Jefferson County Ports

Phase II DRAFT Master Plan

January 2011

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To be completed for the final report after the comment period

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1 INTRODUCTION

1.1 Project Description

In Phase I, the *Herculaneum Repurposing* and the *Jefferson County Ports Feasibility Analysis* identified and characterized the market, described site conditions, developed alternatives for the Herculaneum and Crystal City sites and analyzed their economic benefits. Phase II, the Recommended Development Plan, combines these efforts into a single master plan for all potential port sites in Jefferson County and integrates their development with recommendations for inland transportation improvements and estimates of economic benefits.

In this master plan the Market Assessment is presented in greater details to quantify specific cargo trades and identify specific shipper/terminal operator requirements for facilities and services. This includes an interview program based on the key customer analysis for cargoes and industries identified in Phase I. Trade level forecasts incorporate the results of the interviews to arrive at projections for targeted market sectors and industry types. From the point of view of market assessment, the impact of changes in transport technology are mainly felt indirectly, through changes in land transport costs and service quality, which may, in turn, impact the competitive position of the port and the choice of transport mode to and from the port.

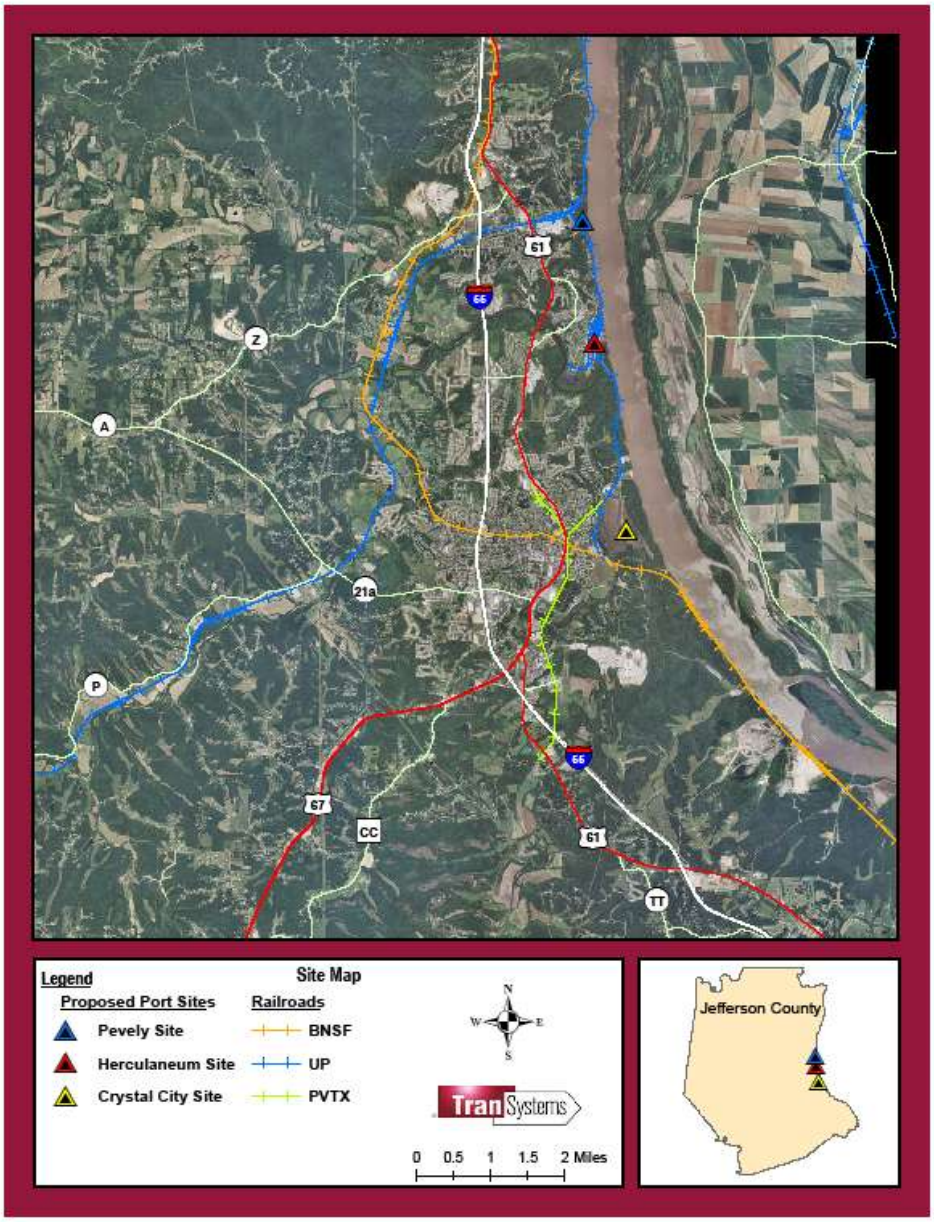
The alternatives considered in Phase I are refined into a single Recommended Development Plan that provides a reasonable strategy for capturing the specific cargo opportunities that was identified in the detailed market assessment. This plan coordinates the 'best use" of sites that were evaluated in Phase I. The Recommended Development Plan illustrates a full build-out scenario and includes recommended surface transportation improvements. Required ancillary facilities are defined and potential environmental issues and constraints are identified. Environmental considerations for a proposed roadway corridor to serve the Crystal City site are presented in greater detail as the Location Study and Environmental Assessment (EA) to ultimately obtain environmental clearance for a new roadway.

A Strategic Development Plan which is tied to market growth projections is also included in the Master Plan; Phased development of the proposed port sites provides priorities for implementation of the Recommended Development Plan. Based on this plan, a timeline for land acquisition, regulatory approvals, infrastructure and tenant dependent development is summarized to guide the necessary sequencing of project elements. An Estimate of Probable Costs and Economic Benefits are then suggested for budgeting and financial planning purposes. Finally, the Implementation Plan offers some financial strategies and guidance for next steps.

1.2 Site Description

This second phase of analysis begins with the same study area identified in the *Jefferson County Ports Phase I Feasibility Analysis* which included the integration and consideration of up to potentially four sites. These four sites previously considered - Pevely Site, Herculaneum Site, Crystal City Site, and LaRoche Site - are within the boundaries of Jefferson County, Missouri approximately 20 to 30 miles south of St. Louis, and are identified in **Figure 1-1**. With the exception of the current owners of the LaRoche Site, each of these entities have expressed interest in redevelopment or repurposing of a portion of their property within the 30 year planning horizon of this Master Plan. Because of the lack of interest by the LaRoche owner, this site was eliminated from any future evaluation

Figure 1-1: Location of Sites for Consideration



This Phase II analysis reduced the number of sites to the three owned and/or adjacent to various public and private entities including Dow Chemical Company, Doe Run Company, and the successors to Pittsburg Plate Glass (PPG), thus eliminating the LaRoche Site from further analysis.

Prioritizing a phased development plan in this Phase II report focuses primarily on Herculaneum followed closely by Crystal City and then Pevely. These sites have the highest and most immediate potential, respectively, for redevelopment. Herculaneum, Crystal City and Pevely are expected to form the core nucleus of the proposed Jefferson County regional port development.

2 MARKET ASSESSMENT

2.1 Introduction

In Phase I of the Jefferson County port market evaluation, the consultant team identified and characterized the regional cargo market, primarily bulk cargo handled by facilities located within the Port of Metropolitan St. Louis (PMSL). The PMSL is a 70-mile stretch along the banks of the Mississippi River from mile 138.8 above the Ohio River (AOR) to mile 208.8. The team provided trade level forecasts by major commodity group for years 2018, 2028 and 2038. The principal finding of the Phase I market evaluation was the regional market is relatively mature with the major bulk commodities having average growth rates in the low single digits. However, such low growth is still projected to generate significant additions to regional cargo tonnage over the 30-year planning horizon. This will support the need for long-term investment in existing and new terminal facilities in the region. The Phase I regional market review and findings provided guidance for development of site alternatives and direction of the overall port and upland opportunities. In the Phase II Market Assessment, the intent is to refine the Phase I market evaluation and to select the preferred subset of targeted markets and industries, and to refine the long-term market projections. The first step is an interview program with a sample of companies active in the major commodity groups that flow through the region. The findings of the interview program are then combined with revisions to the regional forecasts to provide guidance on market opportunities for port development in Jefferson County.

2.2 Interview Program

The project team conducted an interview survey in March and April of 2010 with the objective of completing between 10 and 20 detailed interviews with a focus on the following market sectors:

- Shippers located in close proximity to Jefferson County
- Shippers located in the broader St. Louis/Missouri region
- Terminal operators
- Companies involved in regional container trade

Additional interviews with local shippers were conducted in July 2010. The team also interviewed barge operators for their insight on regional cargo movements and opportunities. Eligible survey respondents were identified from the project team's industry contacts, research on shippers in the St. Louis region, and referrals by respondents and the Jefferson County Port Authority. The project team completed 24 interviews across several market sectors, as shown in Table 2-1. Respondents requested to remain anonymous, but were by-in-large eager to participate in the survey.

