranges/provides complete door-to-door transportation services should also be considered as a potential partner to manage the overall operation.
- **Find and Engage a Port Operator** – Simultaneously, the local sponsor should start an effort toward securing a port terminal operator, focusing on potential operators with Ro/Ro, grain and container experience. Also consider identifying a third party developer to partner in the financing and implementation of the port project.
- **Create a New Entity** – Given the complexity of the project and the potential of partnering with the private sector and of receiving revenue from a private operation, it is important to consider creating a not for profit, for public benefit, wholly owned entity of the local project sponsor, in advance of these private activities coming into play. This is a standard practice by port related entities and authorities in the United States, as it helps to ensure for a smoother process for handling private sector interaction.
- **Shepherd the M-55 Development Process** - Additional actions to encourage the development process include reaching out to potential Ro/Ro ocean carriers with information about this project, reaching out to the local truck drayage community, develop a marketing effort targeted at the local shippers (particularly those who show an interest in this M-55 study) and reach out to third party logistics service providers.

Figure 11: Summary of Actions and Next Steps for the Local Project Sponsor

Find a Barge Operating Partner

Ro/Ro Specialist >> exper., relation w/ocean carrier, strong balance sheet

Engage a Port Operator

Outsource>> port operator with ro/ro, grain (transfer) & container capability
Developer>> consider a third party to help develop/finance the entire port project

Secure Funding

Federal>> apply for grant(s) to help fund barge and port equipment
Local>> revenue bonds to support working capital needs (once in operation)

Create a New Entity

Non-Profit >> not for profit, for public benefit, wholly owned entity of TransPORT
Private Venture >> spearhead the M55 project, port development, revolving loan

"Cheer" Lead the M55 Development Process

Ocean Carrier>> start communicating with ro/ro ocean carrier
Dray Partners>> identify local truckers, develop drayage strategy, chassis pool
Shippers>> start engaging the shippers toward a traffic commitment
3PL>> identify 3PL to manage the logistics (operator may have a preference)

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PART I – LITERARTURE REVIEW

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Introduction

This document summarizes the findings from the Literature Review conducted for the M-55 Marine Highway Corridor Initiative study. The report focuses on the findings from previous projects, reports and case studies that are most relevant to evaluating the market and operational requirements of a containerized and/or trailerized Marine Highway service between Peoria Illinois and the Gulf Coast. This report is not intended to be a broad compendium of the reports on short sea shipping and Marine Highway services in general. Note that this review was conducted at the start of the study process when there was a heavy emphasis on containers-on-barge (COB). Although the emphasis has moved more toward Ro/Ro through the course of the study, the findings herein are still applicable to the overall M-55 barge service, including both Ro/Ro and container traffic.

Key Findings

The review is organized around 21 core findings, focused primarily on operational and market factors.

Finding #1 – Containerized grain is a core market opportunity

- Grain is traditionally a bulk commodity and has relied heavily on barges as a mode of transportation.
- Since 2004, the practice of exporting grain in containers from the Midwest has grown considerably.
- This is attributable to the smaller lot requirements by overseas customers, particularly in China, Japan and Indonesia, who have high-value applications for grain and high product quality requirements.
- By 2011, almost 20 percent of all corn and soy exports from Illinois were in containers.
- The two UP and BNSF intermodal terminals in Will County (near Chicago) alone handled an estimated 60,000 containers of grain exports in 2011.

Finding #2 – Illinois is central to the grain market opportunity

- Illinois is the country's leading grain exporter, followed by Minnesota, California and Washington.
- While these states all export grain, Illinois has experienced the greatest level of export stability.
- Corn, soybeans, distiller grains (DDGs) and planting seeds are the dominant containerized grains.
- Containerized exports from the U.S. reached a peak level of 400,000 TEUs by 2008, but have seen a dip over the recessionary years.

Finding #3 – The Illinois River is a major trade corridor

- The Illinois River connects Central Illinois with the Mississippi River and the Gulf Coast.
- Annual cargo traffic ranges between 30 million tons and 40 million tons.
- Grain, soy and animal feeds account for approximately 1/3-2/5 of the total tonnage.
- Container traffic is a small but growing traffic component, mostly northbound imports.

Finding #4 – Repositioning of container empties is a key influencing factor

- The U.S. is a net importer of goods shipped in containers from Asia.
- Surplus empty containers accumulate at major import consumption centers in the U.S. due to a lack of corresponding containerized export shipments.
- Because of significant demand for empties in Asia, pricing and other incentives have shifted a small segment of traditionally bulk-shipped export commodities to being shipped in containers.
- Surplus empty containers have seen a decline in the U.S. mid-country and interior markets because of increased trans-loading operations at coastal ports. Transloading involves transferring imports to domestic equipment to free empties for quick return to Asia.

Finding #5 – The inland port's proximity to the hinterland market is key to success

- Intermodal barge services have seen greatest success serving inland ports with a concentration of shippers within close proximity of the port, optimally within a 50-mile radius.
- This proximity factor affects the drayage costs between the port and the shippers, impacting the cost effectiveness of the container-on-barge (COB) service. While the COB line-haul enjoys a cost advantage over truck, its advantage is not significant over intermodal rail. The key is in addressing the drayage cost. The closer the market, the lower the overall cost.
- Yields for the drayage operator are heavily influenced by the number of "turns" or deliveries by the operator. The shorter the drayage, the greater the number of daily turns the drayage operator will make. This will increase the level of service provided by the drayage operator, and hence improve the COB's reliability of service.

Finding #6 – The role of the gateway port is an important factor

- Intermodal barge services have seen greatest success serving major gateway ports with regular scheduled services to major international markets.
- The ability to provide a regular COB service that meets the regular scheduled ocean vessel cutoff windows has

shown to be a critical factor for success.

Finding #7 – COB successes to date in the US have relied on the bulk approach

- Container on barge services have had limited success in the U.S.
- The longest sustained COB services are integrated into bulk fleet operations or have towed additional bulk barges to supplement revenue.
- Conventional COB services in the U.S. almost exclusively use a tug/tow boat pushing/pulling a traditional bulk hopper barge or deck barge, with containers.
- The most common approach is to lash a barge carrying containers onto a bulk tow.
- Tug COB shuttles have shown some mixed results, whereby a dedicated tug pushes one to three bulk barges loaded with containers, between two designated ports, most of which have not survived without government subsidy.
- While common in Europe, there are currently no self- propelled barges carrying containers in the U.S., although several operations have tried self propelled off-shore supply vessels with limited success.

Finding #8 – The Panama Canal expansion is likely to have an impact

- Until the expansion of the Panama Canal actually started, there was much debate about whether it would actually happen. Now the debate has shifted to the trade lane impacts, and whether an increasing amount of trade will shift some ships from landing at west coast port to landing at east and gulf coast ports.
- The body of work on the subject is significant and the views are varied.
- In terms of the Canal's impact on COB, the general view is that the Panama Canal expansion will drive additional demand for containerized services to mid-country markets, increasing the demand for COB.

Finding #9 – The most successful COB services are sold as part of liner services

- What has been key to the success of the rail intermodal business is the integration of services into a single price, point-to-point.
- The same applies to COB services. Shippers expect a single price with a single bill of lading, from origin point to destination point.
- Since the intermodal rail operators, and today's COB operators for that matter, do not sell single door-to-door services, they partner with transportation companies which do. Major ocean carriers as well as non-vessel operating common carriers (NVOCC) typically sell door- to- door transportation services.
- Arranging a single way bill liner service pricing structure with ocean carriers or NVOCCs which have services through the requisite gateway port is critical to the COB service's success.

Finding #10 – Low value target cargo mix

- Inland domestic waterway transportation is traditionally a bulk business, where it is the most competitive versus other modes.
- The most ideal cargo mix for a COB service includes containerized cargoes that are relatively low in value and are the least time sensitive.
- Bulk cargoes trending to containerization present the greatest opportunity for success. Examples include grain exports and exports of partially processed steel and metal products and semi manufactured industrial products.
- These cargoes typically weigh-out before the cube-out, generally in reference to cargoes that do not fill a container before meeting or exceeding over-the-road weight restrictions.

Finding #11 – Operational orientation in line with corresponding rail/truck lanes

- COB services feed in the same direction and mileage as the corresponding rail/tuck services.
- Most current COB services are east-west in orientation and correspond to the major east-west intermodal landbridge lanes that serve US interior markets.
- The M-55 Marine Highway service will be north-south in orientation, which is perpendicular in orientation to the major intermodal trade lanes serving the region.
- This issue will be addressed by identifying liner service opportunities connecting with major east-west ocean lanes through the Gulf Coast and the Panama Canal. As well as identifying north-south trade lanes serving Latin America.

Finding #12 – Intermodal market gap strategy

- The more successful COB services operate at inland ports not located in or near the catchment area for a major intermodal center.
- In effect, COB services are most successful at serving secondary intermodal markets, thereby minimizing the likelihood of price wars.
- The Peoria market is not home to a major intermodal yard, and is served out of Chicago, and it sits at the southern limits of the Chicago intermodal catchment area.
- The M-55 Marine Highway COB service will need to be strategically implemented as a gap market strategy.

Finding #13 – Handling costs are a significant challenge to COB success

- The largest challenge to any type of line-haul based service is the double handling on either end.
- For COB services, these costs are associated with loading/unloading the cargo at the inland port, as well as the loading/unloading of cargoes at the gateway port.
- Handling costs at the inland location are typically far less than the costs associated with the coastal gateway port. A rule of thumb is $50 inland and $150-$200 at the coastal port.
- Coastal ports have higher handling costs as they include wharfage and other handling fees as well as the lift charges.
- The Harbor Maintenance Tax is also an barrier to growth in domestic marine shipping as it is charged at each port, in effect a double charge on COB shipments.

Finding #14 – COB is concentrated on international trade

- The majority of existing COB services in the U.S. is focused on international cargoes.
- That is because containers are used mainly for shipping international merchandise trade, and because COB service typically connect to international container gateway ports
- Domestic COB services are limited to trailerized and Ro/Ro traffic.

Finding #15 – Northbound backhaul market strategy is critical to success

- The northbound leg is viewed as the back haul for the M-55 Marine Highway service.
- While a primary market opportunity is the southbound export, for example container grains, the key market challenge are finding traffic for the backhaul. Previous COB failures along the Mississippi were at least partly attributable to a lack of backhaul traffic.
- This issue is simplified somewhat by the net import surplus of container trade. There are more container imports than exports, improving the opportunity for back hauls.
- The opportunity for success is improved by marketing the northbound services concurrently with southbound services, through the partner ocean carrier vessel services and NVOCC's.

Finding #16 – A once-a-week service is the norm

- The majority of the COB services, past and present, have provided at that minimum, a once-a-week is the best level of service. COB services, for a variety of reasons including lack of speed, have not provided more frequent than once a week services.
- Concurrently, a typical ocean container vessel frequency at the gateway port is also once a week, with less frequent services calling every 14, 21 or 30 days. As a result, there is at least a once weekly vessel call at most coastal gateway ports, depending on the mix of services.
- Developing a COB service that provides a minimum "best of service" of at least once a week is critical to success.

Finding #17 – Speed of a barge tow service is a major impediment for the M-55

- Tug barge configurations are slow, compared to other modes.
- Operating between Peoria and New Orleans, a COB service using the lash-to-bulk-tow operation will take between two to three weeks in one direction.
- Given a 7-day transit window requirement by container shippers, and allowing a one-day load time at each end, the line haul for container service would be limited to five days. The Ro/Ro shipper will allow a longer transit time of up to 14-days, allowing for a 12-day line haul. Reducing the load time on either end could provide cushion for a longer line-haul.

Finding #18 – Modal integration is a lesson worth adopting from the intermodal rail industry

- Modal integration has helped make the intermodal rail service a success.
- The railroads began succeeding at the intermodal business when they stopped trying to retail their own services and shifted that function to the long haul trucking companies, who are more adept at providing comprehensive door-to-door transportation services.
- The railroads partnered with major truck lines line JB Hunt, UPS and Schneider to help them (truckers) reduce their line-haul costs.
- The M-55 Marine Highway service will need to follow a similar model in order to succeed.

Finding #19 – Develop a COB service that meets shipper requirements

- Another lesson carried over from the rail intermodal industry is the need to develop services that meet shipper requirements. The railroads found that the volume driven operational requirements of the bulk shipper could not be applied to the containerized merchandise shipper.
- Reliability of service is king with the container shipper, and the railroads gained market share success by developing a reliable scheduled and frequent services.
- For the prospective COB shipper, reliability will be the top factor, followed by cost. Transit time may also matter, depending on the relative value of the cargo.
- The typical COB shipper uses a third party, and pays little attention to mode choice, as long as service requirements are met.

Finding #20 – Manning requirements impact vessel operating costs

- Vessel manning requirements have impacted the development of new vessels in the US for the purpose of carrying containers on domestic waters. COB competitiveness is based on service levels, including the number of calls per week. U.S. vessel manning requirements are based on vessel horsepower. Vessels with more horsepower are required to have more manning than vessels with less horsepower. Faster vessels improve service, but are more expensive to operate due to the higher manning penalty for using a higher horsepower power plant (requisite of higher speeds), in addition to more fuel costs.
- These requirements favor the use of slower tug vessel technologies using less horsepower than high speed self-propelled vessels.

Finding #21 – Mismatch in viability requirements

- From a traditional tug barge carrier perspective, volume commitments are a priority viability requirement; the tug- barge industry is propelled by volumes, primarily bulk.
- The containerized shipper's primary viability requirement is reliability of service.
- For the COB proponent, this mismatch has resulted in a vicious cycle of failure. The lack of COB service in the U.S. partly stems from of the need for volume.
- This obstacle is unlikely to be resolved unless the COB model is moved away from the traditional bulk tug barge model.

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Introduction

This report contains a summary of the findings from the market analysis conducted as part of the M-55 Marine Highway Initiative study. The report contains estimates of the level of potentially contestable cargoes for a containerized and a Ro/Ro barge service between Peoria, IL and the Gulf Coast. The market results provide a basis for the remaining tasks of the project.

The industrial market catchment area covers a broadly defined 50 mile radius of Peoria, as well as outlining areas. The agriculture market catchment area is defined by an 11 county region with roughly the same 50 mile reach.

Figure 1: Map of the Study Area

Findings

Strong Market Potential

There currently exists a vibrant, growing and interested market that is highly convertible to a Peoria based intermodal barge service. The local demand for overweight and over-dimensional transportation services, which are increasingly becoming a major transportation barrier for locally based employers and producers, is the main reason for this strong market potential.

Two Distinct Market Segments

The Peoria market has the nation's highest concentrations of two distinct market segments, specifically (1) heavy equipment manufacturers and (2) corn and soybean growers. An intermodal barge service is suited to the transportation needs of these two segments.

Heavy Equipment Manufacturers Customer Profile

The local industrial base is heavily represented by a small concentration of heavy equipment ("yellow" machine) manufacturers. These firms are large employers, are well-rooted in the Peoria study area, have a corporate self interest in having a viable intermodal barge service as an alternative to over-the-road (OTR) and rail intermodal transportation They have sophisticated transportation logistics departments with a thorough understanding of international shipping (export sales of 35 percent or more), and thus they could provide useful marketing and operational input.

Corn and Soybean Growers Customer Profile

The Peoria market has one of the highest concentrations of grain and soybean producers in the nation. This segment includes a large number of small to large growers who have a historical reliance on barge transportation for bulk shipments. They are well-rooted in the Peoria study area, with an emerging industry-wide interest in intermodal barge service as an alternative to OTR and rail intermodal transportation. They do not have sophisticated transportation logistics departments, but they are well represented by industry associations with a sophisticated understanding of international shipping. These associations could provide useful marketing and operational input.

Two Types of Marine Highway Services

The market requires two types of Marine Highway services: a container-on-barge service targeted at grains and a Ro/Ro service targeted at "yellow" machines, typically over-weight and over-dimension. The former would serve both the agricultural and industrial markets, while the latter would serve the industrial market. The following are the estimates of contestable traffic within these two service areas.

Table 1: Summary of Weekly Contestable Traffic Estimates

	Large Machines Outbound	Small/Medium Machines Outbound	Containers Outbound	Containers Inbound
Industrial Shippers	7	60	275	139
Agricultural Shippers	0	0	971	0
Total	7	60	1,246	139

Note: The convening mix of twenty foot (TEU) to forty foot (FEU) containers for this region is at a range of 25%-30% TEUs and 70%-75% FEUs.

Likely to be Distinct Services

These two service types are distinct from each other. They will require operations with differing frequency and speed of service (transit times). The container service would likely need once weekly frequency and weekly transit times while the Ro/Ro service could have 10-12 day frequency, with up to 14-day day transit times. The Ro/Ro machinery transportation market would likely need in-hull protection from salt water in open seas.

Gateway Port Selection is Critical to Success

The selection of and partnership with one or more Gulf Coast ports with competitive rates and schedules to South America, Europe, Africa, Middle East (EAME), Australia, and Asia is critical to success.

Liner Service Pricing, Marketing and Retailing

Successfully negotiating the roles and rates for the Port of Peoria, selected Gulf ports, shippers, and the ocean carriers serving the selected Gulf Coast port(s) will be critical to creating a viable service and cost competitive advantage. The partner gateway port will need to coordinate with the candidate carrier(s); the candidate carrier(s) will need to be committed to pricing, marketing, and retailing the Port of Peoria as an added terminal point to their service options.

Partner with the Other Modes for Retailing Clout

The Port of Peoria container and Ro/Ro services should be developed in partnership with the large transportation services companies currently serving the Peoria market. These transportation companies have direct access to the customers (shippers), know their needs and are in a good position to sell an additional transportation option. While these service providers are predominantly trucking and rail carriers, they often look beyond their own mode to effectively serve their customers' transportation needs. Our research shows that their customers can benefit from a mode that can save costs and carry over-dimensional shipments.

A Container Pool will Aid Feasibility of the Container Market Strategy

A container lot and container pool located at the port is a necessity so that shippers have easy and convenient access to their shipping equipment. Port users must be able to pick up and terminate empties at the lot, and the lot must have sufficient empty containers to equal to a week's worth of capacity.

Bulk to Container Transfer Facility will Aid Feasibility of the Agriculture Strategy

A transloading facility to load bulk grain cargoes into containers on site at the Port of Peoria would attract local co-op farmers. The port would allow containers to be loaded to weights not permitted on highways, which would be a competitive advantage for container shippers.

Segments Offering Greatest Chance for Success

A Peoria barge Ro/Ro service will have best success targeting over dimension cargo (more than 120,000 pounds, and/or greater than 10'6" in width, and/or 15'6" in height and/or 60' in length) currently having to move by OTR. A Peoria barge container service will have the greatest chance of success focusing on identity preserved corn and soybean exports. These two core segments, while representing only a share of the aforementioned contestable traffic estimates, offer the greatest potential for convertibility and hence a good base-load of traffic to initiate the service. These segments also provide the greatest pricing latitude and revenue potential.

Weekly Volume Estimates and Methodology

Volume Estimate Methodology

Overall market volume estimates were developed based on data and information obtained during shipper interviews, from annual reports and company documents, and detailed six year farm production data supplied by the Illinois Corn Growers Association and the Illinois Soybean Association. Using this information, an accurate picture of the overall size of the study area's market potential was generated.

Overall Approach for the Industrial Market Analysis – The basis for the industrial estimates was interviews with shippers. During the interviews, care was taken to understand the shippers' needs, transportation mode preferences, transit requirements, service and frequency expectations, cost requirements, and perceptions about barge transportation. In addition, questions were oriented toward understanding the volume of shipments over a specific period, and the market regions where the majority of these shipments originated. Most importantly, special focus was given to information that led to identifying shipments that are contestable by container or Ro/Ro barge services. In order to encourage shippers to share more information, they were presented with a range of potential barge services, above and beyond what is currently being offered in the market. The importance of this approach was to allow the shipper to understand the range of potential services, and to relate these potential services to their needs.

Overall Strategy for the Industrial Market Analysis – The agriculture market is disaggregated. It consists of large firms such as ADM and Cargill, as well as many relatively smaller independent firms serving growers that work through cooperatives. While we interviewed several of the larger firms, the basis for the grain estimates is the six year historical production data for an eleven county market around Peoria, sourced from the respective grower and marketing associations. These figures provided the basis for estimating the likely export levels, and the share of exports that are likely most contestable.

Strong in Exports - The market data produced by this study reflects the export-oriented focus of the local shipper and grower base. While there is a demand for import services, the market data reflects a desire on the part of shippers and growers to resolve issues on the export side. As is characteristic of the bulk barge cargo market, there is likely to be a disproportionate share of northbound empty containers.

Convertibility of Cargo – Given that individual shippers were interviewed, each of whom were very dominant in terms of shipment volumes, the conversion factor was customized for each shipper. On the industrial machinery end, the share of each shipper's finished that presented a convertible potential was also determined. Several factors that influence convertibility were taken into consideration:

1. **International Shipments** - Based on local customer needs, international shipments present the highest potential for conversion from road to rail to water transportation. Because of their reliance on major gateway ports, international shippers tend to concentrate toward a fewer number of key shipping lanes and are easier to target with a barge alternative. Whereas, domestic shipments are shipped over a wide array of domestic networks, making them more difficult to serve by water. Based on that analysis, shipments to international destinations with competitive schedules and pricing out of the Gulf Coast ports were given highest weight.
2. **Over-Dimension Cargoes** – Over-dimension and overweight cargoes are contestable segments and are given high consideration. The key factors for this segment are costs and a tighter regulatory outlook toward overweight-oversize shipments moved OTR. OTR costs are prohibitively expensive because of increased fuel prices, increased permitting application fees, and other regularly policies. States which were lenient toward OTR transport of over-dimension and overweight shipments in the past are policing more tightly because of the revenue potential from fines. Those states are also more attentive to the perceived fiscal impacts of increased highway maintenance. From the shipper's perspective, the increases in transportation costs caused by this tightening regulatory environment poses a significant threat to their competitiveness, especially when there are no clear transportation alternatives.
3. **Reliance on Trucking** – Trucked shipments, especially for over-dimension cargoes to gateway ports, were given high consideration as potentially contestable transportation market segments.
4. **Conversion Factors for Industrial Shipments** - Depending on the shipper, prime product exports to Latin America, Europe, Africa and the Middle East (EAME) and Australia received a high convertibility rate (50 percent -100 percent), while prime product exports destined for Asia had a lower convertibility rate (10 percent -20 percent). The main reason for the lower convertibility rate for Asia- bound cargoes is the pricing advantage for ocean shipping from the West Coast to Asia, versus from the Gulf Coast to Asia (this pricing differential is explained further in the section titled *Competitive Pricing*).
5. **Conversion Factors for Agriculture Shipments** – Convertibility factors were applied to the exported portion of the corn and soybean production numbers. The conversion factors were applied on a county specific basis. They were based on the proximity of the various production areas to the river, to the Chicago intermodal yards, as well as in relation to ethanol production plants. For the ethanol production segment, by-products were given a high probability factor - shipper feedback indicated that there is a high preference for shipping containerized distillers grains (DDGs) and gluten shipments on the water.

The study team believes that this survey method, while non-statistical/database in nature produced an accurate representation of the market potential. It is important to note that other factors, such as changes in carrier service levels and pricing levels in the Gulf Coast region, will affect the degree of cargo convertibility to water transportation services. The forecasts herein are based on status quo carrier relationships, and do not take into account speculation about the potential impacts of the widening of the Panama Canal.

Weekly Industrial Volume Estimates

"Yellow" Prime Product Exports – This industrial market represents shippers of heavy equipment for construction, mining and agriculture. This is a market unique to Peoria and represents a high potential for conversion. The core underlying factor is the cost of OTR transportation of over-dimension and over-weight shipments. This sector produces an over-proportionate share of such oversize/overweight shipments, and a large share of this sector's domestic production base is proximate to Peoria. Below are estimates of the number of weekly shipments a reliable once-a-week intermodal container-on-barge service (with a 3-4 day one-way transit time) or a once every 10-12 days Ro/Ro service (with a 4-6 day one-way transit time) could attract from industrial shippers.

- **Large Machines** – These are oversize/overweight machines ranging between 160,000 pounds and 270,000 pounds. They are currently limited to highly specialized and costly OTR escort services, as their dimensions typically exceed rail width and/or height limitations. As a result, over-dimensional OTR shipments present a very high conversion probability and revenue potential, and are a major contributor to the probability of a successful Peoria intermodal barge operation. Based on production, trade lane, mode choice and international market data provided by the shippers we interviewed, a reliable barge service will be able to capture the shipment of seven large machines per week from the local market. These large machines represent multiple shipments as they are knocked down to 2-4 major parts shipped on MAFI trailer, with additional parts and components shipped either in container or pallets.
- **Small/Medium Sized Machines** – These range in weight from 60,000lbs to 160,000lbs, a portion of which are over dimension for rail. For the under-dimension shipments, rail service is preferred, with OTR used for the larger dimension cargo. Where rail transportation is used, service begins at the plant door, and it is frequent enough to meet customer demands. Rail pricing is also significantly lower than OTR. Therefore, low barge conversion probabilities were applied to existing rail shipments. On the other hand, barge conversion probabilities and revenue potential was assumed to be strong versus current OTR transport options. The number of small/medium shipments far outweighs shipments of large machines. Therefore, even with lower net conversion factors because of a stronger emphasis on rail usage in this sector, the overall amount of cargo that might switch to barge transport in this market of small to medium machines is significant relative to the large machines segment. Based on production, trade lane, mode choice and international market data provided by the shippers that were interviewed, a reliable container or Ro/Ro barge service will be able to convert approximately 60 small/medium machines per week. Like the large machines, the small/medium machines are conventionally knocked down into smaller shipments, as needed.

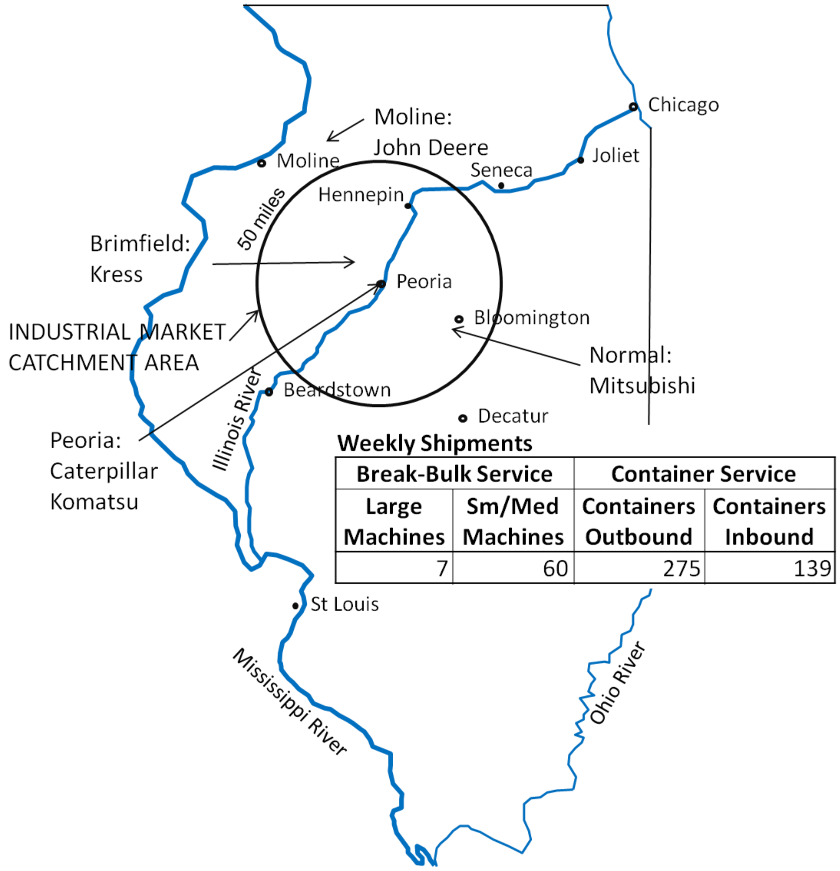
Outbound Containers – Depending on the shipper, the trade lane, the product and the market, each machine shipped requires an additional two to five intermodal containers filled with removable parts and electronics. These parts are removed from the machine either because they are susceptible to damage in transit or they are of an electronic nature that needs protection from the elements. In some cases, hoods and decking are removed so the unit will meet rail and OTR shipping specifications. The larger machines generally require five additional container moves, and these containers are transported separately from the main unit via intermodal rail. These shipments are assumed to have a high conversion probability to a Peoria based barge service. A factor influencing this convertibility is that shippers will find it convenient to ship all parts and components together. The current system of shipping the main chassis components separately from the smaller parts and components increases the logistical challenge of coordinating the arrival of the shipments to meet international vessel schedules. Shipping all of the chassis and other components on the same barge will reduce cost and increase reliability.

The Peoria heavy machinery market has a well-established automotive production and supplies shipper base. While automotive production is currently down, the study interviews revealed plans for expansions to accommodate production of new models. Based on production, trade lane, mode choice, international market data as well as part conversion factors provided by the shippers that were interviewed, a reliable barge service will attract approximately 275 industrial containers per week, of which 16 percent are automotive related and the remainder are heavy equipment related.

Inbound containers – The inbound market was more difficult to estimate. Shippers interviewed for this study are primarily industrial exporters, while U.S. container and Ro/Ro imports are dominated by the retail sector. Nonetheless, industrial shippers do rely on container imports for parts and components for use in manufacturing. Many parts shipments originate in Europe and Asia and arrive at U.S. West Coast and East Coast ports; inbound containers of castings and tires from Brazil and India arrive at the Gulf Coast ports. While it will be difficult to capture the containerized cargoes moving through U.S. West and East Coast ports, a waterborne service can compete to move the containerized shipments arriving at Gulf Coast ports from Brazil and India.

The automotive sector also transports its import parts from Japan and South America in containers. Based on production, trade lane, mode choice, international market data as well as part conversion factors provided by the shippers that were interviewed, a reliable barge could attract approximately 139 import industrial containers per week, of which 46 percent are automotive related and the remainder are heavy equipment related.

Figure 2: Map Showing Markets for Contestable Industrial Traffic



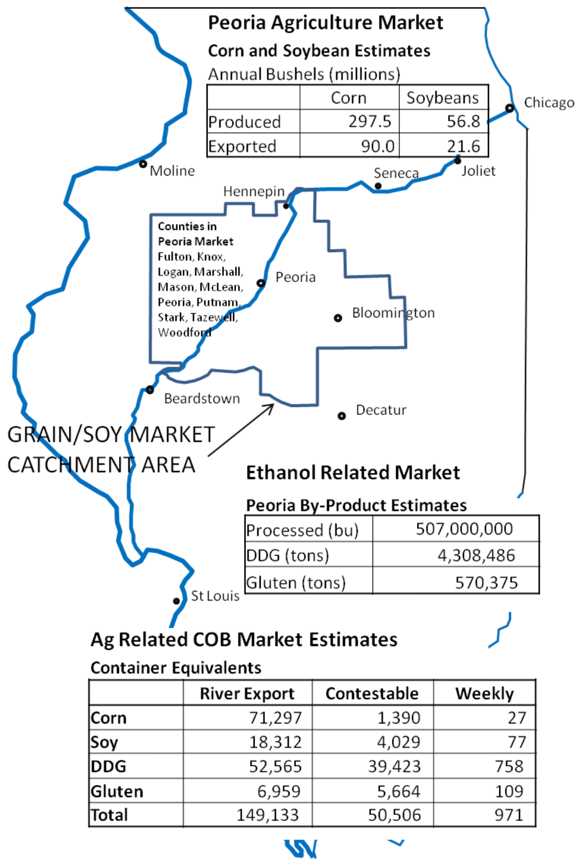
Break-Bulk Service		Container Service	
Large Machines	Sm/Med Machines	Containers Outbound	Containers Inbound
7	60	275	139

Weekly Agricultural Volume Estimates

Three Grain Related Market Segments – For this report, the term grain is used to refer to corn, soybeans and DDGs.

Three Distinct Geographic Areas – Grain production along the Illinois River can be organized around three geographic markets. The northern sector is the region around Hennepin and Seneca. While the majority of production in these areas goes toward ethanol production (Hennepin), this market generates the greatest number of containerized grain volumes because of its proximity to the Chicago rail yards. The second region, referred to as the middle sector, is the area around Peoria. It is an almost exclusively ethanol consumed market, with a marginal share exported down the river. The third market region, referred to as the southern sector, is the area around Beardstown, and is known for its high production in non-genetically modified (non-GMO) product. This segment is often referred to as "identify preserved", in reference to the requirement to package and transport separate from genetically modified (GMO) product. Cross-contamination of these cargoes is not accepted by shippers.

Figure 3: Map Showing Markets for Contestable Agriculture Traffic



Peoria Grain Study Area - This study analyzed an eleven county agricultural (grain) market around Peoria, including Fulton, Knox, Logan, Marshall, Mason, McLean, Peoria, Putnam, Stark, Tazewell and Woodford counties. As is noted later in this report, this grain market falls outside a competitive intermodal drayage distance from Joliet/Chicago. As a result, this market is not actively served by the burgeoning Chicago- and Joliet-based grain-to-container transloaders, compared to the Hennepin/Seneca market which is within a competitive dray distance.

Corn Dominates Production - Corn dominates local production at around 300 million bushels annually, outpacing soybean production by a factor of five to one. Based on the proximity to the river and relative to ethanol production plants, approximately 90 million bushels are exported down river. The remainder goes into local ethanol production.

Soybeans Have a Greater Propensity to Convert to Containers – While producing considerably less in overall volume, soybeans have a greater propensity to convert to containers than corn, by a factor of three to one. Approximately 57 million bushels are grown annually, of which 21 million bushels are exported down the river. Two thirds of that cargo is shipped to Asia. Soybeans are a big part of the Asian diet and a need for non-GMO soybean products to be shipped in containers to prevent contamination by GMO grains, means that there is potential for them to move in containers aboard a barge.

Ethanol Market Consumes Large Share of Local Corn Production – The region has three major ethanol producing areas, specifically Decatur, Peoria and Hennepin. The ethanol industry in those areas consumes about 500 million bushels of corn annually, some of which comes from the local market. In the process, over four million tons of DDGs are produced annually, and almost six hundred thousand pounds of gluten meal are also produced. DDGs produced in Peoria and Hennepin are 100 percent river "exported" (53,000 container equivalents), while DDGs produced in Decatur are rail shipped. When shipper demand and DDG cargoes' relatively low weight to cube ratio are considered, DDGs appear to be an ideal containerized cargo. The lack of container availability and local intermodal services in Peoria has presented a barrier to market adoption and container conversion. Glutens are currently shipped via container, by trucks to Chicago, where the containers are put on rail. With a viable Peoria intermodal barge service, all of the Peoria gluten production will be contestable (due to a significant savings in dray costs), while 50 percent of the Hennepin production is assumed to continue to be drayed to Chicago, and the rest drayed to the Peoria barge service.

Conversion of Grain Exports to Containers – The downriver export segment of the grain market is equal to nearly 148,000 container equivalents annually. The potential contestable market for transporting these cargoes is estimated to approximately 50,500 containers annually, which is about one-third of the peak Chicago volume of 180,000 grain containers annually. The majority of this estimated cargo is DDGs and gluten meal – 39,243 and 5,664 respectively. (If containers were available, and a service was provided, the ethanol by-product market would be highly convertible.) Corn and soybeans represent a smaller share of the market - 1,390 and 4,029 containers respectively. These annual numbers translate to a weekly average of 971 containers, of which 75 percent are ethanol by-products.

Competitive Pricing

This section includes potential pricing and rates for a prospective M55 service, based on comparable data for May and June, 2011.

Total Transportation Cost

In determining the pricing for the domestic line-haul component of the barge service (both Ro/Ro and container) it is critical to take into consideration the impact on the total transportation cost. In other words, the barge line-haul service can't be priced on its own, but rather must be priced based on its impact on total transportation costs. For example, when looking at price feasibility for container exports to Asia, the line haul cost for shipping a container on barge to a Gulf Coast port is likely to be almost half of the corresponding line-haul cost of shipping a container via rail to a West Coast port. However, the ocean line haul segment from the Gulf Coast to Asia is almost twice that from the West Coast. Therefore, in order to be competitive, the barge service has to make up for the relatively greater ocean rates from the Gulf Coast. The same is true for the Ro/Ro service. The use of a barge service would require shippers to shift their ocean export transportation service to a Gulf Coast port. The pricing on the Ro/Ro barge service would need to make up for any pricing differentials on the ocean side. Of the two services, the Ro/Ro service has the greatest potential for being price competitive at this time for two reasons. First, the Ro/Ro market is not dominated by shipments to Asia, which is relatively poorly served out of the U.S. Gulf Coast ports (in comparison to the U.S. West Coast ports.) Secondly, the current OTR line-haul costs for the Ro/Ro market are exceedingly high, offering sufficient cushion to pricing a barge service. The pricing of container rates, specifically to Asia, will remain a challenge until service from the Gulf Coast improves, and this is reflected in the low convertibility assumptions used for container shipments to that region.

Competitive Pricing for Industrial Machines

Pricing for Large Machines – With large machines, the chassis part/s are usually too large and wide for rail, even when stripped down, and must go OTR as a special routed escort service. OTR movements to Savannah, Georgia from plants in the Peoria study area can cost as much as $45,000 for truck transportation. Savannah, Georgia is a major port for large machines and the OTR routes are the least obstructive for over dimension units. A portion of the cost, in addition to fuel, equipment, manpower, logistics, escorts, etc. is associated with permit fees which average $2,500 for each state traveled through on OTR moves. Other major OTR lanes are Peoria to Baltimore and Peoria to Houston/Galveston.

Small/Medium Machines – When trucking is required, medium machines that also must go OTR because of size (or service requirement) are experiencing transportation charges of $28,000 to Savannah, Georgia and $18,000 to Houston, Texas. Rail rates on mid-size units from Chicago rail heads to ports on the east, west, and Gulf Coasts are determined by weight. Rail pricing estimates do not include trucking or short line rail charges from Peoria to Chicago. The Burlington Northern's rates averaged $5.48 per hundredweight (100 lbs.) from Chicago to West Coast ports. Eastbound the Norfolk Southern and the CSX averaged $4.68 per hundredweight. Fuel surcharges for OTR are between 40-46 percent over and above the total line-haul costs. Note that while the Kansas City Southern (KCS) has a rail terminal in Springfield, Illinois, which is closer than the Chicago railheads, none of the industries we interviewed identified the KCS as a Ro/Ro (on rail) service provider.

Recommended Ro/Ro Pricing – OTR costs average at $25.00 per mile for large machines, including permit fees to meet over dimension requirements, which is an average of 25c per ton/mile (based on the mileage of the trade lanes evaluated). By comparison, the average rail cost is approximately 7c per ton/mile (based on the mileage of the trade lanes evaluated). We recommend a niche pricing strategy cushioned between rail "under dimension" and OTR "over dimension" rates. This strategy will likely generate a sufficient base load of traffic at a price level that generates a strong business model. The pricing strategy should seek to provide a much needed service for the OTR niche, as opposed to a strategy that seeks to maximize market share.

Competitive Pricing for Containers

Containers - The price to ship containerized cargo is largely influenced by the rail rates between Chicago and the West Coast. All containerized cargo move via truck from the Peoria market area to Chicago. The average round trip drayage cost is $600-$700, which is greater than the shipping cost that would be paid by shippers using the Peoria barge operation. Eastbound container transportation costs per FEU average at $840 for the line-haul, at a total of $1,440 with the dray, at an average cost of $1.6/mile. Westbound container transportation costs average at $1,400/FEU for the line-haul, totaling $2,100 with the dray, at an average cost of $1.1/mile. This does not include rail fuel service charges, which were at 32-36 percent of the rail line-haul cost. The key competitive factor is the ocean line-haul rate differential. Shipping rates from the West Coast are approximately $1,000 lower per FEU than from the Gulf Coast, especially for cargoes bound for Asia. Therefore, a Peoria COB service must cut at least $1,000/FEU on the landside to substantially affect the conversion rate for the dominantly West Coast favoring Asia market. Assuming a West Coast total intermodal cost of $2,100 (line-haul and dray), that leaves a net cushion of $1,100 ($2,100-$1,000) within which to price the M55 barge service to the Gulf Coast. However, in order to make up for the transit time disadvantage, a likely competitive rate for the containerized service to the Gulf should be in the $800 per FEU range. Note that while the Kansas City Southern (KCS) has a rail terminal in Springfield, Illinois, which is closer than the Chicago railheads, none of the industries we interviewed identified the KCS as an intermodal rail service provider.

- **Grain Container Rates** - For the shipping grain in containers segment, the competitive pricing picture is more complex. In addition to the price differential on the ocean side between rates from the Gulf Coast to Asia versus the West Coast. Shipping grain in containers from the Midwest has been increasing since 2004, and as a result the pricing is fairly evolved. The core determinant of pricing is the comparative price for bulk grain transport rates. If bulk rates rise versus container rates, containerized grain shipment volumes trend upward. When bulk rates fall relative to container rates, containerized grain shipment volumes tend to decrease. At the time of this market study, bulk rates from Peoria to Asia through the West Coast averaged at $75/ton with the ocean rate at about $25/ton and the overland rate at $50/ton. Conversely, bulk grain shipping rates from Peoria through the Gulf Coast to Asia were the same at $75/ton, with the barge line-haul averaging at $25/ton and the ocean line-haul averaging $50/ton. The table below converts various bulk rates per ton to an equivalent rate per container, depending on the container's loaded weight. Based on this, a container loaded with 60,000lbs of grain shipped to Asia would cost approximately $2,250 per FEU based on the $75/ton bulk rate. This is in line with the overall cost of shipping a container to Asia from Chicago, and this is generally the pricing range within which the major containerized grain handlers located around Chicago and Joliet are currently operating. In other words, containerized grain shipping costs to Asia from Chicago via the West Coast are on par with bulk rates through the same lane.

Table 2: Grain Container Shipping Costs Based on Parallel Bulk Rates

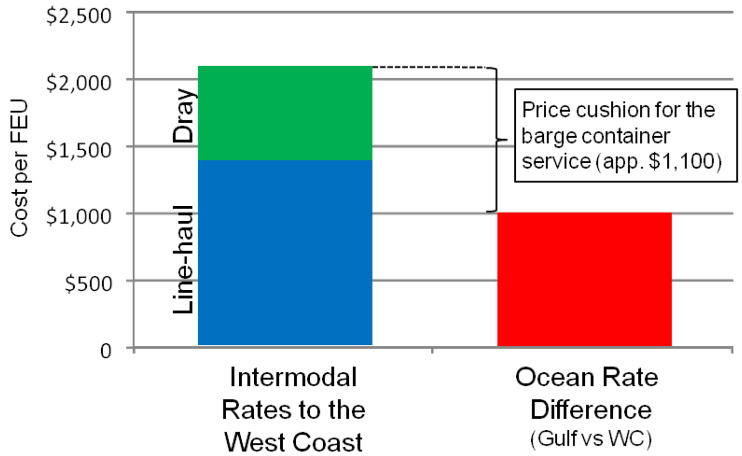
Bulk Rate per Ton	Weight per Container (lbs)					
	35,000	40,000	45,000	50,000	55,000	60,000
$20	$350	$400	$450	$500	$550	$600
$25	$438	$500	$563	$625	$688	$750
$30	$525	$600	$675	$750	$825	$900
$35	$613	$700	$788	$875	$963	$1,050
$40	$700	$800	$900	$1,000	$1,100	$1,200
$45	$788	$900	$1,013	$1,125	$1,238	$1,350
$50	$875	$1,000	$1,125	$1,250	$1,375	$1,500
$55	$963	$1,100	$1,238	$1,375	$1,513	$1,650
$60	$1,050	$1,200	$1,350	$1,500	$1,650	$1,800
$65	$1,138	$1,300	$1,463	$1,625	$1,788	$1,950
$70	$1,225	$1,400	$1,575	$1,750	$1,925	$2,100
$75	$1,313	$1,500	$1,688	$1,875	$2,063	$2,250

However, the same container to bulk price equilibrium does not exist to Asia through the Gulf Coast. The ocean line-haul from the Gulf ranges at around $2,000, which is about $67/ton at the bulk equivalent for a 60,000 pound loaded container. This leaves a cushion for the barge line-haul rate (between Peoria and the Gulf) at the equivalent of $8/ton, or $250 per FEU, before topping the $75/ton rate cap to Asia. This rate ($250 per FEU) is under half the lowest recommended rate ($600) for the container barge service, which is based on nonagriculture related container shipment rates. Therefore, in order to succeed from a pricing perspective, the containerized grain service will need to focus almost exclusively on the non-GMO grain market segment. Since non-GMO shipments have to be shipped with their identity preserved, they are not shipped as bulk, and therefore the applicable container shipping rates are not a function of bulk rates.

Figure 4: Graphs Showing Price Cushion for the M55 Container Barge Service

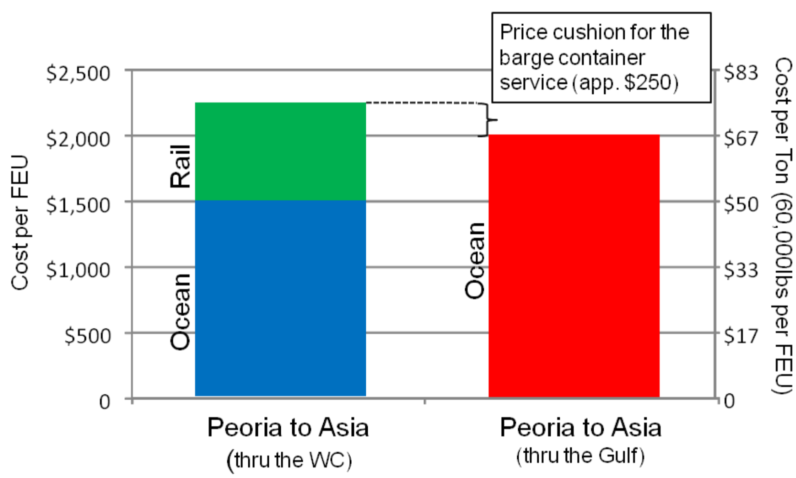
Potential Barge Pricing for Industrial Machinery in Containers

(Influenced by Intermodal Services to the West Coast)



Potential Barge Pricing for Grain in Containers

(Influenced by Bulk Grain Shipping Rates to Asia)



NOTE: Based on Peoria market analysis conducted during May, 2011.

Who Makes the Decision?

Industrial Shipments – While the shippers or their logistics subsidiaries negotiate all carrier contracts and rates, the dealers make the final decision on transportation mode and carrier based on their customers' needs. Generally, price savings is a determining factor for shippers, followed closely by service reliability. It generally takes a ten to 15 percent reduction in total transportation costs for shippers to try a new unproven service. However, in order for the shipper to even make barge an option for the dealer/customer to consider, reliability will be the dominant determining factor, at least for the initial period of operation, and until all concerns associated with barge service levels are resolved.

Agricultural Shipments – Pricing based mode choice decisions are made by the major grain trading companies. They tend to be vertically integrated, whereby they manage the acquisition of locally sourced grain, the local drayage from the grower coops, the stuffing of the containers, the transfer to the intermodal yard, the purchase of the rail line-haul and the purchase of the ocean line-haul. The amount of traffic they handle is determined based on the demand for containerized grain, the availability of empty containers and the comparable bulk transport rates.