Table 2-1: Survey Respondents by Type

General Industry Type	Count
Agriculture Shipper	6
Asphalt, Cement, Minerals Shipper	7
Scrap Metal Shipper	1
Coal Mining Company	1
Tug Boat / Barge Operator	4
Freight Forwarder / Ocean Carrier	2
Retail	1
River Transportation Consultant	1
Terminal Operator	1
Total	**24**

Source: TranSystems

Participants were asked for their opinions on a terminal located at Herculaneum, including topics such as:

- Likely shippers who might use the terminal
- Desired terminal services and features
- The status of the St. Louis River barge terminal network
- Preferred transportation mode
- Future transportation trends

The results of the interviews are presented in Section 2.2.1as general findings and market sector findings.

2.2.1 General Findings

2.2.1.1 Perspective on Barge Transportation

The intent of this study is to identify market sectors and opportunities that should be considered in the Master Planning of the sites in Jefferson County. As a first step, respondents provided guidance on modal preferences and barge transportation to explain the advantages of barging, in general, and at a Jefferson County facility, in particular.

Barging is considered to be the lowest cost transportation mode compared to truck or rail, but lengthy transit times, and the shipper's total landed cost must be considered in order to evaluate true modal cost comparisons. Landed cost for barge transportation is the total cost of the product being shipped, barging and river terminal delivery and pick-up. Trucking is not generally considered to be a viable option for barge eligible cargoes (for example, grain) due to this mode's lower payload carrying capacity, resulting in higher costs when compared to barge or rail. Separate TranSystems research suggests that cargoes currently moving by truck require faster transit times than barge service can offer and are not likely to divert to a terminal located in Jefferson County. Therefore, further discussion focuses on cargoes that currently move by rail or barge.

The following advantages and disadvantages of barge transportation were noted by respondents:

Advantages of Barge Transportation:

- Barge is less expensive than rail on a per ton basis.
- Typical loading capacity for a single shipment size is greater for barge. Roughly 22,500 tons (1,500 tons per barge x 15 barge tow) above St. Louis and 60,000 tons (1,500 tons x 40 barge tow) below St. Louis versus 8,000 tons by rail (100 ton capacity jumbo hopper rail car x 80 cars per unit train)
- Barge logistics management is less complicated compared to rail, especially if the shipment is required to be interchanged between two railroads. This is especially true for St. Louis shipments to the Gulf ports.

Challenges of Barge Transportation:

- Longer barge transit times (for example, New Orleans to St. Louis can take two weeks) as compared to less than one week compared to rail.
- The barge logistics network (terminal locations, rail access, service frequency, etc.) must support shipper sourcing and end user receipt locations.

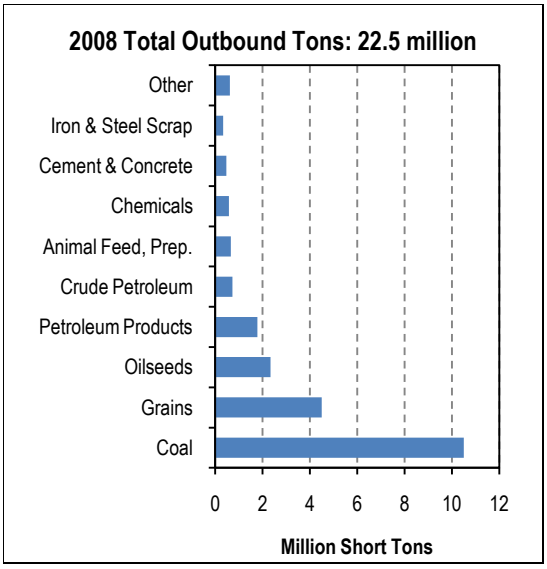
Respondents confirm that barging is the preferred transportation option under the correct circumstances. A facility located in Jefferson County would be attractive to shippers that could lower transportation costs due

to their proximity to this proposed river terminal(s). This would include shippers who currently call at river terminals in St. Louis but who would realize lower delivery or pick-up costs if they, for example, re-located in Herculaneum. St. Louis area over-the-road congestion would also be avoided. The primary issue is that a Herculaneum facility, located 30 miles south of St. Louis, or any other Jefferson County facility must fit into shippers' existing networks of production plants or product origins, river terminals and final delivery areas.

2.2.1.2 Commodity Types

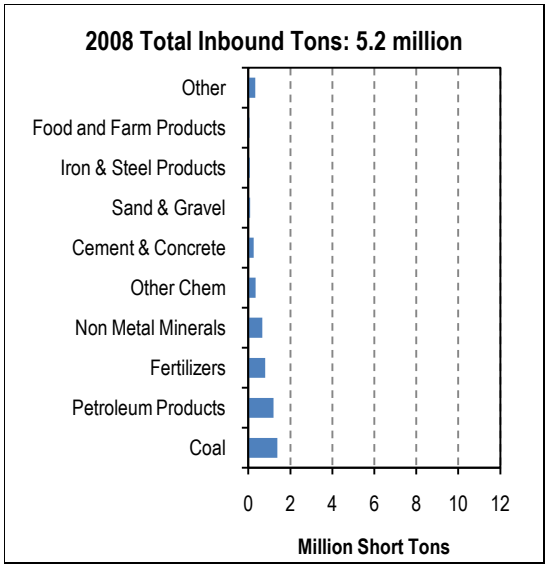
Commodity types that receive the highest economic benefit from barge transportation move in very large quantities of between 1,500 to 60,000 tons. The higher the tonnage of product moved, the lower the per-ton transportation cost. Railroads occasionally offer spot rates that are designed to attract shippers onto rail to increase tonnage on specific routes. This practice is the exception rather than the rule; however, it introduces some uncertainty for shippers when choosing barging versus rail services. Another characteristic of barge eligible commodities is that longer supply chain lead times are built into delivery schedules to accommodate slower barge transits versus rail. The types of commodities moving by barge are summarized in Figure 2-2 and Figure 2-1.

Figure 2-2: St. Louis Region Outbound Barge Commodity Groups in 2008



Source: USACE

Figure 2-1: St. Louis Region Inbound Barge Commodity Groups in 2008



Source: USACE

In 2008, the St. Louis region handled four times more outbound tonnage by barge than inbound with coal being the largest commodity in both directions. The common characteristic among these commodities is that they tend to be lower value and less time sensitive raw materials or semi-processed commodities, which are well suited for shipment in large quantities. The interviews with shippers representing the commodity types displayed above reveal river terminal services and facilities requirements that are somewhat unique to each commodity, and are discussed later in Section 2.2.2.

Nearly all respondents indicated that barge traffic in the St. Louis region is down and the existing barge terminal network is sufficient to handle existing river traffic. The general consensus of respondents is that

regional barge traffic will improve as the economy recovers and into the future, which may lead to requirements for new river facilities. Additional factors that may impact future terminal requirements are potential for congestion surrounding existing sites and the availability of land for development and expansion.

2.2.1.3 Operational Issues

Competative pricing is a key operational challenge for a terminal located 30 miles away from the St. Louis region at Herculaneum or at another location in Jefferson County. One respondent noted that port services, such as fleeting, emergency or barge availability to name a few, are in greater supply in a large port area such as St. Louis. One respondent suggested that Jefferson County might be able to take advantage of available space to offer barge storage areas. This might generate enough traffic in and out of a Herculaneum terminal to support barge availability, channel dredging, tug fleeting and maintenance and emergency related service offerings.

> *"The one advantage [of St. Louis]; there will be more tugs, more services like fleeting, more emergency services, just because there is more activity in St. Louis, as opposed to your site which is 30 miles away. Fleeting services are important, the access to empty barges, etc. is important. Also, the ability to store and move barges is important."*
>
> *- General Cargo Barge Operator*

A caution concerning river silting was offered by one contributor. It was mentioned that terminals near Herculaneum have experienced channel silting problems due to design issues. He advised that a casual assessment of nearby terminal design be undertaken to avoid a similar situation.

2.2.1.4 Regulatory Issues

Respondents promote the fuel efficiency and lower emissions characteristics of barge transportation. Positive impacts on traffic congestion and road wear were also cited.

> *"Environmentally, barges are better because you don't release as much vapor into the atmosphere; you move large quantities, so it is cheaper by barge."*
>
> *- General Cargo Barge Operator*

Even in light of these claims, the US Army Corps of Engineers (USACE) and the Environmental Protection Agency (EPA) are increasingly turning their focus on clean water and terminal expansion regulations according to several respondents.

> *"The USACE issues are environmental, safety and congestion. If business were to increase and congestion become an issue in the St. Louis area, USACE permitting issues might become a bigger problem. Granite City is having problems permitting for their harbor expansion. Impacts to the levee system are a concern for permitting. Regulations in general are becoming an issue. The EPA is getting more involved with more stringent water quality regulations ... with inspections and caps in trade (e.g. coal)."*

2.2.1.5 Project Development Considerations

Based on the interviews, important factors to be considered in development of the Herculaneum site are:

- Tug services, such as fleeting, maintenance, emergency services
- Dredging Services
- Barge storage areas
- EPA and USACE clean water and river congestion compliance

2.2.2 Aggregates and Sand, and Cement

2.2.2.1 Aggregates and Sand Shippers

Interviews with aggregate and sand shippers suggests that a barge loading facility located at the Jefferson County Port would be well positioned to divert shipments from St. Louis terminals if the cost of trucking to the Jefferson County Port were lower than trucking expenses to St. Louis. This is especially true for shippers with operations south of St. Louis and within reasonable distance of the Jefferson County Port. One respondent estimated that he would save nearly $120,000 per month in trucking costs by switching from a St. Louis terminal to the Jefferson County Port. Existing use of the river network is a key element of his support:

> *"For us, a new facility in Herculaneum would result in a reduction of trucking costs (vs. St. Louis) of roughly $120,000 per month. We might also be able to take advantage of storage areas on a Herculaneum site which would reduce our need to store product here. I would think any bulk shipper south of St. Louis would be able to take advantage of similar savings, especially if they were close to Herculaneum. We also ship by rail, so having UP (connecting to BNSF) access would be a big plus… There really isn't any other location for loading barges nearby so the competition would be rail. Our river network is set up so efficiently, we wouldn't really benefit from using rail though - we are set up for barging."*
>
> *- Sand and Gravel Shipper*

Shippers of sand require an inexpensive terminal system, a loading conveyor mounted on pilings. The sand must be kept free of contaminants, so an operation where trucks deliver directly to covered hoppers is preferred. A robust cleaning system should be in place for cleaning the conveyor. A representative shipper could move 250,000 tons per year of sand through a terminal at the Jefferson County Port.

Shippers of aggregate, including ballast stone for railroads, may require two acres of storage to support throughput of up to 300,000 tons per year. Similar to sand, aggregates loading would require a conveyor mounted on pilings.

Rail access is also desirable for shippers of aggregates and sand as it provides transportation options and some customers are better served by rail.

2.2.2.2 Cement Shippers

A cement operator located on the Mississippi River suggested that the river network supporting the carriage of cement is well established and is less likely to use a barge terminal located at the Jefferson County Port. Cement production plants favor a river location to facilitate barge loading; therefore, without a cement facility, the Jefferson County Port is not a good option. Secondly, transportation costs are mitigated to the

extent that the cement is unloaded from barges as close to large population centers as possible. Product unloaded at the Jefferson County Port would incur additional trucking expenses if it were to be delivered the extra 30 miles to the St. Louis region if that is the intended destination. Use of the Jefferson County Port facility for cement would depend on the proximity of projects, such as highway or construction projects, to the proposed river terminal.

2.2.2.3 Project Development Considerations

Based on the interviews, important factors to be considered in development of Jefferson County sites for aggregate and sand and/or cement are:

- Loading sand direct from truck to barge is preferred, so a storage area may not be a requirement for sand. A silo might be useful, but is not necessary.
- Two acres of storage to support shipments of up to 300,000 tons per year of aggregates
- Conveyor systems mounted on piles for loading sand and aggregates
- Robust cleaning system for conveyors
- Fast and efficient hoppers for load and unload operations
- Rail access to accommodate shipments that do not move via barge

2.2.3 Scrap Metal

Scrap metal is shipped by barge from the St. Louis area, mostly to steel mills. The mills are generally located on-river so barging is an attractive transportation option. Use of barge may increase in the future due to the expense and relative inflexibility of rail in serving mills. Scrap for export is one segment of the market with product barged down to New Orleans for transfer into ocean going vessels. A small quantity of scrap is exported in containers and this is currently railed to the export ports.

Scrap can be loaded directly from truck to barge, but the preference is to have storage at the terminal. A grapple is required to load the scrap and a magnet for small pieces and clean up.

2.2.3.1 Project Development Considerations

Based on the interviews, important factors to be considered in development of a new terminal site that may serve scrap metal are:

- Loading using a large grapple for large pieces and a magnet for small pieces and clean-up
- Three to four acres of storage to support shipments of 100,000 to 150,000 tons per year
- Rail access to accommodate shipments that do not move via barge

2.2.4 Grains and Agricultural Products

2.2.4.1 Rail to Barge Connection

Grains and Oilseeds were ranked second and third largest commodities, respectively, of St. Louis outbound cargo in 2008, combining for a total of 6.8 million tons. Interviews with agricultural products shippers indicates that much of the outbound grains from St. Louis are destined for terminals on the Gulf coast, where they are loaded into ocean going vessels for export. Barging is preferred for this trade due its low cost of transportation, but, in addition, one shipper commented that, "rail cars tend to get lost!" Rail

shipments require more monitoring, given that shipments are often required to be interchanged[1] between railroads for Midwest to New Orleans transits, for example. Similar to sand shippers, grain shippers who can realize lower costs by accessing a terminal at the Jefferson County Port versus their existing barge terminal in St. Louis will likely consider the switch. As one responded noted, "We are business people, so if there is a terminal that would provide some benefit, we would consider it."

Grain shippers pointed out that the rail to barge connection is an important handoff in their overall supply chain. A common practice is for railcars and barges to arrive at the river terminal as close to the same time as possible so that the grain can be immediately transferred from rail to barges. The shipper has to pay a penalty for "demurrage" or the stand-by time if a barge has to wait for late railcars to arrive. Conversely, a late barge arrival causes railcars to be tied up unnecessarily. One shipper suggested that a facility equipped with grain silos would address this situation and may be considered to be a selling point for the proposed terminal:

> *"One thing that a terminal in [Herculaneum] could have is large silos that could handle 2,000 or so tons. If we could load our product at origin and get in all the way to [Herculaneum] on one railroad, probably the UP, and then store the product at the [Herculaneum] terminal, that would give us the opportunity to better plan for railcars and barges. We wouldn't have to pay demurrage on barges if the railcars were late or we wouldn't have to worry about the trains arriving before the barges."*
> *- Grain Shipper*

This shipper suggests that easy rail access is essential for shippers in Midwestern states, west of Missouri, to consider this terminal location. A rail service into the Jefferson County Port that avoided the St. Louis area rail congestion would be advantageous; however, the existing rail network indicates rail service at the Jefferson County Port would have to pass through St. Louis.

2.2.4.2 Missouri River Grain Shippers

Shippers using the Missouri River might present yet another opportunity. A grain shipper who is committed to shipping on the Missouri River suggested that a barge loading facility in the Jefferson County Port might be a viable alternative when the Missouri is not accessible due to river closures. The Missouri river season generally runs from March to November and extends from Sioux City Iowa to St. Louis, MO. Intra seasonal high and low water events over the last eight years have negatively impacted barge service reliability, and Missouri River shippers have built-in contingency plans as a result. A terminal located at Jefferson County Port would be considered to be a valuable outlet during times when the Missouri is closed and could potentially attract cargoes previously loaded onto barges as far away as Sioux City, IA. This of course assumes a substantial effort to coordinate with shippers to design terminal and railroad services that meet their needs.

2.2.4.3 IP Grain Facilities

Identify Preserved (IP) grains are specialty grains that require certification that they were not contaminated with other grains during shipment from the farm to the final destination. Loading facilities are inspected and "IP Certified" before they are allowed to handle this specialty product. Shipping containers are the preferred mode of transportation because they prevent the IP grains from being mixed with other grains once they are

[1] No single railroad offers direct service from coast to coast. Grain shippers located west of the Mississippi have to "interchange" or change railroad companies to complete a transit to points east of the Mississippi, including New Orleans.

sealed inside the container. Respondents suggest that the IP product moves in small lot sizes and is mainly exported to key markets in Japan, Taiwan and India.

> *"A Mississippi service really wouldn't help us because we are interested in Asia destinations. Central and South America have their own IP product and don't import any of ours".*
>
> *– IP Grain Shipper*

One IP shipper indicated that the vast majority of exported IP grains in the Missouri area are loaded on westbound trains in Kansas City and loaded onboard ocean-going vessels at ports on the West Coast. Survey responses suggest that IP facilities in Jefferson County are not an immediate need.

2.2.4.4 Project Development Considerations

Based on the interviews, important factors to be considered in development of a port site for grain are:

- Large grain silos
- Fast and efficient hoppers for load/unload operations
- Railcar hopper load/discharge equipment

2.2.5 Bulk Liquids and Chemicals

A respondent representing one of the largest liquid carrying barge operations in the country indicated that St. Louis is not a major area for liquid cargo deliveries, such as chemicals or gasoline. The recent economic downturn caused a further slowdown of liquid barge operations there. Most liquid bulk cargoes are raw materials for resin or other primary products for manufacturing. A common example of a liquid bulk operation is the manufacturing of resin pellets. Chemicals are off-loaded from a barge directly to a resin pellet producing plant, typically located on the river. The pellets are then transported to local manufacturing sites where the pellets are used in the manufacture of plastic articles. Proximity to the resin pellet and end manufacturer is an important consideration when selecting a river terminal:

> *"Liquid bulk is heavily tied to manufacturing, so you need to find out what kind of manufacturer is planning on locating near [Herculaneum], and then determine if you need a liquid terminal… The more water access you have, the better, so many of the refineries are on the water. Other commodities, such as resin chemicals do move inland. The one thing is though for the resins many pellet plants, which is the first stage of processing for plastics, is often along the water but the further stages of production are often further inland near larger population areas. A terminal 30 miles from St. Louis is a bit far away considering that there are liquid terminals closer to St. Louis."*
>
> *- Liquid Barge Operator*

Bulk liquid handling capabilities were not mentioned as something that is immediately needed at a terminal in Jefferson County; however, future expansion of manufacturing capabilities in the area may warrant terminal facilities such as piping, storage tanks and rail bulk liquid loading facilities. Consumer liquid bulk cargoes, such as gasoline would be more likely to utilize river terminals closer to the larger consumer base in St. Louis in order to reduce the "last mile" trucking expenses to local gas stations. Further long-term development of the bio-fuel/ethanol industry in Missouri and neighboring states may generate interest in rail/barge moves of finished product depending on final destination. However, major consumption markets in the Eastern and Western states are served by unit trains.