Competitive Schedules and Transit Times

During the interviews for this study, shippers were about their perception of barge transportation. The overwhelming response was that it was slow, unreliable, unscheduled and took two to three weeks to get down the river to the Gulf. Shippers were given four scenarios to test their response to a range of service changes and improvements to river transportation. This process helped determine likely barge convertibility rates on a shipper specific basis.

Service-Price Elasticity

The conventional wisdom in the river transportation industry is that shippers are price inelastic toward intermodal barge services. In other words, at any given price, shippers are not willing to try containerized barge services. This belief is certainly supported by the lack of successful non-subsidized container-on-barge services to date in the United States. However, the underlying result of this study proves that shippers are in fact service-price elastic. That is, they are very open to an alternative intermodal transport mode, especially within the current competitive economic climate, that is priced competitively at a level of service deemed comparable with other modes. It is remarkably apparent that, in terms of the intermodal market, shippers located in the interior region are often limited to one or two choices. Limiting access to a single mode, or limited mode choices, is costly to local shippers. The region's shippers are thus open to the introduction of an alternative mode that is both cheaper and, while not at the highest service level, still offers a service that meets their basic scheduling and transit requirements.

Potential Service Options

Ad-Hoc Service - The first scenario presented was an "Ad Hoc Service", which represents the current operational context on the river, a service that lashes onto current bulk tow services, yielding transit times of 10-12 days downriver and 17-19 days upriver, with no predictable schedule. This scenario typically fits the respondents' current perception of options and why it was not being used by their companies. While the Ad Hoc service could be in service quickly and would offer the best economics – lowest cost alternative, container and Ro/Ro machinery shippers were both very unreceptive to this service, regardless of price.

Standard Service – The second scenario was a "Standard Service", which represented a dedicated tug and tow using conventional bulk equipment, running at an average of five knots, much like the 64 Express service on the James River. Like the ad-hoc, the scenario could be put into service quickly. This service represents transit times of 6-7 days down river and 14-15 days upriver. While these transit times were acceptable downriver to the machinery Ro/Ro shippers as well as grain shippers, they were not acceptable to industrial container shippers. More importantly, the frequency of sailings at once every 21 days was not acceptable to any shippers. This service offered no advantage to shippers who needed to meet weekly container sailing schedules and 10-14 day Ro/Ro sailings out of the Gulf.

Expedited Service - The next level of service was an "Expedited Service", which represents a prospective dedicated service running at an average speed of ten knots. Transit times for such a service would range from 3-4 days down river to 5-6 days upriver, with a frequency of every 10-12 days. The Expedited Service would not use existing bulk tug-barge systems, but vessels and equipment currently used in coastal and feeder services that could conceivably run on the river and could be put into place without requiring a new-build vessel. This service was very appealing to the Ro/Ro shippers, both from a transit time and schedule frequency standpoint, as it allowed increased production time vs. rail. Bulk machines shipped by rail on manifest trains were experiencing 7-10 days to the East Coast ports and 10-14 days to West Coast ports. Trucking to East Coast ports was average of four days. The Expedited Service frequency (every 10-12 days) was preferred by the Ro/Ro shippers to assure arrivals to meet Ro/Ro ocean sailing schedules. Therefore, from a purely service standpoint, the Expedited Service would suffice for maximum conversion of the machinery related forecasts produced by this report. This service does not meet the requirements of the container market, as they would need a minimum of once a week sailing.

Premium Expedited Service - The fourth scenario offered was a "Premium Service" based on a prospective new-build self-propelled barge vessel capable of operating at 15 knots, providing a direct dedicated service from Peoria to a Gulf Coast port. This service would represent a 2-3 day transit time down river and 3-4 days upriver. Such a service would meet both the scheduling and transit time requirements of the entire shipper spectrum evaluated through this study. The transit times would also compare favorably with rail:

- Burlington Northern Railroad Chicago to Los Angeles – 5-7 days
- Norfolk Southern, CSX Chicago to East Coast Ports – 3-4 days

However, service frequency would still lag behind the railroads, which offer six day a week service compared to a once weekly barge service. Daily schedules were important to the shippers that handled time sensitive containerized parts. Therefore, in estimating the forecasts, these commodities were given a lower convertibility factor.

The Most Feasible Service Option

The overall consensus among the container shippers is that the transit time and weekly service that the Premium Expedited Service provided was necessary to compete with the railroads and secure a high probability of container conversion to container-on-barge. It is important to note that the actual speed of the Premium Service is not what is critical to the shippers. In other words, whether the service traveled at five knots and 15 knots is academic. Furthermore, the subject of naval architecture, vessel economics and hull design and displacement capabilities is not what impacts the shipper decision process. The choice of 15 knots for the premium service was a mathematical consequence based on the distance between Peoria and the Gulf Coast.

The conclusion, from a service perspective, is that the challenge lies in developing a competitive service that meets customer needs, and not in finding potential customers for a service that is short on meeting customer needs. The use of the traditional tug-barge tow configuration to provide high service oriented intermodal services will not meet the needs of a service-price elastic customer base, especially in the case of the container shipper.

Competitive Supply of Containers

There was overall consensus among shippers that a major hindrance to the growth in shipping containerized cargoes in the Peoria area is the inability to access empty containers cost effectively. The larger firms were able to supply themselves with containers because they receive inbound parts in containers; these same inbound containers supply about 60 percent of their outbound shipping requirements. As a result, the supply of containers available to growers for shipping within the study area was nonexistent and there is no measurable containerized grain transportation business today within the Peoria study zone.

Excessive Cost for Drayage - The study area is 170 miles from the closest container pools located in Chicago. This is well above the 50 mile radius zone used as a rule-of-thumb measure for drayage efficiencies and costs. The average drayage costs between Peoria and Chicago are $600 to $750 roundtrip. These extra drayage costs make it uneconomical to ship gran in containers, whether by rail or barge less competitive to bulk shipping from Peoria.

Need for a Locally Based Container Pool – The development of a local container pool is critical to the success of developing a container-on-barge service. With the development of a steady supply of empty containers, that are neutral to carriers and shippers with the flexibility to be shipped to major export markets around the world, we believe the Peoria area represents a viable container business. The success of a viable container pool located in Peoria is dependent on ocean carrier participation. The pool would have to consist of a portfolio of carriers that can provide service from the Gulf to Latin America, EAME, Asia and Australia.

Key to the Containerization of Grain – The need for a locally based container pool is perhaps more important to the successful emergence of a containerized grain transportation market in Peoria than the barge service itself. Regardless of mode (rail or barge), the more important intermediate step towards containerized grain transportation is the development of a local container pool. In markets like Joliet, Illinois where containers are available at a reasonable drayage cost, the containerization of grain is a fast growing and flourishing industry. Containerized grain shipments from intermodal yards around Joliet have doubled since 2006. In fact, approximately 20 percent of all grain and soy exports from Illinois are containerized. Major grain transportation and trading companies like the Delong Company have developed bulk-to-container transload facilities at intermodal yards in the Joliet/Chicago market. Delong has the capacity to process 15,000 containers per month. The main reason for the growth in this market segment at and around Joliet is the availability of empty containers, and of course, the availability of competitive intermodal services as well as grain from markets like Hennepin and Seneca. The Peoria grain market falls outside a competitive intermodal drayage distance from Joliet/Chicago and is not actively served within their containerized grain market catchment area.

Vessel and Terminal Requirements

In addition to volume estimates, pricing and service considerations, the market analysis process also yielded specific findings about vessel and terminal requirements. It has been established that there exists two distinct markets and therefore two separate services and operations are required. It is likely that the vessels deployed for the two services may need to have unique characteristics.

Ro/Ro Ramp Loading Requirements – Although most of the larger machines are shipped without tires, they will be shipped on MAFI trailers, thereby reducing the need for excessive crane lift capacity at the port. The mid-size tractors which typically retain their wheels/tires for shipment may be rolled-on/rolled-off directly without the use of a MAFI trailer (depending on carrier-specific operating procedures).

Ro/Ro Handling and Tie-downs - Loading procedures and bracing procedures need to be put in place to eliminate any chance of paint chipping on the prime finished product.

Ro/Ro Vessel Dimensions and Displacement Requirements - The vessel must have inside dimensions that can handle machines up to 16 feet in height, 21 feet 5 inches wide and up to 60 feet long, typical of the large earthmoving and mining machines, which weigh up to 270,000 pounds. Although only five to seven units of this size are currently projected to be shipped each week, they represent the highest source of revenue per unit. The next range of mid-size to large dump trucks and tractors average 12 feet 5 inches in height, 13 feet wide and 30 feet in length with an average weight from 60,000 to 160,000 pounds.

In-Hull Storage for Ro/Ro Shipments - The Ro/Ro machinery market requires an in-hull covered protection from salt water and sea corrosion. Any exposure to salt water would violate the warranty of the machine and be rejected by the customer. This will likely only be relevant for cross-Gulf shipments, and not for the rivers and intra-coastal lanes.

On-Dock Rail Access – The Tazewell-Peoria Railroad serves the Port of Peoria barge terminal, which at the time of the market study was the candidate port. At the time of the final report edit, a new candidate port location had been identified by the local project sponsor, which is also served by the Tazewell-Peoria Railroad. In either case, having on-dock rail access extends the market reach for the barge service since several of the large Ro/Ro shippers have on-site rail access served by the Tazewell-Peoria Railroad. Direct rail access between the port and the shipper improves the staging and logistics process, and reduces the local drayage cost.

Container Lift-on/lift-off Capacity - The container shippers require a lift-on/lift-off service as all containers are shipped stackable, without chassis.

Container Vessel Capacity - Based upon projected volumes, the vessel should have the capacity to hold between 100 and 200 TEUs.

Container Terminal Capacity - The terminal should have the capacity to park an ample supply of empties and chassis to supply a 200 unit per week service.

Handling Equipment - Several yard tractors would be needed to provide movements of containers within the terminal properties for loading, unloading and parking.

Port Security – Security of the port operation should be taken into consideration, including investments like gates, fencing, lighting, etc.

Bulk-to Container Grain Transload Facility - Construction of a bulk-to-container grain transloading facility located right on port property would allow grain shippers to load containers to 56,000 lbs. (and more) avoiding OTR load limits that cap containers at 45,000 lbs. This gives a tremendous competitive advantage to shippers that have to abide by weight limits.

Staffing - Staffing would be required for normal business hours, Monday through Friday, and a full operation on Saturday from the morning opening to vessel departure.

Contingency Plan - During our interviews the Mississippi River was experiencing flooding and sporadic closures. River service disruptions were a topic of conversation and shippers wanted to be assured of a backup contingency plan for any long term flooding or droughts. It is recommended that if the operations come to fruition, a plan is put together with railroads and truckers for back up emergency transportation. Given that the barge service will likely represent a small share of the total transportation budget for the respective shippers, the contingency plan should be developed in partnership with the shipper's other service providers. The incumbent service providers understand the client, their service requirements, routes, pricing, etc., and are therefore the best backup in an emergency. Working with the shipper/customer to spearhead this process is critical, especially in terms of convincing the other modal carriers to cooperate to the benefit of the shipper.

Selection of a Gateway Port and Preferred Ocean Carriers

Select a Gateway Port Partner - A key factor to a successful Peoria service to the Gulf Coast will depend on selecting a gateway port, or set of ports, that provide container and bulk services to as many international geographic areas as possible. The study group had consumers in all parts of the world, with the majority in Asia, Latin America, EAME and Australia. Port selection must include service to those major geographic markets in order to achieve maximum convertibility.

Partner with a Key Ocean Carrier – The role of the partner carrier is to sell the Peoria service as part of their overall liner service. The goal is to have one or more carriers price the Peoria barge service as part of total point-to-point liner service, offering pricing for Peoria as a terminal point. The alternative approach of selling the barge service as an add-on service will be a near impossible task. Almost all successful land-side line haul services, both truck and rail, are sold as part of a single liner service.

- **Ro/Ro Carrier of Dominance** - Wallenius Shipping Lines is widely used by most industrial shippers surveyed and specializes in bulk machinery to all international markets. It currently provides services from Galveston.
- **Container Carrier Choices** - NYK is widely used through Los Angeles and Tacoma for shipments to Asia. Maersk, Hyundai and K-Line were also mentioned as preferred carriers to Asian markets. With the exception of the Port of Houston, these carriers are generally under-represented in the Gulf Coast.

Rely on the Strong Arm of the Gateway Port Partner – The role of the partner port, in addition to providing a location for the physical interchange of cargo, is to help build the partnership alliance with carriers. In fact, options should be explored whereby the inland port location is operated as an extension of the coastal port. This is precisely the approach being used for the 64 Express container on barge service on the James River. The Virginia Ports Authority (Port of Norfolk) has purchased the Port of Richmond terminal from the City of Richmond for the purpose of operating it as an inland container yard of the Port of Norfolk. This type of arrangement opens up a broader range of possibilities in terms of lowering handling costs on both ends, stronger carrier alliances, and greater availability of chassis and containers.

Start Sooner than Later - Negotiations with these ocean carriers would be an early step in the service development process to secure rates, services, transfers and container pool participation so an actual service plan can be created.

Other Considerations

Physical Constraints of the Waterway – The physical characteristics of the river/waterway between Peoria and the destination coastal port, specifically in terms of constraints, need to be identified. Examples include:

- The dimensions of locks and dams;
- The operating depth of the water maintained/guaranteed by the Army Corps of Engineers; and,
- Air draft restrictions imposed by bridges and overpasses.

Policy and Legislation - The Illinois Corn Growers Association and the Illinois Soybean Association both supported two recent legislative efforts that would increase containerized grain exports.

- HB 1979 which would define an ethanol blended fuel as 15 percent ethanol up from current standard of ten percent. This would increase ethanol consumption and production and thus increase production of DDG's, which can likely be shifted from bulk shipments to being shipped in containers.
- Upcoming Free Trade Agreements with Korea, Columbia and Panama would remove many current restrictions and make shipping to these countries easier. All three countries are large grain and soybean consumer markets.

Environmentally Oriented Market Considerations – The major industrial shippers have very serious corporate programs dealing with environmentally friendly vendors and services. During some interviews, the concept of a LNG powered vessel came up and all companies indicated they would favorably support an LNG service that exceeded clean air requirements. Part of the marketing strategy should be based on emission reduction and reducing highway congestion and road wear and tear.

Market Conclusions

Viable Market Potential - The market analysis indicates that there exists a viable market for pursuing the development of a specialized barge service, or services, tailored toward container cargoes and Ro/Ro cargoes. The volume of potentially contestable traffic exceeds the minimum requirements for starting a basic intermodal barge service.

Apply a Niche Market Strategy - Given that the potential market exceeds the required basic operating volumes, it is possible to deploy a niche strategy focused on those segments that offer the best price competitiveness, and the greatest potential for revenue upside. The niche strategy should focus primarily on the non-GMO grain market (as this segment is immune to the bulk-container rate equilibrium issue) and the Ro/Ro machinery export market currently served by OTR services (this segment has high revenue potential, and shippers are actively seeking an alternative mode).

Predicated on a Service Concept - The market estimates are, however, based on a service concept for which many elements are not in place. For example, there are currently no known services provided elsewhere in the United States that could be replicated for this market. Given the distance from the Gulf to Peoria, the viability of the market forecasts are dependent on the development of a service at speeds in excess of what is currently the norm. Moreover, a vessel that could provide the requisite level of service does not currently exist in the U.S., requiring a new build. The service would need a readily available local pool of containers to meet export demand.

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Introduction

This report evaluates the options for delivering the optimal operational plan for the M-55 Marine Highway Initiative. This operational analysis is focused on putting in place the assets, services, network, and systems necessary to bring to fruition the potential for containerized and roll-on roll-off (Ro/Ro) barge services between Peoria, Illinois and selected Gulf Coast ports.

Key Components of the Operational Plan

This operational "blueprint" for marine highway services on the M-55 Marine Highway Corridor provides a comprehensive plan for how such a service may be operated. The following are the key components of the plan:

- Assets – vessels, rolling stock, capacity, etc.
- Operating system – containers, roll-on/roll-off, etc.
- Terminal infrastructure – area, equipment, etc.
- Service network – hubs, lanes, frequency, etc.
- Information systems – planning, tracking, customer interfaces
- Marketing/sales channels
- Work force and labor agreements
- Key operational partners
- Capital investment requirements
- Operational economics

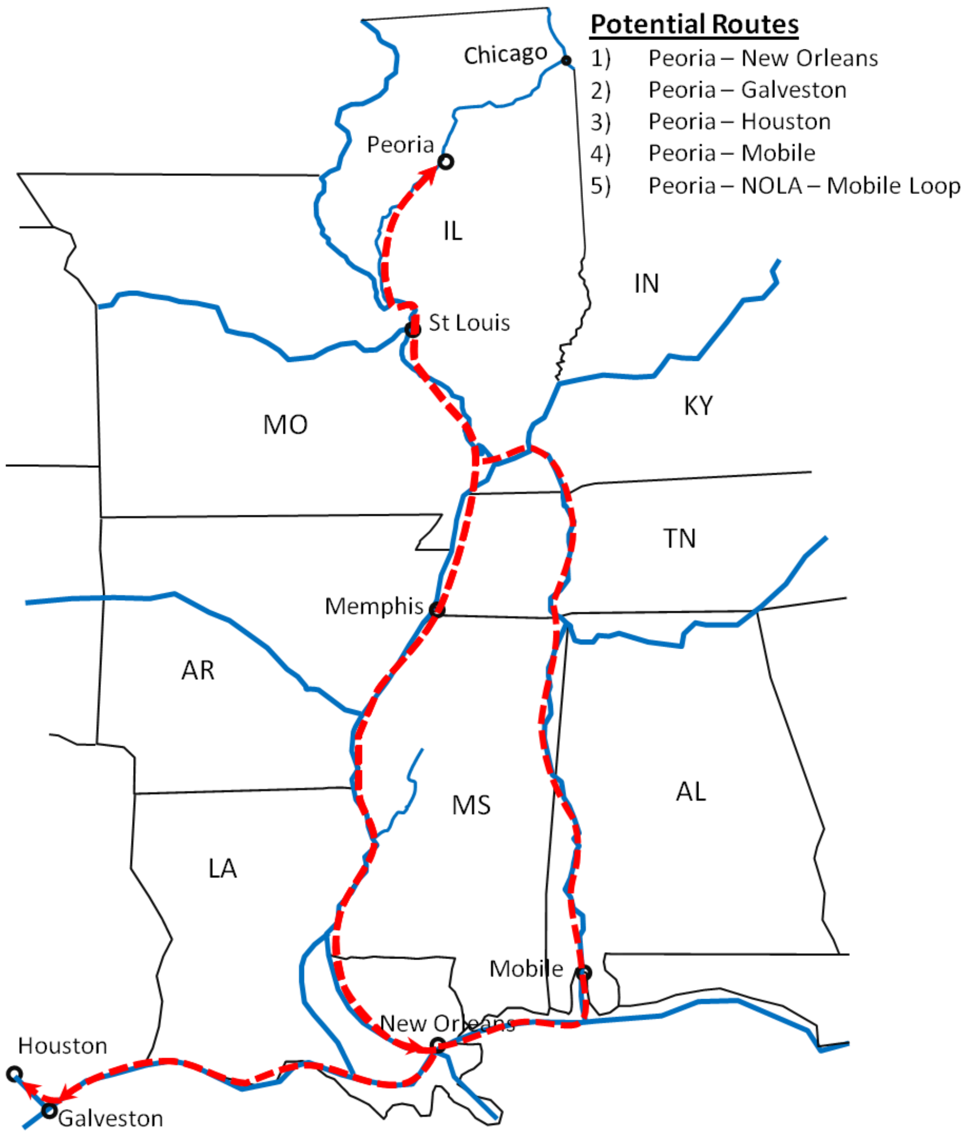
Output from the market analysis and operational plan are incorporated into a comprehensive business plan for the M-55 Marine Highway Initiative.

The Operational Landscape

The market analysis identified two distinct potential marine highway markets on the M-55 Marine Highway Corridor: (1) the movement of large industrial machinery (e.g. "yellow goods" such as agricultural tractors and mining equipment) that is manufactured within a broadly defined 50 mile radius of Peoria as well as outlying areas and is transported to U.S. ports for export; and (2) an agricultural market of specialty grains that may be containerized for export.

The M-55 Marine Highway Corridor connects the Peoria market area with the Gulf Coast ports of Houston, Galveston, New Orleans, and Mobile by a number of waterways as shown below. Based on the mix of Ro / Ro and container cargoes identified, five potential routes were identified to connect Peoria with these key Gulf "bluewater" ports. These routes involve some combination of passage along the Illinois and Mississippi Rivers, the Gulf Intracoastal Waterway (GIWW), and Tennessee-Tombigbee (Tenn-Tom) Waterway.

Figure 1: Potential M-55 Marine Highway Routes



Physical Constraints of the M-55 Marine Highway Corridor

M-55 Marine Highway operations must work within a number of physical constraints imposed by the inland waterways and their current infrastructure:

- Maximum vessel drafts are restricted to nine feet by the Illinois River and Upper Mississippi River.
- Locks on the Illinois/Lower Mississippi and the Tenn-Tom Waterway are generally 100 to 110 feet wide, and either 600 feet or 1200 feet long. The most typical tow size through these locks is three barges wide and five long.
- Locks on the Gulf Intracoastal Waterway (GIWW) are generally 75 feet wide – however, the Bayou Sorrel Lock on the Port Allen – Morgan City route from the Mississippi to the GIWW is only 56 feet wide.
- There are no significant height (air draft) restrictions on the Illinois/Mississippi waterways south of Peoria.
- Vessels operating on the Tenn-Tom Waterway are restricted to an air draft of 52 feet.
- While barge operations can be affected by high water conditions(which may impact air draft allowance) and by low water conditions (which may impact vessel draft), these conditions are not expected to have a significant impact on M-55 Marine Highway operations between Peoria and Gulf Coast ports.

The current mode of barge operations on the M-55 Marine Highway Corridor is primarily focused on dry and liquid bulk cargoes moving in a variety of hopper, deck, and tank barges. The dimensions of a standard Mississippi River barge are 195' long, 35' wide, with a draft up to 9' and deadweight (cargo) capacity of 1,500 tons. Larger barges may be up to 290' by 50' with deadweight capacities of 3,000 tons. Towboats range in size from about 117 feet long by 30 feet wide to more than 200 feet long and 45 feet wide. They draft anywhere from 6.5 feet to 9.0 feet. The power of towboats' diesel engines typically range from a few hundred horsepower up to 10,000 horsepower.

An average tow on the Illinois/Mississippi waterway consists of around 15 barges, but flotillas can go up to 40 barges, depending on the type of cargo, the river segments being navigated, and the size of the towboat (mostly on the lower Mississippi River). Under conventional operating practices, a trip from Peoria to the Gulf may take more than a week as tows in excess of six standard barges are broken up and then reassembled to pass through locks, and barges are picked up and dropped off at various points along the waterway system (known as fleeting).

Vessel Operations

Operational Imperatives

Based on findings from the market analysis and the aforementioned physical constraints imposed by operating within the M-55 Marine Highway Corridor, there are a number of factors that must be incorporated the operational plan:

- **Transit time** is important to shippers of high value "yellow goods" and containerized cargoes – delays in transiting locks, caused by the need to break down and then reassemble tows, are not acceptable. Consequently, M-55 Marine Highway trips must be restricted to tug-barge/vessel capacities that may pass through particular lock systems in one go.
- **Reliability** is more important than transit time – Ro/Ro and container cargo movements are typically scheduled to meet defined oceangoing vessel windows at the Gulf Coast ports. Missing these windows is not acceptable to shippers.
- **Service frequencies** must be at least every ten days for Ro/Ro shipments and at least weekly for container cargoes in order to meet the schedules of the respective vessel types loading in the Gulf Coast ports.

Potential Routes

Ro/Ro Gateway Ports - The Port of Galveston, TX is the Gulf Coast hub for Ro/Ro cargo. The leading Ro/Ro carrier from the Gulf, Wallenius Wilhelmsen Lines (WWL), is also the main carrier for "yellow goods" shippers such as Caterpillar. WWL only calls at Galveston in the Gulf, and has not indicated a willingness to add calls at other Gulf Coast ports such as New Orleans and Mobile. Consequently, it is imperative that any M-55 Marine Highways service for Ro/Ro cargo connects Peoria with Galveston.

Container Gateway Ports - Houston, Galveston's immediate neighbor via the Houston Ship Channel, is also the largest container port in the Gulf in terms of container traffic volumes, as demonstrated by the table below. As most of the region's containerized grain shipments are destined for Asia, connecting Peoria with a Gulf Coast port that has direct shipping services to Asia will be a critical factor in penetrating the container market for the M-55 Marine Highway. Houston is expected to maintain its position as the preeminent Gulf container port after the expansion of the Panama Canal in 2014-2015, although Mobile may also benefit from increased traffic through the canal on "all-water" services between the United States and the Far East. The Port of New Orleans appears to be less positioned for major growth in container traffic from the expansion of the Panama Canal, because of the approximately 110 mile diversion from the Gulf of Mexico to the Port of New Orleans and the draft constraints of 36 to 40 feet imposed by navigation of the lower Mississippi River..

Figure 2: Carriers Providing Container Shipping Services at Major Gulf Ports

Houston	New Orleans	Mobile
• CSAV	• CSAV	• APL
• CMA/CGM	• Hapag-Lloyd	• Hyundai
• Hapag-Lloyd ✓	• Hyundai ✓	• Maersk
• Hamburg Sud	• Maersk	• Zim *
• Maersk	• MSC	
• MSC	• Rickmers	
• NSCSA	• Seaboard	
• Zim ✓		
Container traffic in 2009: 1,254,560 TEU	**Container traffic in 2009: 228,378 TEU**	**Container traffic in 2009: 86,475 TEU**

✓ Indicates service to Asia via Panama Canal
* Zim's Mobile-Kingston feeder connects with its Asia service.

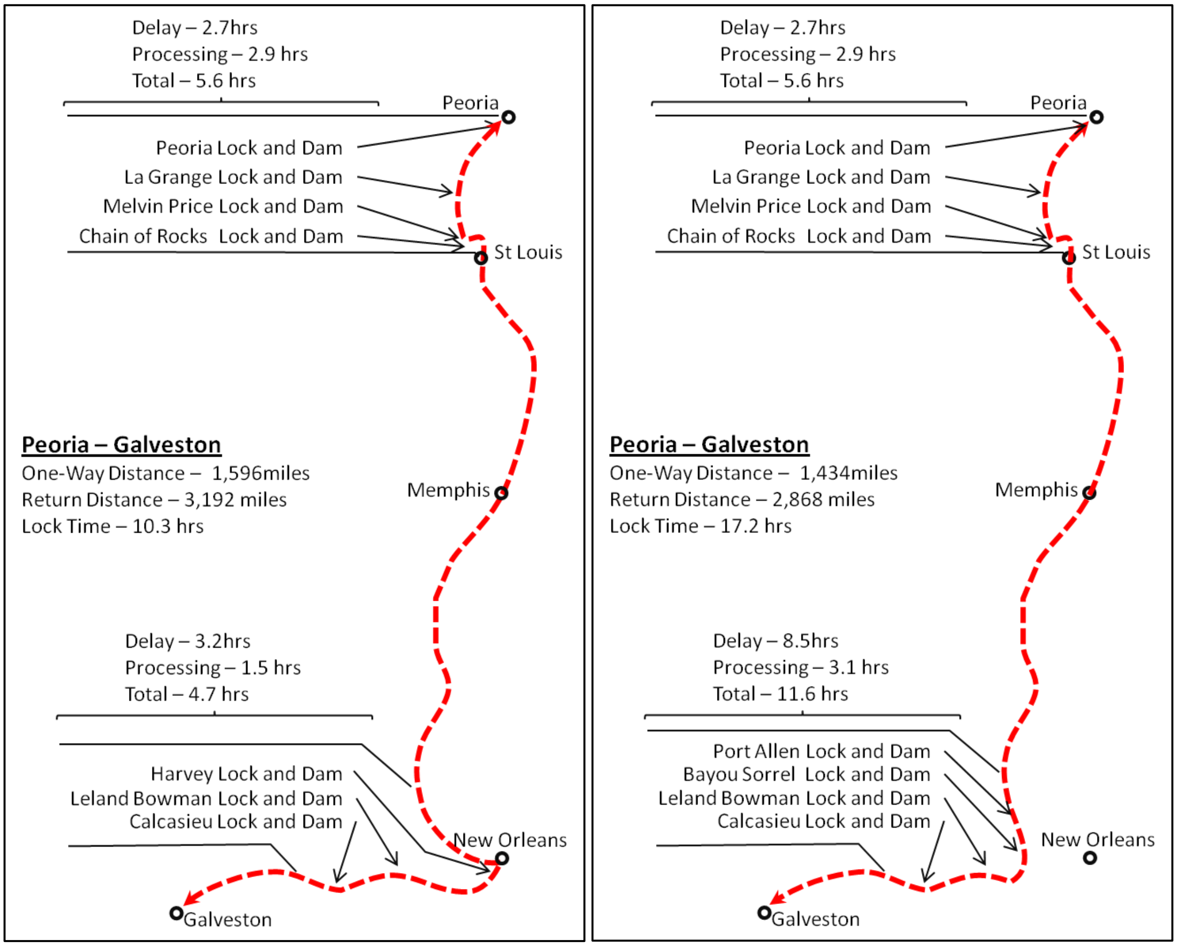
Locks and Dams - A key factor impacting potential routes for M-55 Marine Highway operations is the width of locks on the inland waterways that may be used between Peoria and the various Gulf Coast port destinations. As noted earlier, locks on the Illinois, Mississippi, and Tenn-Tom waterways are generally 100' to 110' wide and 600' to 1200' long. The locks on the GIWW that must be utilized to Houston or Galveston are less standardized dimensions with the greatest constraint being imposed by the Bayou Sorrel lock:

- Port Allen: 1202' by 84'
- Bayou Sorrel: 760' by 56'
- Leland Bowman: 1160' by 110'
- Calcasieu: 1180 by 75'
- Harvey: 425' by 75'

Optional routings to Houston or Galveston taking into account lock dimensions and potential delays are shown in the examples below. As shown, one option diverts away from the Mississippi River at Port Allen and via the Bayou Sorrel Lock by-passing New Orleans. This route effectively reduces the Peoria-Galveston round trip navigation distance by 324 miles (approximately 29 hours in transit time), but it adds almost seven hours of delays in lock waiting time.[1]

[1] Another alternative routing would be to use the Old River Lock (1200' by 75') that connects the Mississippi to the Atchafalaya River in northern Louisiana en-route to the GIWW.

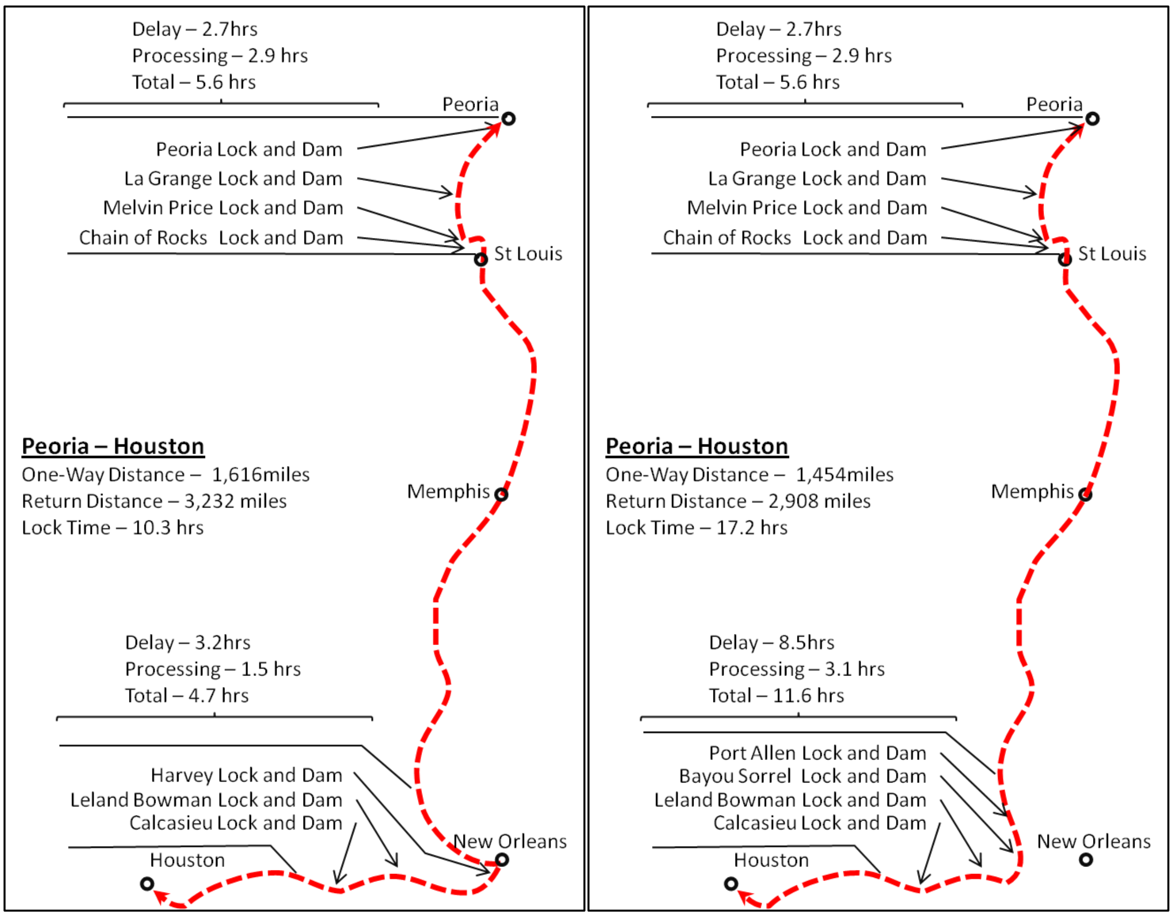
Figure 3: Potential Routings to Galveston (Ro/Ro Cargo)



Assuming an average speed of 8.8 miles per hour (7.65 knots), the round trip in-transit time for a Peoria-Galveston voyage for a single tug-barge unit would be around 14 days, excluding lock delays and additional days for cargo operations and contingencies. Consequently, two tug-barge or vessel units on a Peoria-Galveston run would be able to provide an approximate weekly service frequency (i.e. each tug-barge unit completing a roundtrip in 14 days), but the service might have a very poor level of reliability caused by uncertainties with lock times and cargo operations. However, it is important to note that the Ro/Ro shipper often has a lenient schedule and transit time requirement of 10/12 days and 14 days respectively (compared to the container shipper with a seven day frequency and transit requirement). Therefore, a dual tug-barge configuration on a Peoria-Galveston run could meet Ro/Ro shipper requirements.

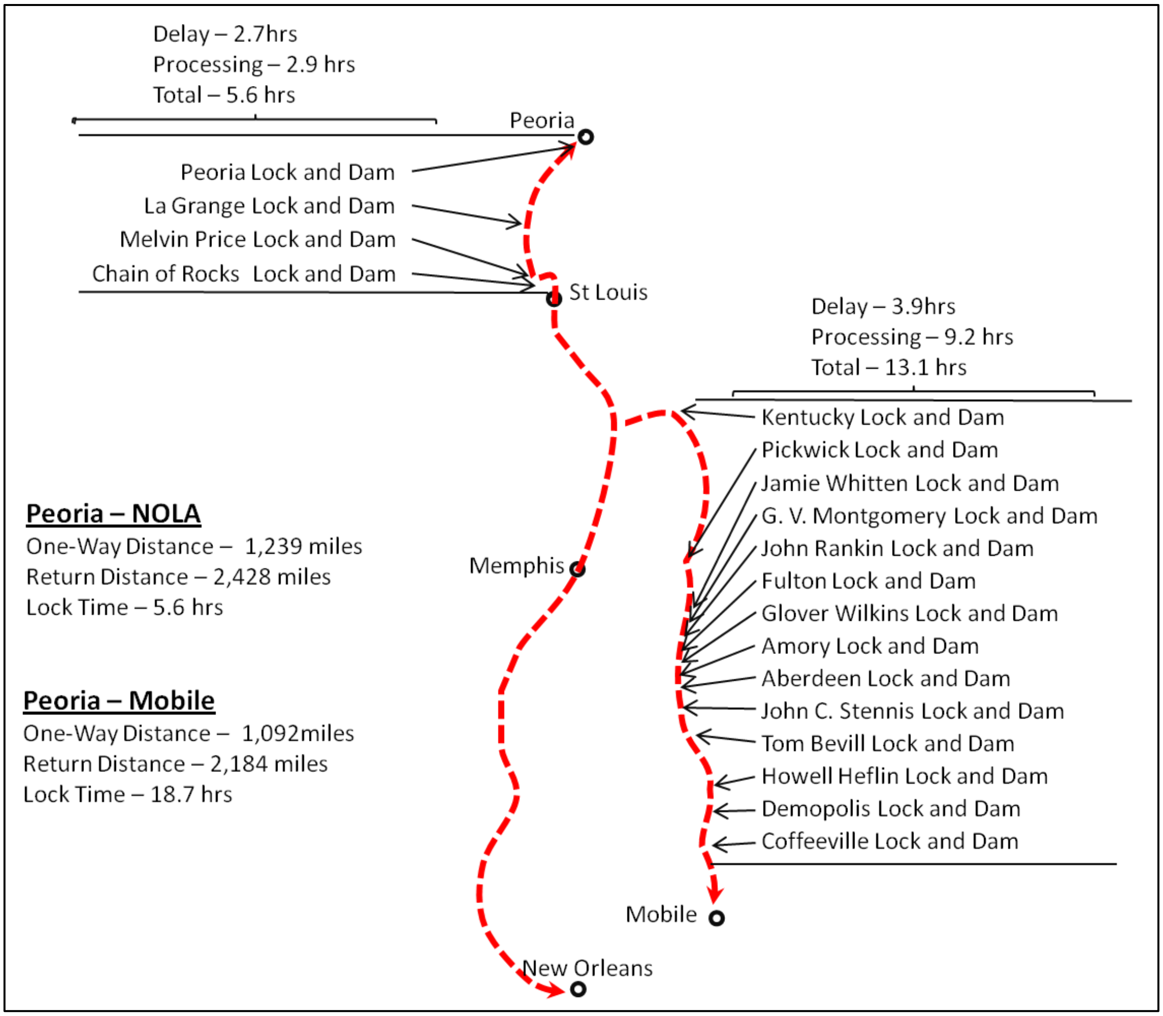
A Peoria-Houston container service would have a similar routing to the Galveston route described above, but with an additional 20-mile transit of the Houston Ship Channel. While a Peoria-Houston container service roundtrip may still be undertaken within a 14-day overall voyage cycle, this does not include an allowance for lock delays, cargo operations, and contingencies. And while two tug-barge or vessel units on this route could provide weekly frequency, the service schedule might not be as reliable as required for a container service.

Figure 4: Potential Routings to Houston (Container Cargo)



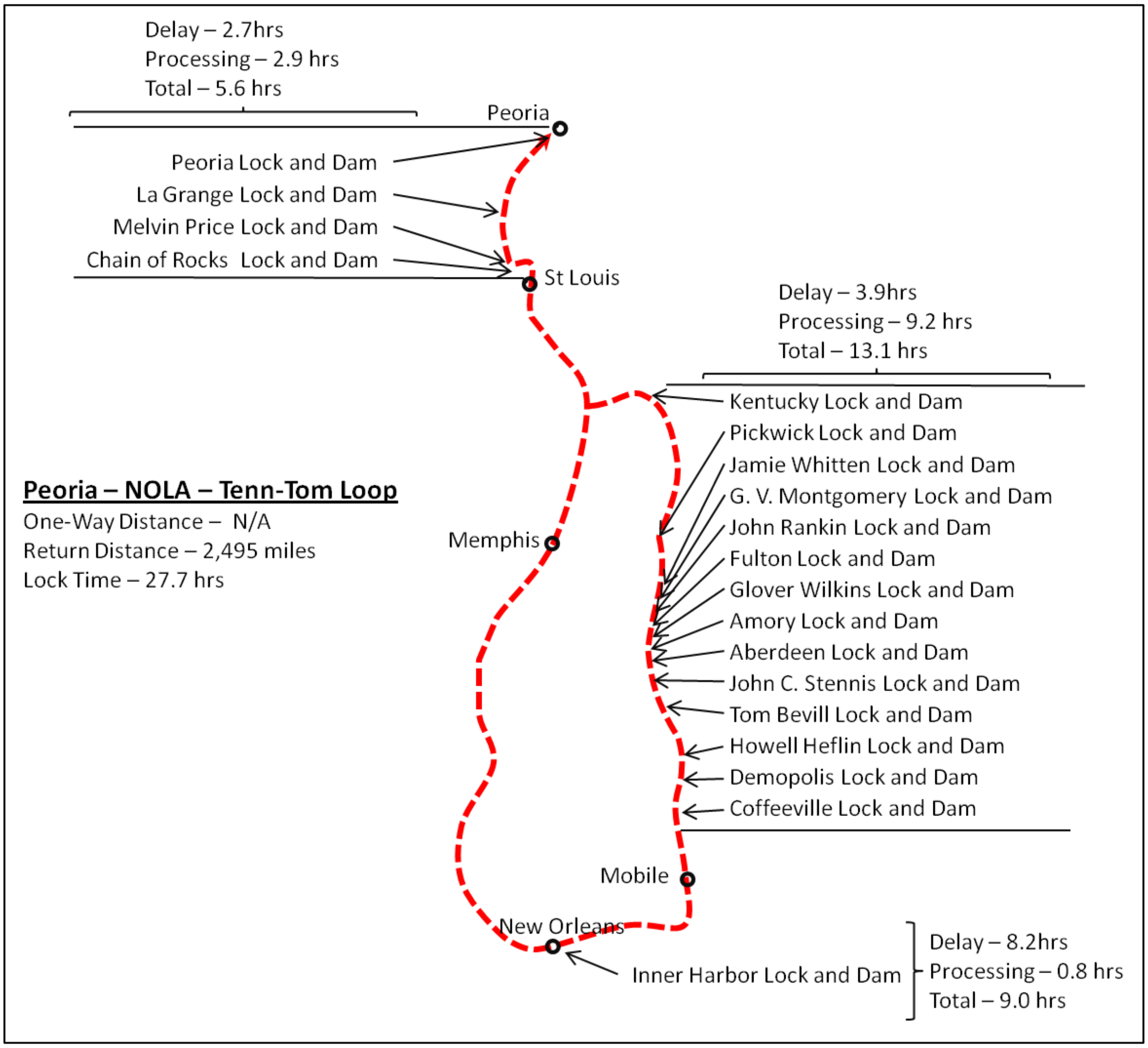
Routing of direct container services between Peoria and New Orleans or Mobile are provided in the charts below. A Peoria-New Orleans round trip would be under 14 days for transit time, excluding lock delays, and cargo operations. Two tug-barges could provide a weekly service (excluding idle time/allowance for contingencies) to match the standard weekly service frequency of most "blue water" container carriers, but at a very low level of reliability. Three units may also be able to provide bi-weekly service, but with minimal allowance for idle time and contingencies.

Figure 5: Potential Routings to New Orleans and Mobile (Container Cargo)



A Peoria-Mobile container service could also operate under fourteen days for a round-trip cycle despite passing through the numerous locks on the Tenn-Tom Waterway because of the relatively limited amount of lock delays on the Tenn-Tom Waterway compared to the other waterways. However, given the much smaller container traffic volumes currently moving through New Orleans and Mobile compared to Houston and their relative proximity, a single weekly service combining calls at both ports is likely to achieve a better utilization rate than separate services. As shown in the following map, such a service could move down river on the Mississippi, taking advantage of the higher speeds achievable with the current and down river vessel priorities for lock transits, and then move northwards on the Tenn-Tom facing less downstream current. As shown in the round trip voyage depicted below, a Peoria-New Orleans-Mobile container trip could take around fourteen days. Two tug-barge or vessel units could be able to provide weekly service, but without a reasonable contingency buffer for delays, maintenance, etc.

Figure 6: Potential Combined Loop Service for New Orleans and Mobile (Container Cargo)



Vessel Capacity and Design – Stage 1 (Current Technology & Practice)

The market analysis identified a considerable volume of Ro/Ro and container cargo that could move on the M-55 Marine Highway Corridor. As shown in the table below, the potential average weekly lifting of industrial machinery in the Ro/Ro sector is projected at 26,400 square feet of vessel deck space, with a total cargo weight of around 3,700 metric tons. In the container sector, average weekly traffic is projected to each up to 1,100 FEU[2], with the majority of containerized cargo coming from grain shippers. The total weight of potential weekly outbound container traffic is projected to be around 30,000 metric tons, including the tare weight of the containers. The mix of sizes of container equipment is estimated to be 75 percent forty-foot units and 25 percent twenty-foot units.

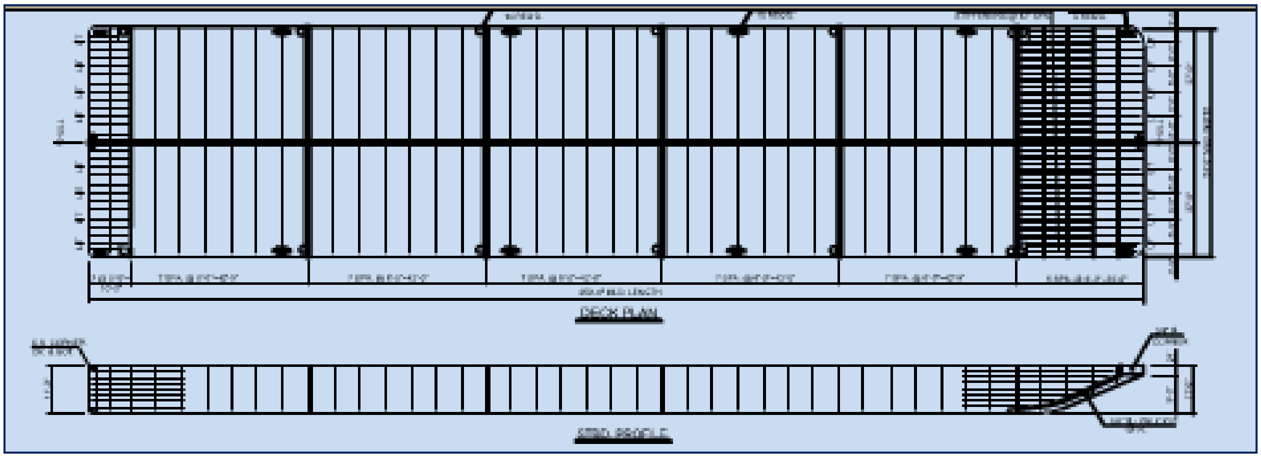
Table 1: Potential Outbound Marine Highway Traffic Volumes (From the Study Area)

Cargo weight:	(Per week)			
Type	Units	Square Feet	Unit Weight*	Total Weight
Breakbulk/RoRo				
Large RoRo	7	8,400	109 MT	763
Medium RoRo	60	18,000	49 MT	2,940
Total RoRo		26,400		3,703
Container (FEU)				
Machinery	241		25 MT	6,025
Grain	872		27.5 MT	23,980
Total Container				30,005

A service utilizing current technology and designs for inland waterway tug-barge equipment for Ro/Ro cargo would be based on deck barges (see example below) that could be loaded and discharged over the stern via ramps from the shore. Two large inland waterways deck barges (250' by 54' with 3,000 lbs. per square foot deck rating – each providing 13,500 square feet for Ro/Ro cargo stowage) would be able to move the projected weekly volume of Ro/Ro cargo from Peoria. Such a service would focus primarily on Ro/Ro cargo, but there may be sufficient additional capacity on the barge to carry a limited number of containers with components accompanying the machines in addition to the Ro/Ro cargo. This may be a powerful marketing asset as shippers of large industrial machinery often ship containerized components with the large Ro/Ro units. Delivery of large Ro/Ro cargoes on the same vessel as associated container cargoes would be an improvement over current methods of separate overland shipments by road and rail.