2.2.5.1 Project Development Considerations

Based on the interviews, important factors to be considered in port development for liquid cargo are:

- Bulk liquid storage tanks
- Piping to facility load and discharge for barge, truck, rail

2.2.6 Coal

Coal is by far the leading barged commodity in St. Louis in 2008, accounting for 47 percent of all outbound and 27 percent of all inbound cargo. The sources of the coal loaded in St. Louis are out-of-state mines, importantly Wyoming, where the commodity is loaded into railcars and transported to several river terminals, including those located in St. Louis. Coal loaded at St. Louis is either destined for power plants on the inland river network or for the Gulf where it is loaded on ocean going vessels for export.

A Jefferson County Port coal terminal would face competition from any loading facility located on the Mississippi that offered competitive rail rates, from as far north as Keokuk, IA (located at Mississippi section 1, mile 360) and as far south as Cairo, IL, located at the confluence of the Mississippi and Ohio rivers (at section 1, mile 0). A Jefferson County Port terminal would need to demonstrate the lowest landed costs as compared to other barge loading facilities in order to be considered as a viable option.

As previously mentioned barges loaded at terminals located at St. Louis and below are not limited to a 15-barge tow due to the absence of river locks below St. Louis. This suggests that a target market for a Jefferson County Port terminal is shippers who move coal in shipments of greater than 22,500 tons who would be less likely to use terminals upstream of St. Louis.

2.2.6.1 Project Development Considerations

From a facility perspective, the handling of coal requires open storage, a rail loop track, equipment (stacker-reclaimer, conveyor system, etc.) for handling coal to/from the storage, and a conveyor system for loading barges.

2.2.7 Container-on-Barge

The intent of a container-on-barge (COB) service is to load marine containers onto barges that would otherwise be loaded onto chassis and transported over-the-road by truck or by rail. TranSystems probed respondents familiar with COB transportation to discuss the advantages and challenges of this service as it might pertain to a potential river terminal located in Jefferson County.

Respondents noted that the main objective of COB is to load and unload containers as close to major population centers as possible. There are two principal reasons for this. First, shippers want to minimize the "last mile" delivery costs to retailers, manufacturers or consumers, which is more likely if the river terminal is near the final destination of the container. Another reason is container availability. Large population centers are more likely to receive inbound containerized goods which, in turn, provide a supply of empty containers for outbound shipments. St. Louis is more likely to maintain a supply of empty containers, again due to its larger population.

Achieving a balance of trade was mentioned as yet another important consideration of COB service. A balanced trade will enable the round-trip barge operating expense to be distributed evenly among inbound and outbound containers, and this will be reflected in the barging per container rate levels. An imbalanced trade will result in higher per container rates for the higher volume, or head-haul portion of the journey, as barge operators charge rates that will recover the round-trip operating expenses. One COB operator who

responded to this survey indicated that he recently canceled a COB service because the imbalance of inbound to outbound containers was so great that the rate he had to charge was higher than truck rates for the same trade lane. Shippers opted to use truck service rather than barge as a result.

2.2.7.1 Project Development Considerations

From a facility perspective, container-on-barge requires a simple terminal that provides barge berthing, a crane for loading and discharging containers, and an open yard for storing containers. Depending on market needs, additional services may include a warehouse for cargo consolidation/deconsolidation.

2.3 Trade Level Forecasts

Long-term projections of regional cargo flows – bulk and general cargo, and containerized cargo – were presented in the Phase I study. The 10-year, 20-year and 30-year projections were provided for 2018, 2028 and 2038. The projections of bulk and general cargo were based on historical cargo trends, state level projections for disposable personal income, manufacturing employment, and manufacturing output, projections for regional consumption of petroleum and coal released by the Energy Information Agency (EIA), and projections for regional crop production released by the U.S. Department of Agriculture (USDA). Projections of regional containerized cargo also took into consideration projections of U.S. imports and exports of containerized cargo by foreign origin and destination region, and state and county level economic and population projections.

The regional cargo market is relatively mature with low projected annual growth rates. However, low growth is still projected to generate significant additions to regional cargo tonnage over the 30-year planning horizon, which in turn is expected to require investment in existing and new terminal handling facilities. In Phase II, the project team has updated the forecasts by incorporating 2008 Waterborne Commerce Statistics on river cargo and 2009 data on containerized cargo, which were not available for the Phase I study, and revised economic projections. Reviews of regional rail cargo flows and the regional industrial real estate market are provided to complement the cargo flow analysis and forecast.

2.3.1 Regional Bulk and General Cargo

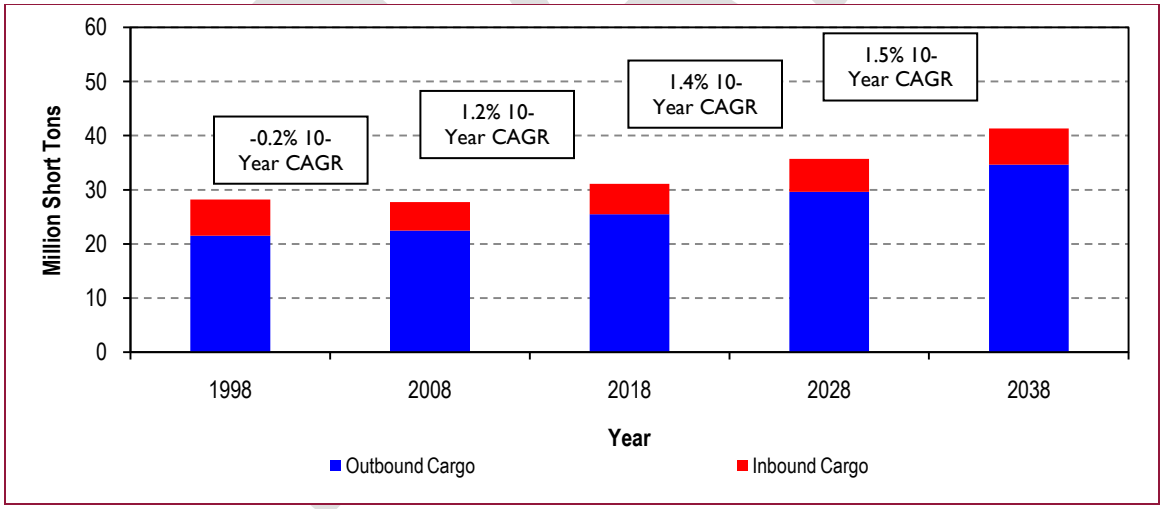
Coal, food and farm products, and petroleum and petroleum products accounted for 91 percent of the 22.5 million tons of outbound cargo moving through the Port of Metropolitan St. Louis in 2008. These three commodity groups also made up 51 percent of the 5.2 million tons of inbound cargo handled by the Port. Trends in these commodity groups will have a heavy influence on future cargo tonnage moving through the region. Overall, the commodities moving through the region are relatively mature with annual growth rates in the low single digits, and this pattern is expected to continue over the forecast horizon.

Annual growth rates for the bulk commodities are projected to be in the low single-digits; however, in the Medium Case projection total cargo tonnage still increases by 50 percent over the 30-year period.

The largest commodity handled in the region is coal with 10.5 million tons shipped outbound in 2008. Current and future coal shipments are tied to specific end-user requirements. Coal has been one of the strongest growing commodities moving by barge, with a 10-year historical CAGR (1998 to 2008) of 3.9 percent. The 10-year CAGR for total outbound cargo was 0.4 percent. The second largest commodity group is outbound shipments of food and farm products, made up of corn, soybeans, wheat and other agricultural products. This commodity group has declined moderately over the past decade with a 10-year CAGR of -2.0 percent. Within food and farm products, growth of corn and soybeans was offset by declines in several other commodities (wheat, other oilseeds, and animal feed). Factors that can impact volumes, and continue to do so in the future, are expansion of bio-fuel production and shifting trade patterns, which may require alternate transport modes to barge. The petroleum and petroleum products sector has also returned negative growth with outbound shipments having a 10-year CAGR of -2.4 percent.

The Medium Case projection, summarized in Figure 2-3 and Table 2-2, is based on an evaluation of historical trends and regional economic projections, and takes into consideration the relative maturity of the major commodities. The projected annual growth rates remain below 2.0 percent, largely consistent with historical trends. Total inbound and outbound cargo volume handled by the Port of Metropolitan St. Louis is projected to increase from slightly less than 28 million tons in 2008 to 41 million tons in 2038, a 30-year CAGR of 1.3 percent. Outbound cargo will remain the dominant direction.