[2] FEU denotes "Forty Foot Equivalent Unit" as a measure of container capacity.

Figure 7: General Arrangement Plan for "Jumbo" Deck Barge



Ro /Ro cargo loading and discharge operations of the deck barges may be effectively handled by shore-based quarter ramps. These ramps will need to have a sufficient weight bearing capability to safely take the weight of the large Ro/Ro cargoes of up to 110 metric tons per unit. A two-barge "tow" of jumbo deck barges (250' by 54') with 2,000 HP tug would be able to use the Port Allen Lock's access to the GIWW.

A key operational issue in penetrating the Ro/Ro market for industrial machinery will be assuring shippers that the inland waterways mode provides an acceptable level of cargo protection. Insurers require that yellow goods shipments in the open sea (salt water) environment be moved in enclosed vessel spaces. Although covered deck barges are used in U.S. coastal operations as towed units (see example below), the 16' internal clearance that such a covering would need to provide in order to protect the largest of the industrial machines moving out of Peoria would seriously obscure the vision of a tug pushing the barges. An M-55 Marine Highway operator must assure the shippers of industrial machinery that their cargo moving over the fresh waters of the Illinois and Mississippi Rivers, and the protected brackish water of sections of the GIWW, is no more vulnerable to salt water corrosion than it is when moving in a similarly uncovered state by road or rail transit to coastal load ports. If coverage of the cargo is required in the inland waterways environment, a system of protection by tarpaulins should be explored.

Figure 8: Example of a Covered Deck Barge

Pure container Marine Highway services from Peoria to container terminals at the Gulf Coast ports of Houston, New Orleans, and/or Mobile would be operated separately from the Ro/Ro cargo services. Although tugs would be interchangeable, the service will call at different ports and terminals and utilize different barge equipment. Using current inland waterways technology and equipment, containers may be effectively stowed in large hopper barges that are 195' by 35' with a cargo capacity of 2,000 metric tons. Each such barge is able to load 40 FEUs by stacking the container four-high. A "Four-Pack" tow (four barges) would be able to move 160 FEUs with a 2,000 HP tug and remain intact for the complete round trip, because the operator would not be required to break up the tow to pass through any of the risers locks (See examples of container on barge operations utilizing hopper barges in the photographs below.)

Figure 9: Illustrations of Inland Waterway Container Hopper Barge Operations

Projected weekly container volumes of over 1,100 FEU would require at least four such Four-Packs to move the entire cargo segment. Containerized machinery cargoes could be transported by a single Four-Pack to either Galveston or Houston. The balance of southbound shipments would be containerized grain shipments that would likely be primarily destined for Houston. Alternatively, "two-pack" container tows with large deck barges could move up to 220 FEU per trip. Two-pack tows with deck barges would be able to use the Port Allen Locks' access to the GIWW. Four-Pack hopper barge tows would need to use the Harvey Locks in New Orleans to access the GIWW.

Vessel Capacity and Design – Stage 2 (New Technology & Practice)

The market analysis has indicated that potential users of an M-55 Marine Highway service place a premium on service transit time and reliability on a cost-competitive basis. Consequently, the merits of a monohull self-propelled barge were evaluated in contrast to the current practice of tug-barge operations on America's inland waterways. Self-propelled barges are not an untried and unproven transportation mode. The vast majority of bulk, breakbulk, and containerized traffic that moves on Europe's inland waterways such as the Rhine River system moves in self-propelled barges. (See examples in the illustration below.)

Figure 10: Examples of Self-Propelled Barges Operating in Europe

Ro/Ro Barge

Container Barge

The optimal design for a self-propelled barge that is (1) able to operate within the physical constraints of the M-55 Marine Highway Corridor and (2) to carry the cargo volumes identified in this study's Market Analysis would be a vessel of around 540' in length, 54' in breadth (i.e. able to transit the Bayou Sorrel Lock), with a draft of 2' unloaded and 9' fully loaded. Such a vessel would be relatively streamlined with a block coefficient of 0.82, similar to a container ship. As a result, the vessel would be much more fuel-efficient than a standard tug-barge combination operating on the inland waterways at this time. The same hull design would be used for both the Ro/Ro and container service vessels, thereby contributing to scale efficiencies and economies in shipbuilding. The cargo carrying capacity of the vessels is calculated at around 4,700 metric tons or 172 FEU (at 27.5 tons per FEU including both container tare weight and cargo weight).[3]

The self-propelled Ro/Ro vessel would be similar to a deck barge, with a large flat deck accessible via a shore ramp for loading and discharge over the stern. The Ro/Ro vessel would be able to carry breakbulk (on MAFI trailers), wheeled, and containerized cargo (either on MAFI trailers or loaded by a shore crane). The container vessels would be of open hatch design to facilitate rapid loading and discharge of the vessels. The bridge and deck house should be positioned forward on the vessel for maximum navigation visibility (similar to an Offshore Supply Vessel – see illustration below) and to not impede Ro/Ro cargo operations over a stern ramp.

Figure 11: 5,000 DWT Offshore Supply Vessel

The vessels could be powered by diesel electric engines of 2,600 horsepower, giving the vessels an operating speed of around 15 knots in still water. Liquid Natural Gas (LNG) rather than diesel would be a possible fuel for the vessels if an appropriate storage and fueling infrastructure is put in place at the Peoria port terminal. It is

[3] See appendix for calculations of vessel deadweight and capacity.

important to note that currently there are no LNG marine fueling stations along the proposed M-55 Marine Highway routes. This situation is likely to change when/if LNG as a marine fuel becomes more widely used in North America as it has in Europe.

Manning for the vessel should be the same as that for a tug of similar horsepower. The Ro/Ro vessel should utilize a shore ramp rather than its own stern ramp given that only two ports are to be served by two vessels and the weight of the ramp will detract from the cargo-lifting capability of the vessel.

Terminal Operations

Several factors will impact the design and size of the terminal in Peoria required to support the M-55 Marine Highway operations to the Gulf Coast ports for both Ro/Ro container cargoes:

- Projected maximum weekly throughput of containers is up to 1,100 outbound FEU (75 percent 40' units, 25 percent 20' units) or around 1,260 container movements in and out of terminal – assume comparable number of inbound full and empty containers to outbound flow.
- Projected maximum weekly throughput of Ro/Ro cargo is 70 large and medium-sized units equivalent to around 28,000 sq. ft.
- Likely first phase of M-55 marine highway throughput estimated at following levels:
  - Containers: 1,000 FEU total movements (in and out) or 1,150 container movements.
  - Ro/Ro: 50 units (20,000 sq. ft.).
- Bulk grain storage and container loading requirement: 20,000 MT (1 week's throughput).
- Number of vessel calls per week in first few years of port development: one Ro/Ro voyage to Galveston; one container voyage to Houston; one container voyage to New Orleans and Mobile.

The terminal infrastructure required to support these cargo operations in Peoria (adequate terminal infrastructure is assumed to already exist in the Gulf Coast ports) for the first phase of M-55 Marine Highway operations is as follows[4]:

- Container cranes: Mobile harbor cranes are a cost-effective means to load and discharge vessels in a relatively low volume terminal (see example on next page). A mobile harbor crane is typically able to handle around 200 container movements per 8-hour shift[5] – consequently, the Peoria will require two cranes for productivity and back-up in case of equipment down time.

[4] The cost for the proposed terminal infrastructure is addressed in the following section on Capital Expenditure.
[5] Example provided by Tropical Shipping's terminal in Riviera Beach, FL that achieves productivity levels of 25-30 containers per crane hour.

- Yard equipment: Reach stackers and terminal tractors and trailers are highly effective in small to medium sized terminals such as the Peoria facility due to their productivity, flexibility, and relatively low capital cost. (See examples below)
- Container storage area: Peoria terminal will need a storage area for 1,000 FEU containers – at 70 FEU containers per acre with reach stacker operation, total container yard (CY) area required is 12-15 acres. With wharf apron and bulk grain storage area, terminal will require around 25 acres in total.
- Berth length: Need to allow 1,100' to accommodate two Stage 2 container or Ro/Ro monohull self-propelled barge vessels.
- Grain storage and bulk-container loading: The terminal will need silos sufficient to store 20,000 MT of grain with the ability to load up to 400 containers a week. Belt throwers used to load bulk containers are typically able to fill six containers per hour – will require five to six bulk container loading stations.
- Gate facility for receiving/delivering 1,150 containers per week and administration building and maintenance and repair facilities for CY equipment.

Figure 12: Example of a Mobile Harbor Crane

Figure 13: Illustration of a Belt Thrower for Loading Bulk Containers

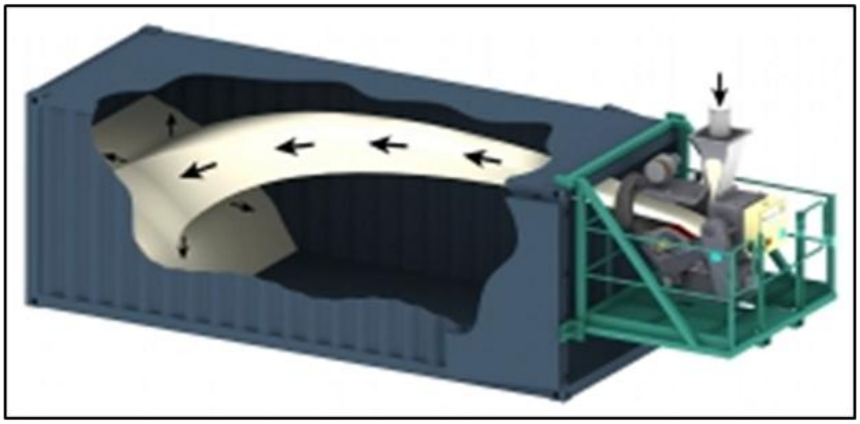


Figure 14: Example of a Reach stacker Container Handler

Capital Expenditure

The main projected capital expenditures for the M-55 Marine Highway Initiative are vessel equipment and the Peoria terminal. Containers used will be provided by ocean carriers who will do the on-carriage of container cargoes and MAFI trailers will be leased on a trip basis from Ro/Ro carriers such as WWL.

Vessels: Stage 1 (utilizing current technology and equipment) may be implemented on the vessel side by leasing current equipment (tugs and barges) that are readily available on the market. Stage 2 (self-propelled barges) will require new construction in U.S. shipyards. The estimated total cost for a Stage 2 self-propelled barge for either Ro/Ro or container operation ranges between $5 million and $15 million[6]. This capital cost may be compared to the Stage 1 current capital cost for a 2600 HP tug of $3.0 million plus $2.0 million each for two Jumbo deck barges (250' by 54') that would total around $7 million. The capital cost for a 200' by 37' hopper barge to be

[6] The estimate is preliminary and could vary substantially from the ultimate design and construction cost.

used for containers in a "Four-Pack" configuration is currently around $750,000 each which, with the $3 million for a tug, is comparable to the upper end of the estimate for a Stage 2 self-propelled container barge.

Terminal Infrastructure: Capital expenditure on all new equipment for the Peoria terminal would be around $18 million (see breakdown below by type of equipment). This level of expenditure could be significantly reduced by utilizing partly depreciated used equipment that may be available to the prospective terminal operator[7]. In addition, improvements to the terminal facility include the berth/dock, construction of gate, maintenance, and administration buildings, paving, and installation of security fencing, lighting, and utilities [may cost in the area of $8-12 million depending on the current state of any terminal site selected.]

Figure 15: Investment in all New Terminal Equipment of Around $18 million

	Illustration	Description	Key characteristics	Required number	Typical life (years)	Estimated Capex per unit
Reach Stackers		• Most flexible CY handling system • Stacking capable • Versatile: empty or loaded containers • Suited to small to medium size ports	• Lifting capacity: up to 45 tons • Stacking capability: 5 high • Sufficient reach to load containers in hopper barge	7	15	$650,000
Terminal Tractor and Trailer		• Used to move containers within the CY – e.g. from stack to shipside	• Fastest means to move containers within terminal • Also used for RoRo loading with MAFI trailers	10-12	10	$160,000
Mobile Harbor Crane		• Efficient means to load/ discharge vessels in relatively small terminals • Flexible – may be used to handle breakbulk and bulk cargoes as well as containers • Diesel-electric – easy to install	• Able to load barges with 6 rows of containers • Capable of handling 30 units per hour with skilled operator	2	20	$6,000,000

[7] Note that this estimate is significantly higher than the $3.5 million capex estimate evaluated as part of the Business Plan, for three reasons: 1) The $3.5 million estimate is based on prices for used equipment. 2) The Operational Plan was designed to serve the full extent of the contestable cargo forecasts, while the Business Plan revised the estimates to serve a targeted share (39 percent of containers and 65 percent of Ro/Ro). 3) The hook 'n haul operation eliminates port operational surges and spreads the loading/discharge of barges across an entire week, hence requiring less equipment.

Marketing & Sales Channels

Effective marketing and sales of the M-55 Marine Highway service will be facilitated by the highly concentrated nature of the potential market. In the case of the Ro/Ro cargo market segment, the vast majority of shippers are situated within the greater Peoria area – the five key potential customers are Caterpillar, Komatsu, John Deere, Kress, and Mitsubishi. These companies typically arrange inland transportation on their own account to export ports where they connect with Ro/Ro carriers such as WWL. The M-55 Marine Highway service operator will need to focus on key account management at a senior level with these big "Yellow Goods" shippers.

The key to penetration of the containerized grain segment in the Peoria area is illustrated by the success of the grain transloaders located near Joliet. In their case, near price parity between bulk shipping and container shipping rates to Asia, the availability of empty containers, the demand for identity preserved grain in Asia, and the availability of competitive intermodal services are critical (external) factors to success. Furthermore, mode choice is not influenced by the grower (producer), but by the large grain trading companies.

Information Systems Requirements

Information systems requirements for the M-55 Marine Highway service are relatively straightforward with most of the basic components being readily applicable from the information technology portfolio of experienced inland waterway and terminal operators. These basic components include the following:

- General ledger/financial accounting.
- Cargo booking, documentation, billing, and tracking.
- Vessel management and tracking.
- Equipment management.
- Terminal management.
- Vessel stowage.
- Payroll/Human Resources.

Whereas a freight integrator will likely have the necessary container management systems necessary to manage the receiving of intermodal (TEU or FEU) containers from ocean carriers, movement of the containers out to customers and then their transit of the containers to ocean load ports, an existing inland waterway operator may not. However, the relatively confined scope of the M-55 Marine Highway market and operations should make management of equipment relatively straightforward with the installation of any off- the- shelf programs that are readily available. Linked to this tracking capability will be the ability to provide shippers with a real time cargo-tracking capability that interfaces directly with shippers' systems. Such systems are also available on the packaged software market and through logistics services information technology providers and should be implemented by the M-55 Marine Highway operator in close consultation with its customers.

Staging of Implementation

Implementation of the marine highway concept on the M-55 Marine Highway Corridor may be carried out on an expedited basis in two stages:

- Stage 1 can be implemented in a matter of months with current type equipment (covered hopper barges for Ro/Ro and deck or hopper barges for containers). The primary constraining factor on implementation is likely to be the development of terminal infrastructure in the Peoria area, as well as meeting schedule and transit time expectations. However, effective start-up may be expected within six months of receiving authorization to proceed. It is noteworthy that a major inland waterway and terminal operator has already indicated willingness to participate in a pilot program.
- Stage 2, involving the use of monohull self-propelled barge vessels, will likely require 2-3 years for vessel design and construction until delivery. The prototype vessels identified in this project utilize readily available materials and technology and should be constructed in an economical manner on a timely basis.

Further Considerations

The strategy unveiled in this report for implementation of the conceptual M-55 Marine Highway service will substantially change the nature of business on America's inland waterways. A further step would be to take the connection of inland sites such as Peoria to not just U.S. coastal ports for Ro/Ro and container cargo, but to extend that reach to foreign ports such as key Caribbean and Central American hubs as Panama and Jamaica. However, this step requires the development of marine technology that would enable a vessel to operate effectively and safely in both the "brown water" and "blue water" environments and is beyond the scope of this study.

Appendix A

Calculation of M-55 Marine Highway Self-Propelled Barge Dimensions and Deadweight

LOA	Beam	Draft	Block	Hull Volume	Lbs in Cubic Foot	Vessel Displacement	
(feet)	(feet)	(feet)	Coefficient	(cubic feet)	of Fresh Water	(lbs)	(MT)
540	54	2	0.82	47,822	62	2,984,118	1,353.59
540	54	9	0.82	215,201	62	13,428,530	6,091.14
Cargo capacity (Metric Tonnes - MT)							4,737.55
Cargo capacity (FEU)							172.3

Source: Reeve & Associates

SECTION IV - BUSINESS PLAN

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Introduction

This report contains a summary of the findings from the business planning analysis conducted as part of the M-55 Marine Highway Corridor (M-55) Initiative study. The M-55 Initiative is a program to develop marine intermodal transportation services on the United States' inland waterway system involving the Mississippi and Illinois Rivers, and the Gulf Intracoastal and Tennessee Tombigbee Waterways. The objective of the initiative is to develop a cost-effective alternative transport mode to ground-based transportation for cargo movements that may be well served by marine intermodal transportation.

Business Planning Process

This business plan is based on the findings from previous tasks completed as part of the M-55 study, specifically the Market Analysis and the Operational Analysis. The business plan takes a financial view of the market and operational aspects.

- **Market** - The results of the market analysis provide the basis for the pricing, cargo volumes, market growth scenarios and the revenue forecasts.
- **Operational** - The operational plan provides the basis for the routes, service frequencies, barge equipment requirements, port capital needs and for estimating operating costs.

Note that although the Business Plan is based on findings and recommendations from the previous analyses, some have been refined to fit the tighter scope of the business planning process.

What Does the Customer Want?

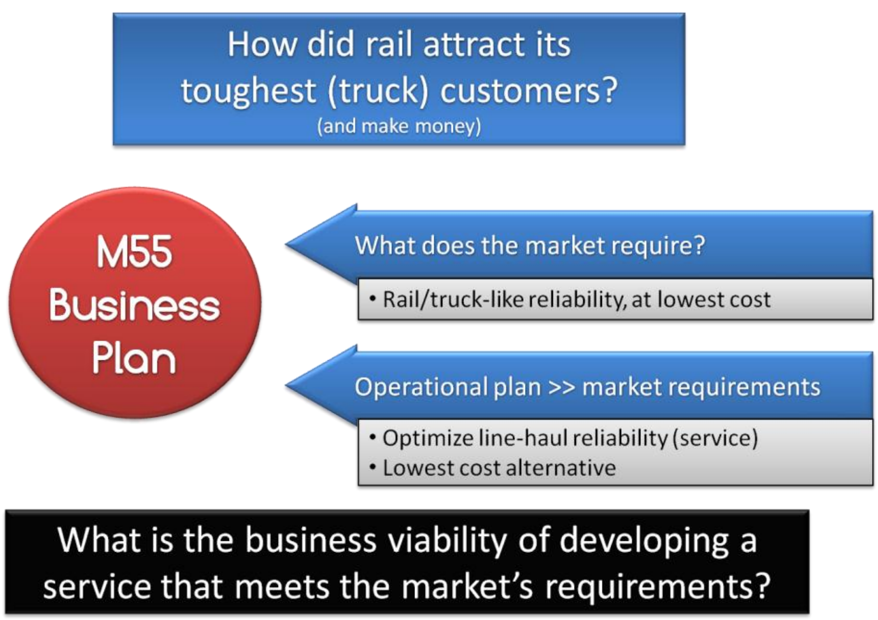
The market and operational aspects providing the basis for this business plan are based on the customer's transportation market requirements. Moreover, the cargo volume forecasts are specific to the operational requirements defined by the customer.

The philosophy for the plan is underlined by the question, what is the use of a business plan without a customer? The approach taken with the previous market and operational tasks was to determine what the customer wants, and to define an operations plan that meets these needs. Conventional studies initially have a product in mind, and then determine what portion of a defined market would use the product. These types of studies are referred to as "modal diversion" studies, whereby macro based models are used to estimate market/modal diversion based on mode shift assumptions and percentages in response to the predefined product.

The methods used for this study represent a paradigm shift away from diversion studies towards the methods used by the railroads when they successfully attracted the trucking industry to become one of their largest customer segments. While they initially struggled to win over trucking customers like UPS and JB Hunt, largely because they tried selling their existing bulk rail operational model as their core product, the railroads eventually succeeded as they developed an operational product that met the customer's needs. The result of the railroads' market plan is a long successful standing partnership that exists to this day between some of the nation's largest trucking and railroad companies to meet the shipper's (customer) needs, and this study hopes to mirror that success.

To that end, potential customers located in and around Peoria, Illinois, were asked what it would take to win over their business to a barge service. Moreover, a specific effort was made to estimate the number of weekly shipments that would be directly contestable if the desired barge service was put in place. These customer specific service requirements, and associated contestable cargo volumes, were used as a basis for defining a specific operational plan.

Figure 1: Paradigm Shift: What Does the Customer Want?



Strong Business Case

There is a strong business case for the M-55 Initiative. The implementation of one or more barge services along the M-55 Marine Highway Corridor, specifically meeting the requirements outlined by the customer, will have a strong basis for being business-case feasible. This conclusion is not solely based on the results of the analysis outlined herein, but also on the overall methods used as a basis for this analysis.

Overview of the Market Development Plan

This section summarizes the market development approach and forecasts. Appendix F summarizes the key market forecast assumptions and variables.

Dual Niche Market Segmentation Strategy

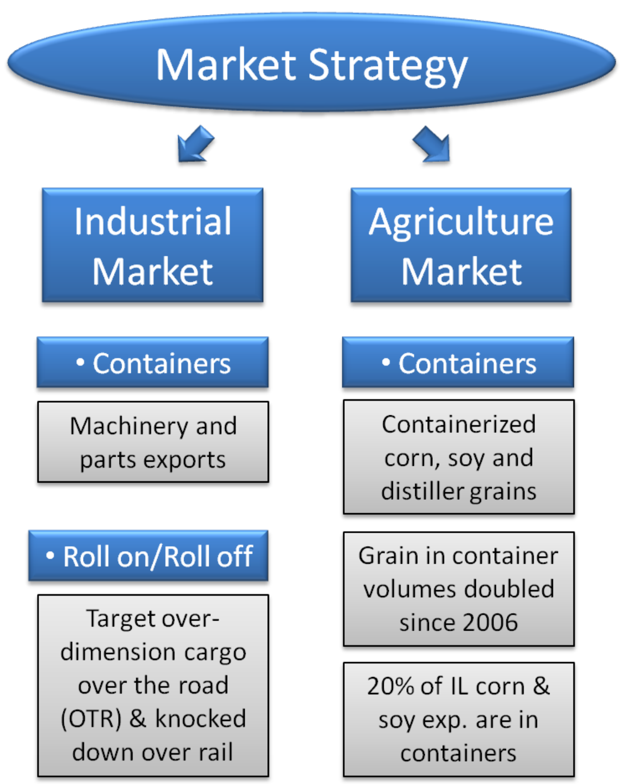
There are two key segments that present the best target for the market development plan, each with unique characteristics providing the basis for a very specific niche market development approach:

(1) **Over-Dimensional Ro/Ro Cargo** – While the Ro/Ro service will target shippers of large industrial and agricultural machinery such as mining equipment, tractors and harvesters ("yellow goods"), the core niche to be targeted are over-dimensional shipments carried over-the-road (OTR) to East Coast and Gulf Coast ports; and,

(2) **Identity Preserved Soy and Grains** – Specialty grains produced around Peoria specifically containerized for the purpose of preserving their identity during export by sea transportation.

The strength of this niche strategy is based on the compelling price differential between prevailing shipment methods and the proposed M-55 services discussed in the next section.

Figure 2: The Two Market Segments and Their Key Characteristics

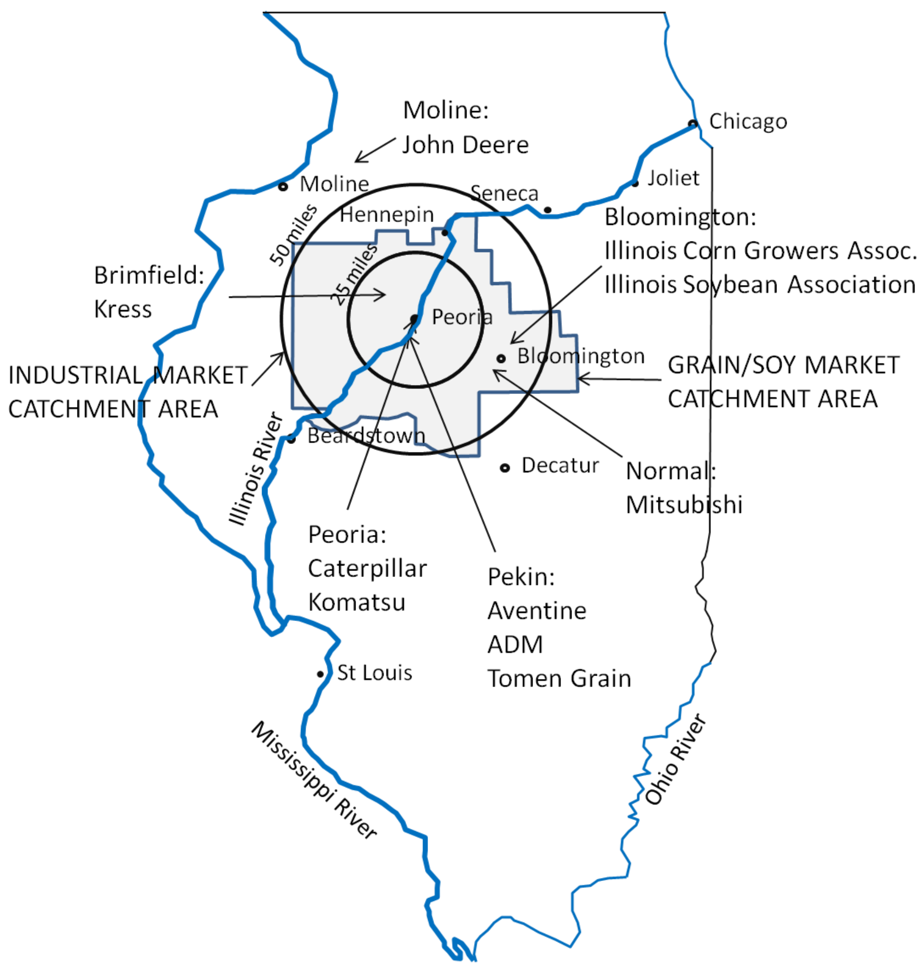


Close Proximity to the Target Market

The market around Peoria to be served by the M-55 service is shown below. The yellow goods segment is comprised of shippers such as Caterpillar, John Deere, Komatsu, Mitsubishi, and Kress that are relatively closely located to Peoria. Shippers within the specialty grain segment are more broadly distributed but still fall within an 11 county region with a roughly 50 mile radius footprint around Peoria.

Close proximity to the market is critical to the success of the market penetration strategy. This is particularly important as the Peoria market does not have a locally based intermodal ramp. Intermodal services are provided directly from the critical mass of rail intermodal operations in and around Chicago (Joliet), Ill. However, Peoria based industrial and grain shippers are underserved in the sense that Peoria is on the outer-limits of Chicago's intermodal dray watershed. As a result, intermodal drayage costs are high due to the long drive and the cost of the empty backhaul (containers are sourced from the Chicago intermodal yards). Since the bulk of the Peoria market base is within 50 miles of the port operation, drayage costs are considerably lower and this market is highly captive.

Figure 3: Map of the Peoria Study Area



Forecast of Contestable Cargo and Associated Market Penetration

The cargo forecasts used in this business plan are based on the market analysis conducted as part of this M-55 study initiative. A description of how the market forecasts were developed is included in the market report.

Customer-Driven Forecasts - In summary, barge service requirements are based on meeting the customers' needs so that they would convert a portion of their supply chain to one or more M-55 barge services. In addition, this customer-centered research process was used to identify the specific supply chain segments that would be contestable, as well as to estimate of the weekly volumes for those specific supply chain segments. This was done for each of the large regional industries. The process included interviews with the top managers overseeing company-wide transportation and logistics operations for large multinational corporations with sophisticated supply chain management systems. These managers were able to provide a strong understanding of the amount of cargo that is likely to be converted (contestable) to a barge service, if the service met their requirements. Factors that went into determining contestability were the pricing of current mode choices, the trade lanes used and/or preferred, the gateway ports, the destination market, frequency and transit requirements. The following two tables summarize the forecasts of contestable cargoes based on the market analysis. The tables also summarize and compare the actual volumes to be serviced if the M-55 services were to be implemented based on this business plan. The services analyzed as part of this business plan will absorb approximately 65 percent of the contestable Ro/Ro cargo this study was able to identify, and approximately 39 percent of the contestable container cargo in the study area.

Table 1: Forecast of Contestable Ro/Ro Cargo Volumes

	Forecast of Contestable Cargo	Business Plan Target	Share of Contestable Cargo
Medium (units)	60	36	60%
Large (units)	7	6	86%
Medium (MT)	2,940	1,764	60%
Large (MT)	763	654	86%
Total (MT)	**3,703**	**2,418**	65%

Table 2: Forecast of Contestable Container Volumes

<table>
<tr><th rowspan="2"></th><th rowspan="2">Forecast of Contestable Containers</th><th colspan="4">Business Plan</th><th rowspan="2">Share of Contestable Containers</th></tr>
<tr><th>Galve-ston</th><th>Hou-ston</th><th>NO/-Mob</th><th>Total</th></tr>
<tr><td>Ro/Ro Parts</td><td rowspan="2">275</td><td>12</td><td></td><td></td><td>12</td><td rowspan="2">63%</td></tr>
<tr><td>Industrial Exports</td><td></td><td>80</td><td>80</td><td>160</td></tr>
<tr><td>Grain Exports</td><td>971</td><td></td><td>160</td><td>160</td><td>320</td><td>33%</td></tr>
<tr><td>Total</td><td>1,246</td><td>12</td><td>240</td><td>240</td><td>492</td><td>39%</td></tr>
</table>

Description of the M-55 Corridor Services

The cost parameters that go into this business plan are based on the operational plan developed as part of this study. The operational plan is focused on providing intermodal barge transportation services between the Peoria and the Gulf Coast. The M-55 operational plan addresses multiple routes, serving multiple port combinations, the barge vessel equipment requirements, and service schedules and frequencies. Appendix H summarizes the key vessel and operations assumptions.

Two Types of Services

The M-55 business plan evaluates two types of services for the M-55 Marine Highway Corridor: containerized and Ro/Ro.

- **Containers** – This type of service focuses exclusively on containers, primarily grain and industrial exports, and the import of merchandise goods. This would essentially be a dedicated barge tow service consisting of a 2,000 horsepower tug and standard hopper barges. Containers are stacked up to three high in hopper barges, as shown below. A hopper barge is 35 feet wide and 195 feet long, and assumed to carry 40 forty-foot equivalent (FEU) containers, 80 twenty-foot equivalent (TEU) containers and about 50 boxes in a mixed configuration (FEUS and TEUs). For this business plan, a tow consists of six hopper barges with a capacity of 240 FEUs.

Figure 4: Containers Stacked in Standard Hopper Barges

- **Ro/Ro** – The service will primarily focus on transporting heavy machinery and equipment, or "yellow goods", as well as some containers with parts (accompanying the parent Ro/Ro shipments). While the illustration below shows project cargo related Ro/Ro traffic, this service will target non-project cargoes, specifically the export of a steady production stream of heavy machinery, manufactured locally by a core group of globally dominant brands. The service would essentially be a dedicated barge tow consisting of a 2,000 horsepower tug boat and two large configuration deck barges. The cargo is rolled onto the deck barge on a MAFI trailer and rolled off again at the destination port. A large deck barge is 54 feet wide and 250 feet long, and assumed to carry about 3,250 metric tons (MT) of cargo on about 13,000 square feet of deck space. For this business plan, a tow consists of two deck barges with a capacity of 6,500 MT.

Figure 5: Heavy Equipment Cargo Rolled-on/Rolled-off Deck Barges

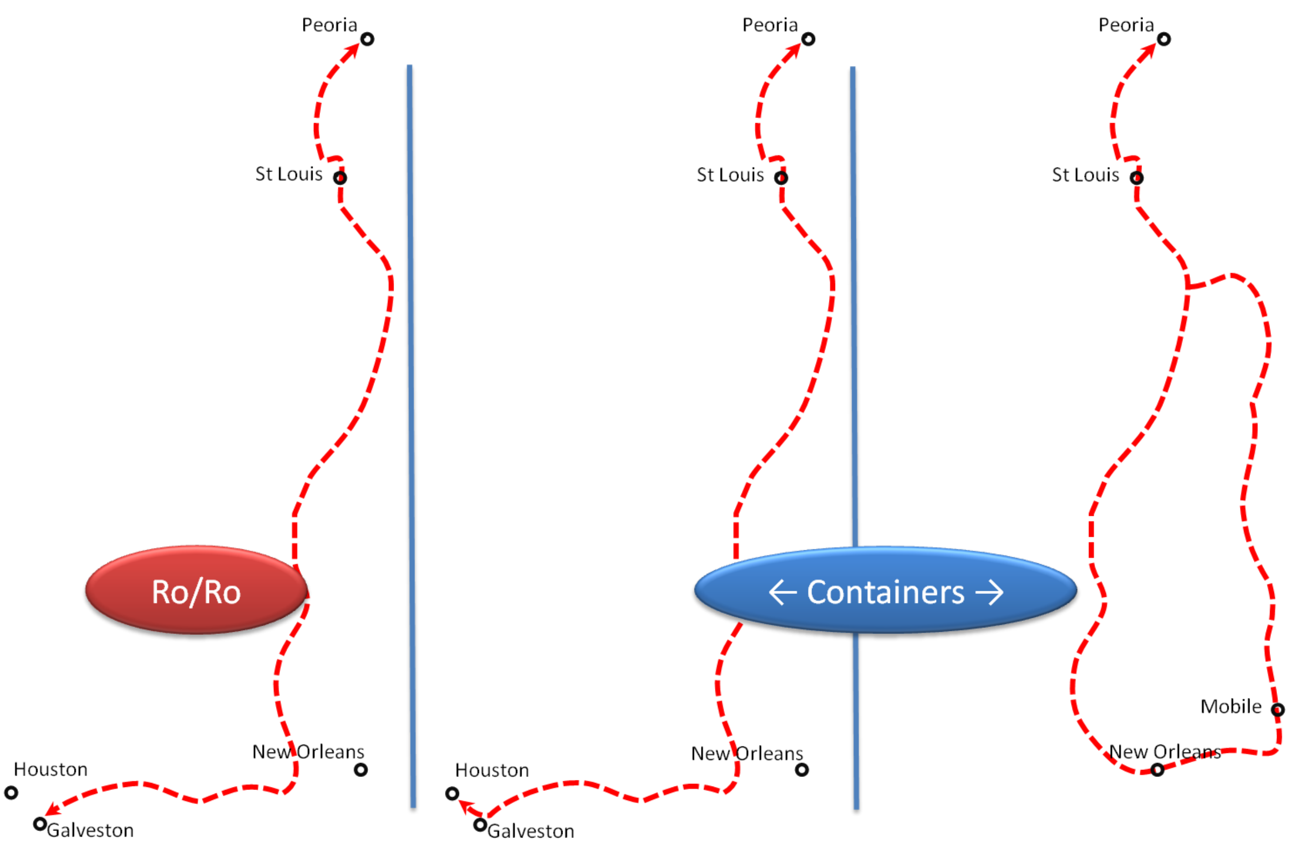
Three Proposed Routes

This business plan evaluates the financial performance of three different routes, two used to evaluate the viability of container services and one for a Ro/Ro service.

Ro/Ro – The M-55 Ro/Ro service is proposed to operate a route between Peoria and Galveston using the Illinois and Mississippi rivers and the western segment of the Gulf Intracoastal Waterway (GIWW). It has a round trip of approximately 2,900 miles with lock delay times of approximately 17 hours. The route can be turned in approximately 14 days using the aforementioned barge configuration.

Containers – Two container services, the first of which is proposed to operate between Peoria and Houston using the same route as the Ro/Ro service. The second route is a loop from Peoria, through New Orleans to Mobile, using the Illinois and Mississippi rivers and the eastern segment of the GIWW, looping back toward Peoria via the Tennessee-Tombigbee waterway. The Peoria-New Orleans-Mobile loop is about 2,500 miles round-trip, and includes an estimated 27 hours of lock delays. Both container routes can be turned in approximately 14 days using the aforementioned barge configuration.

Figure 6: Map Showing Three Proposed Routes



Service Constraints Related to the Proposed Routes

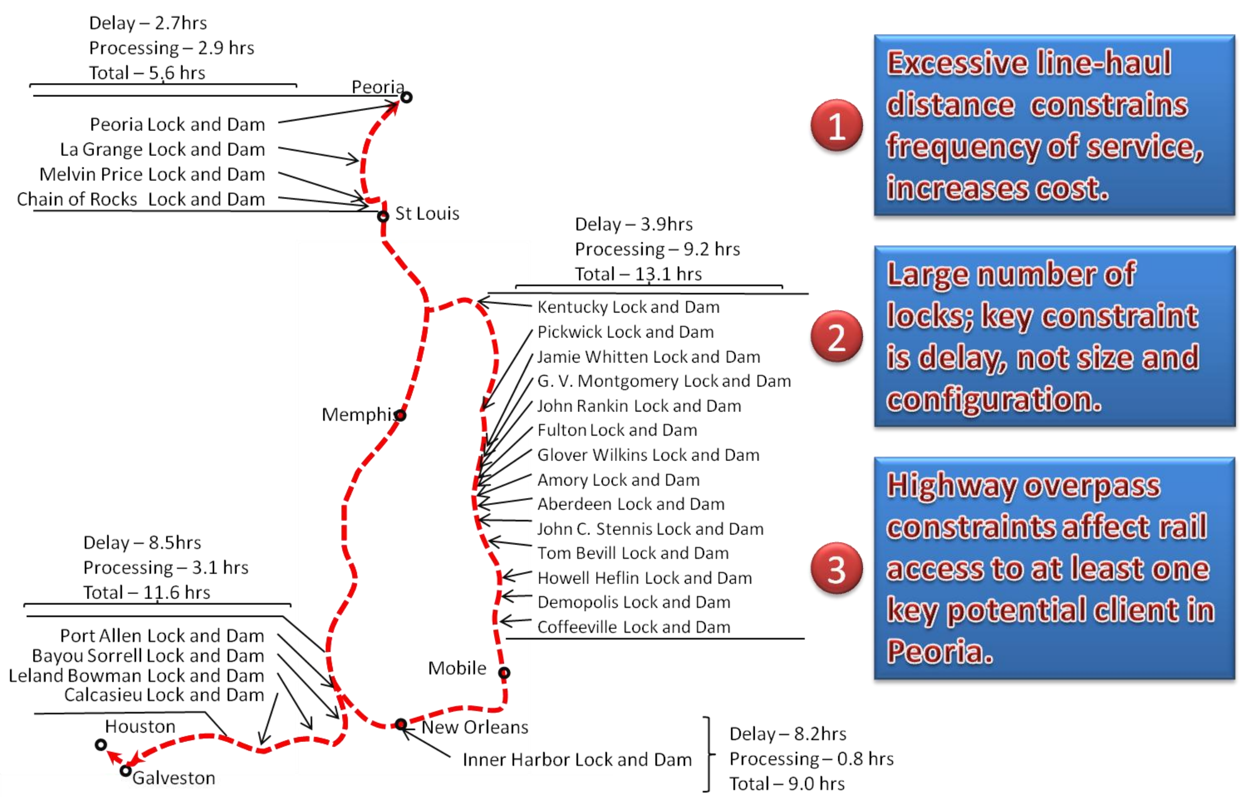
The prospective M-55 customer requires a reliable weekly service, with a defined schedule and transit time of less than seven days. The proposed routes present several constraints that undermine these levels of service.

Excessive Line-haul Distance – The routes have a return distance of between 2,500 and 2,900 miles. A conventional barge configuration can't provide a return trip service within seven days. A more achievable turn time is around 14 days, twice the time required by the customer, and with limited reliability. This is a significant constraint.

Significant Lock Delay Times – All three routes require passage through a large number of locks; a total of nine between Peoria and Houston/Galveston, and nineteen along the Peoria and New Orleans/Mobile loop. The issue is not the size and configuration of the locks, but the delays caused by transition locks. Locks add between 17 and 27 hours to the service schedule. This is a significant constraint.

Highway Overpass Constraints – At least one key prospective customer identified highway overpass constraints that may affect rail access to the port. While this does not impact the barge line-haul service, it is an issue that must be addressed.

Figure 7: Key Service Constraints



Hook-'n-Haul Barge Service Deployment Strategy

The Customer's Requirement - The key challenge for the M-55 initiative is meeting the customer's needs. Aside from the requirement to offer a service at the lowest cost compared to other modes, providing a service that reliably meets a defined schedule within a defined transit time is what will determine the level of cargo conversion. The M-55 customer is looking for a weekly service that coincides with ocean vessel cuts at gateway ports, with a barge southbound line-haul transit time of five to seven days.

Prevailing Technologies Can't Meet Requirements - What makes the scheduling requirement particularly challenging is the state-of-technology of vessels currently used along the M-55 Marine Highway Corridor, specifically bulk barge tows designed to haul large volumes of cargo at slow speeds, will be able to provide service within the requisite transit window. Their operating speeds are too slow to operate a single return trip between Peoria and the major Gulf Coast ports within seven days. Moreover, the practice of fleeting and staging barge fleets at various junctures and crossings along the waterway system further lengthens transit times.

New-build Vessel Design Does Not Exist - Earlier tasks identified the need for a new faster vessel technology designed for cargoes that cube-out before they weigh-out, such as container and Ro/Ro cargoes. As part of the operational analysis, the vessel recommendation received a peer review from shipping industry executives, marine industry experts from major transportation research centers, and naval architects experienced with inland shipping designs. In addition, a special Plenary Session on the need for a next generation inland vessel was convened in conjunction of with the 2011 Smart Rivers Conference in New Orleans on September 12, 2011. The conclusion of the peer review and the Plenary Session was that there is no existing U.S. built and owned vessel designed to carry high-cube cargoes (containers and Ro/Ro cargo), in shallow draft waters (9-12 ft.) at high speeds (12-15 knots) through inland waterways, locks, and dams. Hence, there is no domestic data available to use as a basis for testing the business case for a service using a new-build vessel.

The Hook-'n-Haul Strategy – In order to test the business case for the M-55 service, a hook-'n-haul deployment approach has been adopted. The strategy is essentially to operate an over-capitalized version of a traditional barge configuration – using three times more equipment than what is normally used, so as to meet the necessary service requirements. The following illustration shows a traditional dedicated barge service between two ports. The capital expenditure is limited to a simple barge tow configuration needed to service the line-haul. In comparison, the next illustration shows a highly over-capitalized hook-'n-haul barge deployment plan, an approach which is incorporated into this business plan.

Figure 8: A Basic Dedicated Barge Service Deployment Between Two Ports

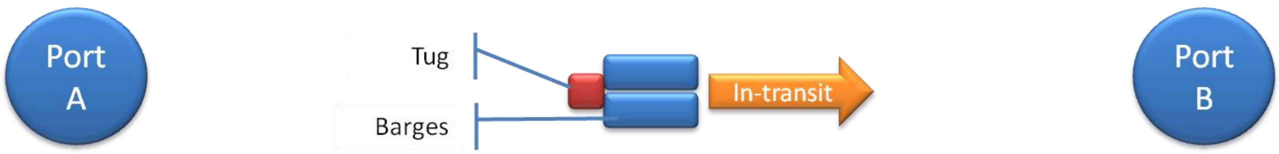
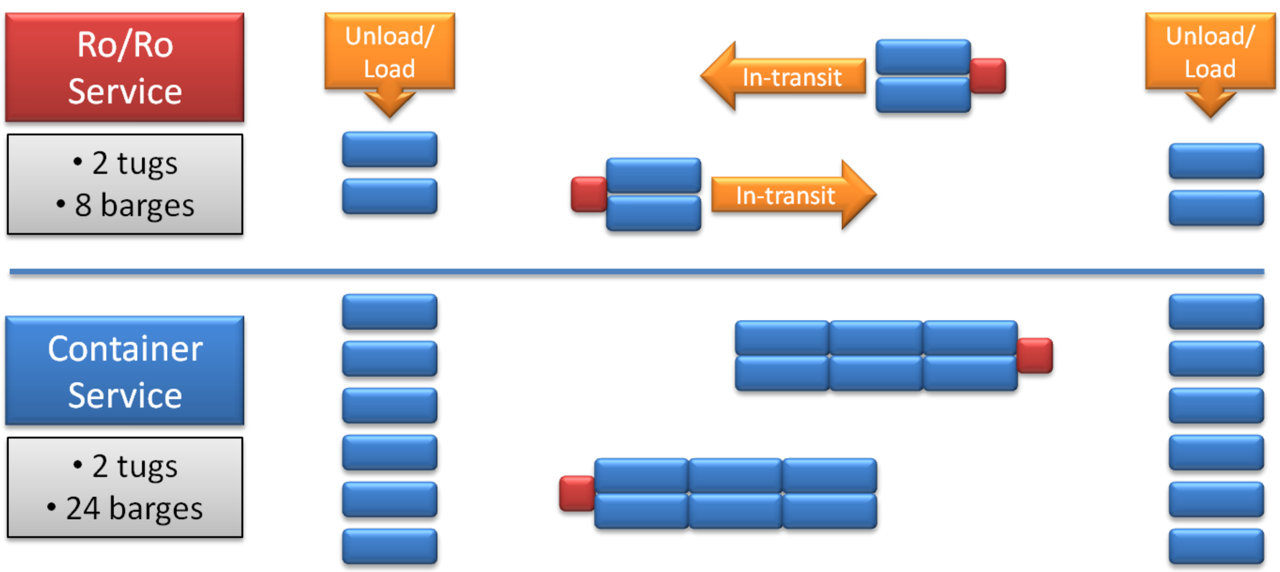


Figure 9: Hook-'n-Haul Barge Deployment Strategy for the M-55



The hook-'n-haul system differs from the basic configuration in the following ways:

- **Dual Simultaneous Bookend Services** – This scenario deploys two barge tow services running simultaneously from both bookends of the route. Running both services from opposite ends allows the M-55 service to meet the frequency requirements. In the case of the Ro/Ro service, two 2,000 hp tugs are deployed simultaneously in opposite directions, each with two deck barges. The container service has 2,000 hp tugs deployed simultaneously in opposite directions, each with six standard hopper barges.

Extra Barges Loaded During Transit – Instead of waiting for the barge tows to reach either port in order to start the process of discharging/loading cargo, there are extra barges at either end for this specific purpose. The extra barges are discharged/loaded while the tows are in transit, and as a result, the dedicated tug does not wait at the port for cargo to be handled. They simply hook-'n-haul. Thus the barge is essentially always in transit, minimizing service transit times.

- In the case of the Ro/Ro service, two pairs of deck barges are discharged/loaded, one pair at each port. The container service has two sets of six hopper barges, one set at each port, available to be discharged/loaded while the tows are in transit.

Good Proxy for a New Build Vessel – The hook-'n-haul approach resolves two of the key challenges in conducting this business plan, specifically achieving the frequency of service offered by a faster new-build vessel that does not yet exist, and addressing the capital outlay that is representative of a new-build vessel.

1. **Feasible Frequency of Service** – The proposed hook-'n-haul service will be able to operate at the frequency that a new build ostensibly offers – service Peoria at least once–a-week - thereby meeting the customer's requirements and affirming the market forecast assumptions outlined earlier.

2. **Accounts for the High Cost of a New Build Vessel** – If the proposed new build self-propelled barge vessel is not mass produced, it will be relatively expensive, at least until mass production levels of demand evolve. This is topical of which new technologies are generally expensive during the early life-cycle period. The hook-'n-haul strategy used in this business cycle is essentially overcapitalized, and therefore is representative of the likely cost of a new-build vessel. Therefore, this business plan sufficiently accounts for the cost of a new-build vessel in the absence of data to apply in this study.

Translating the Market Forecasts into Safe and Efficient Operations

The operational plan must fit within the overall market forecasts. As stated earlier, the proposed barge configuration and frequency of service accounts for between 39 percent and 65 percent of the contestable cargo levels identified through the market analysis. Moreover, the proposed equipment and tow configurations must be able to operate efficiently and safely against the powerful and unpredictable forces associated with the rivers and waterways. The barge utilization rates are within an acceptable and safe range; 68 percent of load capacity for the hopper barges and at 41 percent of load for the deck barges.

Table 3: Market Forecasts Translated into Service Requirements

Containers

Forecasts

	Fore-cast	Served to:			
		Galve-ston	Hou-ston	NO/-Mob	Total
Ro/Ro Parts	275	12			12
Industrial Exports			80	80	160
Grain Exports	971		160	160	320
Total	**1,246**	**12**	**240**	**240**	**492**

Equipment

Type	Size	Daily Cost	Units
Tugs	2,000 HP	$4,000	2
Hopper Barges	35' by 195'	$700	24

Utilization

6 Barge Tow	Units (FEU)	Load (MT)
Planned	240	6,093
Capacity	240	9,000
Utilization	**100%**	**68%**

Ro/Ro

Forecasts

	Contestable Forecast	Served to Galveston
Medium (units)	60	36
Large (units)	7	6
Medium (MT)	2,940	1,764
Large (MT)	763	654
Total (MT)	**3,703**	**2,418**

Equipment

Type	Size	Daily Cost	Units
Tugs	2,000 HP	$4,000	2
Deck Barges	54' by 250'	$1,000	8

Utilization

2 Barge Tow	Area (SF)	Load (MT)
Medium Ro/Ro	10,800	1,764
Large Ro/Ro	7,200	654
Parts	1,920	280
Planned Total	19,920	2,698
Capacity	27,000	6,567
Utilization	**74%**	**41%**

Port Capitalization Plan

The M-55 services analyzed in this business plan have the ability to fully contribute to the port capital requirements at the Port of Peoria. The operational plan defined the overall capital needs for the Port of Peoria, which are further refined as part of the business planning process.

Port of Peoria Equipment Needs

The Port of Peoria will need an estimated $3.5 million in port capital improvements, including:

- Reach stackers (4) – Lift/stack containers on the CY, lift-on/lift-off (Lo/Lo) from rail, truck and barge.
- Terminal tractor and trailers (6) – Hustle containers and Ro/Ro cargo within the terminal.
- Straddle crane (1) – To load/discharge Ro/Ro and containers from truck and rail chassis, side-by-side.
- Grain to Container Bulk Transfer Bins and Belts (4) – To load or "spray" grain into containers.
- Fork Lift Trucks (4) – For the movement of break-bulk and miscellaneous cargo.

Port Capital Funding Program

The port's capital improvements are to be funded through receipt of a portion of port related handling fees such as container handling fees, bulk grain transfer fees and the Ro/Ro handling fees. For the purposes of this business plan analysis, it is assumed that 66 percent of all these fees go toward covering labor and other operational costs associated with handling the cargo at the port, and that 33 percent goes towards the capitalization of the port equipment needs (capital funding program). Based on the various market growth scenarios, the present value of the port capital funding program is forecasted to accumulate between $4.3 million and $6.0 million over three years, and an estimated $15.3 million to $16.5 million over ten years. The table below summarizes the present value of the port capital funding program.

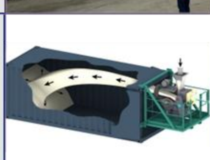
Table 4: Present Value of Port Capital Fund

Growth Scenario	Present Value of Capital Fund ($,000's)	
	36 Months	120 Months
Immediate	$5,995	$16,501
6-Month	$5,550	$16,471
12-Month	$5,178	$16,183
18-Month	$4,806	$15,835
24-Month	$4,294	$15,329

*33% share of Peoria port's container handling fees, bulk grain transfer fees and Ro/Ro handling fees.

Based on these estimates, it is clear that the port capital funding program outlined herein is able to generate sufficient revenue over three years to fund the estimated port capital requirements. Therefore, the M-55 services can effectively contribute toward the payback of any debt associated with the capitalization of the port.

Figure 10: The Proposed Peoria Port Equipment Plan ($3.5 Million)[1]

	Illustration	Description	Key characteristics	Required number	Typical life (years)	Est. Capex per unit
Reach Stackers		• Flexible CY handling system • Stacking capable • Versatile: empty or loaded containers • Suited to small to medium size ports	• Lifting capacity: up to 45 tons • Stacking: 5 high • Sufficient reach to load containers in hopper barge	4	15	$250,000 (used)
Terminal Tractor and Trailer		• Used to move containers within the CY – e.g. from stack to shipside	• Move containers within terminal • Also used for Ro/Ro loading with MAFI trailers	6	10	$160,000 (new)
Straddle Crane		• Load/discharge Ro/Ro cargo from trucks or rail to MAFI trailers side-by-side • Load/discharge containers to/from trucks	• Require a high load capacity - approx. 200,000 pounds • Key for transferring between modes	1	20	$500,000 (used)
Grain to Container Bulk Transfer Bins and Belts		• Load grain into containers • Hopper bottom bins feed variable speed belts that "spray" corn into container	• 1 bin and belt thrower per line • 6 containers/hour per line • 48/day/line	4	10	$125,000 (new)
Fork Lift Trucks		• Used for small misc. movements	• Lifting capacity: 2.5 MT • Diesel / LPG power	4	10	$120,000 (used)

[1] Note that this estimate is significantly lower than the $18 million capex estimate developed as part of the Operational Analysis, for three reasons: 1) The $3.5 million estimate is based on prices for used equipment. 2) The Operational Plan was designed to serve the full extent of the contestable cargo forecasts, while the Business Plan revised the estimates to serve a targeted share (39 percent of containers and 65 percent of Ro/Ro). 3) The hook 'n haul operation eliminates port operational surges and spreads the loading/discharge of barges across an entire week, hence requiring less equipment.

Revenue Estimates

The market forecasts provide the basis for the revenue estimates. There are two key aspects that impact the estimation of revenues, price and volume, both of which are addressed herein. Appendix G outlines the key revenue assumptions and variables.

Price-Point Analysis

The market study provided valuable insight into the most feasible pricing scenarios for each of the major cargo categories targeted by this plan. The pricing scenarios herein are based on data collected during May and June, 2011.

Ro/Ro Pricing – The results of the market analysis support a niche pricing strategy cushioned between the rates for knocked-down rail shipments and the rates for "over dimension" shipments over the road (OTR), a low of 7.9c per ton-mile and a high of 25c per ton-mile, respectively. The rate used in this study is close to the rail rate, specifically set at 8.2c per ton mile. This is a competitive price point as it is set at one-third the level of the prevailing rate for OTR shipments, which is the core target market. This rate equates to an average price of $107.55 per metric ton for medium sized equipment and $143.40 per metric ton for large equipment.

Container Pricing – The pricing for containers is driven by the differential between transpacific ocean rates to the West Coast versus the Gulf Coast as well as the landside intermodal rail rates between Peoria and the West Coast. At the time of this study, landside rail costs, including local drayage, were at $2,100 per FEU, while the transpacific ocean rate differential was at $1,000. This leaves a cushion of approximately $1,100 per FEU as a basis for computing the barge line-haul rate. It is important to note that the landside rail intermodal rates quoted herein exclude a 32 percent -36 percent fuel surcharge added on top of the line-haul rate. Therefore, the potential cushion for the barge line-haul rate could be as high as $1,500. However, experience suggests that a containerized barge service has to be able to absorb a price cut of up-to 50 percent from competing rail services. With these factors as a basis for determining the container price-point, a line-haul rate of $800 per FEU is used for this business plan.

Volume Forecasts

Ro/Ro Volumes – The total weekly south-bound Ro/Ro volumes equates to 1,764 metric tons of medium-sized equipment and 654 metric tons of large equipment, a total of 2,418 metric tons. The backhaul is assumed to be 1,610 metric tons weekly, which reflects the prevailing backhaul ratio for the Illinois River of one to 2.3.

The Peoria-based exporters import finished product made on other continents, as well as parts and components and tires.

Container Volumes – The total weekly container volumes are set at 240 FEUs for both the southbound export and for the northbound backhaul, for each of the container services. The Ro/Ro service is also forecasted to carry 12 FEUs of Ro/Ro parts accompanying the southbound parent Ro/Ro shipments.

Revenue Forecast - Galveston Ro/Ro Service

The Ro/Ro service is estimated to generate approximately $24 million in annual revenue.

Applying the price assumption to the volume forecast produces a weekly revenue estimate of $293,102 for the southbound lane, and $173,156 for the northbound backhaul, and a weekly total of $466,257. On an annual basis, this equates to $15,241,294, $9,004,086 and $24,245,380 respectively.

Table 5: Projected Revenue for the Galveston Ro/Ro Service

Breakbulk/RoRo - Galveston					
		Weekly		Annual	
Southbound	Rev. per Unit	Cargo Units	Revenue	Cargo Units	Revenue
Medium RoRo (MT)	$107.55	1,764	$189,718	91,728	$9,865,346
Large RoRo (MT)	$143.40	654	$93,784	34,008	$4,876,747
Containers (FEU)	$800	12	$9,600	624	$499,200
Total			$293,102		$15,241,294
Northbound					
RoRo (MT)	$107.55	1,610	$173,156		$9,004,086
Containers (FEU)	NA	-	NA		NA
Total			$173,156		$9,004,086
Roundtrip Total			**$466,257**		**$24,245,380**

Revenue Forecast - Houston and New Orleans-Mobile Container Services

The container services are each estimated to generate approximately $20 million in annual revenue.

Weekly revenue is estimated at $192,000 for both the southbound lane as well as for the northbound backhaul, and a weekly total of $384,000. On an annual basis, this equates to $9,984,000 in either direction, or a total of $19,968,000.

Table 6: Projected Revenue for the Houston Container Service

Containers - Houston						
			Weekly		Annual	
Southbound	Rev. per Unit	Cargo Units	Revenue	Cargo Units	Revenue
Full (FEU)	$800	240	$192,000	12,480	$9,984,000
Empties (FEU)	$500	-	$0	-	$0
Total			$192,000		$9,984,000
Northbound					
Full (FEU)	$800	240	$192,000	12,480	$9,984,000
Empties (FEU)	$500	-	$0	-	$0
Total			$192,000		$9,984,000
Roundtrip Total			**$384,000**		**$19,968,000**

Table 7: Projected Revenue for the New Orleans-Mobile Container Service

Containers - Mobile/New Orleans					
			Weekly		Annual
Southbound	Rev. per Unit	Cargo Units	Revenue	Cargo Units	Revenue
Full (FEU)	$800	240	$192,000	12,480	$9,984,000
Empties (FEU)	$500	-	$0	-	$0
Total			$192,000		$9,984,000
Northbound					
Full (FEU)	$800	240	$192,000	12,480	$9,984,000
Empties (FEU)	$500	-	$0	-	$0
Total			$192,000		$9,984,000
Roundtrip Total			**$384,000**		**$19,968,000**

Comparing Revenue Performance – Ro/Ro vs. Container

On an annual basis, the revenue performances between the two services are very comparable. Both types of cargo services are expected to generate approximately $20-$25 million in revenue. However, there are significant differences in terms of revenue yield from comparable payloads. The Ro/Ro service generates approximately 3.5 times more revenue per ton-mile ($.08) than the container services ($.021). This difference in the revenue yield will have a significant impact on the financial performance of each of these services.

Financial Performance

The revenue per ton-mile metric previously mentioned is a strong indication of the comparable cost effectiveness of the various services. The cost of operating a barge service is related to the amount of cargo payload that has to be shipped. The greater the tonnage, the higher the cost; larger tonnage requires more fuel, equipment, and labor. The fact that the container service has to transport three times as much payload in order to generate comparable revenues to the Ro/Ro service has a significant impact on the financial performance results presented in this section.

Summary of Operating Costs

It costs approximately $12.5 million annually to operate the Ro/Ro service between Peoria and Galveston (see Table 8). The majority of these costs – seventy five percent – are associated with leasing the crews, tugs and the barges, and the cost of the fuel to run the service. The remainder of the costs are handling related, including an overhead cost of $1.5 million associated with management, administration and marketing staff.

In comparison, the operating costs for the container services are estimated to be $19.5 million annually; $7 million higher than the Ro/Ro service (see Table 9 and Table 10). The container service requires considerably more barges to operate a reliable service is one reason for the difference, adding $3.2 million annually. The other key contributing factor is the cargo handling costs for containers, which adds another $5.5 million in costs over the Ro/Ro service, because containerized cargoes require considerably more handling.

The operating costs for both the Ro/Ro and container services are summarized in the following tables. The associated operating cost inputs and assumptions are summarized in Appendix F.

Comparison of Operating Margins

The Ro/Ro service operates at a margin of 50 percent over its costs (see Table 8). These are remarkable results, and are attributed to the pricing leverage associated with the high cost of shipping over-dimensional cargo by truck, and not as a result of an overinflated price-point used for the revenue forecasts. In fact, the line-haul rate of $0.08 per ton-mile used for this business plan is one third the rate for OTR shipments, the primary target for the barge service. This rate is on par with the rail rate (note that rail cargo is not a primary target for this service).

On the other hand, the container services have a very thin margin over operating costs, at between three percent and six percent (see Table 9 and Table 10). It is important to note that the container line-haul rate used for this business plan is purposely conservative, to reflect the unfavorable container shipping rates associated with ports in the Gulf Coast, compared to rates for the West Coast. The market study confirmed that the rate differential between the West Coast and the Gulf Coast ports directly impacts the barge line-haul rate; the effective rate cushion for estimating the barge rate is the difference between the rail intermodal rate from Peoria to the West Coast, and the ocean shipping differential. Notwithstanding the need to use a conservative rate for the business plan, it is important to note that rates can be as much 40 percent higher; this business plan excluded the fuel charge the railroads add to the rail intermodal line-haul to the West Coast from Peoria.

The three services together produce revenues levels at a 27 percent margin over total operating costs. This is a very favorable operating cushion for the M-55 initiative as a whole. However, this combined favorable performance rides almost exclusively on the performance of the Ro/Ro service.

Summary of Financial Performance – Ro/Ro Service

The Ro/Ro service produces earnings before interest and taxes (EBIT) of over $12 million annually. This is a very profitable financial performance and presents a very favorable financial outcome for the M-55 initiative. These results indicate that a service targeted at providing a reliable and regularly scheduled weekly service for the Ro/Ro market in Peoria will generate a viable level of earnings. The pricing cushion for providing a Ro/Ro service targeted at the OTR market is significant enough to comfortably cover the cost of the service.

Table 8: Projected Financials for the Galveston Ro/Ro Service

	No. Units	Weekly	Annual
Revenue			
Southbound	2418 tons, 12 FEU	$293,102	$15,241,294
Northbound	1610 tons	$173,156	$9,004,086
Passthrough Fees		$15,056	$782,912
Total	3374 tons, 12 FEUs	**$481,313**	**$25,028,292**
Costs			
Tugs[1]	2 2,000 HP Tugs	$56,000	$2,912,000
Barges[2]	8 Deck Barges	$56,000	$2,912,000
Fuel[3]	11.8 days in transit	$70,800	$3,681,600
Cargo-Handling			
Container	$250 per unit	$3,000	$156,000
RoRo	$240 per unit	$10,080	$524,160
Bulk Grain Transfer		$0	$0
Transport to Port (Peoria)	$200/$500 per unit	$6,236	$324,272
Other (equip. hire, etc.)	MAFI @ $15/day	$8,820	$458,640
Administration, Sales, etc.		$30,000	$1,560,000
Total		**$240,936**	**$12,528,672**
EBIT		**$240,377**	**$12,499,620**
Operating Margin			**50%**

[1] Includes crew,stores, maintenance & repair, insurance, and capital costs - $4000 per day/per tug.
[2] Assumes total of 8 barges in rotation - 4 in transit with tugs and 2 being loaded/discharged at each port - $1000/day.
[3] Assumes 2,000 HP tug consumes 1500 gal. per day when under way. Diesel @ $4 per gal. - includes waterway tax.

NOTE: Pass through fees reflect fees collected by the operator from the shipper, but passed to a third party. In this case, transport costs to the port and other equipment costs are assumed pass through. Transport costs to the port are assumed at $200 for medium machines and $500 for large machines; Local dray hauls are assumed within a tight 50 mile radius. MAFI trailers (Other) are assumed to lease at a rate of $15/day. These estimates are based on industry averages and may vary. The impact of cost variability on project feasibility is analyzed as part of the Sensitivity Analysis; the results of which indicate that underestimating these costs by as much as a factor of three times does not undermine the feasibility of the Ro/Ro services.

Summary of Financial Performance – Container Services

The container service produces an EBIT of between $700 thousand and $1.2 million annually. While this is a profitable financial performance, it does not present a very favorable financial outcome for the M-55 initiative. These results indicate that the costs associated with providing a reliable and regularly scheduled weekly service for the container customer (shipper) in Peoria are too high for the service to be able to generate a viable level of earnings. However, on the upside, an improvement in the container pricing regime for the Gulf Coast region will have a very favorable impact on the financial performance of the container service, as is illustrated by the sensitivity analysis outlined in this report.

Table 9: Projected Financials for the Houston Container Service

	No. Units	Weekly	Annual
Revenue			
Southbound	240 FEU	$192,000	$9,984,000
Northbound	240 FEU	$192,000	$9,984,000
Passthrough Fees		$12,000	$624,000
Total	480 FEU	**$396,000**	**$20,592,000**
Costs			
Tugs[1]	2 2,000 HP Tugs	$56,000	$2,912,000
Barges[2]	24 Hopper Barges	$117,600	$6,115,200
Fuel[3]	12 days in transit	$72,000	$3,744,000
Cargo-Handling			
Container	$250 per unit	$120,000	$6,240,000
RoRo		$0	$0
Bulk Grain Transfer	$25 per unit	$4,000	$208,000
Transport to/from Port (Peoria)	$100 per unit	$8,000	$416,000
Other (equip. hire, etc.)		$0	$0
Administration, Sales, etc.[4]		$5,000	$260,000
Total		**$382,600**	**$19,895,200**
EBIT		**$13,400**	**$696,800**
Operating Margin			**3%**

[1] Includes crew,stores, maintenance & repair, insurance, and capital costs - $4000 per day/per tug.
[2] Assumes total of 24 barges in rotation - 12 in transit with tugs and 6 being loaded/discharged at each port - $700/day.
[3] Assumes 2,000 HP tug consumes 1500 gal. per day when under way. Diesel @ $4 per gal. - includes waterway tax.
[4] Incremetal overhead to base organization to support Breakbulk/RoRo service above.

NOTE: Pass through fees reflect fees collected by the operator from the shipper, but passed to a third party. In this case, transport costs to the port are assumed pass through. Transport costs to the port reflect the local dray for containers carrying Ro/Ro parts, as well as industrial containers; all local hauls are assumed within a tight 50 mile radius. These estimates are based on industry averages and may vary. Impact of cost variability on project feasibility is analyzed as part of the Sensitivity Tests; the results of which indicate that underestimating these costs further undermines the feasibility of the container services.

Table 10:Projected Financials for the NOLA-Mobile Container Service

	No. Units	Weekly	Annual
Revenue			
Southbound	240 FEU	$192,000	$9,984,000
Northbound	240 FEU	$192,000	$9,984,000
Passthrough Fees		$12,000	$624,000
Total	**480 FEU**	**$396,000**	**$20,592,000**
Costs			
Tugs[1]	2 2,000 HP Tugs	$56,000	$2,912,000
Barges[2]	24 Hopper Barges	$117,600	$6,115,200
Fuel[3]	12 days in transit	$61,800	$3,213,600
Cargo-Handling			
Container	$250 per unit	$120,000	$6,240,000
RoRo		$0	$0
Bulk Grain Transfer	$25 per unit	$4,000	$208,000
Transport to/from Port (Peoria)	$100 per unit	$8,000	$416,000
Other (equip. hire, etc.)		$0	$0
Administration, Sales, etc.[4]		$5,000	$260,000
Total		**$372,400**	**$19,364,800**
EBIT		**$23,600**	**$1,227,200**
Operating Margin			**6%**

[1] Includes crew,stores, maintenance & repair, insurance, and capital costs - $4000 per day/per tug.
[2] Assumes total of 24 barges in rotation - 12 in transit with tugs and 6 being loaded/discharged at each port - $700/day.
[3] Assumes 2,000 HP tug consumes 1500 gal. per day when under way. Diesel @ $4 per gal. - includes waterway tax.
[4] Incremetal overhead to base organization to support Breakbulk/RoRo service above.

NOTE: Pass through fees reflect fees collected by the operator from the shipper, but passed to a third party. In this case, transport costs to the port are assumed pass through. Transport costs to the port reflect the local dray for containers carrying Ro/Ro parts, as well as industrial containers; Local dray hauls are assumed within a tight 50 mile radius. These estimates are based on industry averages and may vary. Impact of operating cost variability on project feasibility is analyzed as part of the Sensitivity Analysis; the results of which indicate that underestimating these costs further undermines the feasibility of the container services.

Northbound Container Volume Assumptions – Note that for this business analysis, we used an aggressive northbound assumption of 240 weekly FEU containers. This exceeds the estimate of container imports associated with the local industrial exporters surveyed as part market study (discussed in the Market Analysis section of this report) by an additional 101 weekly containers. We assume these additional containers to be associated with locally based consumer driven demand. However, these are aggressive assumptions particularly because of the longer transit times for the northbound (upstream) line haul versus the southbound (downstream) line haul. While the transit time for the downstream line haul fits into the container shippers' transit time expectation, the transit time for upstream line haul does not.

Summary of Financial Performance – Combined Services

The M-55 initiative is financially viable when all three services are viewed in combination.

All of the services generate a combined positive earnings level of $14.4 million over the course of an annual operation. This is a viable level of earnings for the M-55 initiative as a whole. A container service in conjunction with a Ro/Ro service is financially viable. While all the services produce a positive earning, the container service does not have sufficient margin to operate without the support of the Ro/Ro service.

Table 11: Projected Financial Performance of the Combined M-55 Services

	Weekly	Annual
Revenue		
Southbound	$677,102	$35,209,294
Northbound	$557,156	$28,972,086
Passthrough Fees	$39,056	$2,030,912
Total	**$1,273,313**	**$66,212,292**
Costs		
Tugs	$168,000	$8,736,000
Barges	$291,200	$15,142,400
Fuel	$204,600	$10,639,200
Cargo-Handling		
Container	$243,000	$12,636,000
RoRo	$10,080	$524,160
Bulk Grain Transfer	$8,000	$416,000
Transport to Port (Peoria)	$22,236	$1,156,272
Other (equip. hire, etc.)	$8,820	$458,640
Administration, Sales, etc.	$40,000	$2,080,000
Total	**$995,936**	**$51,788,672**
EBIT	**$277,377**	**$14,423,620**

Impact of Startup and Market Development on Financial Performance

The financial performance outlined thus far in the business plan, while favorable, is not indicative of the real world. The financial results presented earlier are indicative of a mature operation that has achieved full market potential. The results do not reflect a start-up operation in an untested market, which is what the M-55 initiative essentially is. The M-55 service will have to start from a zero base operation, and the M-55 business plan needs to reflect the impact of a start-up on the financial performance results presented earlier.

Market Development Scenarios

To reflect the impact of a start-up operation on financial performance, a series of market development scenarios are applied to the financial model developed for this business plan. Each of the operations are tested under four growth scenarios where the operation grows from a near zero level to full operations over six months, 12 months, 18 months and 24 months. The following two graphs illustrate the impact of the growth scenarios on monthly revenue for the Ro/Ro and container services, respectively.

Figure 11: Startup Market Development Scenarios for the Ro/Ro Service

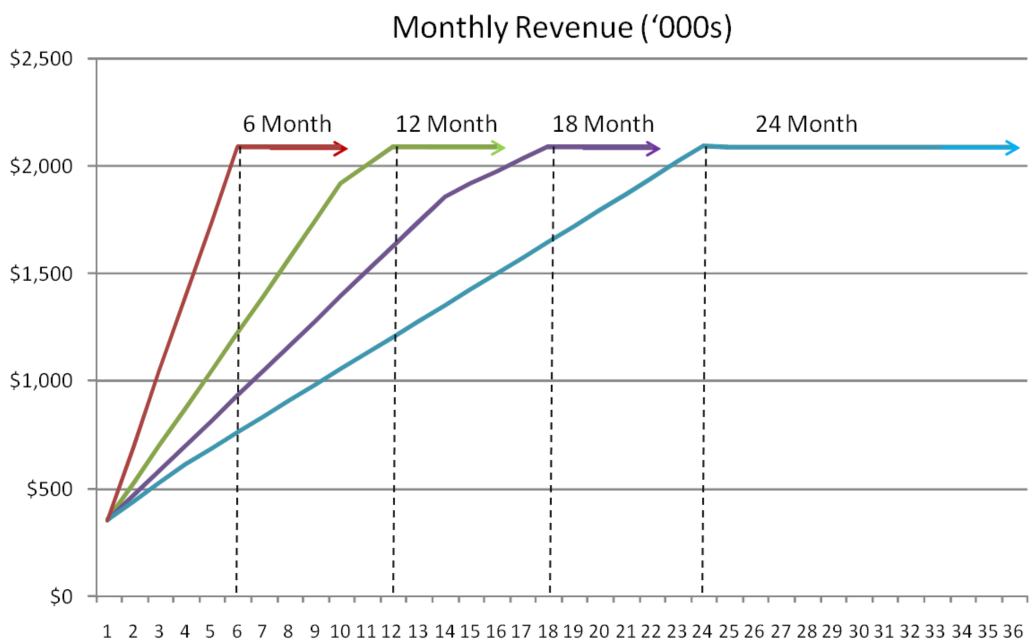
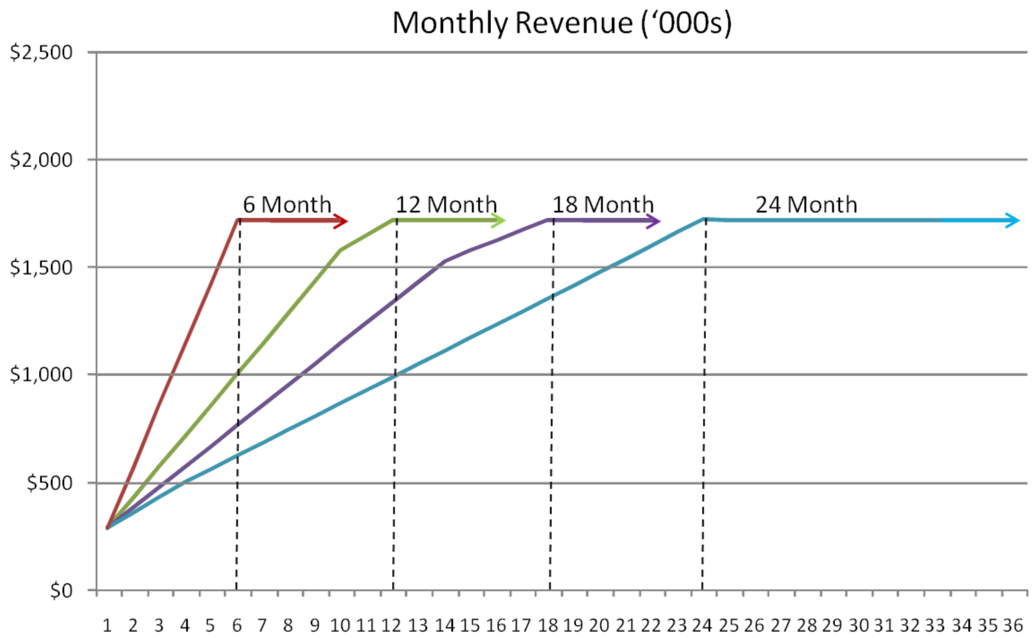


Figure 12: Startup Market Development Scenarios for the Container Services



Impact of the Startup Market Development Scenarios on Earnings

The market development scenarios have an impact on all the M-55 services included in this business plan. All three the services start with negative earnings of approximately $450 thousand in the first month. The main contributing factor is the low revenue from the initial startup.

However, the prospect of starting with negative earnings is not an indication of whether the operations are financially viable as it is not unusual to experience negative earnings at startup; what is important is the degree to which the services move to positive earnings, and the time it takes to get to positive results.

- **Extent of Earnings Recovery** – The Ro/Ro operation shows a very robust recovery from negative earnings, to a monthly earnings level of nearly $1 million. The container services show a weak recovery, with earnings lingering at under $75 thousand monthly. Refer to the following earnings graphs.

- **Rate of Earnings Recovery** – The Ro/Ro operation moves into positive territory within three to nine months, a much faster recovery than the container services, which take between six and twenty two months to reach positive earnings levels.

The Ro/Ro service has sufficient earnings potential to be able to securely recover from the market risks associated with start-up. The container services do not have sufficient earning potential to withstand the market risks associated with a start-up.

Figure 13: Impact of Market Growth Scenarios on Ro/Ro Service Earnings

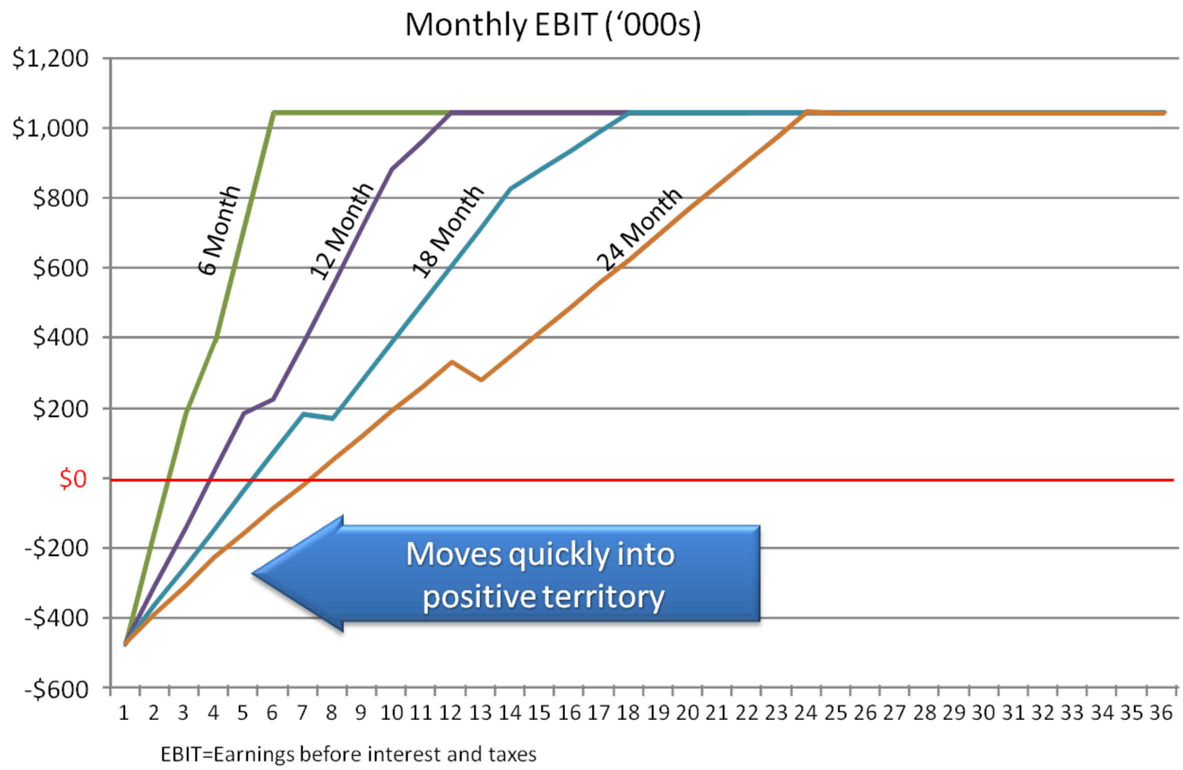
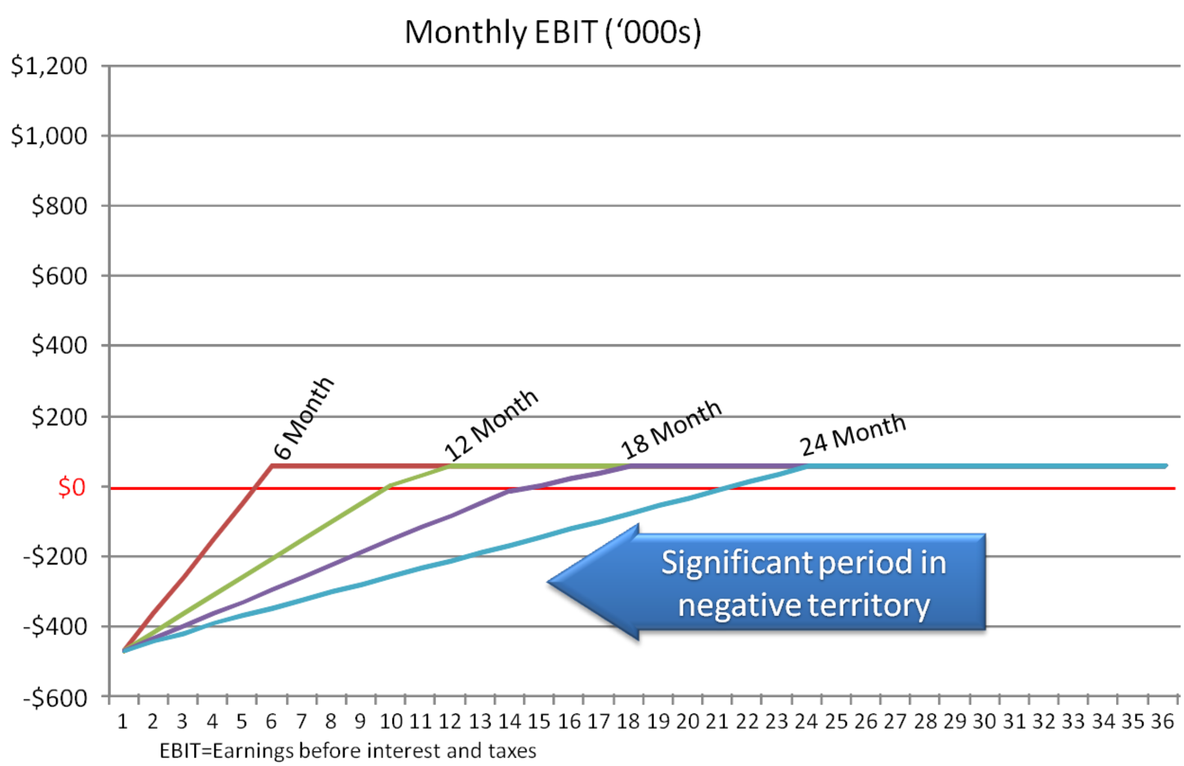


Figure 14: Impact of Growth Scenarios on Container Service Earnings



Cash Flow and Working Capital Requirements

The most important indicator of success for a start-up is cash flow. While earnings are an important driver from a financial reporting and investor analysis perspective, the most important factor influencing success from the perspective of the business owner/operator, as well as investor, is the ability to generate cash flow to cover day-to-day operations. Moreover, is there sufficient cash flow to support the operations' resiliency against business shocks, such as a dip in sales, or a weather event affecting operations, or increased price competition?

Impact of Startup on Cash Flow

The startup market growth scenarios have an impact on cash flow for all of the operations; they all experience negative cash flow during the start-up period. In fact, the cash flow trends are consistent with the earnings trends discussed earlier. As is the case with earnings, the existence of negative cash flow is not a defining factor on its own; what is important is the extent of negative cash flow, and the time it takes to get to a positive cash position. The results of the cash flow analysis are illustrated in the following three charts and table.

- **Extent of Negative Cash Flow** – The Ro/Ro operation's start-up cash flows are impacted negatively by between $500,000 and $2.5 million. The negative impact on each of the container services ranges from between $1.5 million and $6.5 million in net cash flow, a result that is significantly worse than the Ro/Ro service. The extent of negative cash flow is also an indicator of working capital needs (next section).

- **Rate of Cash Flow Recovery** – The Ro/Ro operation's cash flow recovery is relatively quick, with the longest period of negative cash flow at eight months. The container operation is likely to be in negative cash flow for as long as almost two years, indicating a significantly less resilient cash flow operation.

Figure 15: Monthly Net Cash Flow for the Galveston Ro/Ro Service

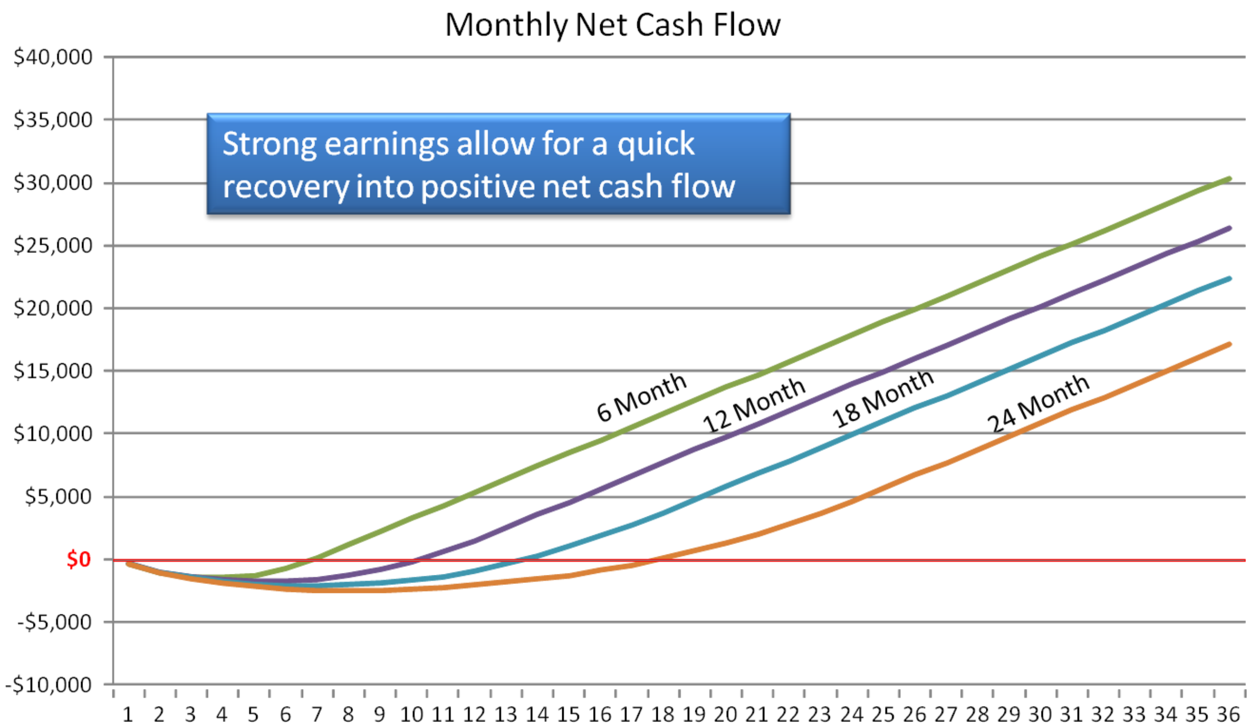


Figure 16: Monthly Net Cash Flow for the Houston Container Service

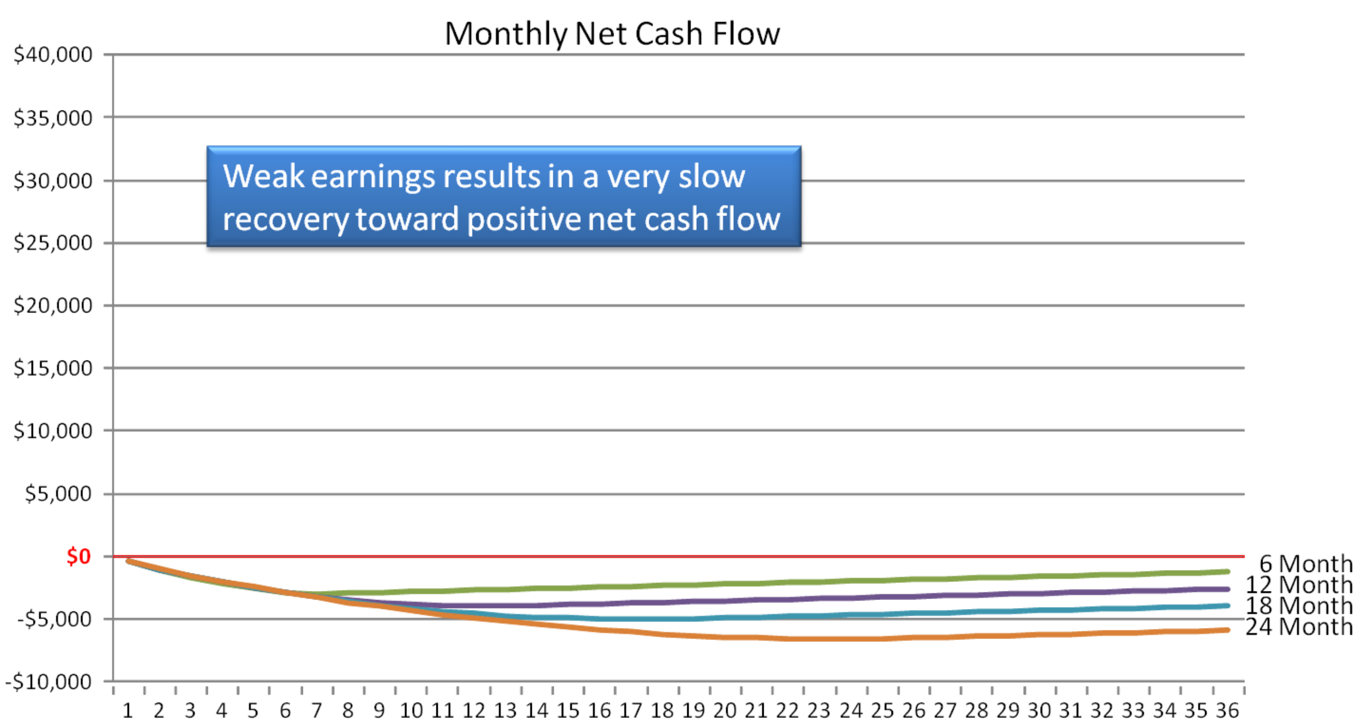


Figure 17: Monthly Net Cash Flow for the New Orleans-Mobile Container Service

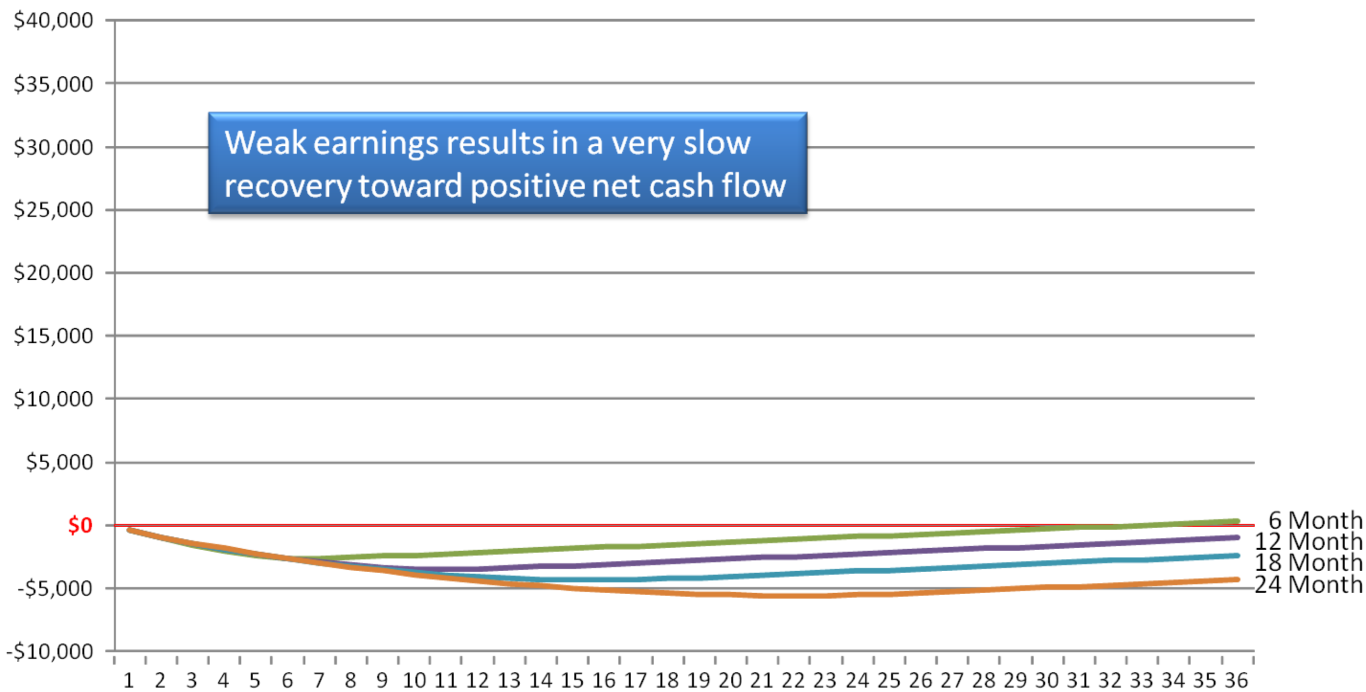


Table 12: Months of Negative Cash Flow During Startup

	Months of Negative Cash Flow				
Growth Scenario (Months)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	2	4	5	6	8
Containers (Houston)	2	7	12	17	21
Containers (NOLA/Mobile)	2	7	11	15	20
Total	**2**	**5**	**8**	**11**	**14**

Growth Scenarios: 0 = full market penetration from day-one of operations. 6 = full market penetration within 6 months. 12 = full market penetration within 12 months etc. 18 = full market penetration within 18 months. 24 = full market penetration within 24 months etc.