Figure 2-3: Medium Case Cargo Projection for Port of Metropolitan St. Louis



Source: TranSystems

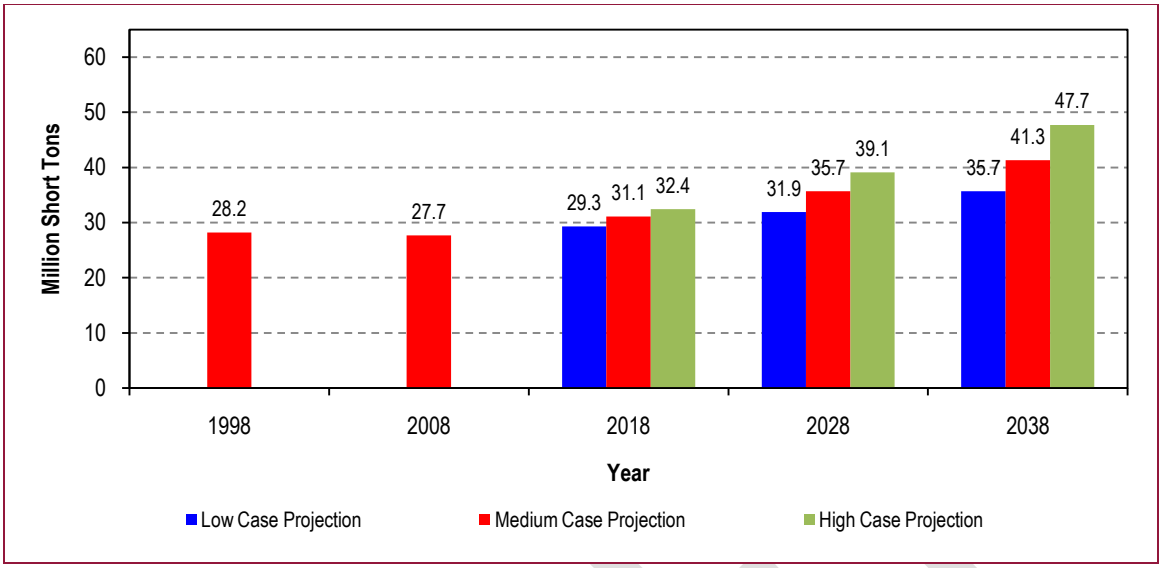
Table 2-2: Medium Case Cargo Projection for Port of Metropolitan St. Louis

	000 Short Tons						Compound Annual Growth Rate			
	1998	2007	2008	2018	2028	2038	98 to 08	08 to 18	18 to 28	28 to 38
Outbound Commodity Group										
Coal	7,170	11,175	10,497	13,437	16,704	20,362	3.9%	2.5%	2.2%	2.0%
Food and Farm Products	9,195	7,947	7,511	7,144	7,737	8,979	-2.0%	-0.5%	0.8%	1.5%
Petroleum & Petroleum Products	3,205	2,399	2,508	2,584	2,482	2,314	-2.4%	0.3%	-0.4%	-0.7%
Primary Manufactured Goods	1,117	824	740	843	978	1,146	-4.0%	1.3%	1.5%	1.6%
Crude Materials, Inedible Except Fuels	550	635	638	712	771	800	1.5%	1.1%	0.8%	0.4%
Chemicals & Related Products	279	479	576	744	889	1,012	7.5%	2.6%	1.8%	1.3%
All Manufactured Equipment, Machinery and Products	9	22	25	27	29	31	10.8%	0.8%	0.7%	0.7%
Total Outbound	**21,525**	**23,481**	**22,495**	**25,491**	**29,590**	**34,644**	**0.4%**	**1.3%**	**1.5%**	**1.6%**
Inbound Commodity Group										
Coal	1,895	1,202	1,385	1,190	1,044	963	-3.1%	-1.5%	-1.3%	-0.8%
Petroleum & Petroleum Products	1,441	1,903	1,200	1,053	952	905	-1.8%	-1.3%	-1.0%	-0.5%
Chemicals & Related Products	963	1,067	1,137	1,462	1,835	2,304	1.7%	2.5%	2.3%	2.3%
Crude Materials, Inedible Except Fuels	957	1,467	946	1,250	1,523	1,699	-0.1%	2.8%	2.0%	1.1%
Primary Manufactured Goods	1,300	585	453	576	655	716	-10.0%	2.4%	1.3%	0.9%
Food and Farm Products	112	44	61	43	50	58	-5.9%	-3.4%	1.5%	1.5%
All Manufactured Equipment, Machinery and Products	14	25	25	25	25	25	6.0%	0.0%	0.0%	0.0%
Total Inbound	**6,682**	**6,293**	**5,207**	**5,599**	**6,084**	**6,670**	**-2.5%**	**0.7%**	**0.8%**	**0.9%**
Total Inbound and Outbound	**28,207**	**29,774**	**27,702**	**31,090**	**35,674**	**41,314**	**-0.2%**	**1.2%**	**1.4%**	**1.5%**

Source: TranSystems

The Medium Case projection is compared to the Low Case and High Case projections in Figure 2-4, and supporting detail is provided in Table 2-3 and Table 2-4. While the three cases show considerable divergence by the end of the forecast period – total projected throughput is 35.7 million tons in the Low Case, 41.3 million tons in the Medium Case, and 47.7 million tons in the High Case – the results are driven by relatively small differences in annual growth rates of key macroeconomic variables. The Medium Case 30-year CAGR of 1.3 percent compares with 0.8 percent in the Low Case and 1.8 percent in the High Case. Factors that could cause lower or higher growth compared to the Medium Case include changes in demand for coal and major agricultural commodities, weaker or stronger regional economic activity, shifts in sourcing patterns and overseas markets, competiveness of barge against other transport modes, and specific company decisions on plant location.

Figure 2-4: Low, Medium and High Case Cargo Projections for Port of Metropolitan St. Louis



Source: TranSystems

Table 2-3: Low Case Cargo Projection for Port of Metropolitan St. Louis

	000 Short Tons						Compound Annual Growth Rate			
	1998	2007	2008	2018	2028	2038	98 to 08	08 to 18	18 to 28	28 to 38
Outbound Commodity Group										
Coal	7,170	11,175	10,497	12,921	15,445	18,281	3.9%	2.1%	1.8%	1.7%
Food and Farm Products	9,195	7,947	7,511	6,901	7,182	8,092	-2.0%	-0.8%	0.4%	1.2%
Petroleum & Petroleum Products	3,205	2,399	2,508	2,044	1,641	1,530	-2.4%	-2.0%	-2.2%	-0.7%
Primary Manufactured Goods	1,117	824	740	809	958	1,016	-4.0%	0.9%	1.7%	0.6%
Crude Materials, Inedible Except Fuels	550	635	638	700	650	638	1.5%	0.9%	-0.7%	-0.2%
Chemicals & Related Products	279	479	576	701	814	890	7.5%	2.0%	1.5%	0.9%
All Manufactured Equipment, Machinery and Products	9	22	25	22	19	16	10.8%	-1.5%	-1.5%	-1.5%
Total Outbound	**21,525**	**23,481**	**22,495**	**24,098**	**26,708**	**30,463**	**0.4%**	**0.7%**	**1.0%**	**1.3%**
Inbound Commodity Group										
Coal	1,895	1,202	1,385	1,132	944	828	-3.1%	-2.0%	-1.8%	-1.3%
Petroleum & Petroleum Products	1,441	1,903	1,200	1,021	897	828	-1.8%	-1.6%	-1.3%	-0.8%
Chemicals & Related Products	963	1,067	1,137	1,324	1,504	1,709	1.7%	1.5%	1.3%	1.3%
Crude Materials, Inedible Except Fuels	957	1,467	946	1,165	1,339	1,407	-0.1%	2.1%	1.4%	0.5%
Primary Manufactured Goods	1,300	585	453	521	449	387	-10.0%	1.4%	-1.5%	-1.5%
Food and Farm Products	112	44	61	41	37	37	-5.9%	-3.9%	-1.0%	0.0%
All Manufactured Equipment, Machinery and Products	14	25	25	22	19	16	6.0%	-1.5%	-1.5%	-1.5%
Total Inbound	**6,682**	**6,293**	**5,207**	**5,225**	**5,189**	**5,212**	**-2.5%**	**0.0%**	**-0.1%**	**0.0%**
Total Inbound and Outbound	**28,207**	**29,774**	**27,702**	**29,323**	**31,897**	**35,675**	**-0.2%**	**0.6%**	**0.8%**	**1.1%**