Working Capital Requirements to Cover Startup Period

Given that all three operations will experience negative cash flow during startup, they will need working capital funding to support start-up operations. The amount of working capital is determined by identifying the lowest net cash position during the start-up process. Note that consecutive months of cash flow have a cumulative impact on net cash flow. Essentially, each consecutive month of negative cash flow is added up until cash flows turn positive, at which point the net cash flow will have reached its lowest level. This is the amount that determines the level of working capital funding that is needed. The following table summarizes the working capital needs.

- **Ro/Ro Working Capital Needs** – For the slowest startup growth scenario (24 months) the Ro/Ro service will need a working capital line of credit of as much as $2.5 million. Even with the most positive startup scenario, where full operations theoretically start at day-one (serving 100 percent of the market forecasts), the Ro/Ro operation will still need a minimum working capital line of credit of approximately $500 thousand. Under this business plan, the recommended working capital line of credit for the Ro/Ro service is $2.5 million.

- **Container Working Capital Needs** – In the very best situation, each container service will need a working capital line of credit of approximately $1.6 million, or a total of $3.2 million. Under the worst case startup scenario (24 months), they will need a working capital line of credit of between approximately $5.5 million and $6.5 million, a total of $12.0 million. For this business plan, the recommended working capital line of credit is $12.0 million to start both the container services simultaneously.

Table 13: Working Capital requirements During Startup

	Working Capital Requirement ($000s)				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$523	-$1,462	-$1,778	-$2,110	-$2,511
Containers (Houston)	-$1,629	-$2,925	-$3,947	-$4,978	-$6,538
Containers (NOLA/Mobile)	-$1,563	-$2,637	-$3,456	-$4,287	-$5,539
Total	**-$3,715**	**-$7,024**	**-$9,180**	**-$11,374**	**-$14,589**

Growth Scenarios: 0 = full market penetration from day-one of operations. 6 = full market penetration within 6 months. 12 = full market penetration within 12 months etc. 18 = full market penetration within 18 months. 24 = full market penetration within 24 months etc.

Assessment of Risk Associated with Startup

In assessing the viability of the M-55, it is important to assess the risks associated with startup. Two key indicators are the extent of working capital needs, and the time it takes to pay back the line of credit.

- **Extent of Working Capital Needs** – Each of the container services essentially need two and a half times more in working capital than the Ro/Ro service, and five times more if combined. Therefore this factor alone indicates that the container services are more risky than the Ro/Ro service. It is therefore critical that the container services be deployed in conjunction with an existing and flourishing operation that can cover the risk of the container start-ups.

- **Payback of Working Capital** – The Ro/Ro service offers a very manageable level of payback risk. The following table shows that it takes the Ro/Ro service 16 months to reach net positive cash flow, under the worst case. Meaning, it will take 16 months to pay back the working capital. On the other hand, the container services will each take more than 36 months (this business plan extends to 36 months) to payback the working capital. In effect, from a risk perspective, the ability of the container services to payback the line of credit is indefinite, or undeterminable. The container services are extremely risky in terms of working capital payback, under the current business plan scenario.

Table 14: Working Capital Payback Risk During Startup

	Months to Positive Net Cash Flow				
Growth Scenario (Months)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	2	6	10	13	16
Containers (Houston)	30	>36	>36	>36	>36
Containers (NOLA/Mobile)	17	32	>36	>36	>36
Total	**5**	**11**	**17**	**22**	**27**

Growth Scenarios: 0 = full market penetration from day-one of operations. 6 = full market penetration within 6 months. 12 = full market penetration within 12 months etc. 18 = full market penetration within 18 months. 24 = full market penetration within 24 months etc.

From a purely risk-reward perspective, the Ro/Ro service presents the least amount of risk and offers the greatest earnings returns. The start-up risks associated with container services, on the other hand, are not manageable. Moreover the low level of earning versus high risk makes these services even less attractive.

Sensitivity Analysis

While the findings thus far standout quite clearly, it is important to note that these findings are based on a set of assumptions that can change, and thereby impact the results. Therefore a sensitivity analysis was conducted on a broad range of variables that may influence the results of the business plan. The results of the various sensitivity tests are summarized below. Detailed tables with results are included in Appendix G.

Improved Fuel Efficiencies, Lower Fuel Costs

A scenario where fuel costs are lowered by 25 percent represents a reduction in the market rate for diesel fuel, a shift to a cheaper fuel source, the use of more efficient engine technologies, slower running speeds, or a combination of these. Such a scenario would cut annual operating costs by between $800 thousand and $900 thousand. Both the Ro/Ro and container services experience improved earnings, cash flow and lower working capital needs. However, this is not sufficient to eliminate working capital payback risk for the container services.

Increase in Fuel Costs

A 25 percent increase in fuel costs represents the opposite of the previous test; an increase in the market rate for diesel fuel, a shift to a more expensive fuel source, the use of less efficient engine technologies, higher running speeds, or a combination of these. This increases annual operating costs by between $800 thousand and $900 thousand. Both the Ro/Ro and container services will experience reduced earnings and a deteriorated cash flow and increased working capital needs. While further undermining the already risky container services, the impact on the Ro/Ro service is not fatal; working capital needs will increase marginally to $3.0 million in the worst case.

Less Reliable and Limited Hook 'n Haul Service

This scenario represents a less aggressive hook 'n haul service whereby only half of the additional barges are in use to pre-load. This will severely reduce reliability by reducing the window for meeting the once weekly service, reduces the likelihood of cargo conversion, and puts into jeopardy the market and revenue forecast assumptions. A less aggressive hook 'n haul approach cuts the level of barge "over-capitalization", and reduces operating costs by between $700 thousand and $1.5 million annually, with the higher range applicable to the container services. For the container services, specifically, this approach will not improve the working capital risk picture significantly enough to warrant operating a less reliable service.

Aggressive Price Competition

While the Ro/Ro service will be able to absorb the impact of aggressive price competition, the container services will not. This conclusion is based on a 25 percent cut in the line-haul barge rates used for the revenue forecasts.

The container operation will never become profitable, let alone eventually generate positive cash flow. While the Ro/Ro service experiences a 50 percent reduction in its operating margin, dropping from a base case of 50 percent to 25 percent of operating costs, the impact on cash flow and working capital payback is still manageable indicating that the service will likely be able to withstand price competition.

Favorable Pricing Environment, Panama Canal Expansion

This scenario attempts to test the impact of improved ocean shipping price regime for the Gulf Coast ports. This outcome could be associated with a favorable effect of the widening of the Panama Canal on the levels of service into the Gulf Coast. The issue of ocean shipping rates is a particularly salient issue for the container services, with this point made clearly throughout the business plan write-up. To test this issue, line-haul rates were increased by 25 percent. The result is very positive for both types of services, but particularly for the container services; earnings during startup recover sooner into strong positive territory, and working capital needs are cut in half to a level that is manageable. The net effect is a viable outlook on financial performance with a significant enough reduction in working capital payback risk.

Increase in Ro/Ro Cargo Handling Costs

One of the observations of the financial results is that the cargo handling costs for the Ro/Ro service are significantly lower than the container services. To test the impact of a scenario where these costs are underestimated for this business plan, these costs are increased by three times the levels used in the business plan. The impact is not significant on Ro/Ro earnings, and working capital needs only increase by $250 thousand over a base of $2.5 million.

Impact of Discount Rate on Feasibility

Given the one- to three-year time horizon (versus ten or twenty years), a discount rate is not applied to the financial analysis in this business plan. A sensitivity analysis was conducted to test the impact of a required rate of return on capital of seven percent on feasibility. The results indicate that the conclusions regarding feasibility are not affected by the use a discount rate.

Summary of Sensitivity Analysis Results

- All of the negative factors tested further undermine the viability of the container services.
- The Ro/Ro service is able to withstand all of the negative factors tested.
- The only factor that significantly improves the financial feasibility of the container services are a positive ocean pricing regime and improved service levels potentially associated with the Panama Canal expansion.

Key Findings and Conclusions

1. **M-55 Initiative Produces Positive Financial Results:** The results are mixed between the Ro/Ro and container services. While all of the services individually, and combined are able to produce positive financial earnings, only the Ro/Ro service produces convincingly favorable earnings due to its 50 percent operating margins. The container services have operating margins of between three percent and six percent are not convincingly favorable.

2. **Risks Associated with Startup are Significant:** Gradual market penetration associated with startup severely jeopardizes viability of the container services, while strong earnings and cash flow associated with the Ro/Ro service allow it to remain buoyant through startup.

3. **Working Capital Funding is Needed:** All of the services will need working capital to make it through startup. The Ro/Ro service will need approximately $2.5 million, while the two container services well need $12 million combined. Moreover the payback risk on the Ro/Ro service is manageable.

4. **Ro/Ro Service is Financially Viable:** The Ro/Ro service presents a significant business opportunity to implement. It services a captive market that is currently being served by excessively priced services. Moreover, there is a desire by the customer to reduce costs, and to increase mode options.

5. **Container Services Require Significant Support:** The container services can only be viewed as viable if any combination of the following occurs. Ocean rates to the Gulf Coast become more comparable to the West Coast, the container services are launched by the Ro/Ro operator after about a year of operation, and/or with a funding subsidy of up to $12 million.

6. **Hook-'n-Haul Reduces Earnings and Increases Working Capital Requirements:** The results of this business plan indicate that, in the absence of a faster Marine Highway vessel designed for cargoes with high cube ratios, the only way to meet the clients' service requirements is to operate a service highly overcapitalized with traditional bulk equipment. Moreover, the plan is able to show that the services are able to accommodate the likely higher capital costs of a faster, aptly designed new-build vessel.

7. **Port Handling Fees Can Contribute Toward Port Capital Improvements:** The port handling fees used as part of the business plan are set high enough to contribute toward a port capital funding program which fully covers the capital improvements at the Port of Peoria.

Appendix B

General Assumptions and Variables

Calendar Variables

Days/week	7
Weeks/Year	52
Weeks/Month	4.33

Cash Flow Variables

	Days	Monthly Proportions	
Revenue	45	50%	50%
Costs	30	50%	50%

Appendix C

Vessel and Service Operational Assumptions

Containers per Barge

40' equiv. (FEU)	40
20' equiv. (TEU)	80
Mixed	50

Ro/Ro Unit Weights/Dimensions

	Metric Tons	Pounds	Sq. Ft.
Medium	49	107,800	300
Large	109	239,800	1,200

Deck Barge Utilization

	Area (SF)	Load (MT)
Medium Ro/Ro	10,800	1,764
Large Ro/Ro	7,200	654
Parts	1,920	280
Planned Total	19,920	2,698
Capacity	27,000	6,567
Utilization	**74%**	**41%**

Hopper Barge Utilization

	Units (FEU)	Load (MT)
Planned	240	6,093
Capacity	240	9,000
Utilization	**100%**	**68%**

Appendix D

Market Forecast Assumptions and Variables

Ro/Ro Market Forecasts

	Forecast of Contestable Cargo	Business Plan Target	Share of Contestable Cargo
Medium (units)	60	36	60%
Large (units)	7	6	86%
Medium (MT)	2,940	1,764	60%
Large (MT)	763	654	86%
Total (MT)	**3,703**	**2,418**	65%

Container Market Forecasts

	Forecast of Contestable Containers	Business Plan				Share of Contestable
		Galve-ston	Hou-ston	NO/-Mob	Total	
Ro/Ro Parts	275	12			12	63%
Industrial Exports			80	80	160	
Grain Exports	971		160	160	320	33%
Total	**1,246**	**12**	**240**	**240**	**492**	**39%**

Ro/Ro Backhaul Ratio

Backhaul	1
Southbound	2.3

Appendix E

Revenue Forecast Assumptions and Variables

Line-haul Barge Rates

Medium Ro/Ro (per MT)	$107.55
Large Ro/Ro (per MT)	$143.40
FEU (full)	$800.00
FEU (empty)	$500.00

MT - Metric Ton

Ro/Ro Price Point Analysis

Per Unit	Prevailing Pricing			M55 Plan		Break Even Point	
	OTR	Rail East	Rail West	M55 Target	% of OTR	BEP	% of OTR
Medium Sized	$18,000	$5,045	$5,907	$5,270	29%	2,631	15%
Large	$45,000			$15,631	35%	5,854	13%

OTR - Over the Road

Container Price Point Analysis

Ocean Rate Difference	W. Coast IMX Rate	M55 Price Cushion	Break Even Point	
			Houston	NO/Mobile
$1,400	$2,000	$600	$750	$770
$1,300		$700		
$1,200		$800		
$1,100		$900		
$1,000		$1,000		
$900		$1,100		
$800		$1,200		
$700		$1,300		

Appendix F

Operating Cost Assumptions and Variables

Note: The operating cost variables are assumptions, and may vary in a real world operation. The risk is that the assumptions used herein are materially lower (than real world) and thereby overstate the feasibility of the M-55 services being studied. A sensitivity test conducted on operating costs assumptions suggests that the unfavorable feasibility of the container services are worsened by only slight increases in the assumed operating costs. Furthermore, the favorable feasibility of the Ro/Ro service can withstand significant increases in the operating cost assumptions.

Container Handling Fees

Activity Type	Cost
Lift, port fees - Peoria	$75
Lift, port fees - Gulf	$175
Grain bulk transfer	$25
Drayage - Peoria	$100

Ro/Ro Handling Fees

Activity Type	Cost
Handling, port fees	$120
Grain bulk transfer	$25
Drayage, Medium - Peoria	$200
Drayage, Large - Peoria	$500
MAFI Trailer rental/day	$15

Diesel Fuel Variables

Gallons/Day	1,500
Cost/Gallon	$4.00

Container Barge Capital Costs

Type	Size	Daily Cost	Units
Tugs	2,000 HP	$4,000	2
Hopper Barges	35' by 195'	$700	24

Ro/RO Barge Capital Costs

Type	Size	Daily Cost	Units
Tugs	2,000 HP	$4,000	2
Deck Barges	54' by 250'	$1,000	8

Appendix G

Results of the Sensitivity Analysis

EBIT Sensitivity to a 25% Fuel Efficiency Improvement

$800K-$900K Annual Operating Savings

Takes Yr 2 container EBIT out of risk

	Base Case			Scenario		
6 Months	**1**	**2**	**3**	**1**	**2**	**3**
RoRo (Galveston)	$7,954	$12,500	$12,500	$8,875	$13,420	$13,420
Containers (Houston)	-$889	$697	$697	$47	$1,633	$1,633
Containers (NOLA/Mobile)	-$359	$1,227	$1,227	$445	$2,031	$2,031
Total	**$6,706**	**$14,424**	**$14,424**	**$9,366**	**$17,083**	**$17,083**
12 Months						
RoRo (Galveston)	$4,024	$12,500	$12,500	$4,944	$13,420	$13,420
Containers (Houston)	-$2,237	$697	$697	-$1,301	$1,633	$1,633
Containers (NOLA/Mobile)	-$1,707	$1,227	$1,227	-$904	$2,031	$2,031
Total	**$80**	**$14,424**	**$14,424**	**$2,739**	**$17,083**	**$17,083**
18 Months						
RoRo (Galveston)	$911	$11,626	$12,500	$1,831	$12,547	$13,420
Containers (Houston)	-$3,321	$415	$697	-$2,385	$1,351	$1,633
Containers (NOLA/Mobile)	-$2,791	$945	$1,227	-$1,987	$1,748	$2,031
Total	**-$5,201**	**$12,986**	**$14,424**	**-$2,541**	**$15,646**	**$17,083**
24 Months						
RoRo (Galveston)	-$718	$7,938	$12,500	$203	$8,858	$13,420
Containers (Houston)	-$4,043	-$777	$697	-$3,107	$159	$1,633
Containers (NOLA/Mobile)	-$3,513	-$247	$1,227	-$2,710	$557	$2,031
Total	**-$8,274**	**$6,914**	**$14,424**	**-$5,614**	**$9,574**	**$17,083**

Working Capital Sensitivity to a 25% Fuel Efficiency Improvement

Significantly reduces WC risk for the Ro/Ro; only marginally improves WC for the container services.

	Working Capital Reuired - Base Case				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$523	-$1,462	-$1,778	-$2,110	-$2,511
Containers (Houston)	-$1,629	-$2,925	-$3,947	-$4,978	-$6,538
Containers (NOLA/Mobile)	-$1,563	-$2,637	-$3,456	-$4,287	-$5,539
Total	**-$3,715**	**-$7,024**	**-$9,180**	**-$11,374**	**-$14,589**

	Working Capital Reuired - Scenario				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$484	-$1,206	-$1,435	-$1,688	-$1,954
Containers (Houston)	-$1,512	-$2,418	-$3,101	-$3,800	-$4,833
Containers (NOLA/Mobile)	-$1,462	-$2,228	-$2,775	-$3,352	-$4,192
Total	**-$3,458**	**-$5,852**	**-$7,311**	**-$8,840**	**-$10,978**

	Change in Working Capital Requirement				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$40	-$255	-$343	-$422	-$557
Containers (Houston)	-$117	-$507	-$846	-$1,178	-$1,706
Containers (NOLA/Mobile)	-$100	-$409	-$681	-$935	-$1,348
Total	**-$257**	**-$1,171**	**-$1,869**	**-$2,535**	**-$3,610**

EBIT Sensitivity to a 25% Increase in Fuel Costs

$800K-$900K Annual Operating Increase → **Puts Yr 3 container EBIT at risk**

EBIT	Base Case			Scenario		
6 Months	**1**	**2**	**3**	**1**	**2**	**3**
RoRo (Galveston)	$7,954	$12,500	$12,500	$7,034	$11,579	$11,579
Containers (Houston)	-$889	$697	$697	-$1,825	-$239	-$239
Containers (NOLA/Mobile)	-$359	$1,227	$1,227	-$1,162	$424	$424
Total	**$6,706**	**$14,424**	**$14,424**	**$4,046**	**$11,764**	**$11,764**
12 Months						
RoRo (Galveston)	$4,024	$12,500	$12,500	$3,103	$11,579	$11,579
Containers (Houston)	-$2,237	$697	$697	-$3,173	-$239	-$239
Containers (NOLA/Mobile)	-$1,707	$1,227	$1,227	-$2,510	$424	$424
Total	**$80**	**$14,424**	**$14,424**	**-$2,580**	**$11,764**	**$11,764**
18 Months						
RoRo (Galveston)	$911	$11,626	$12,500	-$9	$10,706	$11,579
Containers (Houston)	-$3,321	$415	$697	-$4,257	-$521	-$239
Containers (NOLA/Mobile)	-$2,791	$945	$1,227	-$3,594	$142	$424
Total	**-$5,201**	**$12,986**	**$14,424**	**-$7,861**	**$10,326**	**$11,764**
24 Months						
RoRo (Galveston)	-$718	$7,938	$12,500	-$1,638	$7,017	$11,579
Containers (Houston)	-$4,043	-$777	$697	-$4,979	-$1,713	-$239
Containers (NOLA/Mobile)	-$3,513	-$247	$1,227	-$4,316	-$1,050	$424
Total	**-$8,274**	**$6,914**	**$14,424**	**-$10,934**	**$4,255**	**$11,764**

Working Capital Sensitivity to a 25% Increase in Fuel Costs

Measurably increases WC risk for the Ro/Ro and the container services.

	Working Capital Required - Base Case				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$523	-$1,462	-$1,778	-$2,110	-$2,511
Containers (Houston)	-$1,629	-$2,925	-$3,947	-$4,978	-$6,538
Containers (NOLA/Mobile)	-$1,563	-$2,637	-$3,456	-$4,287	-$5,539
Total	**-$3,715**	**-$7,024**	**-$9,180**	**-$11,374**	**-$14,589**
	Working Capital Required - Scenario				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$638	-$1,730	-$2,171	-$2,615	-$3,151
Containers (Houston)	-$2,424	-$4,010	-$5,358	-$6,724	-$8,638
Containers (NOLA/Mobile)	-$1,663	-$3,072	-$4,209	-$5,374	-$7,073
Total	**-$4,725**	**-$8,812**	**-$11,737**	**-$14,714**	**-$18,862**
	Change in Working Capital Requirement				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	$115	$268	$393	$506	$640
Containers (Houston)	$795	$1,085	$1,411	$1,746	$2,099
Containers (NOLA/Mobile)	$100	$435	$753	$1,087	$1,534
Total	**$1,010**	**$1,789**	**$2,557**	**$3,339**	**$4,273**

EBIT Sensitivity to a Half as Many Barges Loading

$700K-$1.5M Annual Operating Savings

Takes Yr 2 container EBIT out of risk

	Base Case			Scenario		
6 Months	**1**	**2**	**3**	**1**	**2**	**3**
RoRo (Galveston)	$7,954	$12,500	$12,500	$8,591	$13,228	$13,228
Containers (Houston)	-$889	$697	$697	$321	$2,226	$2,226
Containers (NOLA/Mobile)	-$359	$1,227	$1,227	$851	$2,756	$2,756
Total	**$6,706**	**$14,424**	**$14,424**	**$9,764**	**$18,209**	**$18,209**
12 Months						
RoRo (Galveston)	$4,024	$12,500	$12,500	$4,600	$13,228	$13,228
Containers (Houston)	-$2,237	$697	$697	-$1,298	$2,226	$2,226
Containers (NOLA/Mobile)	-$1,707	$1,227	$1,227	-$767	$2,756	$2,756
Total	**$80**	**$14,424**	**$14,424**	**$2,535**	**$18,209**	**$18,209**
18 Months						
RoRo (Galveston)	$911	$11,626	$12,500	$1,427	$12,354	$13,228
Containers (Houston)	-$3,321	$415	$697	-$2,599	$1,887	$2,226
Containers (NOLA/Mobile)	-$2,791	$945	$1,227	-$2,069	$2,417	$2,756
Total	**-$5,201**	**$12,986**	**$14,424**	**-$3,242**	**$16,658**	**$18,209**
24 Months						
RoRo (Galveston)	-$718	$7,938	$12,500	-$354	$8,666	$13,228
Containers (Houston)	-$4,043	-$777	$697	-$3,467	$456	$2,226
Containers (NOLA/Mobile)	-$3,513	-$247	$1,227	-$2,936	$986	$2,756
Total	**-$8,274**	**$6,914**	**$14,424**	**-$6,756**	**$10,108**	**$18,209**

Working Capital Sensitivity to Half as Many Barges Loading

Marginal positive impact on W.C. requirements for all three services.

Working Capital Reuired - Base Case					
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$523	-$1,462	-$1,778	-$2,110	-$2,511
Containers (Houston)	-$1,629	-$2,925	-$3,947	-$4,978	-$6,538
Containers (NOLA/Mobile)	-$1,563	-$2,637	-$3,456	-$4,287	-$5,539
Total	**-$3,715**	**-$7,024**	**-$9,180**	**-$11,374**	**-$14,589**

Working Capital Reuired - Scenario					
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$492	-$1,340	-$1,641	-$1,943	-$2,283
Containers (Houston)	-$1,438	-$2,457	-$3,199	-$3,968	-$5,083
Containers (NOLA/Mobile)	-$1,372	-$2,214	-$2,780	-$3,400	-$4,287
Total	**-$3,301**	**-$6,012**	**-$7,620**	**-$9,311**	**-$11,654**

Change in Working Capital Requirement					
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$32	-$121	-$137	-$167	-$228
Containers (Houston)	-$191	-$467	-$747	-$1,010	-$1,455
Containers (NOLA/Mobile)	-$191	-$423	-$676	-$887	-$1,252
Total	**-$414**	**-$1,011**	**-$1,560**	**-$2,064**	**-$2,935**

EBIT Sensitivity to Strong Competition (25% rate cut)

$5M-6M Decrease in Annual revenue

Container services will not survive; Ro/Ro will survive

	Base Case			Scenario		
6 Months	**1**	**2**	**3**	**1**	**2**	**3**
RoRo (Galveston)	$7,954	$12,500	$12,500	$3,156	$6,438	$6,438
Containers (Houston)	-$889	$697	$697	-$4,841	-$4,295	-$4,295
Containers (NOLA/Mobile)	-$359	$1,227	$1,227	-$4,311	-$3,765	-$3,765
Total	**$6,706**	**$14,424**	**$14,424**	**-$5,996**	**-$1,622**	**-$1,622**
12 Months						
RoRo (Galveston)	$4,024	$12,500	$12,500	$299	$6,438	$6,438
Containers (Houston)	-$2,237	$697	$697	-$5,305	-$4,295	-$4,295
Containers (NOLA/Mobile)	-$1,707	$1,227	$1,227	-$4,775	-$3,765	-$3,765
Total	**$80**	**$14,424**	**$14,424**	**-$9,782**	**-$1,622**	**-$1,622**
18 Months						
RoRo (Galveston)	$911	$11,626	$12,500	-$1,951	$5,789	$6,438
Containers (Houston)	-$3,321	$415	$697	-$5,678	-$4,392	-$4,295
Containers (NOLA/Mobile)	-$2,791	$945	$1,227	-$5,148	-$3,862	-$3,765
Total	**-$5,201**	**$12,986**	**$14,424**	**-$12,778**	**-$2,465**	**-$1,622**
24 Months						
RoRo (Galveston)	-$718	$7,938	$12,500	-$3,005	$3,050	$6,438
Containers (Houston)	-$4,043	-$777	$697	-$5,927	-$4,803	-$4,295
Containers (NOLA/Mobile)	-$3,513	-$247	$1,227	-$5,397	-$4,272	-$3,765
Total	**-$8,274**	**$6,914**	**$14,424**	**-$14,329**	**-$6,025**	**-$1,622**

Working Capital Sensitivity to Strong Competition (25% rate cut)

Insurmountable W.C. requirements for container services; Ro/Ro services still manageable.

	Working Capital Required - Base Case				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$523	-$1,462	-$1,778	-$2,110	-$2,511
Containers (Houston)	-$1,629	-$2,925	-$3,947	-$4,978	-$6,538
Containers (NOLA/Mobile)	-$1,563	-$2,637	-$3,456	-$4,287	-$5,539
Total	**-$3,715**	**-$7,024**	**-$9,180**	**-$11,374**	**-$14,589**
	Working Capital Required - Scenario				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$776	-$1,932	-$2,627	-$3,329	-$4,028
Containers (Houston)	-$14,007	-$14,553	-$15,017	-$15,487	-$16,146
Containers (NOLA/Mobile)	-$12,438	-$12,984	-$13,448	-$13,918	-$14,577
Total	**-$27,220**	**-$29,468**	**-$31,092**	**-$32,735**	**-$34,751**
	Change in Working Capital Requirement				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	$253	$470	$850	$1,220	$1,517
Containers (Houston)	$12,378	$11,628	$11,070	$10,509	$9,608
Containers (NOLA/Mobile)	$10,875	$10,346	$9,992	$9,631	$9,037
Total	**$23,505**	**$22,445**	**$21,912**	**$21,360**	**$20,162**

EBIT Sensitivity to Improved Gulf Shipping (25% rate incr.)

$5M-6M Increase in Annual Revenue

Moves the container services into strong positive earnings.

	Base Case			Scenario		
6 Months	**1**	**2**	**3**	**1**	**2**	**3**
RoRo (Galveston)	$7,954	$12,500	$12,500	$12,753	$18,561	$18,561
Containers (Houston)	-$889	$697	$697	$3,063	$5,689	$5,689
Containers (NOLA/Mobile)	-$359	$1,227	$1,227	$3,593	$6,219	$6,219
Total	**$6,706**	**$14,424**	**$14,424**	**$19,409**	**$30,469**	**$30,469**
12 Months						
RoRo (Galveston)	$4,024	$12,500	$12,500	$7,749	$18,561	$18,561
Containers (Houston)	-$2,237	$697	$697	$831	$5,689	$5,689
Containers (NOLA/Mobile)	-$1,707	$1,227	$1,227	$1,361	$6,219	$6,219
Total	**$80**	**$14,424**	**$14,424**	**$9,941**	**$30,469**	**$30,469**
18 Months						
RoRo (Galveston)	$911	$11,626	$12,500	$3,773	$17,463	$18,561
Containers (Houston)	-$3,321	$415	$697	-$964	$5,222	$5,689
Containers (NOLA/Mobile)	-$2,791	$945	$1,227	-$434	$5,752	$6,219
Total	**-$5,201**	**$12,986**	**$14,424**	**$2,375**	**$28,436**	**$30,469**
24 Months						
RoRo (Galveston)	-$718	$7,938	$12,500	$1,569	$12,826	$18,561
Containers (Houston)	-$4,043	-$777	$697	-$2,160	$3,249	$5,689
Containers (NOLA/Mobile)	-$3,513	-$247	$1,227	-$1,629	$3,779	$6,219
Total	**-$8,274**	**$6,914**	**$14,424**	**-$2,220**	**$19,854**	**$30,469**

Working Capital Sensitivity to Improved Gulf Shipping (25 percent rate increase)

Cuts W.C. requirements in half for the container and the Ro/Ro services.

	Working Capital Required - Base Case				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$523	-$1,462	-$1,778	-$2,110	-$2,511
Containers (Houston)	-$1,629	-$2,925	-$3,947	-$4,978	-$6,538
Containers (NOLA/Mobile)	-$1,563	-$2,637	-$3,456	-$4,287	-$5,539
Total	**-$3,715**	**-$7,024**	**-$9,180**	**-$11,374**	**-$14,589**
	Working Capital Required - Scenario				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$522	-$1,230	-$1,408	-$1,590	-$1,779
Containers (Houston)	-$1,421	-$2,004	-$2,375	-$2,811	-$3,392
Containers (NOLA/Mobile)	-$1,355	-$1,805	-$2,078	-$2,411	-$2,855
Total	**-$3,298**	**-$5,039**	**-$5,861**	**-$6,813**	**-$8,027**
	Change in Working Capital Requirement				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$1	-$232	-$369	-$519	-$732
Containers (Houston)	-$208	-$920	-$1,571	-$2,167	-$3,146
Containers (NOLA/Mobile)	-$208	-$832	-$1,378	-$1,876	-$2,684
Total	**-$417**	**-$1,984**	**-$3,319**	**-$4,562**	**-$6,562**

EBIT Sensitivity to Increase in Ro/Ro Handling Costs (3X)

$1M Increase in Annual Operating Cost

Not a significant impact on Ro/Ro Earnings.

	Base Case			Scenario		
6 Months	**1**	**2**	**3**	**1**	**2**	**3**
RoRo (Galveston)	$7,954	$12,500	$12,500	$7,124	$11,451	$11,451
Containers (Houston)	-$889	$697	$697	-$889	$697	$697
Containers (NOLA/Mobile)	-$359	$1,227	$1,227	-$359	$1,227	$1,227
Total	**$6,706**	**$14,424**	**$14,424**	**$5,876**	**$13,375**	**$13,375**
12 Months						
RoRo (Galveston)	$4,024	$12,500	$12,500	$3,380	$11,451	$11,451
Containers (Houston)	-$2,237	$697	$697	-$2,237	$697	$697
Containers (NOLA/Mobile)	-$1,707	$1,227	$1,227	-$1,707	$1,227	$1,227
Total	**$80**	**$14,424**	**$14,424**	**-$565**	**$13,375**	**$13,375**
18 Months						
RoRo (Galveston)	$911	$11,626	$12,500	$416	$10,617	$11,451
Containers (Houston)	-$3,321	$415	$697	-$3,321	$415	$697
Containers (NOLA/Mobile)	-$2,791	$945	$1,227	-$2,791	$945	$1,227
Total	**-$5,201**	**$12,986**	**$14,424**	**-$5,696**	**$11,976**	**$13,375**
24 Months						
RoRo (Galveston)	-$718	$7,938	$12,500	-$1,113	$7,092	$11,451
Containers (Houston)	-$4,043	-$777	$697	-$4,043	-$777	$697
Containers (NOLA/Mobile)	-$3,513	-$247	$1,227	-$3,513	-$247	$1,227
Total	**-$8,274**	**$6,914**	**$14,424**	**-$8,670**	**$6,069**	**$13,375**

Working Capital Sensitivity to Increase in Ro/Ro Handling Costs (3X)

Slight increase in W.C. requirements.

	Working Capital Required - Base Case				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$523	-$1,462	-$1,778	-$2,110	-$2,511
Containers (Houston)	-$1,629	-$2,925	-$3,947	-$4,978	-$6,538
Containers (NOLA/Mobile)	-$1,563	-$2,637	-$3,456	-$4,287	-$5,539
Total	**-$3,715**	**-$7,024**	**-$9,180**	**-$11,374**	**-$14,589**
	Working Capital Required - Scenario				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$708	-$1,610	-$1,949	-$2,306	-$2,757
Containers (Houston)	-$1,629	-$2,925	-$3,947	-$4,978	-$6,538
Containers (NOLA/Mobile)	-$1,563	-$2,637	-$3,456	-$4,287	-$5,539
Total	**-$3,900**	**-$7,171**	**-$9,352**	**-$11,571**	**-$14,835**
	Change in Working Capital Requirement				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	$185	$148	$172	$197	$246
Containers (Houston)	$0	$0	$0	$0	$0
Containers (NOLA/Mobile)	$0	$0	$0	$0	$0
Total	**$185**	**$148**	**$172**	**$197**	**$246**

Impact of a 7% Discount Rate on EBIT and Feasibility

EBIT	**Base Case**			**Scenario**		
Immediate Full Operations	**1**	**2**	**3**	**1**	**2**	**3**
RoRo (Galveston)	$12,500	$12,500	$12,500	$12,038	$11,227	$10,470
Containers (Houston)	$697	$697	$697	$671	$626	$584
Containers (NOLA/Mobile)	$1,227	$1,227	$1,227	$1,182	$1,102	$1,028
Total	**$14,424**	**$14,424**	**$14,424**	**$13,891**	**$12,955**	**$12,081**
6 Months						
RoRo (Galveston)	$7,954	$12,500	$12,500	$7,555	$11,227	$10,470
Containers (Houston)	-$889	$697	$697	-$894	$626	$584
Containers (NOLA/Mobile)	-$359	$1,227	$1,227	-$383	$1,102	$1,028
Total	**$6,706**	**$14,424**	**$14,424**	**$6,278**	**$12,955**	**$12,081**
12 Months						
RoRo (Galveston)	$4,024	$12,500	$12,500	$3,763	$11,227	$10,470
Containers (Houston)	-$2,237	$697	$697	-$2,195	$626	$584
Containers (NOLA/Mobile)	-$1,707	$1,227	$1,227	-$1,684	$1,102	$1,028
Total	**$80**	**$14,424**	**$14,424**	**-$116**	**$12,955**	**$12,081**
18 Months						
RoRo (Galveston)	$911	$11,626	$12,500	$802	$10,423	$10,470
Containers (Houston)	-$3,321	$415	$697	-$3,227	$366	$584
Containers (NOLA/Mobile)	-$2,791	$945	$1,227	-$2,716	$842	$1,028
Total	**-$5,201**	**$12,986**	**$14,424**	**-$5,141**	**$11,631**	**$12,081**
24 Months						
RoRo (Galveston)	-$718	$7,938	$12,500	-$749	$7,077	$10,470
Containers (Houston)	-$4,043	-$777	$697	-$3,913	-$715	$584
Containers (NOLA/Mobile)	-$3,513	-$247	$1,227	-$3,402	-$238	$1,028
Total	**-$8,274**	**$6,914**	**$14,424**	**-$8,064**	**$6,125**	**$12,081**

Impact of a 7% Discount Rate on Working Capital and Feasibility

	Working Capital Required - Base Case				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$523	-$1,462	-$1,778	-$2,110	-$2,511
Containers (Houston)	-$1,629	-$2,925	-$3,947	-$4,978	-$6,538
Containers (NOLA/Mobile)	-$1,563	-$2,637	-$3,456	-$4,287	-$5,539
Total	**-$3,715**	**-$7,024**	**-$9,180**	**-$11,374**	**-$14,589**

	Working Capital Required - Scenario				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$519	-$1,428	-$1,727	-$2,037	-$2,397
Containers (Houston)	-$1,610	-$2,808	-$3,681	-$4,521	-$5,710
Containers (NOLA/Mobile)	-$1,545	-$2,532	-$3,242	-$3,929	-$4,890
Total	**-$3,674**	**-$6,768**	**-$8,649**	**-$10,487**	**-$12,997**

	Change in Working Capital Requirement				
Growth Scenario (Month)>>	**0**	**6**	**12**	**18**	**24**
RoRo (Galveston)	-$4	-$34	-$51	-$72	-$114
Containers (Houston)	-$19	-$117	-$266	-$457	-$828
Containers (NOLA/Mobile)	-$18	-$105	-$214	-$358	-$649
Total	**-$41**	**-$256**	**-$531**	**-$888**	**-$1,591**

Appendix H

3-Year Annual Financial Performance

3-year Annual Financial Performance: Full Operations ('000s)

	1	2	3
Revenue			
RoRo (Galveston)	$25,028	$25,028	$25,028
Containers (Houston)	$20,592	$20,592	$20,592
Containers (NOLA/Mobile)	$20,592	$20,592	$20,592
Total	**$66,212**	**$66,212**	**$66,212**
Costs			
RoRo (Galveston)	$12,529	$12,529	$12,529
Containers (Houston)	$19,895	$19,895	$19,895
Containers (NOLA/Mobile)	$19,365	$19,365	$19,365
Total	**$51,789**	**$51,789**	**$51,789**
EBIT			
RoRo (Galveston)	$12,500	$12,500	$12,500
Containers (Houston)	$697	$697	$697
Containers (NOLA/Mobile)	$1,227	$1,227	$1,227
Total	**$14,424**	**$14,424**	**$14,424**
Net Cash Flow			
RoRo (Galveston)	$9,893	$22,393	$34,892
Containers (Houston)	-$1,048	-$351	$345
Containers (NOLA/Mobile)	-$540	$687	$1,914
Total	**$8,305**	**$22,729**	**$37,152**

3-year Annual Financial Performance: 6-Month Startup (‘000s)

	1	2	3
Revenue			
RoRo (Galveston)	$19,814	$25,028	$25,028
Containers (Houston)	$16,302	$20,592	$20,592
Containers (NOLA/Mobile)	$16,302	$20,592	$20,592
Total	**$52,418**	**$66,212**	**$66,212**
Costs			
RoRo (Galveston)	$11,860	$12,529	$12,529
Containers (Houston)	$17,191	$19,895	$19,895
Containers (NOLA/Mobile)	$16,661	$19,365	$19,365
Total	**$45,712**	**$51,789**	**$51,789**
EBIT			
RoRo (Galveston)	$7,954	$12,500	$12,500
Containers (Houston)	-$889	$697	$697
Containers (NOLA/Mobile)	-$359	$1,227	$1,227
Total	**$6,706**	**$14,424**	**$14,424**
Net Cash Flow			
RoRo (Galveston)	$5,348	$17,847	$30,347
Containers (Houston)	-$2,634	-$1,937	-$1,241
Containers (NOLA/Mobile)	-$2,126	-$899	$328
Total	**$588**	**$15,011**	**$29,435**

3-year Annual Financial Performance: 12-Month Startup (‘000s)

	1	2	3
Revenue			
RoRo (Galveston)	$15,382	$25,028	$25,028
Containers (Houston)	$12,656	$20,592	$20,592
Containers (NOLA/Mobile)	$12,656	$20,592	$20,592
Total	**$40,693**	**$66,212**	**$66,212**
Costs			
RoRo (Galveston)	$11,358	$12,529	$12,529
Containers (Houston)	$14,893	$19,895	$19,895
Containers (NOLA/Mobile)	$14,362	$19,365	$19,365
Total	**$40,613**	**$51,789**	**$51,789**
EBIT			
RoRo (Galveston)	$4,024	$12,500	$12,500
Containers (Houston)	-$2,237	$697	$697
Containers (NOLA/Mobile)	-$1,707	$1,227	$1,227
Total	**$80**	**$14,424**	**$14,424**
Net Cash Flow			
RoRo (Galveston)	$1,461	$13,917	$26,417
Containers (Houston)	-$3,947	-$3,286	-$2,589
Containers (NOLA/Mobile)	-$3,438	-$2,247	-$1,020
Total	**-$5,924**	**$8,385**	**$22,808**

3-year Annual Financial Performance: 18-Month Startup ('000s)

	1	2	3
Revenue			
RoRo (Galveston)	$11,818	$24,101	$25,028
Containers (Houston)	$9,723	$19,829	$20,592
Containers (NOLA/Mobile)	$9,723	$19,829	$20,592
Total	**$31,265**	**$63,758**	**$66,212**
Costs			
RoRo (Galveston)	$10,907	$12,474	$12,529
Containers (Houston)	$13,045	$19,414	$19,895
Containers (NOLA/Mobile)	$12,514	$18,884	$19,365
Total	**$36,466**	**$50,772**	**$51,789**
EBIT			
RoRo (Galveston)	$911	$11,626	$12,500
Containers (Houston)	-$3,321	$415	$697
Containers (NOLA/Mobile)	-$2,791	$945	$1,227
Total	**-$5,201**	**$12,986**	**$14,424**
Net Cash Flow			
RoRo (Galveston)	-$956	$9,931	$22,430
Containers (Houston)	-$4,567	-$4,652	-$3,955
Containers (NOLA/Mobile)	-$4,058	-$3,613	-$2,386
Total	**-$9,581**	**$1,666**	**$16,089**

3-year Annual Financial Performance: 24-Month Startup ('000s)

	1	2	3
Revenue			
RoRo (Galveston)	$9,444	$20,183	$25,028
Containers (Houston)	$7,770	$16,606	$20,592
Containers (NOLA/Mobile)	$7,770	$16,606	$20,592
Total	**$24,984**	**$53,395**	**$66,212**
Costs			
RoRo (Galveston)	$10,162	$12,245	$12,529
Containers (Houston)	$11,813	$17,383	$19,895
Containers (NOLA/Mobile)	$11,283	$16,852	$19,365
Total	**$33,258**	**$46,480**	**$51,789**
EBIT			
RoRo (Galveston)	-$718	$7,938	$12,500
Containers (Houston)	-$4,043	-$777	$697
Containers (NOLA/Mobile)	-$3,513	-$247	$1,227
Total	**-$8,274**	**$6,914**	**$14,424**
Net Cash Flow			
RoRo (Galveston)	-$2,046	$4,646	$17,113
Containers (Houston)	-$4,895	-$6,538	-$5,869
Containers (NOLA/Mobile)	-$4,387	-$5,500	-$4,299
Total	**-$11,328**	**-$7,392**	**$6,945**

Appendix I

3-Year Quarterly Financial Performance

3-year Quarterly Financial Performance: Full Operations ('000s)

	1	2	3	4	5	6	7	8	9	10	11	12
Revenue												
RoRo (Galveston)	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257
Containers (Houston)	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148
Containers (NOLA/Mobile)	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148
Total	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**
Costs												
RoRo (Galveston)	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132
Containers (Houston)	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974
Containers (NOLA/Mobile)	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841
Total	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**
EBIT												
RoRo (Galveston)	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125
Containers (Houston)	$174	$174	$174	$174	$174	$174	$174	$174	$174	$174	$174	$174
Containers (NOLA/Mobile)	$307	$307	$307	$307	$307	$307	$307	$307	$307	$307	$307	$307
Total	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**
Net Cash Flow												
RoRo (Galveston)	$518	$3,643	$6,768	$9,893	$13,018	$16,143	$19,268	$22,393	$25,518	$28,643	$31,767	$34,892
Containers (Houston)	-$1,571	-$1,397	-$1,222	-$1,048	-$874	-$700	-$526	-$351	-$177	-$3	$171	$345
Containers (NOLA/Mobile)	-$1,460	-$1,154	-$847	-$540	-$233	$74	$380	$687	$994	$1,301	$1,608	$1,914
Total	**-$2,513**	**$1,093**	**$4,699**	**$8,305**	**$11,911**	**$15,517**	**$19,123**	**$22,729**	**$26,334**	**$29,940**	**$33,546**	**$37,152**

3-year Quarterly Financial Performance: 6-Month Startup ('000s)

	1	2	3	4	5	6	7	8	9	10	11	12
Revenue												
RoRo (Galveston)	$2,086	$5,214	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257
Containers (Houston)	$1,716	$4,290	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148
Containers (NOLA/Mobile)	$1,716	$4,290	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148
Total	**$5,518**	**$13,794**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**
Costs												
RoRo (Galveston)	$2,524	$3,071	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132
Containers (Houston)	$2,811	$4,433	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974
Containers (NOLA/Mobile)	$2,678	$4,300	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841
Total	**$8,013**	**$11,805**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**
EBIT												
RoRo (Galveston)	-$439	$2,143	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125
Containers (Houston)	-$1,095	-$143	$174	$174	$174	$174	$174	$174	$174	$174	$174	$174
Containers (NOLA/Mobile)	-$962	-$10	$307	$307	$307	$307	$307	$307	$307	$307	$307	$307
Total	**-$2,495**	**$1,990**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**
Net Cash Flow												
RoRo (Galveston)	-$1,398	-$728	$2,223	$5,348	$8,473	$11,598	$14,722	$17,847	$20,972	$24,097	$27,222	$30,347
Containers (Houston)	-$1,680	-$2,840	-$2,808	-$2,634	-$2,460	-$2,286	-$2,112	-$1,937	-$1,763	-$1,589	-$1,415	-$1,241
Containers (NOLA/Mobile)	-$1,570	-$2,597	-$2,433	-$2,126	-$1,819	-$1,512	-$1,206	-$899	-$592	-$285	$22	$328
Total	**-$4,648**	**-$6,164**	**-$3,018**	**$588**	**$4,193**	**$7,799**	**$11,405**	**$15,011**	**$18,617**	**$22,223**	**$25,829**	**$29,435**

3-year Quarterly Financial Performance: 12-Month Startup ('000s)