Source: TranSystems

Table 2-4: High Case Cargo Projection for Port of Metropolitan St. Louis

	000 Short Tons						Compound Annual Growth Rate			
000 Short Tons	**1998**	**2007**	**2008**	**2018**	**2028**	**2038**	**98 to 08**	**08 to 18**	**18 to 28**	**28 to 38**
Outbound Commodity Group										
Coal	7,170	11,175	10,497	14,107	18,414	23,571	3.9%	3.0%	2.7%	2.5%
Food and Farm Products	9,195	7,947	7,511	7,511	8,547	10,419	-2.0%	0.0%	1.3%	2.0%
Petroleum & Petroleum Products	3,205	2,399	2,508	2,716	2,743	2,689	-2.4%	0.8%	0.1%	-0.2%
Primary Manufactured Goods	1,117	824	740	885	1,079	1,328	-4.0%	1.8%	2.0%	2.1%
Crude Materials, Inedible Except Fuels	550	635	638	748	851	890	1.5%	1.6%	1.3%	0.4%
Chemicals & Related Products	279	479	576	782	982	1,174	7.5%	3.1%	2.3%	1.8%
All Manufactured Equipment, Machinery and Products	9	22	25	29	34	39	10.8%	1.5%	1.5%	1.5%
Total Outbound	**21,525**	**23,481**	**22,495**	**26,778**	**32,650**	**40,110**	**0.4%**	**1.8%**	**2.0%**	**2.1%**
Inbound Commodity Group										
Coal	1,895	1,202	1,385	1,253	1,156	1,122	-3.1%	-1.0%	-0.8%	-0.3%
Petroleum & Petroleum Products	1,441	1,903	1,200	1,107	1,064	1,064	-1.8%	-0.8%	-0.4%	0.0%
Chemicals & Related Products	963	1,067	1,137	1,528	2,014	2,655	1.7%	3.0%	2.8%	2.8%
Crude Materials, Inedible Except Fuels	957	1,467	946	1,113	1,424	1,669	-0.1%	1.6%	2.5%	1.6%
Primary Manufactured Goods	1,300	585	453	569	728	941	-10.0%	2.3%	2.5%	2.6%
Food and Farm Products	112	44	61	50	61	78	-5.9%	-2.0%	2.0%	2.5%
All Manufactured Equipment, Machinery and Products	14	25	25	29	34	39	6.0%	1.5%	1.5%	1.5%
Total Inbound	**6,682**	**6,293**	**5,207**	**5,649**	**6,481**	**7,568**	**-2.5%**	**0.8%**	**1.4%**	**1.6%**
Total Inbound and Outbound	**28,207**	**29,774**	**27,702**	**32,427**	**39,130**	**47,678**	**-0.2%**	**1.6%**	**1.9%**	**2.0%**

Source: TranSystems

The Port of Metropolitan St. Louis generated 16,671 outbound barge trips and 16,611 inbound barge trips in 2008, the outbound trips mostly laden and the inbound trips mostly empty. Empty barges are brought into the region to accommodate the larger outbound cargo flows. Total barge trips fell by around 5,000 compared to 2007 due to the fall in cargo tonnage shipments. A projection of future total barge trips was made by (1) applying the average ratio for 2007 and 2008 between outbound trips and outbound cargo tons to the projections of outbound cargo tons and (2) multiplying the results by two since barges must be positioned into the region to accommodate the greater outbound cargo movements. The results are summarized in Table 2-5 and show that barge trips are projected to increase significantly over the 30-year planning horizon.

Table 2-5: Projection of Barge Trips Generated by the Port of Metropolitan St. Louis

Number of Barge Trips (Laden and Empty)	2007	2008	2018	2028	2038
Outbound Barge Trips					
Low Case Cargo Projection	18,698	16,671	18,500	20,504	23,387
Medium Case Cargo Projection	18,698	16,671	19,570	22,717	26,597
High Case Cargo Projection	18,698	16,671	20,558	25,065	30,793
Total Outbound and Inbound Trips*					
Low Case Cargo Projection	37,186	33,282	37,000	41,008	46,773
Medium Case Cargo Projection	37,186	33,282	39,139	45,433	53,193
High Case Cargo Projection	37,186	33,282	41,115	50,131	61,586

* Projections for years 2018 to 2038 calculated as double the number of outbound trips, since outbound cargo is the dominant cargo flow and generates inbound moves of empty barges.

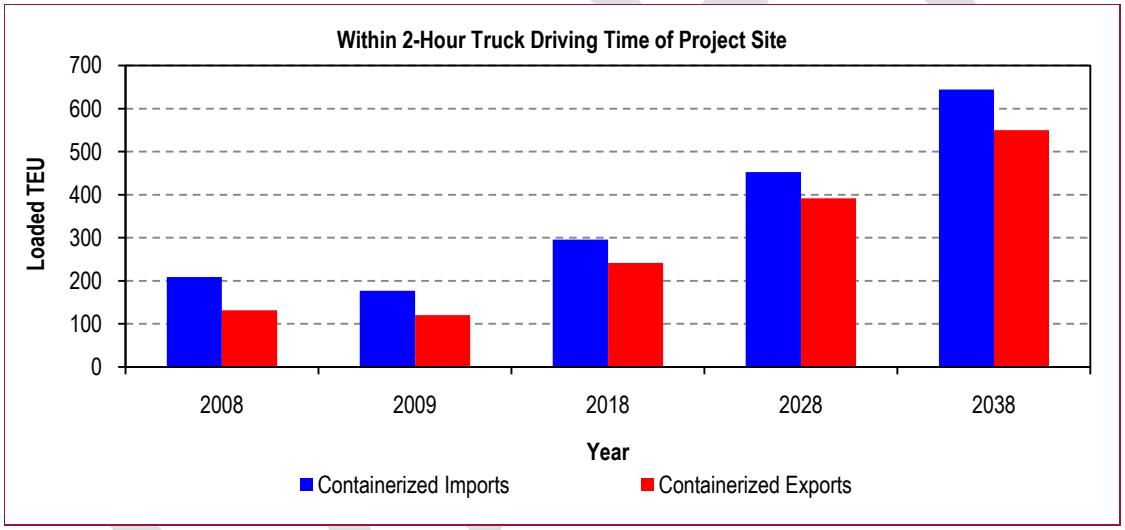
Source: TranSystems

2.3.2 Regional Containerized Cargo

The long term projection of regional containerized cargo presented in the Phase I report has been updated to reflect container trade statistics for 2009, the full impact of the economic recession and revised economic projections. The estimates of regional containerized cargo are based on long term projections for U.S. containerized trade, state-level disposable income and state-level manufacturing output.

The state of Missouri generated an estimated 521,000 TEU of containerized cargo in 2008 and 463,000 TEU in 2009, the fall in volume caused by the economic recession. In 2009, the State generated an estimated 272,000 TEU of containerized imports and 192,000 TEU of containerized exports. In addition, Illinois generated an estimated 1.1 million TEU of containerized cargo in 2009, 646,000 TEU of imports and 421,000 TEU of exports. Of these markets, an estimated 211,000 TEU of Missouri cargo and 86,000 TEU of Illinois cargo falls within the two-hour truck driving time window around the Jefferson County Port sites. This estimate was based on an evaluation of county-level disposable income and manufacturing output. Using these 2009 estimates as a base, long-term projections were prepared for containerized cargo within the hinterland of the Jefferson County Port sites. The results are summarized in Figure 2-5 and Table 2-6, and they show projections for loaded containers and exclude empty containers.

Figure 2-5: Projection of Containerized Cargo within Hinterland of Project



Source: TranSystems

Table 2-6: Projection of Regional Containerized Imports and Exports

Loaded TEU	2008	2009	2018	2028	2038	08 – 18	18 - 28	28 - 38	30-Year CAGR
MO Imports	317,323	271,629	457,452	703,995	1,004,598	3.7%	4.4%	3.6%	3.9%
MO Exports	204,072	191,569	387,352	635,288	897,963	6.6%	5.1%	3.5%	5.1%
Total Missouri	521,395	463,198	844,804	1,339,283	1,902,560	4.9%	4.7%	3.6%	4.4%
Within 2 Hour Truck Driving Time									
Imports	149,117	127,644	214,966	330,821	472,080	3.7%	4.4%	3.6%	3.9%
Exports	89,184	83,720	169,282	277,635	392,430	6.6%	5.1%	3.5%	5.1%
Total	238,301	211,364	384,247	608,456	864,511	4.9%	4.7%	3.6%	4.4%
IL Imports	777,512	645,854	1,062,996	1,592,248	2,256,171	3.2%	4.1%	3.5%	3.6%
IL Exports	487,665	420,624	829,314	1,299,136	1,799,415	5.5%	4.6%	3.3%	4.4%
Total Illinois	1,265,178	1,066,478	1,892,309	2,891,383	4,055,586	4.1%	4.3%	3.4%	4.0%
Within 2 Hour Truck Driving Time									
Imports	59,380	49,325	81,183	121,603	172,309	3.2%	4.1%	3.5%	3.6%
Exports	42,677	36,810	72,576	113,692	157,473	5.5%	4.6%	3.3%	4.4%
Total	102,057	86,135	153,759	235,295	329,781	4.2%	4.3%	3.4%	4.0%
Total Missouri and Illinois									
Imports	1,094,836	917,483	1,520,448	2,296,243	3,260,769	3.3%	4.2%	3.6%	3.7%
Exports	691,737	612,193	1,216,665	1,934,423	2,697,378	5.8%	4.7%	3.4%	4.6%
Total	1,786,573	1,529,676	2,737,113	4,230,666	5,958,146	4.4%	4.5%	3.5%	4.1%
Within 2 Hour Truck Driving Time									
Imports	208,497	176,969	296,149	452,425	644,389	3.6%	4.3%	3.6%	3.8%
Exports	131,861	120,530	241,857	391,327	549,903	6.3%	4.9%	3.5%	4.9%
Total	340,358	297,499	538,006	843,751	1,194,292	4.7%	4.6%	3.5%	4.3%

Source: TranSystems

Total containerized cargo generated by Missouri is projected to increase from 521,000 TEU in 2008 to 1.9 million TEU in 2038, a 30-year CAGR of 4.4 percent. Growth is projected to be strongest in the 10-year period to 2018, largely due to the projected recovery of the U.S. and world economies over the next several years. Containerized cargo generated by Illinois is projected to have similar rates of growth. A projection of the addressable market for the Jefferson County Port was derived based on estimated disaggregation of state containerized cargo to the county level and application of a two-hour truck driving window around the Jefferson County Port sites. The addressable market, largely comprised of Missouri imports and exports, is projected to increase from 340,000 TEU in 2008 (70 percent Missouri cargo) to 1.2 million TEU in 2038 (72 percent Missouri cargo), with imports the largest cargo flow.

The project site's addressable containerized market is projected to expand threefold over the 30-year planning horizon, from an estimated 340,000 TEU in 2008 to 1.2 million TEU in 2038.

The overseas origin-destination pattern of the addressable market will have a bearing on the ability of container-on-barge service to compete for business. For example, most import containers from Asia will move over ports on the U.S. West Coast and then by rail to Missouri, thus presenting limited opportunities for barge service. Approximately 72 percent of containerized imports and 54 percent of containerized exports are estimated to be related to Asia, and therefore more suited to east-west intermodal rail service rather than north-south barge transportation. The more attractive market segments are trade with Latin America and Europe, which together account for an estimated 23 percent of imports and 34 percent of exports, or 27 percent of the addressable market. European cargo would also move over East Coast ports; however, there remain probable opportunities to move European cargo via barge, similar in concept to the containerized agricultural commodities shipped from Memphis via barge to New Orleans, where they are transferred to container ships bound for Europe.

The most attractive segments of the addressable market for barge service are the Latin America and Europe trades, which together account for an estimated 27 percent of the addressable market.

2.3.3 Regional Rail Cargo

The St. Louis region is an important rail hub and handles significant volumes of bulk commodities moving inbound and outbound by rail. A profile of regional rail cargo was developed by reviewing the Public Use Waybill Sample (PUWS) released by the Surface Transportation Board (STB). The PUWS is a non-proprietary version of the confidential Carload Waybill Sample File compiled by the STB. It is subject to qualification due to the exclusion of some records for reasons of confidentiality and the nature of sampling, which results in some sectors being more represented than others.

A summary of St. Louis region rail cargo captured by the 2008 PUWS is shown in Table 2-7. The principal direction is inbound rail freight to the St. Louis region and the dominant commodity is coal. Other important commodities are Chemicals or Allied Products, Food and Kindred Products (including grain mill products), and Farm Products (primarily grains). Principal origins for inbound rail cargo are Wyoming (coal), surrounding agricultural states (farm products and food products), Texas (chemicals or allied products, and petroleum products), West Coast (miscellaneous mixed shipments), and Michigan (transportation equipment).

An unidentified share of these commodity flows involve rail to barge handoffs. As revealed in the interview survey, the rail to barge handoff is an important supply chain element for many shippers of bulk commodities, notably coal and grain, and they require efficient and cost competitive terminal facilities for managing this handoff.

Table 2-7: Summary of St. Louis Region Rail Cargo

2008 Public Use Waybill Sample	Inbound Rail Shipments to St. Louis BEA			Outbound Rail Shipments from St. Louis BEA	
STCC 2 Commodity Group	Sample - Billed Weight in Million Tons	Expanded Million Tons*		Sample - Billed Weight in Million Tons	Expanded Million Tons*
Coal	29.664	59.383		6.014	13.034
Chemicals or Allied Products	0.232	5.630		0.128	2.706
Transportation Equipment	0.112	3.279		0.102	3.251
Food or Kindred Products	0.181	3.238		0.034	1.191
Farm Products	0.839	3.219		0.134	0.690
Miscellaneous Mixed Shipments	0.036	1.423		0.045	1.792
Petroleum or Coal Products	0.026	0.927		0.004	0.168
Primary Metal Products	0.022	0.844		0.048	1.747
Pulp, Paper or Allied Products	0.012	0.480		0.000	0.000
Lumber or Wood Products	0.010	0.415		0.002	0.100
Waste or Scrap Materials	0.010	0.329		0.022	0.792
Clay, Concrete, Glass or Stone Products	0.006	0.221		0.033	1.159
Nonmetallic Minerals	0.001	0.027		0.031	0.479
Grand Total	**31.151**	**79.415**		**6.596**	**27.108**

* The billed weight in tons multiplied by an expansion factor. The STB applies an expansion factor to estimate total tons.

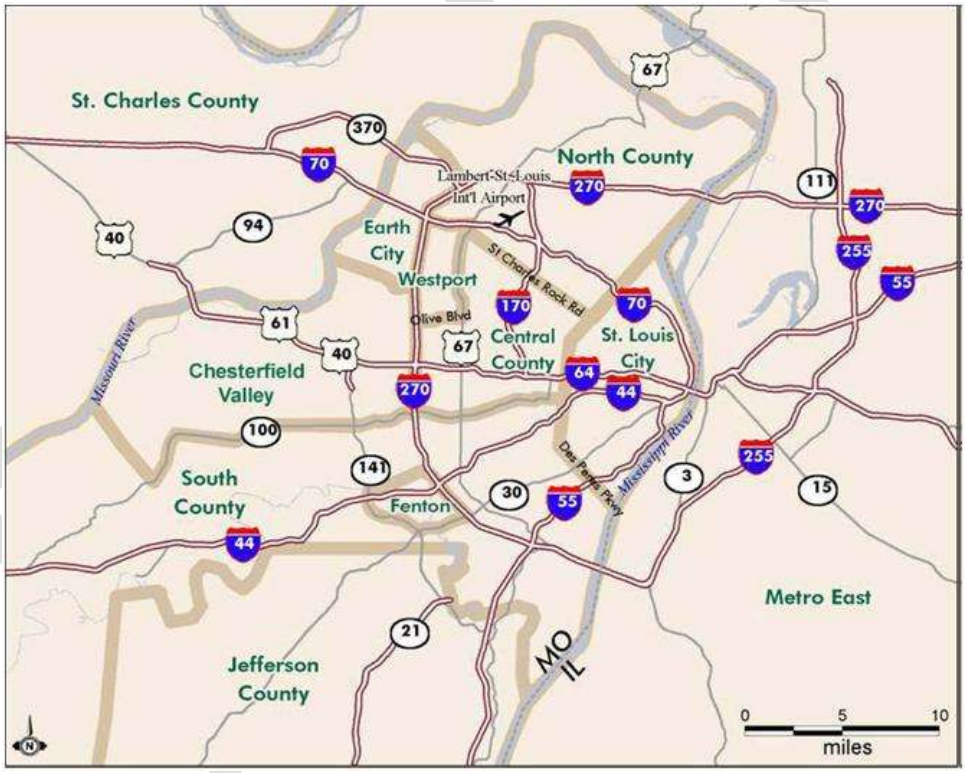
Source: Surface Transportation Board - Public Use Waybill Sample 2008

2.3.4 Regional Industrial Real Estate Market

The St. Louis industrial market comprises several sub-markets offering a broad variety of facilities and rental prices (Figure 2-6 and Table 2-8). At the lower end are the older warehouse buildings in Downtown St. Louis, while the flex[2] space in the Chesterfield Valley commands the region's highest rental prices. In the first quarter of 2010, average asking lease rates in the St. Louis region were $3.69 for general industrial, $3.91 for warehouse/distribution, and $6.21 for R&D/Flex space. Industrial/warehouse space at the Jefferson County Port site would compete against neighboring sub-markets including South County and Fenton. Fenton is the location of the recently closed Chrysler Plant.

A location's attractiveness and lease rates will be driven by factors including supply and demand of land and buildings, construction costs, transportation access, building characteristics (ceiling height, etc.), and specific customization needs. The Jefferson County port project presents an opportunity to construct modern buildings with multimodal transportation connections – proximity to the I-55 corridor, rail access, and water access.

Figure 2-6: St. Louis Industrial Real Estate Sub-Market Map



Source: CB Richard Ellis "MarketView St. Louis Industrial First Quarter 2010"

[2] The following are standard building types:

- Flex – higher end properties commonly distinguished from warehouse/distribution and manufacturing facilities by high build-out of office space. Tech space and multi-stories are also common features. They are typically used for more specialized activities, for example, technical sectors.
- Warehouse/Distribution and General Industrial/Manufacturing – typically one-story and have low internal specifications with high ceiling clearance, and various other building amenities suitable storage and manufacturing activities.