	1	2	3	4	5	6	7	8	9	10	11	12
Revenue												
RoRo (Galveston)	$1,564	$3,129	$4,693	$5,996	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257
Containers (Houston)	$1,287	$2,574	$3,861	$4,934	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148
Containers (NOLA/Mobile)	$1,287	$2,574	$3,861	$4,934	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148
Total	**$4,138**	**$8,277**	**$12,415**	**$15,863**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**
Costs												
RoRo (Galveston)	$2,494	$2,707	$3,041	$3,117	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132
Containers (Houston)	$2,540	$3,351	$4,163	$4,839	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974
Containers (NOLA/Mobile)	$2,408	$3,219	$4,030	$4,706	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841
Total	**$7,442**	**$9,277**	**$11,233**	**$12,662**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**
EBIT												
RoRo (Galveston)	-$930	$422	$1,652	$2,879	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125
Containers (Houston)	-$1,253	-$777	-$302	$95	$174	$174	$174	$174	$174	$174	$174	$174
Containers (NOLA/Mobile)	-$1,121	-$645	-$169	$228	$307	$307	$307	$307	$307	$307	$307	$307
Total	**-$3,303**	**-$1,000**	**$1,181**	**$3,202**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**
Net Cash Flow												
RoRo (Galveston)	-$1,465	-$1,749	-$864	$1,461	$4,542	$7,667	$10,792	$13,917	$17,042	$20,167	$23,292	$26,417
Containers (Houston)	-$1,571	-$2,857	-$3,667	-$3,947	-$3,808	-$3,634	-$3,460	-$3,286	-$3,111	-$2,937	-$2,763	-$2,589
Containers (NOLA/Mobile)	-$1,461	-$2,614	-$3,291	-$3,438	-$3,167	-$2,860	-$2,554	-$2,247	-$1,940	-$1,633	-$1,326	-$1,020
Total	**-$4,497**	**-$7,220**	**-$7,822**	**-$5,924**	**-$2,433**	**$1,173**	**$4,779**	**$8,385**	**$11,991**	**$15,596**	**$19,202**	**$22,808**

3-year Quarterly Financial Performance: 18-Month Startup ('000s)

	1	2	3	4	5	6	7	8	9	10	11	12
Revenue												
RoRo (Galveston)	$1,390	$2,433	$3,476	$4,519	$5,503	$6,083	$6,257	$6,257	$6,257	$6,257	$6,257	$6,257
Containers (Houston)	$1,144	$2,002	$2,860	$3,718	$4,528	$5,005	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148
Containers (NOLA/Mobile)	$1,144	$2,002	$2,860	$3,718	$4,528	$5,005	$5,148	$5,148	$5,148	$5,148	$5,148	$5,148
Total	**$3,678**	**$6,437**	**$9,196**	**$11,954**	**$14,559**	**$16,092**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**	**$16,553**
Costs												
RoRo (Galveston)	$2,484	$2,545	$2,848	$3,031	$3,088	$3,122	$3,132	$3,132	$3,132	$3,132	$3,132	$3,132
Containers (Houston)	$2,450	$2,991	$3,532	$4,072	$4,583	$4,883	$4,974	$4,974	$4,974	$4,974	$4,974	$4,974
Containers (NOLA/Mobile)	$2,317	$2,858	$3,399	$3,940	$4,450	$4,751	$4,841	$4,841	$4,841	$4,841	$4,841	$4,841
Total	**$7,251**	**$8,394**	**$9,779**	**$11,043**	**$12,121**	**$12,756**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**	**$12,947**
EBIT												
RoRo (Galveston)	-$1,093	-$111	$628	$1,488	$2,415	$2,961	$3,125	$3,125	$3,125	$3,125	$3,125	$3,125
Containers (Houston)	-$1,306	-$989	-$672	-$355	-$55	$121	$174	$174	$174	$174	$174	$174
Containers (NOLA/Mobile)	-$1,173	-$856	-$539	-$222	$78	$254	$307	$307	$307	$307	$307	$307
Total	**-$3,573**	**-$1,957**	**-$583**	**$912**	**$2,438**	**$3,336**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**	**$3,606**
Net Cash Flow												
RoRo (Galveston)	-$1,487	-$2,110	-$1,933	-$956	$1,005	$3,710	$6,806	$9,931	$13,056	$16,180	$19,305	$22,430
Containers (Houston)	-$1,535	-$2,863	-$3,873	-$4,567	-$4,928	-$4,976	-$4,826	-$4,652	-$4,478	-$4,303	-$4,129	-$3,955
Containers (NOLA/Mobile)	-$1,425	-$2,620	-$3,498	-$4,058	-$4,287	-$4,203	-$3,920	-$3,613	-$3,306	-$2,999	-$2,693	-$2,386
Total	**-$4,447**	**-$7,592**	**-$9,304**	**-$9,581**	**-$8,210**	**-$5,469**	**-$1,940**	**$1,666**	**$5,272**	**$8,878**	**$12,484**	**$16,089**

3-year Quarterly Financial Performance: 24-Month Startup ('000s)

	1	2	3	4	5	6	7	8	9	10	11	12
Revenue												
RoRo (Galveston)	$1,304	$2,047	$2,713	$3,380	$4,046	$4,713	$5,379	$6,045	$6,257	$6,257	$6,257	$6,257
Containers (Houston)	$1,073	$1,684	$2,233	$2,781	$3,329	$3,877	$4,426	$4,974	$5,148	$5,148	$5,148	$5,148
Containers (NOLA/Mobile)	$1,073	$1,684	$2,233	$2,781	$3,329	$3,877	$4,426	$4,974	$5,148	$5,148	$5,148	$5,148
Total	**$3,449**	**$5,416**	**$7,179**	**$8,941**	**$10,704**	**$12,467**	**$14,230**	**$15,993**	**$16,553**	**$16,553**	**$16,553**	**$16,553**
Costs												
RoRo (Galveston)	$2,479	$2,522	$2,561	$2,600	$3,003	$3,042	$3,081	$3,120	$3,132	$3,132	$3,132	$3,132
Containers (Houston)	$2,405	$2,791	$3,136	$3,482	$3,827	$4,173	$4,518	$4,864	$4,974	$4,974	$4,974	$4,974
Containers (NOLA/Mobile)	$2,272	$2,658	$3,004	$3,349	$3,695	$4,040	$4,386	$4,731	$4,841	$4,841	$4,841	$4,841
Total	**$7,156**	**$7,971**	**$8,701**	**$9,431**	**$10,525**	**$11,255**	**$11,985**	**$12,715**	**$12,947**	**$12,947**	**$12,947**	**$12,947**
EBIT												
RoRo (Galveston)	-$1,175	-$475	$152	$780	$1,043	$1,671	$2,298	$2,926	$3,125	$3,125	$3,125	$3,125
Containers (Houston)	-$1,333	-$1,106	-$904	-$701	-$498	-$296	-$93	$110	$174	$174	$174	$174
Containers (NOLA/Mobile)	-$1,200	-$974	-$771	-$568	-$366	-$163	$40	$242	$307	$307	$307	$307
Total	**-$3,707**	**-$2,555**	**-$1,522**	**-$489**	**$179**	**$1,212**	**$2,245**	**$3,278**	**$3,606**	**$3,606**	**$3,606**	**$3,606**
Net Cash Flow												
RoRo (Galveston)	-$1,498	-$2,325	-$2,499	-$2,046	-$1,269	$75	$2,047	$4,646	$7,739	$10,863	$13,988	$17,113
Containers (Houston)	-$1,517	-$2,858	-$3,978	-$4,895	-$5,610	-$6,122	-$6,432	-$6,538	-$6,391	-$6,217	-$6,043	-$5,869
Containers (NOLA/Mobile)	-$1,406	-$2,614	-$3,602	-$4,387	-$4,969	-$5,349	-$5,525	-$5,500	-$5,220	-$4,913	-$4,606	-$4,299
Total	**-$4,421**	**-$7,797**	**-$10,079**	**-$11,328**	**-$11,848**	**-$11,396**	**-$9,910**	**-$7,392**	**-$3,873**	**-$267**	**$3,339**	**$6,945**

Appendix J

3-Year Monthly Financial Performance

3-year Monthly Financial Performance: Full Operations ($Millions)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Revenue																																				
RoRo	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09
Cont (H)	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72
Cont (NM)	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72
Total	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**
Costs																																				
RoRo	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Cont (H)	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66
Cont (NM)	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
Total	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**
EBIT																																				
RoRo	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Cont (H)	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Cont (NM)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Total	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**
Net Cash Flow																																				
RoRo	-0.52	-0.52	0.52	1.56	2.60	3.64	4.68	5.73	6.77	7.81	8.85	9.89	10.93	11.98	13.02	14.06	15.10	16.14	17.18	18.23	19.27	20.31	21.35	22.39	23.43	24.48	25.52	26.56	27.60	28.64	29.68	30.73	31.77	32.81	33.85	34.89
Cont (H)	-0.83	-1.63	-1.57	-1.51	-1.45	-1.40	-1.34	-1.28	-1.22	-1.16	-1.11	-1.05	-0.99	-0.93	-0.87	-0.82	-0.76	-0.70	-0.64	-0.58	-0.53	-0.47	-0.41	-0.35	-0.29	-0.24	-0.18	-0.12	-0.06	0.00	0.06	0.11	0.17	0.23	0.29	0.35
Cont (NM)	-0.81	-1.56	-1.46	-1.36	-1.26	-1.15	-1.05	-0.95	-0.85	-0.74	-0.64	-0.54	-0.44	-0.34	-0.23	-0.13	-0.03	0.07	0.18	0.28	0.38	0.48	0.58	0.69	0.79	0.89	0.99	1.10	1.20	1.30	1.40	1.51	1.61	1.71	1.81	1.91
Total	**-2.16**	**-3.71**	**-2.51**	**-1.31**	**-0.11**	**1.09**	**2.30**	**3.50**	**4.70**	**5.90**	**7.10**	**8.30**	**9.51**	**10.71**	**11.91**	**13.11**	**14.31**	**15.52**	**16.72**	**17.92**	**19.12**	**20.32**	**21.53**	**22.73**	**23.93**	**25.13**	**26.33**	**27.54**	**28.74**	**29.94**	**31.14**	**32.34**	**33.55**	**34.75**	**35.95**	**37.15**

3-year Monthly Financial Performance: 6-Month Startup ($Millions)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Revenue																																				
RoRo	0.35	0.70	1.04	1.39	1.74	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09
Cont (H)	0.29	0.57	0.86	1.14	1.43	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72
Cont (NM)	0.29	0.57	0.86	1.14	1.43	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72
Total	**0.92**	**1.84**	**2.76**	**3.68**	**4.60**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**
Costs																																				
RoRo	0.82	0.84	0.86	1.00	1.02	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Cont (H)	0.76	0.94	1.12	1.30	1.48	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66
Cont (NM)	0.71	0.89	1.07	1.25	1.43	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
Total	**2.29**	**2.67**	**3.05**	**3.55**	**3.93**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**
EBIT																																				
RoRo	-0.47	-0.15	0.18	0.39	0.71	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Cont (H)	-0.47	-0.36	-0.26	-0.15	-0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Cont (NM)	-0.43	-0.32	-0.21	-0.11	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Total	**-1.37**	**-0.83**	**-0.29**	**0.12**	**0.66**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**
Net Cash Flow																																				
RoRo	-0.41	-1.07	-1.40	-1.46	-1.26	-0.73	0.14	1.18	2.22	3.26	4.31	5.35	6.39	7.43	8.47	9.51	10.56	11.60	12.64	13.68	14.72	15.76	16.81	17.85	18.89	19.93	20.97	22.01	23.06	24.10	25.14	26.18	27.22	28.26	29.31	30.35
Cont (H)	-0.38	-1.08	-1.68	-2.17	-2.56	-2.84	-2.92	-2.87	-2.81	-2.75	-2.69	-2.63	-2.58	-2.52	-2.46	-2.40	-2.34	-2.29	-2.23	-2.17	-2.11	-2.05	-2.00	-1.94	-1.88	-1.82	-1.76	-1.71	-1.65	-1.59	-1.53	-1.47	-1.41	-1.36	-1.30	-1.24
Cont (NM)	-0.36	-1.02	-1.57	-2.02	-2.36	-2.60	-2.64	-2.54	-2.43	-2.33	-2.23	-2.13	-2.02	-1.92	-1.82	-1.72	-1.61	-1.51	-1.41	-1.31	-1.21	-1.10	-1.00	-0.90	-0.80	-0.69	-0.59	-0.49	-0.39	-0.29	-0.18	-0.08	0.02	0.12	0.23	0.33
Total	**-1.15**	**-3.17**	**-4.65**	**-5.65**	**-6.18**	**-6.16**	**-5.42**	**-4.22**	**-3.02**	**-1.82**	**-0.61**	**0.59**	**1.79**	**2.99**	**4.19**	**5.40**	**6.60**	**7.80**	**9.00**	**10.20**	**11.41**	**12.61**	**13.81**	**15.01**	**16.21**	**17.42**	**18.62**	**19.82**	**21.02**	**22.22**	**23.42**	**24.63**	**25.83**	**27.03**	**28.23**	**29.43**

3-year Monthly Financial Performance: 12-Month Startup ($Millions)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Revenue																		
RoRo	0.35	0.52	0.70	0.87	1.04	1.22	1.39	1.56	1.74	1.91	2.00	2.09	2.09	2.09	2.09	2.09	2.09	2.09
Cont (H)	0.29	0.43	0.57	0.72	0.86	1.00	1.14	1.29	1.43	1.57	1.64	1.72	1.72	1.72	1.72	1.72	1.72	1.72
Cont (NM)	0.29	0.43	0.57	0.72	0.86	1.00	1.14	1.29	1.43	1.57	1.64	1.72	1.72	1.72	1.72	1.72	1.72	1.72
Total	**0.92**	**1.38**	**1.84**	**2.30**	**2.76**	**3.22**	**3.68**	**4.14**	**4.60**	**5.06**	**5.29**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**
Costs																		
RoRo	0.82	0.83	0.84	0.85	0.86	0.99	1.00	1.01	1.02	1.03	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Cont (H)	0.76	0.85	0.94	1.03	1.12	1.21	1.30	1.39	1.48	1.57	1.61	1.66	1.66	1.66	1.66	1.66	1.66	1.66
Cont (NM)	0.71	0.80	0.89	0.98	1.07	1.16	1.25	1.34	1.43	1.52	1.57	1.61	1.61	1.61	1.61	1.61	1.61	1.61
Total	**2.29**	**2.48**	**2.67**	**2.86**	**3.05**	**3.36**	**3.55**	**3.74**	**3.93**	**4.13**	**4.22**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**
EBIT																		
RoRo	-0.47	-0.31	-0.15	0.02	0.18	0.22	0.39	0.55	0.71	0.88	0.96	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Cont (H)	-0.47	-0.42	-0.36	-0.31	-0.26	-0.21	-0.15	-0.10	-0.05	0.01	0.03	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Cont (NM)	-0.43	-0.37	-0.32	-0.27	-0.21	-0.16	-0.11	-0.06	0.00	0.05	0.08	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Total	**-1.37**	**-1.10**	**-0.83**	**-0.56**	**-0.29**	**-0.14**	**0.12**	**0.39**	**0.66**	**0.93**	**1.07**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**
Net Cash Flow																		
RoRo	-0.41	-1.06	-1.46	-1.70	-1.78	-1.75	-1.62	-1.32	-0.86	-0.24	0.55	1.46	2.46	3.50	4.54	5.58	6.63	7.67
Cont (H)	-0.38	-1.04	-1.57	-2.05	-2.48	-2.86	-3.18	-3.45	-3.67	-3.83	-3.92	-3.95	-3.92	-3.87	-3.81	-3.75	-3.69	-3.63
Cont (NM)	-0.36	-0.97	-1.46	-1.90	-2.28	-2.61	-2.89	-3.12	-3.29	-3.41	-3.46	-3.44	-3.37	-3.27	-3.17	-3.06	-2.96	-2.86
Total	**-1.15**	**-3.07**	**-4.50**	**-5.65**	**-6.54**	**-7.22**	**-7.69**	**-7.89**	**-7.82**	**-7.48**	**-6.83**	**-5.92**	**-4.84**	**-3.64**	**-2.43**	**-1.23**	**-0.03**	**1.17**

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Revenue																		
RoRo	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09
Cont (H)	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72
Cont (NM)	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72
Total	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**
Costs																		
RoRo	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Cont (H)	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66
Cont (NM)	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
Total	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**
EBIT																		
RoRo	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Cont (H)	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Cont (NM)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Total	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**
Net Cash Flow																		
RoRo	8.71	9.75	10.79	11.83	12.88	13.92	14.96	16.00	17.04	18.08	19.13	20.17	21.21	22.25	23.29	24.33	25.37	26.42
Cont (H)	-3.58	-3.52	-3.46	-3.40	-3.34	-3.29	-3.23	-3.17	-3.11	-3.05	-3.00	-2.94	-2.88	-2.82	-2.76	-2.70	-2.65	-2.59
Cont (NM)	-2.76	-2.66	-2.55	-2.45	-2.35	-2.25	-2.14	-2.04	-1.94	-1.84	-1.74	-1.63	-1.53	-1.43	-1.33	-1.22	-1.12	-1.02
Total	**2.37**	**3.58**	**4.78**	**5.98**	**7.18**	**8.38**	**9.59**	**10.79**	**11.99**	**13.19**	**14.39**	**15.60**	**16.80**	**18.00**	**19.20**	**20.40**	**21.61**	**22.81**

3-year Monthly Financial Performance: 18-Month Startup ($Millions)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Revenue																																				
RoRo	0.35	0.46	0.58	0.70	0.81	0.93	1.04	1.16	1.27	1.39	1.51	1.62	1.74	1.85	1.91	1.97	2.03	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09
Cont (H)	0.29	0.38	0.48	0.57	0.67	0.76	0.86	0.95	1.05	1.14	1.24	1.33	1.43	1.53	1.57	1.62	1.67	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72
Cont (NM)	0.29	0.38	0.48	0.57	0.67	0.76	0.86	0.95	1.05	1.14	1.24	1.33	1.43	1.53	1.57	1.62	1.67	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72
Total	**0.92**	**1.23**	**1.53**	**1.84**	**2.15**	**2.45**	**2.76**	**3.07**	**3.37**	**3.68**	**3.98**	**4.29**	**4.60**	**4.90**	**5.06**	**5.21**	**5.36**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**
Costs																																				
RoRo	0.82	0.83	0.83	0.84	0.85	0.85	0.86	0.99	1.00	1.00	1.01	1.02	1.02	1.03	1.03	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Cont (H)	0.76	0.82	0.88	0.94	1.00	1.06	1.12	1.18	1.24	1.30	1.36	1.42	1.48	1.54	1.57	1.60	1.63	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66
Cont (NM)	0.71	0.77	0.83	0.89	0.95	1.01	1.07	1.13	1.19	1.25	1.31	1.37	1.43	1.49	1.52	1.55	1.58	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
Total	**2.29**	**2.42**	**2.54**	**2.67**	**2.80**	**2.92**	**3.05**	**3.30**	**3.43**	**3.55**	**3.68**	**3.81**	**3.93**	**4.06**	**4.13**	**4.19**	**4.25**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**
EBIT																																				
RoRo	-0.47	-0.36	-0.26	-0.15	-0.04	0.07	0.18	0.17	0.28	0.39	0.50	0.61	0.71	0.82	0.88	0.93	0.99	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Cont (H)	-0.47	-0.44	-0.40	-0.36	-0.33	-0.29	-0.26	-0.22	-0.19	-0.15	-0.12	-0.08	-0.05	-0.01	0.01	0.02	0.04	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Cont (NM)	-0.43	-0.39	-0.36	-0.32	-0.29	-0.25	-0.21	-0.18	-0.14	-0.11	-0.07	-0.04	0.00	0.03	0.05	0.07	0.08	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Total	**-1.37**	**-1.19**	**-1.01**	**-0.83**	**-0.65**	**-0.47**	**-0.29**	**-0.23**	**-0.06**	**0.12**	**0.30**	**0.48**	**0.66**	**0.84**	**0.93**	**1.02**	**1.11**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**
Net Cash Flow																																				
RoRo	-0.41	-1.06	-1.49	-1.80	-2.01	-2.11	-2.10	-2.04	-1.93	-1.72	-1.39	-0.96	-0.41	0.24	1.00	1.85	2.75	3.71	4.72	5.76	6.81	7.85	8.89	9.93	10.97	12.01	13.06	14.10	15.14	16.18	17.22	18.26	19.31	20.35	21.39	22.43
Cont (H)	-0.38	-1.02	-1.54	-2.01	-2.46	-2.86	-3.23	-3.57	-3.87	-4.14	-4.37	-4.57	-4.73	-4.85	-4.93	-4.96	-4.98	-4.98	-4.94	-4.88	-4.83	-4.77	-4.71	-4.65	-4.59	-4.54	-4.48	-4.42	-4.36	-4.30	-4.25	-4.19	-4.13	-4.07	-4.01	-3.95
Cont (NM)	-0.36	-0.96	-1.42	-1.86	-2.26	-2.62	-2.95	-3.24	-3.50	-3.72	-3.91	-4.06	-4.17	-4.26	-4.29	-4.28	-4.25	-4.20	-4.12	-4.02	-3.92	-3.82	-3.72	-3.61	-3.51	-3.41	-3.31	-3.20	-3.10	-3.00	-2.90	-2.79	-2.69	-2.59	-2.49	-2.39
Total	**-1.15**	**-3.04**	**-4.45**	**-5.67**	**-6.72**	**-7.59**	**-8.28**	**-8.85**	**-9.30**	**-9.58**	**-9.67**	**-9.58**	**-9.31**	**-8.87**	**-8.21**	**-7.39**	**-6.47**	**-5.47**	**-4.34**	**-3.14**	**-1.94**	**-0.74**	**0.46**	**1.67**	**2.87**	**4.07**	**5.27**	**6.47**	**7.68**	**8.88**	**10.08**	**11.28**	**12.48**	**13.69**	**14.89**	**16.09**

3-year Monthly Financial Performance: 24-Month Startup ($Millions)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Revenue																		
RoRo	0.35	0.43	0.52	0.61	0.68	0.76	0.83	0.90	0.98	1.05	1.13	1.20	1.27	1.35	1.42	1.50	1.57	1.64
Cont (H)	0.29	0.36	0.43	0.50	0.56	0.62	0.68	0.74	0.81	0.87	0.93	0.99	1.05	1.11	1.17	1.23	1.29	1.35
Cont (NM)	0.29	0.36	0.43	0.50	0.56	0.62	0.68	0.74	0.81	0.87	0.93	0.99	1.05	1.11	1.17	1.23	1.29	1.35
Total	**0.92**	**1.15**	**1.38**	**1.61**	**1.81**	**2.00**	**2.20**	**2.39**	**2.59**	**2.78**	**2.98**	**3.18**	**3.37**	**3.57**	**3.76**	**3.96**	**4.16**	**4.35**
Costs																		
RoRo	0.82	0.83	0.83	0.84	0.84	0.85	0.85	0.85	0.86	0.86	0.87	0.87	1.00	1.00	1.01	1.01	1.01	1.02
Cont (H)	0.76	0.80	0.85	0.89	0.93	0.97	1.01	1.05	1.08	1.12	1.16	1.20	1.24	1.28	1.31	1.35	1.39	1.43
Cont (NM)	0.71	0.76	0.80	0.85	0.89	0.92	0.96	1.00	1.04	1.08	1.12	1.15	1.19	1.23	1.27	1.31	1.35	1.39
Total	**2.29**	**2.39**	**2.48**	**2.58**	**2.66**	**2.74**	**2.82**	**2.90**	**2.98**	**3.06**	**3.14**	**3.22**	**3.43**	**3.51**	**3.59**	**3.67**	**3.75**	**3.83**
EBIT																		
RoRo	-0.47	-0.39	-0.31	-0.23	-0.16	-0.09	-0.02	0.05	0.12	0.19	0.26	0.33	0.28	0.35	0.42	0.49	0.56	0.63
Cont (H)	-0.47	-0.44	-0.42	-0.39	-0.37	-0.35	-0.32	-0.30	-0.28	-0.26	-0.23	-0.21	-0.19	-0.17	-0.14	-0.12	-0.10	-0.08
Cont (NM)	-0.43	-0.40	-0.37	-0.35	-0.32	-0.30	-0.28	-0.26	-0.23	-0.21	-0.19	-0.17	-0.14	-0.12	-0.10	-0.08	-0.05	-0.03
Total	**-1.37**	**-1.24**	**-1.10**	**-0.97**	**-0.85**	**-0.74**	**-0.62**	**-0.51**	**-0.39**	**-0.28**	**-0.16**	**-0.05**	**-0.05**	**0.06**	**0.17**	**0.29**	**0.40**	**0.52**
Net Cash Flow																		
RoRo	-0.41	-1.06	-1.50	-1.85	-2.13	-2.33	-2.45	-2.51	-2.50	-2.42	-2.27	-2.05	-1.82	-1.58	-1.27	-0.89	-0.44	0.08
Cont (H)	-0.38	-1.01	-1.52	-1.99	-2.44	-2.86	-3.25	-3.63	-3.98	-4.31	-4.61	-4.90	-5.16	-5.39	-5.61	-5.80	-5.97	-6.12
Cont (NM)	-0.36	-0.95	-1.41	-1.84	-2.24	-2.61	-2.97	-3.30	-3.60	-3.89	-4.15	-4.39	-4.60	-4.80	-4.97	-5.12	-5.24	-5.35
Total	**-1.15**	**-3.02**	**-4.42**	**-5.69**	**-6.81**	**-7.80**	**-8.67**	**-9.43**	**-10.08**	**-10.61**	**-11.03**	**-11.33**	**-11.58**	**-11.77**	**-11.85**	**-11.81**	**-11.66**	**-11.40**

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Revenue																		
RoRo	1.72	1.79	1.87	1.94	2.02	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09
Cont (H)	1.41	1.48	1.54	1.60	1.66	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72
Cont (NM)	1.41	1.48	1.54	1.60	1.66	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72
Total	**4.55**	**4.74**	**4.94**	**5.14**	**5.33**	**5.53**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**	**5.52**
Costs																		
RoRo	1.02	1.03	1.03	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Cont (H)	1.47	1.51	1.54	1.58	1.62	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66
Cont (NM)	1.42	1.46	1.50	1.54	1.58	1.62	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
Total	**3.91**	**4.00**	**4.08**	**4.16**	**4.24**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**	**4.32**
EBIT																		
RoRo	0.70	0.77	0.84	0.91	0.98	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Cont (H)	-0.05	-0.03	-0.01	0.01	0.04	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Cont (NM)	-0.01	0.01	0.04	0.06	0.08	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Total	**0.63**	**0.75**	**0.86**	**0.98**	**1.09**	**1.21**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**	**1.20**
Net Cash Flow																		
RoRo	0.66	1.32	2.05	2.84	3.71	4.65	5.65	6.70	7.74	8.78	9.82	10.86	11.91	12.95	13.99	15.03	16.07	17.11
Cont (H)	-6.25	-6.35	-6.43	-6.49	-6.53	-6.54	-6.51	-6.45	-6.39	-6.33	-6.28	-6.22	-6.16	-6.10	-6.04	-5.98	-5.93	-5.87
Cont (NM)	-5.43	-5.49	-5.53	-5.54	-5.53	-5.50	-5.43	-5.32	-5.22	-5.12	-5.02	-4.91	-4.81	-4.71	-4.61	-4.50	-4.40	-4.30
Total	**-11.02**	**-10.52**	**-9.91**	**-9.19**	**-8.35**	**-7.39**	**-6.28**	**-5.07**	**-3.87**	**-2.67**	**-1.47**	**-0.27**	**0.94**	**2.14**	**3.34**	**4.54**	**5.74**	**6.95**

SECTION V – ENVIRONMENMENTAL REPORT

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Introduction

The principal need for this project is demand in the Peoria study area for overweight and over-dimensional transportation services. Increasingly, the high cost of such services is a major transportation barrier for Midwest based employers and producers of equipment. Heavy equipment and containerized grain, especially corn and soybeans, were identified as market segments offering greatest chance for success. Galveston, Texas was identified as the preferred destination of overweight and over-dimensional services. The destinations of containerized services were identified as New Orleans, Louisiana; Houston, Texas and Mobile, Alabama.

Based on the M-55 Market Analysis, an optimized Operational Plan was developed which defines the "Preferred Alternative," referred to as the M-55 service in this document. The current system which is the No-Action alternative consists of a mixture of intermodal rail, truck and barge transportation. Heavy machinery is transported to the east coast and grain and manufactured goods are transported to the West Coast and Gulf Coast. The Preferred Alternative proposes diverting heavy equipment and grain from the Peoria, IL market catchment area for loading on barges for delivery to Gulf Coast ports. The environmental costs and benefits of the proposed use expansion of the existing M-55 Marine Highway are compared with the alternative of maintaining the status quo as follows:

- Employment:
    - Potential Negatives -
        - Reduction in long-haul services from Chicago to West Coast Ports.
        - Reduction in specialized long-haul truck service from Peoria to Savannah.
    - Benefits -
        - Increased short-haul dray services.
        - Increased barge crew employment.
- Access to Markets:
    - Potential Negatives -
        - Asian shipments from the Gulf Coast are dependent on the Panama Canal which requires widening to accommodate modern cargo ships.
    - Benefits -
        - Increased access to foreign markets for manufactures.
        - Shorter drays for grain and manufactures destined for Asian markets.
        - Reduction in Chicago to West Coast long-haul for grains, grain products, manufactures.
- Environmental Quality:
    - Potential Negatives -
        - Marginal increase in risk of marine spills.
        - Marginal increase in risk of collision with wildlife.
    - Benefits -
        - 32 percent to 36 percent increase in energy efficiency.
        - 30 percent to 50 percent decrease in fuel consumption.
        - 27 percent to 49 percent decrease in air pollution (by mass of particulates, hydro-carbons, carbon monoxide, and nitrogen oxides).

Routine barge operation is not directly indicated as a source of water quality impairment. However, spills, accidents and discharges of bilge and sewage potentially could contribute to low dissolved oxygen, fecal coliform, nutrients and petroleum contamination. Barge traffic may affect aquatic species through discharge of polluted bilge or sewage. Discharge of bilge and sewage is regulated and any environmental harm may be mitigated by following the regulations for the disposal of bilge and sewage. There is a small risk that barge traffic may collide with individual free-swimming species such as fish, sea turtles, river turtles, whales and manatee. However, the rivers, canals and shipping channels used for barge traffic are not suitable habitat for whales and none have been reported. Viable manatee populations are currently restricted to Florida, although occasional sightings have been reported in gulf coastal waters. Collision hazards to free swimming species are mitigated by navigating only in designated shipping lanes and channels.

It is noted that the incremental differences between the No-Action Alternative and the Preferred Alternative are extremely small with respect to the potential for adverse impact to water quality or aquatic species because the proposed alternative would add only one or two additional barge trips per week. The proposed alternative will not require any significant modification to landside terminals[1] or the current network of lock and dams. Therefore, there will be no temporary construction impacts to critical habitat of any threatened or endangered species listed in this study.

The aforementioned energy efficiency, fuel consumption reduction and air pollution reduction benefits for the proposed M-55 Marine Highway were based on the specific routes and freight volumes and previously documented fuel consumption and emission rates. In addition, fuel consumption rates were expressed in fuel use per ton-mile for all modes of travel to ensure consistent treatment among the three modes. Although, there may be some minimal impact on traffic movement in the vicinity of the Peoria area due to a slight increase in dray traffic, the impact would be minimal in terms of the congestion and air quality impacts and no further analysis is needed. It is also noted that all freight in this proposed alternative is destined for foreign ports and should not increase local short haul at the ports along the Gulf Coast.

[1] Note that this finding is based on the fact that at the time this Environmental Analysis was conducted, an existing barge terminal (Peoria Barge Terminal, Inc.) in Peoria was being put forward as the candidate Peoria site. Since it is an existing barge terminal, it will not need significant improvements to become operational as part of the M-55 service. However, in the event an alternative candidate site is identified, a specific environmental assessment will need to be conducted, to determine impact and required next steps.

Purpose and Need

The U. S. Department of Transportation working with Heart of Illinois Regional Port District and the Missouri Department of Transportation commissioned a consultant to conduct a study to better understand the feasibility, benefits and potential efficiencies of an M-55 intermodal barge service. Analysis and research can help identify specific opportunities that could advance this initiative to a regularly scheduled service.

The M-55 Market Analysis is intended to identify and describe the optimal services along the corridor that offer the greatest public benefit and external cost savings and are the most likely to become self-sufficient in a reasonable period of time. Based on the Marketing Analysis, an optimized Operational Plan was developed which defines the preferred alternative referred to as the M-55 service in this document.

The Operational Plan identified the need for a roll-on/roll-off (Ro/Ro) service and a container-on-barge service between Peoria and the Gulf Coast. These services require no major construction or modifications to existing port facilities at any of the proposed ports of call including Peoria[2], Illinois, New Orleans, Louisiana; Mobile, Alabama; Galveston, TX or Houston, Texas. The proposed service also does not require any construction or modification to existing locks and dams.

This Environmental Assessment evaluates the Operational Plan and service alternatives with respect to the beneficial and detrimental effects of the alternative routes and landside support facilities. Environmental analysis includes the direct, indirect and cumulative effects of the proposed M-55 Marine Highway and its intermodal dock support services on the environment. The corridor routes along the Illinois and Mississippi Rivers from Peoria, Illinois to the Gulf Coast ports range from 1,100 to 1,600 river miles long and passes along or through nine states including Illinois, Missouri, Kentucky, Tennessee, Arkansas, Mississippi, Louisiana, Alabama and Texas (see Figure 1) and EPA Regions 4, 5, 6 and 7. State and federal resources agencies in these states and EPA Regions were contacted for information as part of the research. This document recommends consensus-building with agencies as required for mitigation and planning with the goal of resolving identified issues at the highest level possible, within due diligence, to reduce the burden and cost of studying environmental impacts. Subsequent Environmental Impact Statements may be prepared, if needed, to address location/site-specific details. Note that if the M-55 service is developed by a purely private venture, further EIS statements will not be required.

[2] Ibid.

Figure 1: Map of the M-55 Marine Highway

Summary of Market Analysis

The Market Analysis arrived at the following conclusions:

- There exists strong market potential for industrial and agricultural customers;
- Industrial customers will likely demand a type of marine highway service which is distinctly different from services demanded by agricultural customers;
- A bulk to container transfer facility will aid feasibility of the agriculture strategy;
- A container pool will aid feasibility of the container market strategy;
- Gateway port selection is critical to success; and,

- Partner with the other modes for retailing clout.

The principal need for this project is demand in the Peoria and Central Illinois Area for overweight and over-dimensional transportation services. Increasingly, lack of such services is a major transportation barrier for locally based employers and producers of equipment. Galveston, Texas was identified as the preferred destination for overweight and over-dimensional services.

Heavy equipment and containerized grain, especially corn and soybeans, were identified as market segments offering greatest chance for success. The destinations of containerized services were identified as New Orleans, Louisiana; Houston, Texas and Mobile, Alabama.

Alternatives Including the Proposed Action

This Environmental Assessment compares the environmental costs and benefits of the proposed use expansion of the existing M-55 Marine Highway with the alternative of maintaining the status quo, that is, a mixture of intermodal rail, truck and barge transportation. This section distinguishes the proposed M-55 service expansion with respect to the existing intermodal mix, referred to as the "No Action Scenario." This section closes with a qualitative discussion of the costs and benefits associated with the proposed M-55 service expansion with respect to the "No Action Scenario."

Concept of the Marine Highway

The M-55 service has potential to provide vehicle congestion relief, greenhouse gas emissions reduction, energy savings and future long distance transportation system capacity in the M-55 Illinois – Gulf Corridor and along the currently used routes to the East and West Coast ports. The potential negative effect may be increased local traffic at the proposed port terminal as well as along urban routes in Peoria, Illinois. However, the minimal impact of adding one or two barge trips per week will be insignificant and further evaluation is not believed to be necessary. The potential trade-offs related to local traffic flow should be studied in greater detail in subsequent EIS documents. Marine Highways are water transportation corridor analogues of the Interstate Highway system. These corridors identify routes where water transportation presents an opportunity to offer relief to landside corridors that suffer from traffic congestion, excessive air emissions and other environmental concerns and other challenges.

More specifically, the M-55 Marine Highway Initiative study examines the challenges and opportunities of a Marine Highway service between U. S. Gulf Coast seaports and Peoria, Illinois via the Illinois, Mississippi, Ohio, Tennessee and Tombigbee Rivers, the Gulf Intra-coastal Waterway (GIWW) and the Tennessee-Tombigbee Waterway (Tenn-Tom). The proposed service includes transporting containerized cargoes of grains and manufactured products and over-dimensional or overweight construction equipment from the industrial and agricultural bases in and around Peoria to international and domestic ports. The scheduled expansion of the Panama Canal and recent and planned Gulf Coast container terminal improvements may offer an all-water route linking the Midwest to international markets.

Operational Plan Summary

The Operational Plan identified the freight currently transported from a 50 mile radius around Peoria, Illinois and the circumstances under which it could move by water. The Operational Plan described the optimal services, including vessels, ports, terminals and operations.

The point of origin for the services which are the subject of this study is the port facilities at Peoria, Illinois on the Illinois River. The proposed barge route includes the Illinois River downstream of Peoria to its confluence with the Mississippi River, thence southward on the Mississippi River to the confluence with the Ohio River, thence along the Mississippi River to the GIWW at New Orleans, Louisiana. The route diverges along the GIWW either westward to Galveston and Houston, Texas or eastward to Mobile, Alabama, depending on the cargo and its ultimate destination.

Potentially a Ro/Ro service could ship an average of 67 overweight or oversize units per week at an estimated weekly weight of 3,703 million tons, most of it destined for Houston, Texas. The Ro/Ro shipment could route through New Orleans to the GIWW to Galveston for a one-way haul of 1,596 miles. Alternatively, the Ro/Ro shipment could route through the Port Allen and Bayou Sorrell Locks and Dams which by-pass New Orleans and cuts 162 miles from the one-way trip.

Container-on-barge service potentially could ship an average of 1,113 oversize or overweight units per week at an estimated weekly weight of 30,005 million tons. Container-on-barge shipments would route either to New Orleans directly via the Mississippi River or to Mobile, Alabama directly via the Tennessee and Tombigbee Rivers or to both New Orleans and Mobile in a loop consisting of the Mississippi River to GIWW to Tombigbee River to Tennessee River to Ohio River.

Container backhaul would be via the GIWW, Tombigbee, Tennessee Rivers route and preferably filled with bulk materials. However, specific goods and services have not yet been identified for the backhaul.

No Action Alternative

With no action, it is anticipated that current transportation practices will remain unchanged. Manufacturers and grain shippers in the Peoria area currently rely on highway, rail and bulk barge transport.

Overweight and over-dimensional machines are limited to highway shipping as their dimensions typically exceed rail width or height limitations. Multiple modes of shipment are typically required for large machines. Smaller equipment is shipped by rail or highway transport or intermodal rail and highway.

Grain destined for foreign ports is normally shipped via highway transport, typically on Heavy Duty Diesel powered tractor-trailer rigs to either Peoria, IL for transfer to barges or to Chicago, IL for transfer to rail cars. Ports at New Orleans, LA; Galveston, TX; Houston TX or Mobile, AL support deepwater cargo vessels needed for bulk shipment to foreign ports.

Existing Modes of Transport

Currently, container-on-barge (COB) commodities are destined almost exclusively for the export market. The Market Analysis identified COB corn, soy beans, dry distillers grain, gluten, industrial equipment and machine parts and large heavy construction equipment as the commodity markets most likely to benefit from conversion to the proposed service.

COB commodities may be shipped by rail, barge or truck to ports in the U. S. for export. Commodities destined for Asian markets are typically sent to West Coast Ports and commodities destined for Europe, Africa and South America are typically shipped through East Coast and Gulf Coast ports.

Large and medium heavy construction equipment typically cannot be shipped by rail due to width and height restriction. Currently large and medium heavy construction equipment must be partially dismantled and loaded on tractor trailer rigs for shipment to East Coast and Gulf Coast ports for loading on cargo ships. Oversize loads must be permitted through the State and local authorities who also designate the routes.

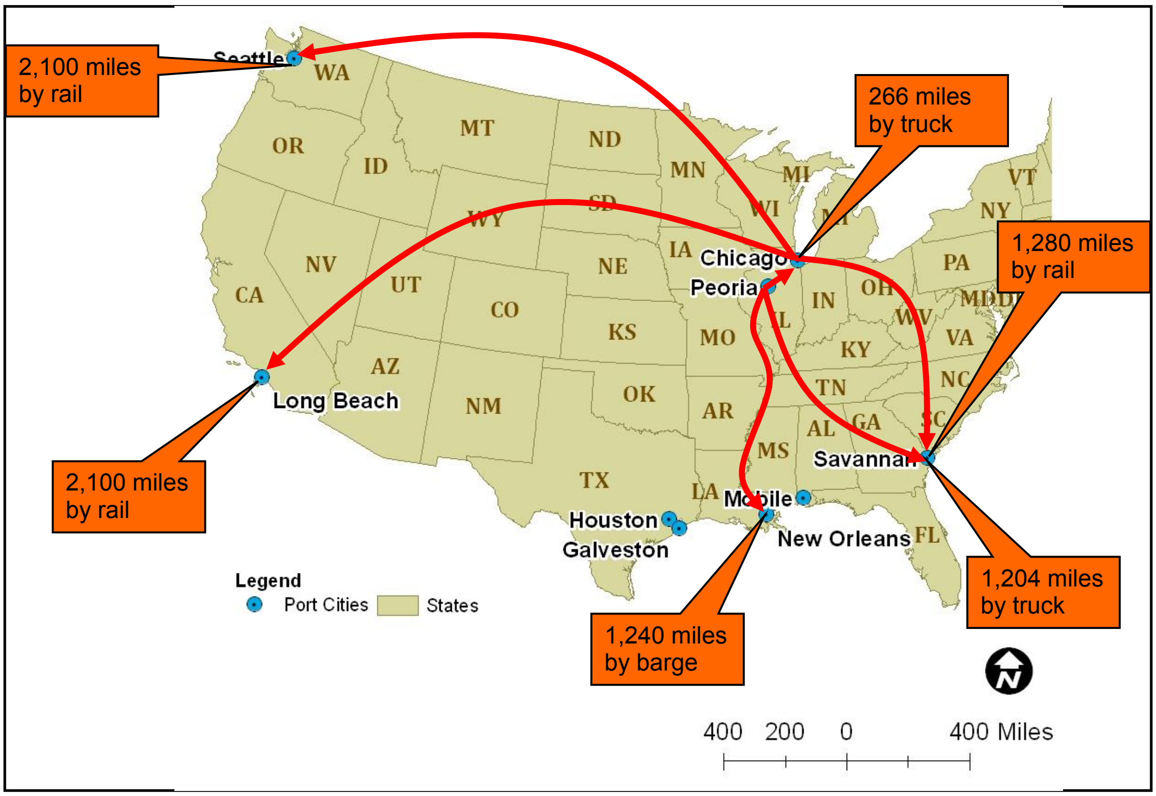
Table 1: Current Route Explanations lists the assumptions underlying the analysis of the environmental effects of the existing versus proposed services, and Figure 2 illustrates these routes.

Table 1: Current Route Explanations

Dray	Line Haul	Market	Mode	Tons
Local	Peoria-Gulf Coast	Corn – GMO*	Barge	330
Peoria-Chicago	Chicago-West Coast	Corn – no GMO*	Rail	330
Local	Peoria-Gulf Coast	Soy – GMO*	Barge	956
Peoria-Chicago	Chicago-West Coast	Soy – no GMO*	Rail	956
Local	Peoria-Gulf Coast A	DDG	Barge	18,718
Peoria-Chicago	Chicago-West Coast	Gluten	Rail	2,690
Peoria-Chicago	Chicago-West Coast	Industrial	Rail	6,025
Peoria-Chicago	Chicago-East Coast	Ro/Ro Parts	Rail	280
No Dray	Peoria- East Coast	Ro/Ro Large	Truck	763
No Dray	Peoria- East Coast	Ro/Ro Medium	Truck	2,940

**GMO – Genetically Modified*

Figure 2: Current Routes from Peoria

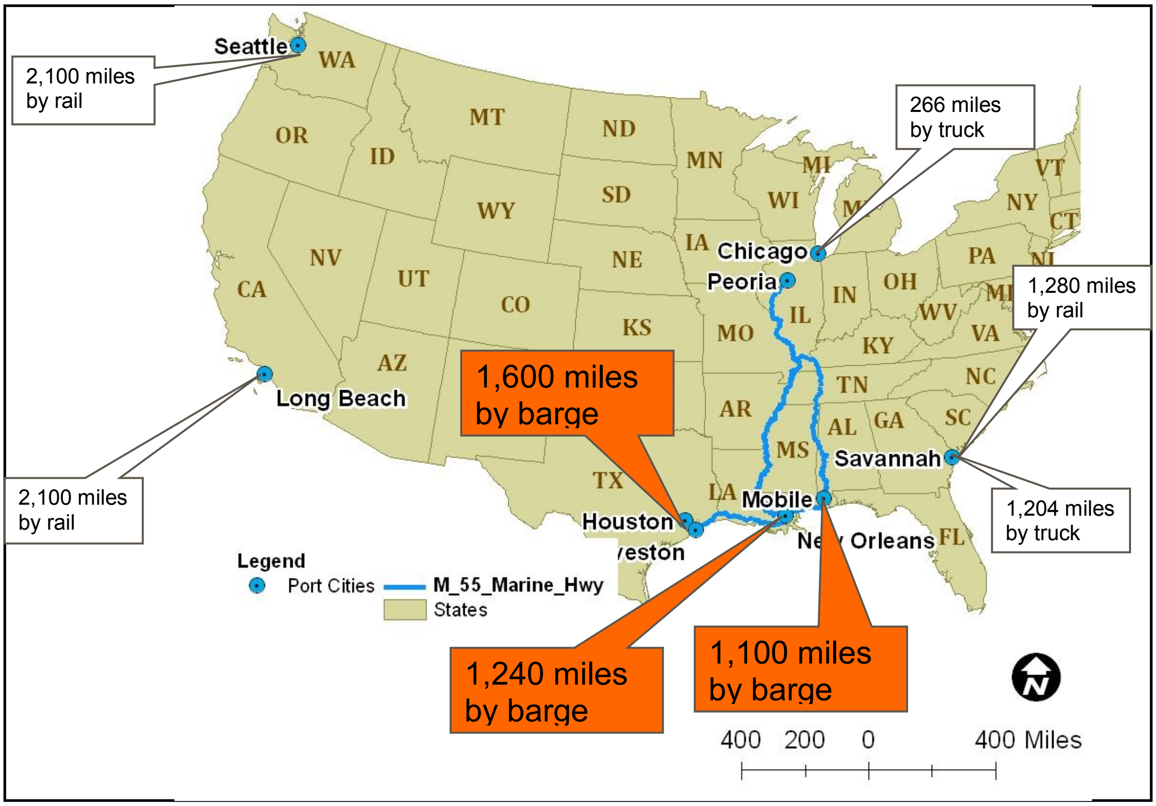


Proposed Service

The proposed route for the M-55 Marine Highway Evaluation and Market Analysis begins at the port facilities in Peoria on the Illinois River and proceeds to the confluence of the Illinois and Mississippi Rivers, thence along the Mississippi River to the intersection of the GIWW and diverges westward to Galveston and Houston, Texas or eastward to Mobile, Alabama. Alternatively, the route may use the Mississippi River to the Ohio River to the

Tennessee River to the Tenn-Tom Canal to the Tombigbee River to the Mobile River ending at Mobile, Alabama. Figure 3 illustrates these routes.

Figure 3: Proposed Routes



The proposed service that is based on the Operational Plan, uses conventional barges, either decked or hopper carriers and would operate using a dedicated tug boat. This service would require at least two tug-barge units with round trip time of about14 days from Peoria to Houston to achieve a reliable weekly service. .

Potential Negatives and Benefits of the Preferred Alternative

The preferred alternative to the existing mix of intermodal freight for the movement of overweight and oversize heavy equipment from central Illinois to foreign markets is the proposed M-55 service. The preferred alternative may also benefit the exporters of grain. The following list qualitatively compares the costs and benefits of expanding the M-55 Marine Highway as proposed for intermodal barge service, the Preferred Alternative, with the existing "No Action Scenario". The list compared Preferred Alternative and "No Action Scenario" with respect to employment, access to markets and environmental quality.

Employment

Potential Negatives -

- Reduction in long-haul services Chicago to West Coast Ports.
- Reduction in specialized long-haul truck service Peoria to Savannah.

Benefits -

- Increased short-haul dray services.
- Increased barge crew employment.

Access to Markets

Potential Negatives -

- Asian shipments from the Gulf coast are dependent on the Panama Canal which requires widening to accommodate modern cargo ships.

Benefits -

- Increased access to foreign markets for manufactures.
- Shorter drays for grain and manufactures destined for Asian markets.
- Reduction in Chicago to West Coast long-haul for grains, grain products, manufactures.

Environmental Quality

Potential Negatives -

- Marginal increase in risk of marine spills.
- Marginal increase in risk of collision with wildlife.

Benefits -

- Increased energy efficiency.
- Decreased fuel consumption.
- Decreased air pollution.

Affected Environment

Environmental Analysis includes the direct, indirect and cumulative effects of the proposed M-55 Marine Highway and its intermodal dock support services on the environment. The proposed M-55 Marine Highway routes range from approximately 1,100 to 1,600 river miles long and passes along or through nine states including Illinois, Missouri, Kentucky, Tennessee, Arkansas, Mississippi, Louisiana, Alabama and Texas and EPA Regions 4, 5, 6 and 7. Economic, historic and environmental data are typically made available on a county basis. The M-55 Marine Highway passes by or through 129 counties.

Due to the length of the route and complexity and variety of the environments spanned by the M-55 Marine Highway, the study area of the M-55 Marine Highway was segmented into "reaches" for analysis. These reaches were based on convenient geographic divisions with similar ecology, geography and climate. Thus the Illinois River defines the reach from Peoria to the Mississippi River which is dominated by northern Illinois prairie. Similarly, the Mississippi River from the Illinois River to the Ohio River is dominated by eastern Missouri and southwestern Illinois. South of the tip of Illinois water quality and ecology is a blend of the upper Mississippi River and Ohio River. South of Memphis, TN the Mississippi River ecology is dominated by a warmer, wetter climate zone with typical winter lows above five degrees F and annual average precipitation exceeding 55 inches. The Gulf Coastal Waters was selected based on proximity to the Gulf Intra-coastal Waterway which is dominated by bayous, estuaries and canal. The counties adjacent to the Tombigbee, Tennessee and Ohio Rivers are dominated by the southeastern plains ecological zone, terrain and climate.

Based on the aforementioned criteria, the M-55 Marine Highway was segmented into the following reaches for analysis (See Figure 4):

- Illinois River to Confluence with Mississippi River
- Upper Mississippi River from Confluence with the Illinois to Confluence with Ohio Rivers
- Middle Mississippi River from Confluence with Ohio River to Memphis, Tennessee
- Lower Mississippi River from Memphis, Tennessee to New Orleans, Louisiana
- Ohio River, Tennessee River and Tombigbee River
- Gulf Coastal Waters

Figure 4: Reaches Defined

Table 2: Summary of Housing Units by Study Area Reach shows the sum of the area in acres of the counties adjacent to the M-55 Marine Highway by each reach along with breakout of areas summarized by housing unit (HU) density ranges of less than one HU/acre, at least one to less than ten HU/acre and at least ten or more HU/acre. Housing units per acre in suburban and urban areas typically exceed four HU/acre except in recreational, commercial and industrial zones, in which housing units are typically much sparser. The table indicates that the entire study area is mostly sparsely populated with a few areas of high density population.

Table 2: Summary of Housing Units by Study Area Reach

Study Area Reach	Total Acres in Study Area	Area in Acres of Density Less Than 1 HU Per Acre	Area in Acres of Density Less Than 10 and at Least 1 HU per Acre	Area in Acres of 10 HU per Acre or Greater
Illinois River	4,320,996	4,265,682	54,850	464
Upper Mississippi River	5,237,685	4,926,963	301,363	9,359
Middle Mississippi River	4,254,151	4,115,542	135,289	3,320
Lower Mississippi River	13,889,791	13,694,763	186,177	8,851
Gulf Intra-coastal Waterway	14,519,400	13,907,646	590,554	21,201
Ohio -Tennessee - Tombigbee Rivers	12,075,352	12,022,614	52,344	394
TOTALS	**54,011,855**	**52,649,487**	**1,318,780**	**43,588**

Areas of high density population usually include industrial and commercial operations all of which, historically, have altered local water quality, species habitat and storm water runoff patterns. However, agricultural development historically has its own characteristic patterns of environmental alteration such as diversion of streams, wetland drainage, increased soil erosion and deforestation.

Water Quality

Barge traffic is not directly indicated as a source of water quality impairment. However, spills, accidents and discharges of bilge and sewage would contribute to low dissolved oxygen and potential petroleum contamination.

Water quality analysis was based on extracts from the National 303(d) list of impaired waters and, where available, also based on state 305(b) reports and special assessment reports (illustrated in Figure 5). The Clean Water Act (CWA) Part 303(d) requires listing of waters that fail to meet the stated goal of "fishable, swimmable waters." The 303(d) Listed Impaired Waters program system identifies impaired river segments, lakes, and estuaries designated under Section 303(d) of the Clean Water Act. EPA maintains a national listing of the location of the impairments by Watershed Boundary Dataset 12-digit Hydrologic Unit Code (HUC-12) and the source and cause of the impairment. The National 303(d) Listed Impaired Waters provides convenient, consistent, standardized water quality data which is comparable nationwide.

Figure 5: Water Quality

Table 3: Summary 303(d) Listed Impaired Waters summarizes the approximate lengths of impaired reaches from the March 31, 2011 National Extract GIS Database. Note the "Impaired Waters" listed here do not represent all impaired waters reported in a state's Integrated Report, but only the waters comprised of a state's approved 303(d) list.

Table 3: Summary 303(d) Listed Impaired Waters

Study Area Reaches	Total Main Channel Length (miles)	Length of 303(d) Listed (miles)	Percent of Main Channel Length 303(d) Listed
Illinois River	188.07	181.90	96.72%
Upper Mississippi River	228.68	180.12	78.77%
Middle Mississippi River	260.50	246.47	94.61%
Lower Mississippi River	632.48	410.39	64.89%
Gulf Intra-coastal Waterway	474.44	109.28	23.03%
Ohio -Tennessee - Tombigbee Rivers	808.27	109.83	13.59%
TOTALS	**2,592.44**	**1,238.00**	**47.75%**

Air Quality

Areas of the country where air pollution levels persistently exceed the National Ambient Air Quality Standards may be designated "non-attainment" by the US Environmental Protection Agency. Non-attainment areas, as currently designated for all criteria pollutants listed by state, county and pollutant as of August 30, 2011 for the M-55 study area are illustrated in Figure 6.

Figure 6: Air Quality

Threatened and Endangered Species

Threatened and endangered flying species such as the piping plover, red-cockaded woodpecker, ivory-billed woodpecker, least tern, gray bat and the Indiana bat were not considered vulnerable to the effects of barge traffic. Plants, mainly wild flowers, none of which are aquatic although some are wet-prairie species, were not considered vulnerable to the effects of barge traffic. Land animal species such as the Louisiana black bear, black pine snake, Perdido Key beach mouse and gopher tortoise were also not considered vulnerable to the effects of barge traffic. The land species identified including the flying species are vulnerable to construction activities that disturb existing habitat. However, the proposed project does not require expansion of dock facilities at Peoria or construction on undeveloped sites. The critical habitats for the threatened and endangered species are illustrated in Figure 7 and Figure 8 below.

Threatened and endangered species vulnerable to barge traffic are aquatic species that are unable to relocate themselves away from mobile hazards, those that are slow moving free-swimmers found in the upper 12 feet of water column, species sensitive to bilge and sewage discharges and species sensitive to noise.

The following is a list of species found in the study area that are potentially threatened by barge traffic:
Species Threatened by Boat Collisions

- Loggerhead Sea Turtle, Caretta caretta
- Green Sea Turtle, Chelonia mydas
- Kemp's Ridley Sea Turtle, Lepidochelys kempii
- Humpback Whale, Megaptera novaeangliae
- West Indian Manatee, Trichechus manatus

Species Threatened by Boat Disturbances

- Humpback Whale, Megaptera novaeangliae
- Smalltooth Sawfish, Pristis pectinata

Species Threatened by Boat Pollution – Spills/Dumping

- Leatherback Sea Turtle, Dermochelys coriacea
- Mussels – 47 species identified in the study area

Figure 7: Threatened and Endangered Species – Critical Habitat Overview

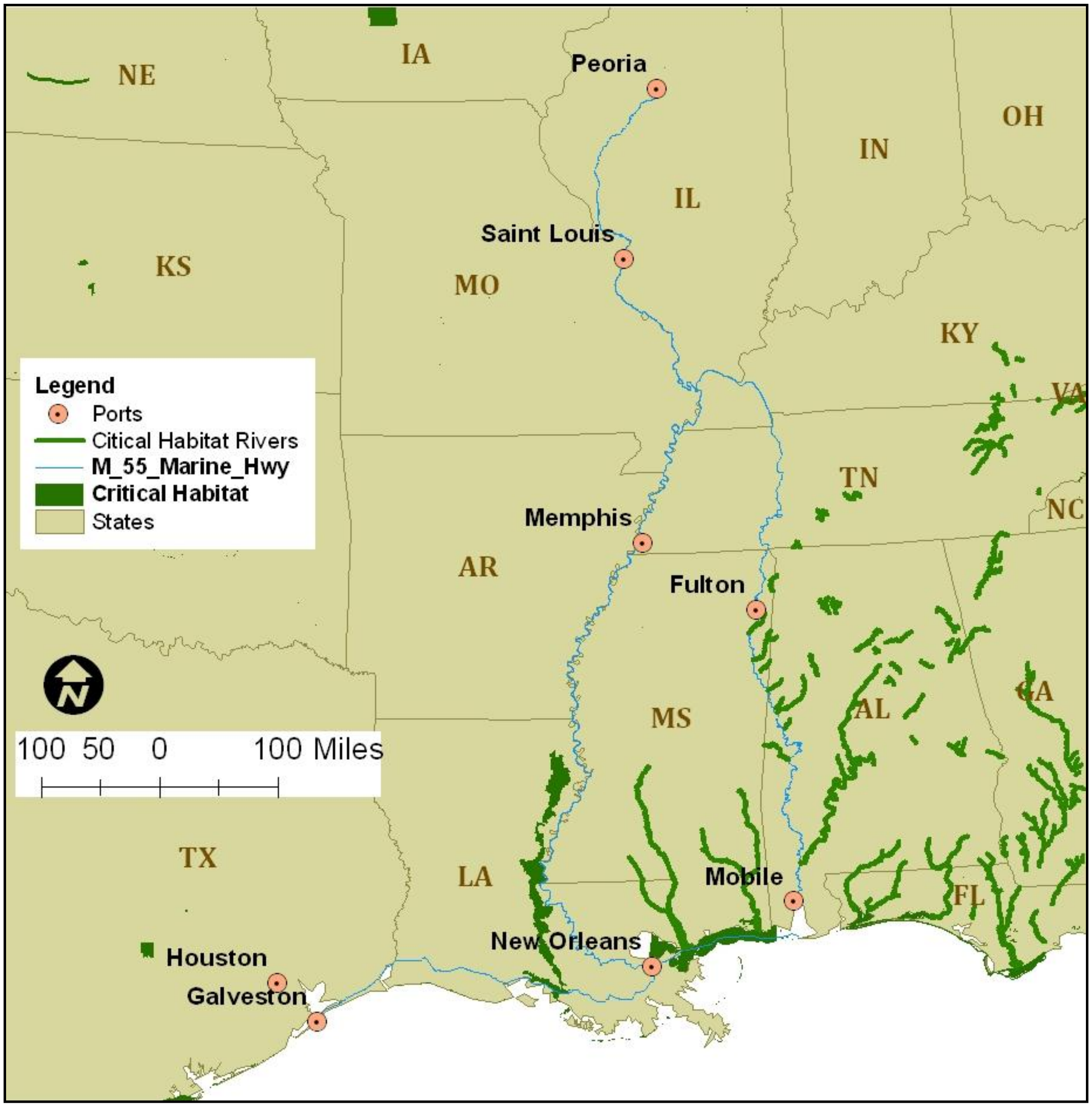
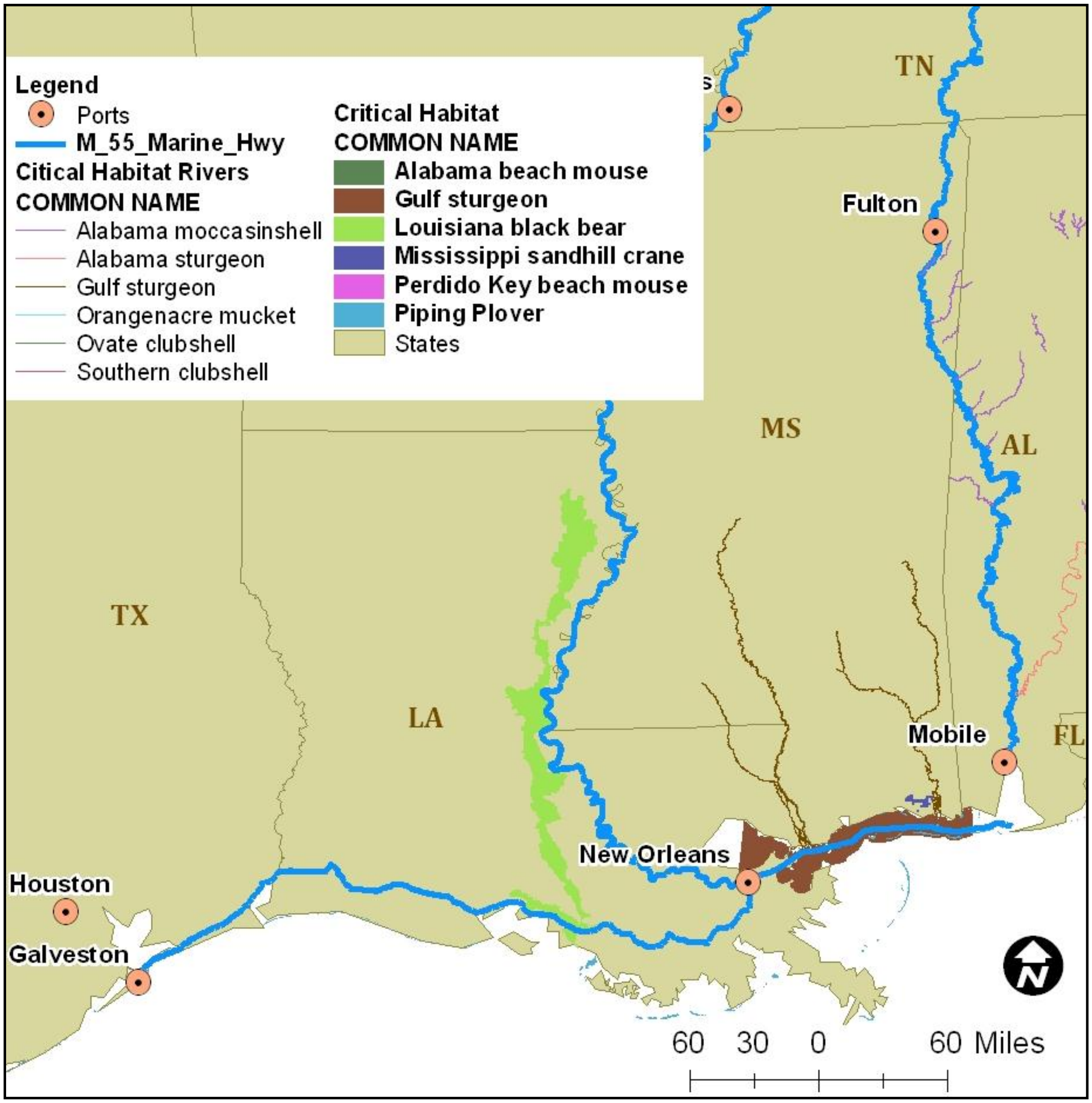


Figure 8: Threatened and Endangered Species – Critical Habitat Detailed



Illinois River to Confluence with Mississippi River

This section details the existing condition of the Illinois River from Peoria to the confluence with the Mississippi River. The current condition of the Illinois River watershed and floodplain is a result of at least 150 years of agricultural and urban development. The development of the Chicago area has contributed significantly to demand for navigation, agriculture and urbanization. Demand for navigation from Lake Michigan to the Mississippi River required modification of the Illinois River channel and construction of a levee system and seven locks and dams. Agricultural tillage combined with the loss of floodplains and wetlands increased erosion rates from stream banks and bluffs which has degraded water quality.

Current Uses - Documented uses of the Illinois River, according to the 303(d) Draft Report, March 26, 2010 include:

- Sport fishing
- Commercial fishing
- Swimming
- Water supply
- Shipping

Water Quality - Pollutants of concern in the Illinois River include bacteria, phosphorus, total suspended solids, sedimentation, siltation, dissolved oxygen, chloride, manganese, and total dissolved solids. These pollutants can originate from an array of sources including point source discharges (e.g., industrial pipes) and surface runoff, particularly storm water. Figure 9 illustrates the impaired sections of the reach.

Figure 9: Illinois River to Confluence with Mississippi River Water Quality

Threatened and Endangered Species - A review of the threatened and endangered species listed by the U. S. Fish and Wildlife Service yielded ten species for the counties in Illinois adjacent to the Illinois River. Three species listed, the spectaclecase mussel, Higgins eye mussel and the sheepnose mussel were wholly aquatic.

The spectaclecase mussel, Higgins eye mussel and the sheepnose mussel are primarily threatened by overfishing, commercial harvesting, invasive species, habitat modification, pollution, poor water quality and sedimentation. The proposed operation potentially may spread invasive species through discharges of contaminated bilge water or contribute to pollution through spills or accident.

Mississippi River to Confluence with Ohio River

The reach of the Mississippi River from the confluence with the Illinois River to the confluence with the Ohio River forms the border between Illinois and Missouri. This reach includes the cities and suburbs of St. Louis, MO; East St. Louis, IL; Cape Girardeau, MO; and Cairo, IL. The draft 2010 Illinois 305(b) Water Quality Report and 303(d) Impaired Waters Report identified impairments to fishing, swimming and public water supply on Mississippi reaches from the confluence with the Illinois River to Sainte Genevieve, MO. Additional information on pollution trends for this reach were found in Upper Mississippi River, Water Quality Assessment Report, Sponsored by Upper Mississippi River Conservation Committee, March 2002.

The counties adjacent to this reach of the Mississippi River host a mix of industrial, commercial, residential and agricultural land uses. The Missouri counties of St. Louis and St. Charles and the Illinois counties of Madison and St. Clair, were early areas of industrial, commercial and residential development. Counties further south support less industrial development. However, most of the counties in this area support significant agricultural development.

Current Uses - The Mississippi River in this reach supports the following uses:

- Fishing
- Swimming
- Potable water source
- Commercial navigation
- Recreational boating
- Fish and aquatic life
- Irrigation
- Wildlife and livestock watering

Water Quality - The draft 2010 Illinois 303(d) Impaired Waters Report identified impairments to fishing, swimming and public water supply on Mississippi reaches from the confluence with the Illinois River to Sainte Genevieve, MO. These reaches of the Mississippi River begin at the confluence of the Illinois River and the Missouri River and flow by the St. Louis, MO and East St. Louis, IL urban area. Specifically, fish from this reach were found contaminated with mercury and polychlorinated biphenyls (PCB). Manganese concentrations in the water along this reach of the Mississippi River impair its use as a water supply source. Swimming in this reach is impaired by the presence of fecal coliforms. Figure 10 illustrates the impaired sections of the reach.

Figure 10: Mississippi River to Confluence with Ohio River Water Quality

Additional information on pollution trends for this reach were found in Upper Mississippi River, Water Quality Assessment Report, Sponsored by Upper Mississippi River Conservation Committee, March 2002. The Water Quality Assessment Report reviewed mercury and PCB concentrations from fish sampled from 1975 to 1999 and found a declining trend in concentrations of both mercury and PCB. The Water Quality Assessment Report attributed "large" differences in upstream versus downstream nutrient and suspended solids concentrations and associated water quality to agricultural non-point source pollution from the Missouri River.

Threatened and Endangered Species - A review of the threatened and endangered species listed by the U. S. Fish and Wildlife Service yielded 19 species for the Illinois and Missouri counties adjacent to the Mississippi River. Eight of the species listed are wholly aquatic. However, six were mussels. Barge traffic may affect mussels through discharge of polluted bilge or sewage. There is a small risk that barge traffic may collide with an endangered species potentially found in this reach: individual pallid sturgeons. The remaining species are the Illinois cave amphipod, a tiny shrimp-like crustacean which was found in only six cave systems in the world and the grotto sculpin, a rare fish found only in Missouri caves. It is unlikely that barge traffic can affect cave species.

Mississippi River from Ohio River to Memphis

The Mississippi River from the confluence with the Ohio River to Memphis, Tennessee is affected by a mix of agricultural and urban runoff. Immediately below the confluence with the Ohio River, water quality resembles the industrial contamination found in the Ohio River. Impairments are due to chlordane, dioxins, mercury and PCBs. Farther downstream and away from urban influences, dilution, sedimentation and biological uptake of industrial pollutants improve the water quality. However, water quality in the reach between Missouri and Tennessee is dominated by rural influences such as agricultural runoff and soil erosion such as sedimentation, nitrates, nitrites, and low dissolved oxygen. In the vicinity of Memphis, TN, industrial and urban influences again dominate water quality.

Current Uses - The Mississippi River in this reach supports the following uses:

- Fishing
- Swimming
- Potable water source
- Commercial navigation
- Recreational boating
- Fish and aquatic life
- Irrigation
- Wildlife and livestock watering

Water Quality - Based on the 303(d) listed waters, the impairments to usage of Mississippi River appear the result of industrial pollution (mercury and dioxins are often the result of fossil fuel combustion, incineration of solid wastes and manufacturing by-products). Physical substrate and habitat alterations may be due to channelization of the Mississippi River and tributaries for flood control and agricultural development. Figure 11 illustrates the impaired sections of the reach.

Figure 11: Mississippi River from Ohio River to Memphis Water Quality

Barge traffic is not directly indicated as a source of water quality impairment. However, spills, accidents and discharges of bilge and sewage would contribute to low dissolved oxygen and potential petroleum contamination.

Threatened and Endangered Species - A review of the threatened and endangered species listed by the U. S. Fish and Wildlife Service yielded 18 species for the Arkansas, Kentucky, Missouri and Tennessee counties adjacent to the Mississippi River. Eleven of the species listed are wholly aquatic. However, nine were mussels potentially found in this reach of the Mississippi and one, relict darter, is a rare fish found only in a single lake in Kentucky. Barge traffic may affect mussels through discharge of polluted bilge or sewage. There is a small risk that barge traffic may collide with endangered species potentially found in this reach: individual pallid sturgeons.

The remaining specie is the Royal Marstonia snail known only from two springs. It is unlikely that barge traffic can affect springs located above the elevation of the Mississippi River.

Mississippi River from Memphis to New Orleans

Water quality of the reaches of the Mississippi River just below Memphis, TN is characterized by industrial style contamination in the form of dioxins, chlordane, mercury and PCBs. Most of the impairments in this reach, however, are characterized by agricultural run-off such as sedimentation, nutrients and low dissolved oxygen.

Current Uses - The Mississippi River in this reach supports the following uses:

- Fishing
- Swimming
- Potable water source
- Commercial navigation
- Recreational boating
- Fish and aquatic life
- Irrigation
- Wildlife and livestock watering

Water Quality - Chlordane was used more in the south than in the north for termite control and it shows in the water quality impairments in this reach. Persistent heavy metals such as mercury may be from Tennessee mining operations as well as local sources. Nutrients, pesticides, sedimentation, and organic loadings which increase oxygen demand in the lower reaches are all symptomatic of impairment from agriculture. Figure 12 illustrates the impaired sections of the reach.

Figure 12: Mississippi River from Memphis to New Orleans Water Quality

Threatened and Endangered Species - A review of the threatened and endangered species listed by the U. S. Fish and Wildlife Service yielded 30 species for the Arkansas, Louisiana, and Mississippi counties adjacent to the Mississippi River. Twenty of the species listed are wholly aquatic. However, ten were mussels found in the Mississippi River and one, bayou darter, is a rare fish found only in Bayou Pierre in Mississippi. Barge traffic may affect mussels through discharge of polluted bilge or sewage. There is a small risk that barge traffic may collide with endangered species potentially found in this reach: individual pallid sturgeons, gulf sturgeons, small-toothed sawfish or West Indian manatee. The small-tooth sawfish is said to be sensitive to noise. Although there is habitat for the West Indian manatee, there is no documentation that manatee are a problem in the canals and shipping lanes. The current documented viable populations of manatee are confined to Florida and possibly Pamlico Sound in North Carolina.

Gulf Coastal Waters

Counties on the Gulf coast are low agricultural intensity. Crop area as a percent averages about 13 percent. New Orleans, LA; Mobile, AL and Galveston and Houston, TX areas are densely populated with associated urban water quality impairments. Between the urban centers, population density is low. The bayous, swamps and estuaries of the Gulf coast are rich in specialized species.

Current Uses -

- Fishing
- Swimming
- Commercial navigation
- Recreational boating
- Fish and aquatic life

Water Quality - Impairments in terms of percent of length of the GIWW were about 23 percent. Most of the length of GIWW meets use standards. Lengths that fail to meet use standards were affected by urban pollutants such as fecal coliform, nutrients, low dissolved oxygen, nitrites, nitrates and phosphorus. Figure 13 illustrates the impaired sections of the reach.

Figure 13: Gulf Coastal Waters Water Quality

Barge traffic is not directly indicated as a source of water quality impairment. However, spills, accidents and discharges of bilge and sewage potentially would contribute to low dissolved oxygen, fecal coliform, nutrients, nitrites, nitrates phosphorus and petroleum contamination.

Threatened and Endangered Species - A review of the threatened and endangered species listed by the U. S. Fish and Wildlife Service yielded 34 species for the Alabama, Louisiana, Mississippi and Texas counties adjacent to the GIWW. Seventeen of the species listed are wholly aquatic. However, three were mussels, five were sea turtles and three were freshwater turtles. Pearl darter is known only from the Pearl and Pascagoula river drainages in Mississippi and Louisiana and may be extirpated from the Pearl River. Barge traffic may affect mussels through discharge of polluted bilge or sewage. There is a small risk that barge traffic may collide with endangered species potentially found in this reach: individual pallid sturgeons, gulf sturgeons, Alabama sturgeons or West Indian manatee. The small-tooth sawfish is said to be sensitive to noise. Although there is habitat for the West Indian manatee, there is no documentation that manatee are a problem in the canals and shipping lanes. The current documented viable populations of manatee are confined to Florida and possibly Pamlico Sound in North Carolina.

Ohio, Tennessee and Tombigbee Rivers Waterway

Area in crops averages 15.73 percent over the counties adjacent to the Ohio, Tennessee, Tombigbee and approximately 46 miles of the Mobile Rivers. Much of the area is rural; about 99.6 percent of the total area is characterized by fewer than one housing unit per acre. Activities in counties in Kentucky, Tennessee, Mississippi and Alabama adjacent to the M-55 Marine Highway are low intensity agricultural, mining, forestry and conservation. Recreation is a primary use of the Kentucky portion of the Tennessee River.

Current Uses - The Ohio, Tennessee, and Tombigbee Rivers support the following uses:

- Fishing
- Swimming
- Potable water source
- Commercial navigation
- Recreational boating
- Fish and aquatic life
- Irrigation
- Wildlife and livestock watering

Water Quality - The Tennessee and Tombigbee Rivers apparently are the least impaired waters of the M-55 Marine Highway routes. These waters also harbor many species of mollusks, 36 of which are on the threatened and endangered lists. Large urban areas are found in Mobile, AL at the extreme end of this reach and the water quality at this location is impaired by the urban and industrial run-off characterized by carbonaceous biological oxygen demand, nitrogenous biological oxygen demand, phosphorus, iron, fecal coliform, mercury, DDT and chlordane. Figure 14 illustrates the impaired sections of the reach.

Figure 14: Ohio, Tennessee and Tombigbee Rivers Waterway Water Quality

Impairments of the Ohio River at the southern tip of Illinois are characterized by industrial and agricultural run-off such as mercury, PCBs, atrazine, low dissolved oxygen, fecal coliform, phosphorus, sedimentation/siltation, and total suspended solids (a measure of sediment).

Barge traffic is not directly indicated as a source of water quality impairment. However, spills, accidents and discharges of bilge and sewage potentially would contribute to low dissolved oxygen, fecal coliform, nutrients, nitrites, nitrates, phosphorus and petroleum contamination.

Threatened and Endangered Species - This study identified 56 threatened and endangered species in counties adjacent to the Mobile, Tombigbee, Tennessee, and Ohio Rivers. Of these, 42 were wholly aquatic species. The aquatic species included six fish, 35 mussels and one snail species. In the free flowing sections of the lower Tennessee River there are several locations for experimental populations of rare mussel species. Nine species of mussels were planted in these experimental plots from collections of captive mussels.

The six fish species included the Alabama cavefish, a blind fish found only in limestone caves in northwest Alabama. Barges are unlikely to affect the Alabama cavefish. However, barge traffic may discharge polluted bilge or sewage which is especially harmful to filter feeding mussels. Barge traffic may collide with individual free swimming species such as fish.

Environmental Consequences

In this section, the environmental consequences of both the proposed M-55 Marine Highway and the "No Action" alternative are summarized. The defining difference between the proposed M-55 Marine Highway service and the existing services is the addition of one or two barges per week to transport the same amount of commodities as is currently transported by trains and a fleet of tractor-trailer rigs. The existing system transports an estimated 33,700 tons of commodities per week (50 million ton-miles) to various parts of the U. S. for overseas shipment. The proposed system would move the same 33,700 tons of freight to the Gulf coast for overseas shipping. Overall energy savings from the energy efficiency of water transport compared to land transport were calculated from 32 percent to 36 percent for three scenarios.

Due to the relationship between energy savings, fuel consumption and emissions, air pollution in the form of particulates, carbon dioxide, carbon monoxide and nitrogen oxides should all be reduced in proportion to energy savings.

Water quality of the M-55 Marine Highway has been degraded compared to pre-Columbian times as a result of channel modifications, clear-cutting, tillage, construction, industrial discharges, urban run-off and sewage discharges. To support barge traffic, canals, locks and dams were constructed. The canals, locks and dams have altered water quality and created barriers to migrating fish species. However, the proposed M-55 Marine Highway does not require construction or remodeling of any canals, locks or dams.

The primary threat to the Threatened and Endangered Species found for the M-55 Marine Highway is habitat modification. Habitat modification has included construction of canals, locks and dams and deforestation, draining wetlands, farmland tillage and channelization of tributaries. Threats also include industrial discharges, agricultural chemicals and urban run-off.

Energy Conservation and Air Quality

The potential for the M-55 service to improve environmental quality lies primarily with reducing air emissions and energy consumption. Internal combustion engines currently provide the motive power for water, rail and truck modes of freight transport. Exhaust emissions from internal combustion engines are proportional to the amount of energy output.

Water transport is inherently more energy efficient due to greatly reduced frictional losses compared with truck and rail ground transport. Comparison between the modes of transport may be made by calculating the energy consumption required per unit distance to move a unit amount of freight. The US Department of Transportation (DOT) and the US Department of Energy (DOE) publish national statistics on the use of energy for transport. Fuel economy and fleet performance were based on information from the following documents:

- National Transportation Statistics, 2010, rev. July 2011, Table 4-14: Combination Truck Fuel Consumption and Travel, Year 2008 average miles per gallon
- "A Modal Comparison of Domestic Freight Transportation Effects on the General Public," December 2007, amended March 2009, Center For Ports and Waterways, Texas Transportation Institute
- National Transportation Statistics, 2010, rev. July 2011, Table 4-25: Energy Intensity of Class I Railroad Freight Service, derived from Year 2009 Revenue freight ton-miles / Fuel consumed

Information regarding the movements of barges is restricted and generally only available to the Army Corps of Engineers. The fuel efficiency of barges was based on data from a model developed by the Tennessee Valley Authority (TVA) which found that based on a year 2005 scenario, barges should get 575.6 ton-miles/gal.

Whereas both the National Transportation Statistics and the Transportation Energy Databook both report ton-miles and fuel consumption for trucks, the fuel consumption reported includes trucks not used to haul freight. The result is the ton-miles per gallon derived from these data are too low by a factor of about 1/3. Converting the miles per gallon to ton miles per gallon requires using an average payload. Using 5.35 miles per gallon[3], the ton-miles per gallon for import and export were estimated as follows:

- Based on an average truck payload for exports of 25.2 tons, export truck fuel consumption is 134.9 ton-miles per gallon.
- Based on an average truck payload for imports of 22.7 tons, import truck fuel consumption is 121.5 ton-miles per gallon.

Analysis of the net air quality effects were based on the following:

- All goods are assumed transported to foreign countries.
- Proposed barge services use Tier 2[4] compliant retrofitted tug and barge units.
- Short haul highway route changes are limited to the dray of 35 miles.
- Dray vehicles are combination tractor-trailer rigs, model year 2001 or newer with 50,000 miles of wear.
- Foreign local effects of local distribution in the No Action Scenario were assumed to be the same as the proposed project and therefore are "a wash."
- Fuel is assumed to be diesel containing 2,778 grams of carbon per gallon.
- Conversion to CO_2 is assumed 99.85 percent efficient with remainder becoming CO.
- Non-tampered exhaust emission rates for low altitude heavy duty diesel powered vehicles.

Additional reductions in pollutants are possible through the use of alternative fuels such as liquefied natural gas (LNG). Natural gas is mostly methane and has been treated to remove sulfur compounds and particulates. According to *LNG Use for Washington State Ferries*, prepared for Washington State Ferries, 19 March 2010:

> For pure gas propulsion engines NOx emissions reductions will be at least 90 percent and PM and SOx emissions will be reduced nearly 100 percent. CO_2 emissions reductions from pure gas propulsion engines will be approximately 20 percent.

Information published on the World Wide Web by the U.S. Department of Energy - Energy Efficiency and Renewable Energy[5] indicates that LNG semi-trucks operating on a five-mile route achieved: the following reductions as compared to diesel semi-trucks:

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[3] National Transportation Statistics, 2010, rev. July 2011, Table 4-14:Combination Truck Fuel Consumption and Travel, Year 2008 average miles per gallon

[4] Finalization of EPA's requirements for more stringent emission standards for nitrogen oxides, hydrocarbons, and particulate matter from new non-road diesel engines.

- Particulate Matter Reduction — 96 percent
- Non-Methane Hydro-carbon Reduction — 59 percent Less Than Diesel Total Hydro-carbon
- CO Reduction — –263 percent (burn efficiency increases CO)
- NOx Reduction — 80 percent

Based on the literature, the following factors were used to estimate the generation of pollutants for each of the Marine Highway scenarios if LNG were used in the barges instead of diesel fuel:

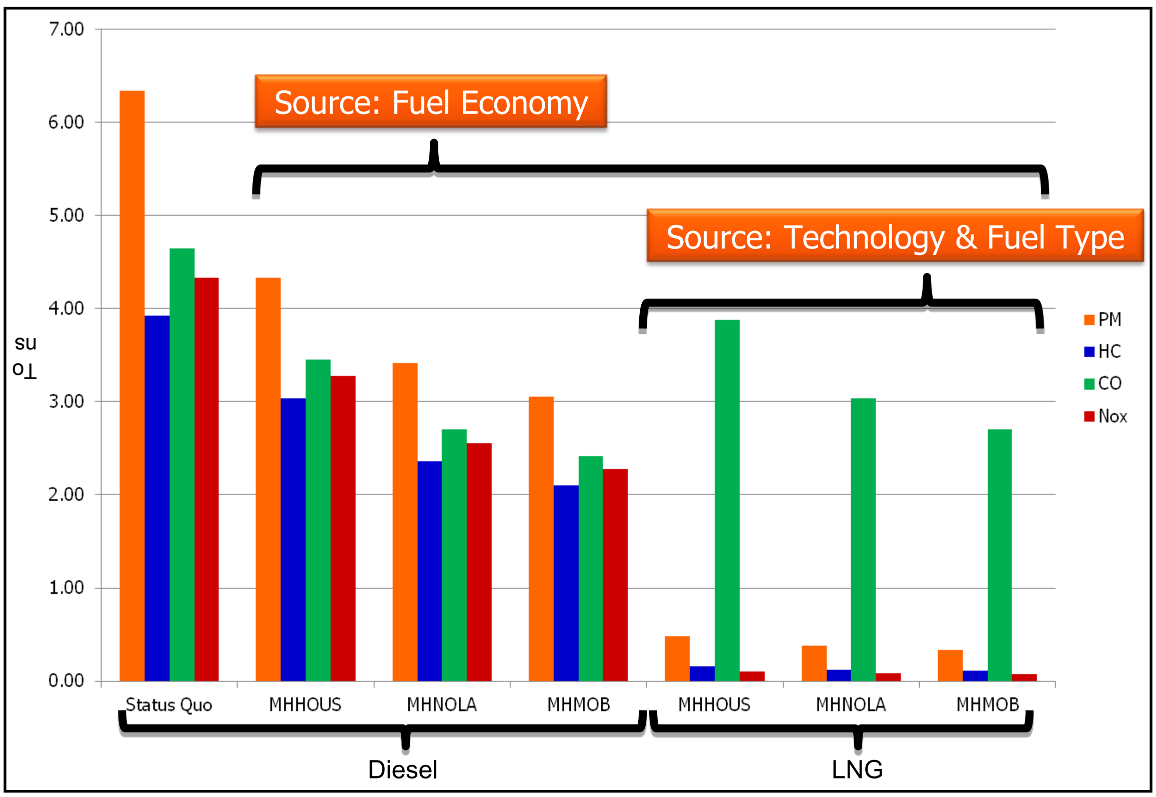
- Particulate Matter — 8.17 grams per MBtu
- Non-Methane Hydro-carbon — 6.21 grams per MBtu
- CO — 188.10 grams per MBtu
- NOx — 0.10 grams per MBtu
- CO_2 — 53,060 grams per MBtu

[5] Alternative Fuels and Advanced Vehicles Data Center: Natural Gas Emissions http://www.afdc.energy.gov/afdc/vehicles/emissions_natural_gas.html

Diesel fuel consumption by the barges was converted to energy consumption in millions of Btu assuming a diesel fuel energy density of 0.1387 MBtu per gallon of diesel.

Compared to the proposed Marine Highway with diesel powered barges the LNG powered barges reduce particulates and non-methane hydro-carbon emissions. Diesel combustion inefficiencies account for the higher particulates and hydro-carbon emissions compared to LNG emissions. Carbon monoxide and carbon dioxide emissions are higher for the LNG scenarios compared to the diesel scenarios due to the greater efficiency of LNG combustion which burns almost all of the available carbon. Appendix J, Table 4 shows the reduction in pollutants in LNG barges compared to diesel barges. Figure 15 is a graph summarizing the emissions impact.

Figure 15: Summary of Emission Impacts



Figures 16, 17, and 18 show the three areas of air pollution non-attainment for the study area.

Figure 16: Mississippi River to Confluence with Ohio River Air Quality

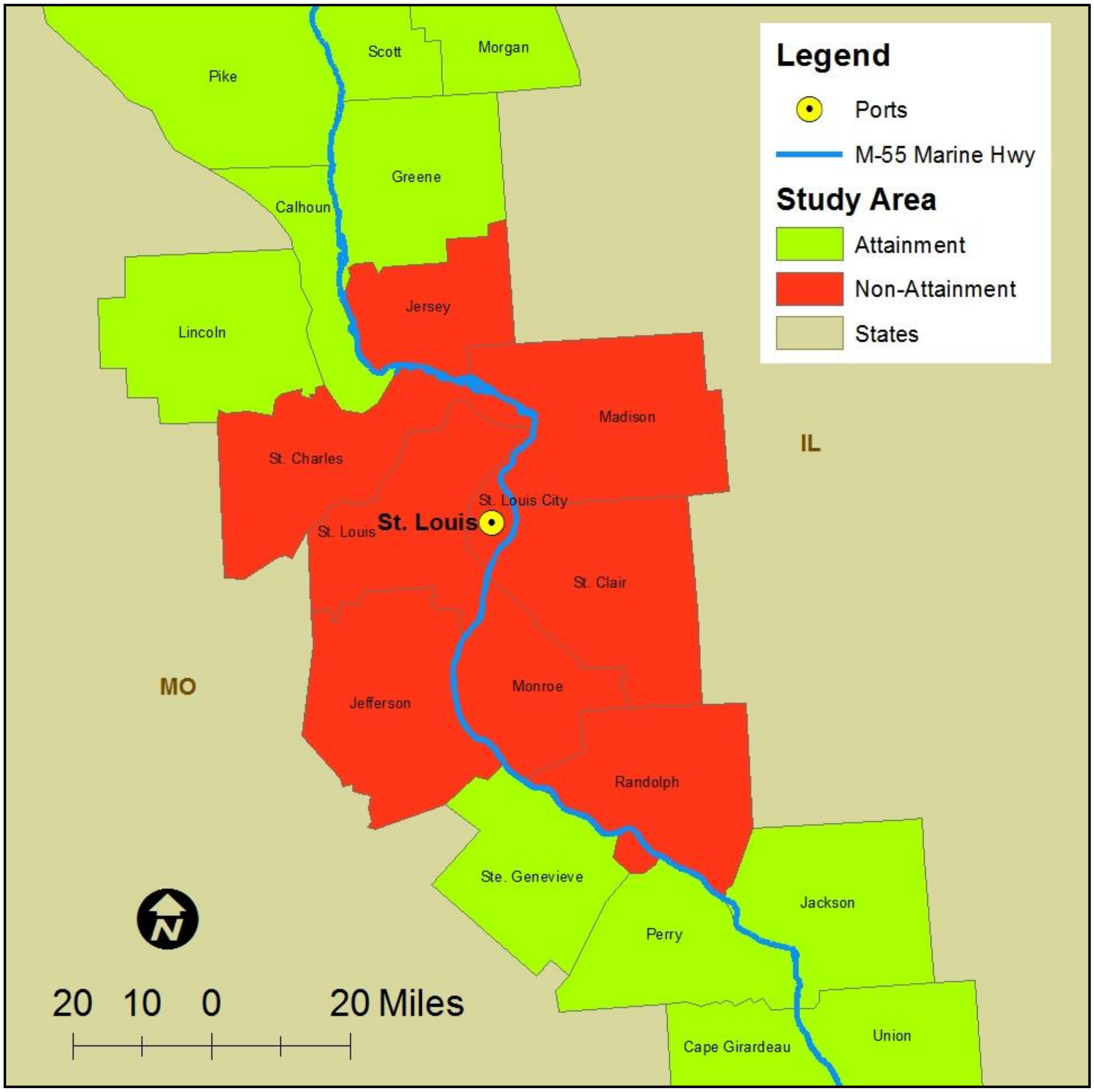


Figure 17: Mississippi River from Memphis to New Orleans Air Quality

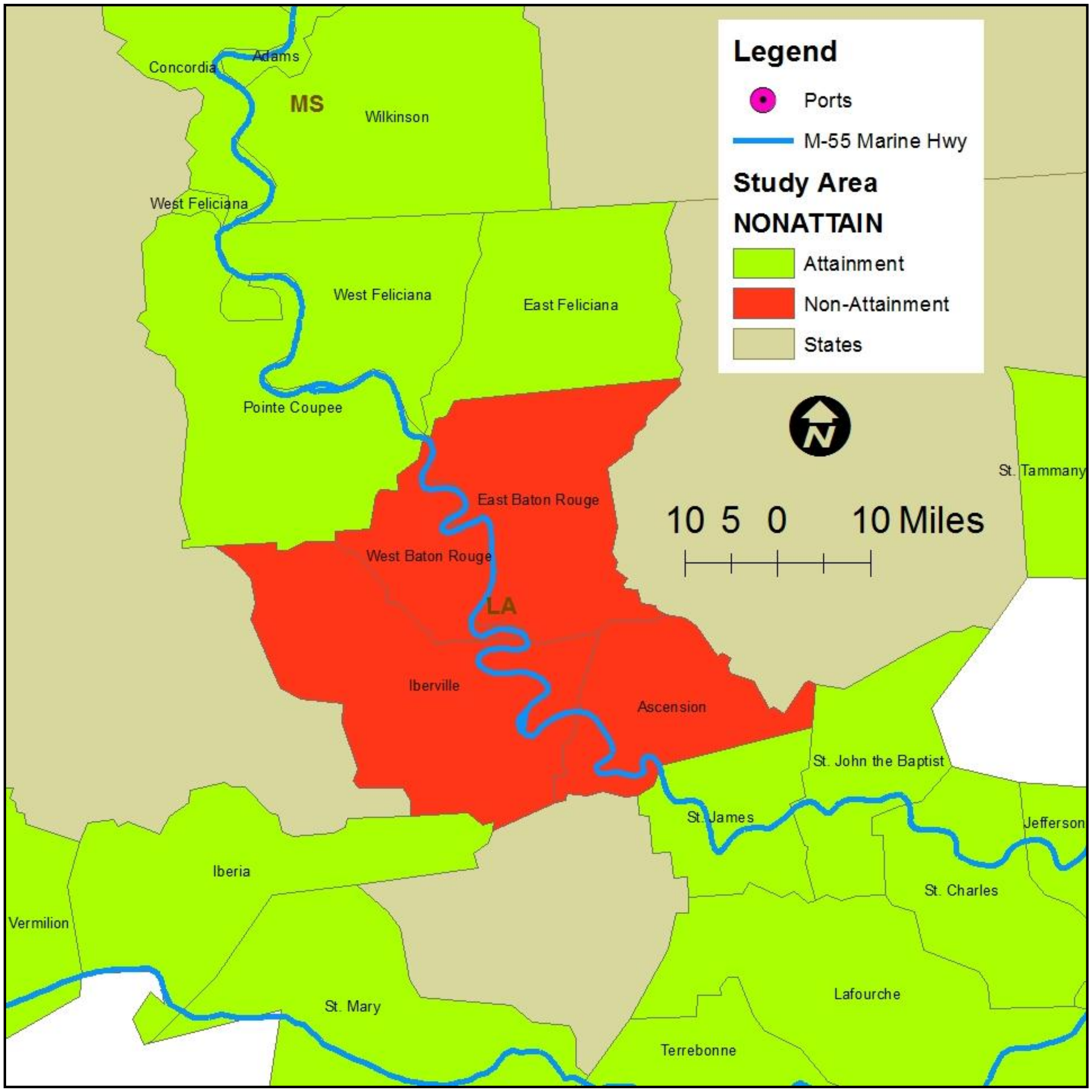
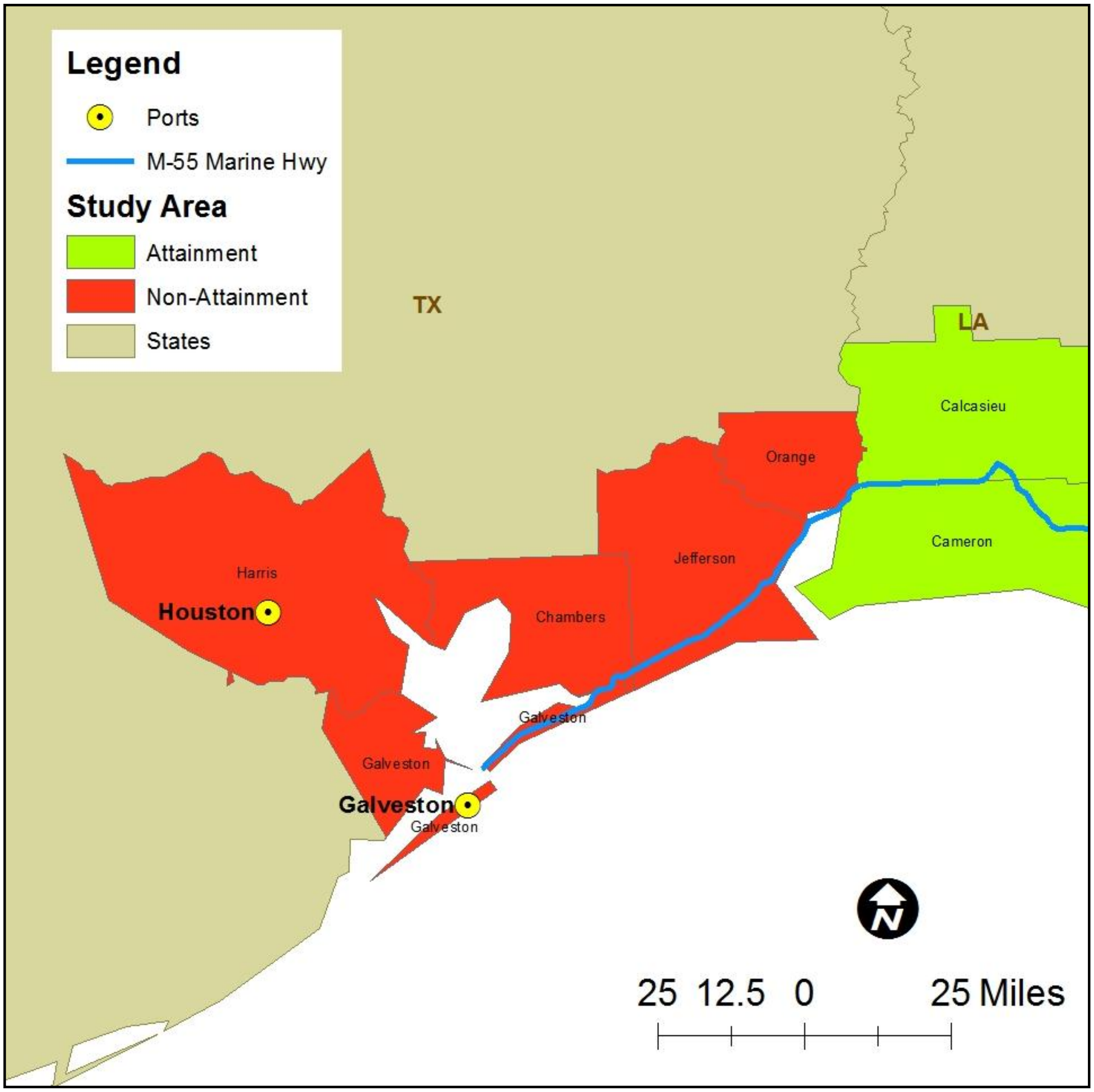


Figure 18: Gulf Coastal Waters Air Quality



Water Quality

Operation of the proposed barge service would appear to have the following potential negative effects on the water quality of the M-55 Marine Highway:

- Spills of fuel and loss of cargo which are mitigated by observing standard care and procedures when loading and unloading fuel and cargo.
- Discharges of sewage and bilge which are mitigated by observing regulations regarding these discharges.
- River bank erosion due to high velocity in shallow water which is mitigated by navigating only in designated shipping channels, observing speed limits and avoiding shallow waters.

Barge traffic potentially affects water quality by fuel leakage, sewage and bilge discharges and bulk storage cargo loss. Direct effects of barge traffic are controlled by proper maintenance, adherence to maritime discharge regulations and avoidance of accidents. Contact with spilled diesel fuel is toxic to most aquatic life forms. Sewage and bilge water may contain toxic constituents, disease organisms, invasive exotic species and high concentrations of nutrients. The effects of bulk storage loss depend on the nature and quantity of the material lost. Loss of bulk stored grain and vegetable oil due to accident or careless handling could contribute to nutrient and solids loadings at the site of the spill. However, these effects would be temporary.

Indirectly, construction activities on port facilities in support of the project potentially could affect water quality. However, the project as proposed does not require expansion of existing port facilities beyond addition of some land-based equipment. Water quality effects due to construction of facilities would likely be temporary and are governed by permitting processes such as CWA Section 404 permitting. The project will not require modifications to existing locks and dams nor require construction of additional locks and dams which would have permanent effects on water quality and habitat for many aquatic species.

Threatened and Endangered Species

This project is similar in environment effect to existing barge traffic. The proposed equipment includes conventional decked or hopper barges and diesel powered tug boats for propulsion and control. It is likely that initially, the equipment will be leased or purchased as used equipment from the existing commercial fleet.

Marine Mammals - The effects of marine engine noise on marine mammals have been well documented. The proposed barge service however, will operate either in freshwater rivers or in shallow coastal water ship channels such as the GIWW between New Orleans, LA and Mobile, AL. Neither of these areas are suitable habitat for the finback whale or the humpback whale. Whereas manatee habitat does exist in areas along the GIWW, manatees are not a problem in the intra-coastal canals and shipping channels due to extirpation of the species. Viable manatee populations are currently restricted to Florida.

Mussels - The primary threats to endangered species of mussels throughout the M-55 IL-Gulf Marine Highway are due to:

- habitat modification due to deforestation, tillage and drainage of wetlands
- hydrologic modification due to channelization and drainage of wetlands
- water quality degradation due to agricultural, mining and urban induced soil erosion and contaminated run-off

A few studies have shown that high-speed pleasure craft in shallow, narrow water bodies may increase stream bank erosion and water turbidity. The applicability of extending these studies to barges on large rivers in water depths exceeding 12 feet is not clear. The proposed barge service does not require construction of new facilities, expansion of existing port facilities, hydrologic modification such as dams and locks or habitat modifications, on-shore or in-stream. No threats to any species of threatened or endangered mussels are directly due to barge operations.

Free-swimming and Other Species - Existing barge traffic on the Mississippi River, Illinois River, Tennessee River, Tombigbee River and the GIWW has not been implicated with direct adverse effects on any of the threatened and endangered species identified in this study.

Construction of barge facilities and barge accidents may have negative temporary local effects on water quality that potentially could harm rare species. However, the proposed project requires only existing facilities, none of which are located in or near critical habitat of any threatened or endangered species listed in this study.

Recommendations and Coordination

Open Issues Requiring Additional Study

Net Positive Air Quality Effects - The air quality calculations and modeling conducted for this report suggest that diverting cargo from highway and rail systems to barges dramatically reduces the consumption of fuel and reduces air emissions, proportional to fuel consumption. This conclusion, however is based on simplifying assumptions especially regarding the per ton-mile consumption of barge fuel. Information regarding the movements of barges is restricted and generally only available to the Army Corps of Engineers. The fuel efficiency of barges was based on data from a model developed by the Tennessee Valley Authority (TVA). It is beyond the scope of this study to validate the TVA model results.

Due to the small number of vehicles, train cars and barges, no attempt was made to adjust fuel consumption and emissions for age and mileage of the fleet. Fuel was assumed to be diesel for all vehicles in the fleet except for the LNG scenario which assumed that the only proposed barges only were retrofit for LNG.

River Bank Erosion by High-speed Traffic - The proposed service does not require barge performance beyond conventional operations as they are currently conducted. However, stream and river bank erosion may contribute to some of the turbidity, siltation and sedimentation which has degraded habitat for numerous threatened and endangered mollusks in the Mississippi, Ohio and Tennessee Rivers.

Additional study would be necessary to determine if conventional barge traffic is negatively affecting river habitats due to wave-action erosion of shorelines.

Coordination among Agencies

If an EIS is determined as a necessary next step for the M-55 project, a list of federal, state, regional, and local agencies that should be involved as participating or cooperating agencies should be developed. A preliminary list of agencies is provided in Table 4. Please see the following paragraphs for a discussion of the definition of cooperating and participating agencies. Note that if the M-55 project was developed as a purely private venture, then an EIS will not be needed.

Cooperating agencies are those agencies that have jurisdiction by law. The United States Department of Transportation NEPA regulations 23 CFR 771.111(d) require that those federal agencies with jurisdiction by law (with permitting or other authority) be invited to be cooperating agencies in the issue which must be addressed. Other agencies with special expertise with respect to any environmental issue, which should be addressed in the EIS, may also be invited. It is noted that state or local agencies with similar qualifications or expertise may also be invited to be cooperating agencies.

Participating agencies are federal and non-federal governmental agencies that may have an interest in the project, and may be formally invited to participate in the environmental review of any project.

Table 4: Lead, Cooperating and Participating Agency Recommendations

Jurisdiction	Agency	Agency Type/Coordination Role	Regulatory Role or Technical Expertise
Federal	U.S. Maritime Administration	Lead Federal Agency	NEPA Compliance
	U.S. Corps of Engineers, District Offices	Cooperating Agency	Navigation/Wetlands/Water Quality
	U.S. Coast Guard	Cooperating Agency	Navigation/Spills/Accidents/Safety
	U. S. Environmental Protection Agency, Regions 4, 5, 6, & 7	Cooperating Agency	NEPA Compliance/Water Quality/Air Quality
	U.S. Fish & Wildlife Service	Participating Agency	Federally Listed Threatened and Endangered Species
	U.S. Federal Highway Administration	Participating Agency	Roadway Traffic and Operations
	U.S. Department of Agriculture	Participating Agency	Grain Production and Shipping?
State	MO Department of Transportation	Joint Lead Agency	
	State Environmental Agencies and Natural Resources Agencies in all nine bordering states	Participating Agency	Water Quality/Air Quality/Threatened and Endangered Species
	State Transportation Agencies in the remaining eight bordering states	Participating Agency	Roadway Traffic and Operations
	State Fish & Game Agencies		
Regional	Regional Planning Commissions in Major Cities along the M-55 Corridor	Participating Agency	Roadway Traffic and Operations, Economic Development
Local	Local Environmental Agencies	Participating Agency	Water Quality/Air Quality
	Port Authorities	Participating	Barge Traffic and Operations

All participating agencies would be invited to participate in the scoping process, if an EIS is determined necessary for the M-55 project.

Plan for Public Involvement and Comments

If an EIS is determined necessary for the M-55 project, the ongoing early and open scoping process that has started with the development of this M-55 study, should be continued with the intent of refining the scope of issues to be addressed and for identifying significant issues related to the proposed action. If a full EIS is to be conducted, a Notice of Intent to the general public to prepare an EIS for the M-55 project should be published by MARAD in the Federal Register to invite public comment. The participation of the cooperating and participating agencies should be formally requested via letter with a copy of this document.

If an EIS is determined necessary for the M-55 project, the scoping process should be used to identify and eliminate from detailed study the issues which are not significant; thus narrowing the discussions of those issues in the statement to a brief presentation of why they will not have a significant effect on the public health or the environment or providing a reference to their coverage elsewhere.

Applicable FHWA regulations (23 CFR 771.111) as supplemented by appropriate Missouri Department of Transportation requirements for agency and public involvement developed pursuant to the aforementioned FHWA regulations should be followed for subsequent public involvement.

The aforementioned regulations call for one or more public hearings. It is recommended that multiple public hearings be held on the Draft EIS based on the length and breadth of the area affected by the M-55 Marine Highway service. Because the proposed alternative is anticipated to have minimal negative environmental impacts, public scoping meetings are not recommended. Recommended locations for public hearings on the draft EIS are noted below. These locations should be considered tentative until the initial scoping process is completed as comments received may indicate special interests in areas not well served by the noted locations:

- Peoria, Illinois.
- St. Louis, Missouri.
- Galveston, Texas.
- New Orleans, Louisiana.
- Mobile, Alabama.

It is also recommended that a public relations consultant be retained to assist with the implementation of public involvement activities. This consultant would handle the logistics of local public notice and the planning and conducting of public meetings for seeking input on the draft EIS.

A coordination plan should be developed to inform the public and other agencies of how agency coordination will be accomplished if an M-55 Marine Highway EIS is to be conducted. The Coordination Plan will define the schedule and method communication of information among the lead agencies about the EIS to the cooperating and participating agencies and the public. The goal of the coordination plan is to expedite and improve the environmental review process. The plan should include the following:

- Identification of early coordination efforts;
- Identification of cooperating and participating agencies;
- Establishment of the schedule and form for agency involvement in reviewing NEPA documents;
- Establishment of the schedule for public opportunities to provide issues of concern and environmental features, and commenting on the findings of the Draft EIS; and,
- Describe the communication methods that will be used to inform the affected community about the project.

Appendix L

Counties Adjacent To M-55 Marine Highway

State Name	County Name	Total Area in Acres	1997 Crop Area in Acres	Percent 1997 Crop Area
Alabama	Baldwin	1,066,901	117,013	10.97%
Alabama	Choctaw	600,149	16,417	2.74%
Alabama	Clarke	802,623	16,827	2.10%
Alabama	Colbert	402,604	69,533	17.27%
Alabama	Greene	438,093	47,061	10.74%
Alabama	Lauderdale	472,607	133,791	28.31%
Alabama	Marengo	626,624	68,134	10.87%
Alabama	Mobile	811,512	60,665	7.48%
Alabama	Pickens	574,358	45,344	7.89%
Alabama	Sumter	585,849	59,247	10.11%
Alabama	Washington	703,857	25,940	3.69%
Arkansas	Chicot	429,070	253,709	59.13%
Arkansas	Crittenden	409,494	304,202	74.29%
Arkansas	Desha	504,675	257,230	50.97%
Arkansas	Lee	397,823	262,839	66.07%
Arkansas	Mississippi	586,759	480,157	81.83%
Arkansas	Phillips	452,408	345,592	76.39%
Illinois	Alexander	159,472	57,646	36.15%
Illinois	Brown	198,185	100,763	50.84%
Illinois	Calhoun	180,399	59,123	32.77%
Illinois	Cass	243,398	160,247	65.84%
Illinois	Fulton	561,990	318,763	56.72%
Illinois	Greene	355,528	261,055	73.43%
Illinois	Jackson	388,754	160,556	41.30%
Illinois	Jersey	241,222	130,642	54.16%
Illinois	Madison	464,872	247,524	53.25%
Illinois	Mason	365,667	264,417	72.31%
Illinois	Massac	165,980	84,491	50.90%
Illinois	Monroe	254,380	154,216	60.62%
Illinois	Morgan	365,983	266,939	72.94%
Illinois	Peoria	402,906	224,387	55.69%
Illinois	Pike	554,656	341,546	61.58%
Illinois	Pulaski	136,509	70,547	51.68%
Illinois	Randolph	379,948	208,421	54.86%
Illinois	Schuyler	282,571	144,407	51.10%

State Name	County Name	Total Area in Acres	1997 Crop Area in Acres	Percent 1997 Crop Area
Illinois	Scott	162,757	117,428	72.15%
Illinois	St. Clair	426,062	239,008	56.10%
Illinois	Tazewell	415,245	305,386	73.54%
Illinois	Union	272,260	95,473	35.07%
Kentucky	Ballard	164,396	95,703	58.21%
Kentucky	Calloway	278,193	116,986	42.05%
Kentucky	Carlisle	124,680	74,451	59.71%
Kentucky	Fulton	148,107	83,371	56.29%
Kentucky	Hickman	168,211	101,066	60.08%
Kentucky	Livingston	212,218	74,462	35.09%
Kentucky	Lyon	164,160	33,011	20.11%
Kentucky	Marshall	207,614	62,116	29.92%
Kentucky	McCracken	165,610	54,556	32.94%
Kentucky	Trigg	313,712	81,472	25.97%
Louisiana	Ascension	198,196	32,000	16.15%
Louisiana	Calcasieu	697,235	140,044	20.09%
Louisiana	Cameron	1,026,781	74,744	7.28%
Louisiana	Concordia	473,428	220,676	46.61%
Louisiana	East Baton Rouge	297,882	31,903	10.71%
Louisiana	East Carroll	279,866	186,054	66.48%
Louisiana	East Feliciana	289,728	39,773	13.73%
Louisiana	Iberia	402,509	89,639	22.27%
Louisiana	Iberville	413,814	70,924	17.14%
Louisiana	Jefferson	215,585	1,815	0.84%
Louisiana	Lafourche	767,623	69,402	9.04%
Louisiana	Madison	401,447	237,053	59.05%
Louisiana	Orleans	136,907	23	0.02%
Louisiana	Plaquemines	714,011	4,523	0.63%
Louisiana	Pointe Coupee	381,930	159,762	41.83%
Louisiana	St. Bernard	268,976	1,568	0.58%
Louisiana	St. Charles	238,805	8,646	3.62%
Louisiana	St. James	159,145	40,417	25.40%
Louisiana	St. John the Baptist	196,200	6,264	3.19%
Louisiana	St. Mary	436,441	65,199	14.94%
Louisiana	St. Tammany	544,322	16,559	3.04%
Louisiana	Tensas	415,940	196,731	47.30%
Louisiana	Terrebonne	857,626	30,956	3.61%
Louisiana	Vermilion	836,300	256,064	30.62%

State Name	County Name	Total Area in Acres	1997 Crop Area in Acres	Percent 1997 Crop Area
Louisiana	West Baton Rouge	126,943	22,370	17.62%
Louisiana	West Feliciana	270,459	23,798	8.80%
Mississippi	Adams	298,440	29,283	9.81%
Mississippi	Bolivar	574,688	416,300	72.44%
Mississippi	Claiborne	309,994	29,031	9.37%
Mississippi	Clay	263,360	60,829	23.10%
Mississippi	Coahoma	380,251	251,754	66.21%
Mississippi	DeSoto	319,774	103,087	32.24%
Mississippi	Hancock	306,684	16,576	5.40%
Mississippi	Harrison	380,003	7,827	2.06%
Mississippi	Issaquena	280,873	96,279	34.28%
Mississippi	Itawamba	344,083	36,786	10.69%
Mississippi	Jackson	455,025	15,020	3.30%
Mississippi	Jefferson	337,792	25,427	7.53%
Mississippi	Lowndes	325,669	70,737	21.72%
Mississippi	Monroe	496,638	100,120	20.16%
Mississippi	Noxubee	449,081	100,043	22.28%
Mississippi	Prentiss	268,174	51,020	19.02%
Mississippi	Tishomingo	280,230	17,204	6.14%
Mississippi	Tunica	299,153	185,374	61.97%
Mississippi	Warren	408,737	51,195	12.53%
Mississippi	Washington	485,941	308,367	63.46%
Mississippi	Wilkinson	447,503	37,911	8.47%
Missouri	Cape Girardeau	377,914	196,914	52.11%
Missouri	Jefferson	419,355	56,789	13.54%
Missouri	Lincoln	410,435	187,747	45.74%
Missouri	Mississippi	285,468	254,735	89.23%
Missouri	New Madrid	446,694	375,046	83.96%
Missouri	Pemiscot	334,649	290,872	86.92%
Missouri	Perry	306,116	130,782	42.72%
Missouri	Scott	275,597	222,943	80.89%
Missouri	St. Charles	377,019	147,957	39.24%
Missouri	St. Louis	336,273	31,010	9.22%
Missouri	St. Louis City	46,095	0	0.00%
Missouri	Ste. Genevieve	319,712	85,740	26.82%
Tennessee	Benton	273,072	35,802	13.11%
Tennessee	Decatur	226,139	41,682	18.43%
Tennessee	Dyer	337,780	217,310	64.33%

State Name	County Name	Total Area in Acres	1997 Crop Area in Acres	Percent 1997 Crop Area
Tennessee	Hardin	380,081	64,906	17.08%
Tennessee	Henry	375,064	118,196	31.51%
Tennessee	Houston	132,132	23,794	18.01%
Tennessee	Humphreys	357,440	56,319	15.76%
Tennessee	Lake	124,655	85,556	68.63%
Tennessee	Lauderdale	320,163	160,746	50.21%
Tennessee	Perry	264,128	21,484	8.13%
Tennessee	Shelby	505,906	97,757	19.32%
Tennessee	Stewart	320,297	25,893	8.08%
Tennessee	Tipton	283,182	149,220	52.69%
Tennessee	Wayne	473,106	59,977	12.68%
Texas	Chambers	398,860	118,316	29.66%
Texas	Galveston	261,784	30,285	11.57%
Texas	Harris	1,115,157	118,827	10.66%
Texas	Jefferson	620,311	180,719	29.13%
Texas	Orange	233,484	25,669	10.99%
	TOTALS	**48,489,308**	**15,003,950**	**30.94%**

Appendix M

303(d) Listed Impaired Waters of M-55 Marine Highway

Watershed Boundary Dataset 12 Digit Hydrologic Unit Code	State	Detailed Cause of Impairment
031601010205	MS	Biological Impairment
031601010205	MS	Pathogens
031601010305	MS	Biological Impairment
031601010305	MS	Pathogens
031601010402	MS	Biological Impairment
031601010402	MS	Pathogens
031601011001	MS	Biological Impairment
031601011204	MS	Biological Impairment
031601011204	MS	Pathogens
031601011302	MS	Biological Impairment
031601011403	MS	Biological Impairment
031601011406	MS	Cause Unknown
031601060307	MS	Biological Impairment
031601060308	MS	Biological Impairment
031601060308	MS	Pathogens
031601060502	AL	Carbonaceous BOD
031601060502	AL	Nitrogenous BOD
031601060705	AL	Carbonaceous BOD
031601060705	AL	Nitrogenous BOD
031601060705	AL	Phosphorus, Total
031601070306	AL	Iron
031602010905	AL	Fecal Coliform
031602030903	AL	Mercury
031602031103	AL	Carbonaceous BOD
031602031103	AL	DDT
031602031103	AL	Mercury
031602031103	AL	Nitrogenous BOD
031602040106	AL	Mercury
031602040504	AL	Chlordane
031602040504	AL	Fecal Coliform
031602040505	AL	Mercury
051402060102	IL	Mercury
051402060102	IL	Polychlorinated Biphenyls (PCBs)
051402060702	IL	Cause Unknown
051402060702	KY	Cause Unknown

Watershed Boundary Dataset 12 Digit Hydrologic Unit Code	State	Detailed Cause of Impairment
051402060702	IL	Mercury
051402060702	IL	Polychlorinated Biphenyls (PCBs)
071100090401	IL	Manganese
071100090401	IL	Mercury
071100090401	IL	Polychlorinated Biphenyls (PCBs)
071100090402	IL	Copper
071100090402	IL	Fecal Coliform
071100090402	IL	Habitat Alterations
071100090402	IL	Manganese
071100090402	IL	Phosphorus, Total
071100090402	IL	Sedimentation/Siltation
071100090402	IL	Total Dissolved Solids (TDS)
071100090402	IL	Total Suspended Solids (TSS)
071100090403	MO	Bacteria
071100090403	IL	Copper
071100090403	IL	Dissolved Oxygen
071100090403	IL	Habitat Alterations
071100090403	IL	Sedimentation/Siltation
071401010401	MO	Chloride
071401010401	IL	Habitat Alterations
071401010401	IL	Priority Organics Compounds
071401010401	IL	Sedimentation/Siltation
071401010401	IL	Total Suspended Solids (TSS)
071401010403	IL	Dissolved Oxygen
071401010403	IL	Fecal Coliform
071401010403	IL	Habitat Alterations
071401010403	IL	Manganese
071401010403	IL	Nitrogen, Total
071401010403	IL	Phosphorus, Total
071401010403	IL	Sedimentation/Siltation
071401010904	IL	Barium
071401010904	IL	Habitat Alterations
071401010910	MO	Lead
071401010910	IL	Manganese
071401010910	IL	Polychlorinated Biphenyls (PCBs)
071401010910	MO	Zinc
071401050804	IL	Atrazine
071401050804	IL	Dissolved Oxygen

Watershed Boundary Dataset 12 Digit Hydrologic Unit Code	State	Detailed Cause of Impairment
071401050804	IL	Fecal Coliform
071401050804	IL	Manganese
071401050804	IL	pH
071401050804	IL	Phosphorus, Total
071401050804	IL	Polychlorinated Biphenyls (PCBs)
071401050804	IL	Sedimentation/Siltation
071401050804	IL	Sulfates
071401050804	IL	Total Suspended Solids (TSS)
071401061205	IL	Dissolved Oxygen
071401061205	IL	Manganese
071401061205	IL	pH
071401061205	IL	Sedimentation/Siltation
071401061205	IL	Sulfates
071401061205	IL	Total Suspended Solids (TSS)
071401080304	IL	Habitat Alterations
071401080304	IL	Sedimentation/Siltation
071401080304	IL	Total Suspended Solids (TSS)
080101000103	MO	Mercury in Fish Tissue
080101000301	TN	Chlordane
080101000301	TN	Dioxins
080101000301	TN	Physical Substrate Habitat Alterations
080101000301	TN	Polychlorinated Biphenyls (PCBs)
080101000501	TN	Escherichia Coli (E. Coli)
080101000501	TN	Nitrate/Nitrite
080101000501	TN	Sedimentation/Siltation
080101000502	MO	Mercury in Fish Tissue
080101000503	TN	Chlordane
080101000503	TN	Dioxins
080101000503	TN	Physical Substrate Habitat Alterations
080101000503	TN	Polychlorinated Biphenyls (PCBs)
080101000604	TN	Chlordane
080101000604	TN	Dioxins
080101000604	TN	Physical Substrate Habitat Alterations
080101000604	TN	Polychlorinated Biphenyls (PCBs)
080101000702	TN	Chlordane
080101000702	TN	Dioxins
080101000702	TN	Physical Substrate Habitat Alterations
080101000702	TN	Polychlorinated Biphenyls (PCBs)

Watershed Boundary Dataset 12 Digit Hydrologic Unit Code	State	Detailed Cause of Impairment
080101000703	TN	Chlordane
080101000703	TN	Dioxins
080101000703	TN	Dissolved Oxygen
080101000703	TN	Escherichia Coli (E. Coli)
080101000703	TN	Mercury
080101000703	TN	Nitrate/Nitrite
080101000703	TN	Polychlorinated Biphenyls (PCBs)
080101000703	TN	Sedimentation/Siltation
080101000704	TN	Chlordane
080101000704	TN	Dioxins
080101000704	TN	Mercury
080101000704	TN	Physical Substrate Habitat Alterations
080101000704	TN	Polychlorinated Biphenyls (PCBs)
080201000300	MS	Mercury
080301000300	MS	Nutrients
080301000300	MS	Pesticides
080301000300	MS	Sedimentation/Siltation
080601000300	MS	Nutrients
080601000300	MS	Organic Enrichment/Low Dissolved Oxygen
080601000300	MS	Pesticides
080601000300	MS	Sedimentation/Siltation
080601000600	MS	Nutrients
080601000600	MS	Organic Enrichment/Low Dissolved Oxygen
080601000600	MS	Pesticides
080601000600	MS	Sedimentation/Siltation
080602021104	MS	Pesticides
080602021104	MS	Sedimentation/Siltation
080802021001	LA	Mercury
080802060103	LA	Turbidity
080902030302	LA	Dissolved Oxygen
080902030302	LA	Total and Fecal Coliform
080903010308	LA	Dissolved Oxygen
080903010308	LA	Nutrients
080903010308	LA	Total and Fecal Coliform
080903020102	LA	Dissolved Oxygen
080903020102	LA	pH
080903020208	LA	Dissolved Oxygen
080903020208	LA	Nitrite/Nitrate

Watershed Boundary Dataset 12 Digit Hydrologic Unit Code	State	Detailed Cause of Impairment
080903020208	LA	Phosphorus, Total
080903020501	LA	Dissolved Oxygen
080903020501	LA	Nitrite/Nitrate
080903020501	LA	Phosphorus, Total
080903020501	LA	Total and Fecal Coliform
080903020504	LA	Dissolved Oxygen
080903020504	LA	Nutrients
080903020601	LA	Dissolved Oxygen
080903020601	LA	Nitrite/Nitrate
080903020601	LA	Phosphorus, Total
120100051100	TX	Bacteria
120100051100	TX	Dissolved Oxygen
120100051100	TX	pH, Low
120402020400	TX	Bacteria

Appendix N

Air Pollution Non-Attainment Areas within the Study Area

County	Area Name	Pollutant
Jersey Co, IL	St. Louis, MO-IL	8-Hr Ozone
Madison Co, IL	St .Louis, MO-IL	8-Hr Ozone, PM-2.5 1997
Madison Co, IL	Granite City, IL	Lead 2008
Monroe Co, IL	St. Louis, MO-IL	8-Hr Ozone, PM-2.5 1997
Randolph Co, IL	St. Louis, MO-IL	PM-2.5 1997
St Clair Co, IL	St. Louis, MO-IL	8-Hr Ozone, PM-2.5 1997
Ascension Par, LA	Baton Rouge, LA	1-Hr Ozone, 8-Hr Ozone
East Baton Rouge Par, LA	Baton Rouge, LA	1-Hr Ozone, 8-Hr Ozone
Iberville Par, LA	Baton Rouge, LA	1-Hr Ozone, 8-Hr Ozone
West Baton Rouge Par, LA	Baton Rouge, LA	1-Hr Ozone, 8-Hr Ozone
Jefferson Co, MO	St Louis, MO-IL	8-Hr Ozone, PM-2.5 1997
Jefferson Co, MO	Jefferson County (part); Herculaneum, MO	Lead
Jefferson Co, MO	Jefferson County, MO	Lead 2008
St Charles Co, MO	St. Louis, MO-IL	8-Hr Ozone, PM-2.5 1997
St Louis Co, MO	St. Louis, MO-IL	8-Hr Ozone, PM-2.5 1997
St Louis, MO	St. Louis, MO-IL	8-Hr Ozone, PM-2.5 1997
Chambers Co, TX	Houston-Galveston-Brazoria, TX	1-Hr Ozone, 8-Hr Ozone
Galveston Co, TX	Houston-Galveston-Brazoria, TX	1-Hr Ozone, 8-Hr Ozone
Harris Co, TX	Houston-Galveston-Brazoria, TX	1-Hr Ozone, 8-Hr Ozone
Jefferson Co, TX	Beaumont-Port Arthur, TX	1-Hr Ozone
Orange Co, TX	Beaumont-Port Arthur, TX	1-Hr Ozone

Appendix O

Illinois River to Confluence with Mississippi River Threatened and Endangered Species

Scientific Name	Common Name	Status
Boltonia decurrens	Decurrent False Aster	Threatened
Cumberlandia monodonta	Spectaclecase	Proposed Endangered
Hymenoxys herbacea	Lakeside Daisy	Threatened
Lampsilis higginsii	Higgins Eye	Endangered
Lespedeza leptostachya	Prairie Bush-Clover	Threatened
Myotis grisescens	Gray Bat	Endangered
Myotis sodalis	Indiana Bat	Endangered
Platanthera leucophaea	Eastern Prairie Fringed Orchid	Threatened
Plethobasus cyphyus	Sheepnose Mussel	Proposed Endangered
Apios priceana	Price's Potato-Bean	Threatened

Between 1945 and 1976, the acreage in row crop production increased 60 percent. Increases in land available for agricultural use were made by converting and draining wetlands, planting stream banks and stream channelization.

Based on Bureau of Census 2010 housing unit counts, 98.7 percent of the area of counties bordering the Illinois River downstream of Peoria averages fewer than one housing unit per acre. Suburban housing densities generally range from two to ten units per acre. In general, the reach of the Illinois River watershed downstream of Peoria is dominated by agriculture. Corn and soybeans are the primary crops in the lower Illinois River basin. Secondary farm products include winter wheat, oats, hay, vegetables, cattle, hogs, dairy products, poultry, sheep and wool.

Approximately 68 percent of the watershed, by area, is agricultural. Water, wetlands and upland forest are approximately 21 percent of the watershed area. Other land cover categories, including urban, represent the remaining 11 percent. Point source discharges include municipal or industrial wastewater treatment plants, urban storm water, and livestock facilities. Potential non-point sources include agriculture land practices (e.g., pasture management and crop-related sources), land disposal of human and animal waste, septic drain fields, bank or shoreline modification and destabilization, habitat modification, urban runoff, storm water and waterfowl.

Peoria urban area storm water is efficiently conveyed to the Illinois River through numerous storm water outfalls. Storm water also enters the combined sewer system, causing occasional discharge of untreated domestic wastewater to the Illinois River through combined sewer overflow (CSO). In addition, pollutants associated with runoff from agricultural areas have the potential to be carried to the Illinois River and its tributaries during rain and snowmelt events.

The 303(d) reports that swimming is impaired by fecal coliform and fishing for food is impaired by presence of mercury and PCB in reaches of the Illinois River above and below Peoria. Positive tests for fecal coliform are cited by the 303(d) report as evidence of contamination by CSO. The 303(d) report states that the Peoria combined system overflows, on average, 28 times per year.

Appendix P

Mississippi River from Confluence with Illinois River to Confluence with Ohio River Threatened and Endangered Species

Scientific Name	Common Name	Status
Asclepias meadii	Mead's Milkweed	Threatened
Boltonia decurrens	Decurrent False Aster	Threatened
Cottus sp.	Grotto Sculpin	Candidate
Cumberlandia monodonta	Spectaclecase	Proposed Endangered
Epioblasma triquetra	Snuffbox Mussel	Proposed Endangered
Gammarus acherondytes	Illinois Cave Amphipod	Endangered
Isotria medeoloides	Small Whorled Pogonia	Threatened
Lampsilis abrupta	Pink Mucket	Endangered
Leptodea leptodon	Scaleshell mussel	Endangered
Myotis grisescens	Gray Bat	Endangered
Myotis sodalis	Indiana Bat	Endangered
Platanthera leucophaea	Eastern Prairie Fringed Orchid	Threatened
Plethobasus cyphyus	Sheepnose Mussel	Proposed Endangered
Scaphirhynchus albus	Pallid Sturgeon	Endangered
Sistrurus catenatus	Eastern Massasauga	Candidate
Sterna antillarum	Least Tern	Endangered
Trifolium stoloniferum	Running Buffalo Clover	Endangered
Apios priceana	Price's Potato-Bean	Threatened
Potamilus capax	Fat Pocketbook	Endangered

Appendix Q

Mississippi River from Ohio River to Memphis Threatened and Endangered Species

Scientific Name	Common Name	Status
Boltonia decurrens	Decurrent False Aster	Threatened
Charadrius melodus	Piping Plover	Threatened
Etheostoma chienense	Relict Darter	Endangered
Lampsilis abrupta	Pink Mucket	Endangered
Myotis sodalis	Indiana Bat	Endangered
Plethobasus cooperianus	Orangefoot Pimpleback	Endangered
Potamilus capax	Fat Pocketbook	Endangered
Scaphirhynchus albus	Pallid Sturgeon	Endangered
Sterna antillarum	Least Tern	Endangered
Epioblasma florentina walkeri	Tan Riffleshell	Endangered
Epioblasma metastriata	Upland Combshell	Endangered
Epioblasma othcaloogensis	Southern Acornshell	Endangered
Epioblasma torulosa gubernaculum	Green Blossom	Endangered
Noturus stanauli	Pygmy Madtom	Endangered
Pleurobema gibberum	Cumberland Pigtoe	Endangered
Pyrgulopsis ogmorhaphe	Royal Marstonia snail	Endangered
Quadrula cylindrica strigillata	Rough Rabbitsfoot	Endangered

Appendix R

Mississippi River from Memphis to New Orleans Threatened and Endangered Species

Scientific Name	Common Name	Status
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Threatened
Anthus spragueii	Sprague's Pipit	Candidate
Campephilus principalis	Ivory-Billed Woodpecker	Endangered
Caretta caretta	Loggerhead Sea Turtle	Threatened
Charadrius melodus	Piping Plover	Threatened
Chelonia mydas	Green Sea Turtle	Threatened
Dermochelys coriacea	Leatherback Sea Turtle	Endangered
Eretmochelys imbricate	Hawksbill Sea Turtle	Endangered
Etheostoma rubrum	Bayou Darter	Threatened
Lepidochelys kempii	Kemp's Ridley Sea Turtle	Endangered
Lindera melissifolia	Pondberry	Endangered
Picoides borealis	Red-Cockaded Woodpecker	Endangered
Potamilus capax	Fat Pocketbook	Endangered
Potamilus inflatus	Alabama Heelsplitter	Threatened
Quadrula cylindrica cylindrical	Rabbitsfoot	Candidate
Scaphirhynchus albus	Pallid Sturgeon	Endangered
Sterna antillarum	Least Tern	Endangered
Trichechus manatus	West Indian Manatee	Endangered
Ursus americanus luteolus	Louisiana Black Bear	Threatened
Alasmidonta atropurpurea	Cumberland Elktoe	Endangered
Epioblasma metastriata	Upland Combshell	Endangered
Epioblasma othcaloogensis	Southern Acornshell	Endangered
Epioblasma torulosa gubernaculum	Green Blossom	Endangered
Epioblasma torulosa torulosa	Tubercled Blossom	Endangered
Noturus stanauli	Pygmy Madtom	Endangered
Pleurobema gibberum	Cumberland Pigtoe	Endangered
Pristis pectinata	Smalltooth Sawfish	Endangered
Quadrula stapes	Stirrupshell	Endangered
Quadrula cylindrica strigillata	Rough Rabbitsfoot	Endangered
Sarracenia oreophila	Green Pitcher-Plant	Endangered

Agriculture in the form of row crops averages 34.52 percent of total area, which is not as intense along this section of the Mississippi River as the section between the Ohio River and Memphis (average 65.33 percent) or the Mississippi River between the Illinois and Ohio Rivers (average 42.63 percent). Approximately 64.89 percent of this reach is identified as impaired.

Appendix S

Gulf Coastal Waters Threatened and Endangered Species

Scientific Name	Common Name	Status
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Threatened
Anthus spragueii	Sprague's Pipit	Candidate
Caretta caretta	Loggerhead Sea Turtle	Threatened
Charadrius melodus	Piping Plover	Threatened
Chelonia mydas	Green Sea Turtle	Threatened
Dermochelys coriacea	Leatherback Sea Turtle	Endangered
Drymarchon corais couperi	Eastern Indigo Snake	Threatened
Eretmochelys imbricata	Hawksbill Sea Turtle	Endangered
Gopherus polyphemus	Gopher Tortoise	Threatened
Graptemys flavimaculata	Yellow-Blotched Map Turtle	Threatened
Graptemys oculifera	Ringed Map Turtle	Threatened
Grus canadensis pulla	Mississippi Sandhill Crane	Endangered
Hymenoxys texena	Texas Prairie Dawn-Flower	Endangered
Isoetes louisianensis	Louisiana Quillwort	Endangered
Lepidochelys kempii	Kemp's Ridley Sea Turtle	Endangered
Mycteria americana	Wood Stork	Endangered
Numenius borealis	Eskimo Curlew	Endangered
Percina aurora	Pearl Darter	Candidate
Peromyscus polionotus ammobates	Alabama Beach Mouse	Endangered
Peromyscus polionotus trissyllepsis	Perdido Key Beach Mouse	Endangered
Picoides borealis	Red-Cockaded Woodpecker	Endangered
Pituophis melanoleucus lodingi	Black Pine Snake	Candidate
Pleurobema decisum	Southern Clubshell	Endangered
Potamilus inflatus	Alabama Heelsplitter	Threatened
Pseudemys alabamensis	Alabama Red-Belly Turtle	Endangered
Rana capito sevosa	Mississippi Gopher Frog	Endangered
Scaphirhynchus albus	Pallid Sturgeon	Endangered
Scaphirhynchus suttkusi	Alabama Sturgeon	Endangered
Schwalbea americana	American Chaffseed	Endangered
Trichechus manatus	West Indian Manatee	Endangered
Tympanuchus cupido attwateri	Attwater's Greater Prairie-Chicken	Endangered
Ursus americanus luteolus	Louisiana Black Bear	Threatened
Balaenoptera physalus	Finback Whale	Endangered
Quadrula stapes	Stirrupshell	Endangered

Appendix T

Ohio, Tennessee and Tombigbee Rivers Waterway Threatened and Endangered Species

Scientific Name	Common Name	Status
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Threatened
Apios priceana	Price's Potato-Bean	Threatened
Athearnia anthonyi	Anthony's Riversnail	Experimental Population, Non-Essential
Conradilla caelata	Birdwing Pearlymussel	Endangered
Cumberlandia monodonta	Spectaclecase	Proposed Endangered
Cyprogenia stegaria	Fanshell	Endangered
Dalea foliosa	Leafy Prairie-Clover	Endangered
Dromus dromas	Dromedary Pearlymussel	Endangered
Drymarchon corais couperi	Eastern Indigo Snake	Threatened
Epioblasma brevidens	Cumberlandian Combshell	Endangered
Epioblasma capsaeformis	Oyster Mussel	Experimental Population, Non-Essential
Epioblasma florentina florentina	Yellow Blossom	Endangered
Epioblasma penita	Southern Combshell	Endangered
Epioblasma torulosa torulosa	Tubercled Blossom	Endangered
Epioblasma turgidula	Turgid Blossom	Experimental Population, Non-Essential
Erimonax monachus	Spotfin Chub	Threatened
Etheostoma boschungi	Slackwater Darter	Threatened
Fusconaia cor	Shiny Pigtoe	Experimental Population, Non-Essential
Fusconaia cuneolus	Finerayed Pigtoe	Experimental Population, Non-Essential
Gopherus polyphemus	Gopher Tortoise	Threatened
Hemistena lata	Cracking Pearlymussel	Endangered
Lampsilis abrupta	Pink Mucket	Endangered
Lampsilis perovalis	Orangenacre Mucket	Threatened
Lampsilis virescens	Alabama Lampmussel	Experimental Population, Non-Essential
Lesquerella lyrata	Lyrate Bladderpod	Threatened
Lexingtonia dolabelloides	Slabside Pearlymussel	Candidate
Medionidus acutissimus	Alabama Moccasinshell	Threatened
Mycteria americana	Wood Stork	Endangered
Myotis grisescens	Gray Bat	Endangered
Myotis sodalis	Indiana Bat	Endangered
Neonympha mitchellii mitchellii	Mitchell's Satyr Butterfly	Endangered
Obovaria retusa	Ring Pink	Endangered
Pegias fabula	Littlewing Pearlymussel	Endangered
Picoides borealis	Red-Cockaded Woodpecker	Endangered

Scientific Name	Common Name	Status
Pituophis melanoleucus lodingi	Black Pine Snake	Candidate
Platanthera integrilabia	White Fringeless Orchid	Candidate
Plethobasus cicatricosus	White Wartyback	Endangered
Plethobasus cooperianus	Orangefoot Pimpleback	Endangered
Plethobasus cyphyus	Sheepnose Mussel	Proposed Endangered
Pleurobema clava	Clubshell	Experimental Population, Non-Essential
Pleurobema curtum	Black Clubshell	Endangered
Pleurobema decisum	Southern Clubshell	Endangered
Pleurobema marshalli	Flat Pigtoe	Endangered
Pleurobema perovatum	Ovate Clubshell	Endangered
Pleurobema plenum	Rough Pigtoe	Endangered
Pleurobema taitianum	Heavy Pigtoe	Endangered
Potamilus capax	Fat Pocketbook	Endangered
Potamilus inflatus	Alabama Heelsplitter	Threatened
Quadrula cylindrica cylindrica	Rabbitsfoot	Candidate
Quadrula fragosa	Winged Mapleleaf	Experimental Population, Non-Essential
Quadrula intermedia	Cumberland Monkeyface	Experimental Population, Non-Essential
Scaphirhynchus suttkusi	Alabama Sturgeon	Endangered
Speoplatyrhinus poulsoni	Alabama Cavefish	Endangered
Sterna antillarum	Least Tern	Endangered
Pristis pectinata	Smalltooth Sawfish	Endangered
Quadrula stapes	Stirrupshell	Endangered

Appendix U

Fuel Economy and Emissions

Table 1: Fuel Economy and Emissions Summary by Scenario for Combined Import and Export System

Scenario	Diesel Fuel Usage in gallons	Particu-lates in tons	Hydro-carbon Emissions in tons	Carbon monoxide in tons	Nitrogen oxides in tons	Carbon dioxode in tons
No-action	202,963	6.3395	3.9232	4.6434	4.3275	940
Marine Highway New Orleans	113,367	3.4115	2.3603	2.7033	2.5528	448
Marine Highway Houston/Galveston	142,743	4.3290	3.0380	3.4524	3.2706	542
Marine Highway Mobile	101,944	3.0547	2.0967	2.4119	2.2737	412

Table 2: Percent Reduction of Preferred Alternative Over No Action Scenario

Scenario	Diesel Fuel	Particu-lates	Hydro-carbon Emissions	Carbon monoxide	Nitrogen oxides	Carbon dioxode
New Orleans	44.14%	46.19%	39.84%	41.78%	41.01%	52.32%
Houston/Galveston	29.67%	31.71%	22.56%	25.65%	24.42%	42.37%
Mobile	49.77%	51.82%	46.56%	48.06%	47.46%	56.20%

Table 3: Marine Highway with LNG Powered Barges

Scenario	Particulate Matter in tons	Hydro-carbon Emissions in tons	Carbon monoxide in tons	Nitrogen oxides in tons	Carbon dioxide in tons
New Orleans	0.3775	0.1220	3.0326	0.0819	470
Houston/Galveston	0.4142	0.1499	3.8774	0.0823	571
Mobile	0.3633	0.1112	2.7041	0.0817	432

Table 4: Percent Reduction in Pollutants LNG Barges over Diesel Barges

Scenario	Particulate Matter	Hydro-carbon Emissions	Carbon monoxide	Nitrogen oxides	Carbon dioxide
New Orleans	88.93%	94.83%	-12.18%	96.79%	-4.94%
Houston/Galveston	90.43%	95.07%	-12.31%	97.48%	-5.27%
Mobile	88.11%	94.70%	-12.11%	96.41%	-4.77%