Table 2-8: St. Louis Industrial Real Estate Market, First Quarter 2010

Sub-Market	Market Size (Million Sq. Ft.)	Vacancy Rate (%)	Average Asking Lease Rate (Annual Rate/Sq. Ft.)
Downtown	76.6	7.0%	$3.06
North County	29.4	12.6%	$4.04
Metro East	24.0	8.4%	$3.73
Central County	21.2	8.7%	$6.24
St. Charles County	21.0	4.9%	$4.18
Earth City	14.1	13.8%	$4.12
Westport	13.9	13.0%	$6.05
Fenton	12.9	47.7%	$6.84
South County	9.9	9.9%	$5.19
Chesterfield Valley	4.4	8.7%	$11.52
Total Market	**227.4**	**11.1%**	**$4.49**

Source: CB Richard Ellis "MarketView St. Louis Industrial First Quarter 2010"

2.4 Impact of Future Technologies and Trends

The interview program focused on market trends and potential cargo opportunities for the Jefferson County port. Interview respondents did not suggest any specific future technologies that could impact future regional cargo flows. However, several participants suggested the provision of a "green" port could be a competitive advantage for the Jefferson County port, given an increasingly stringent regulatory environment. A further area for consideration is the marine highway program of the U.S. Department of Transportation, which has identified 18 marine corridors, eight projects, and six initiatives for further development as part of America's Marine Highway Program. These industry trends are discussed further below.

2.4.1 Environmental Impacts of Port Operations

The port industry is incorporating more stringent environmental policies into the planning, design and operation of cargo terminals, in response to concerns about the environmental impact of port operations on surrounding communities and local, state and federal environmental regulations. Similar environmental strategies could be incorporated into future development and operation of port sites in Jefferson County.

Many ports have introduced environmental policy objectives into the planning, management and operation of their facilities. They are taking policy and program based approaches. The policy serves as an organization-wide guide for decision making and provides a framework for the port's program-based actions. Examples of guiding principles are[3]:

- Protect the community from harmful environmental impacts of port operations
- Distinguish the port as a leader in environmental stewardship and compliance
- Promote sustainability
- Employ best available technology to avoid or reduce environmental impacts
- Engage and educate the community

Program elements may include:

- Wildlife – protect, maintain or restore aquatic ecosystems and marine habitats
- Air – reduce harmful air emissions from port activities
- Water – improve the quality harbor waters
- Soils/Sediments – remove, treat, or render suitable for beneficial reuse contaminated soils and sediments
- Community Engagement – interact with and educate the community regarding port operations and environmental programs
- Sustainability – implement sustainable practices in design and construction, operations, and administrative practices throughout the port

Ports are applying and testing different approaches to meet environmental goals and examples are:

- Green tenants in the port
- Green standards for new construction
- Greenhouse gas reduction measures
    - Running equipment on ultra-low-sulfur diesel or biodiesel.
    - LNG yard tractors
    - Low emission locomotives for harbor railroads
    - Development of hybrid power tugs
- Renewable energy
    - On-site wind and/or solar power
    - Purchase of renewable energy

2.4.2 Marine Highway Program

The purpose of U.S. Department of Transportation's Marine Highway Program (MHP) is to "designate short sea transportation routes as extensions of the surface transportation system to focus public and private efforts to use the waterways to relieve landside congestion along coastal corridors."[4] The extent of the MHP is illustrated in Figure 2-7, which shows 11 designated coastal and inland waterway marine highway corridors around the country. A Marine Highway Corridor (MHC) is defined as "A water transportation route that serves as an extension of the surface transportation system that can help mitigate congestion-related impacts along a specified land transportation route. It is identified and described in terms of the land transportation route that it supplements, and must, by transporting freight or passengers, provide measurable benefits to the surface transportation route in the form of traffic reductions, reduced emissions,

[3] Drawn from the Green Port Policy of the Port of Long Beach
[4] Federal Register /Vol. 75, No. 68 / Friday, April 9, 2010 /Rules and Regulations, PART 393, § 393.1 (a)

energy savings, improved safety, system resiliency, and/or reduced infrastructure costs."[5] The designation of corridors means the potential for federal funding for research, planning and infrastructure improvements along the corridors.

Figure 2-7: Map of Marine Highway Corridors

Source: MARAD

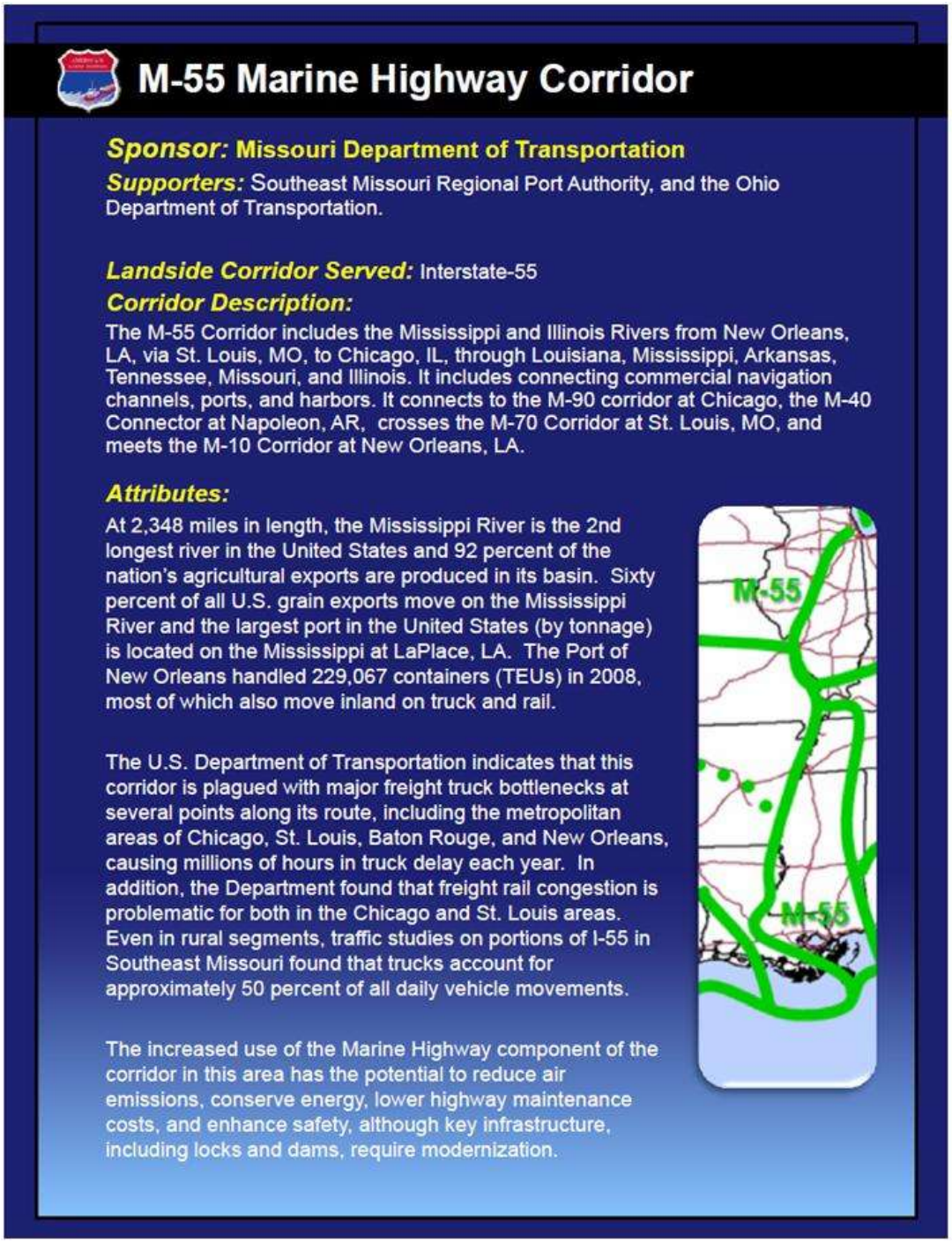
The principle corridor of interest to the Jefferson County port is M-55 (described in **Figure 2-8**), which includes the Mississippi and Illinois Rivers from New Orleans to Chicago. The U.S. Department of Transportation indicates there are significant incidents of freight truck bottlenecks in major metropolitan areas along the corridor – St. Louis, New Orleans, Baton Rouge, and Chicago. Similarly, freight rail congestion was found to be problematic in St. Louis and Chicago. The expansion of freight movement by waterway has the potential to provide environmental benefits along the corridor (for example, reductions in air emissions and conservation of energy) and to lower highway maintenance costs. Expansion of waterway traffic would require improvements to key infrastructure, including modernization of locks and dams. However, the need for improvements to locks and dams only impacts waterway service north of Jefferson County port (and St. Louis). The Jefferson County port sites are situated south of the last lock on the Mississippi River (Chain of the Rocks Lock #27) and so there is lock-free navigation between St. Louis and New Orleans.

A secondary corridor of interest to the Jefferson County port is M-70 (described in Figure 2-9), which includes the Missouri, Mississippi and Ohio Rivers, from Kansas City to Pittsburg, Within Missouri, the

[5] Federal Register /Vol. 75, No. 68 / Friday, April 9, 2010 /Rules and Regulations, PART 393, § 393.1 (b)

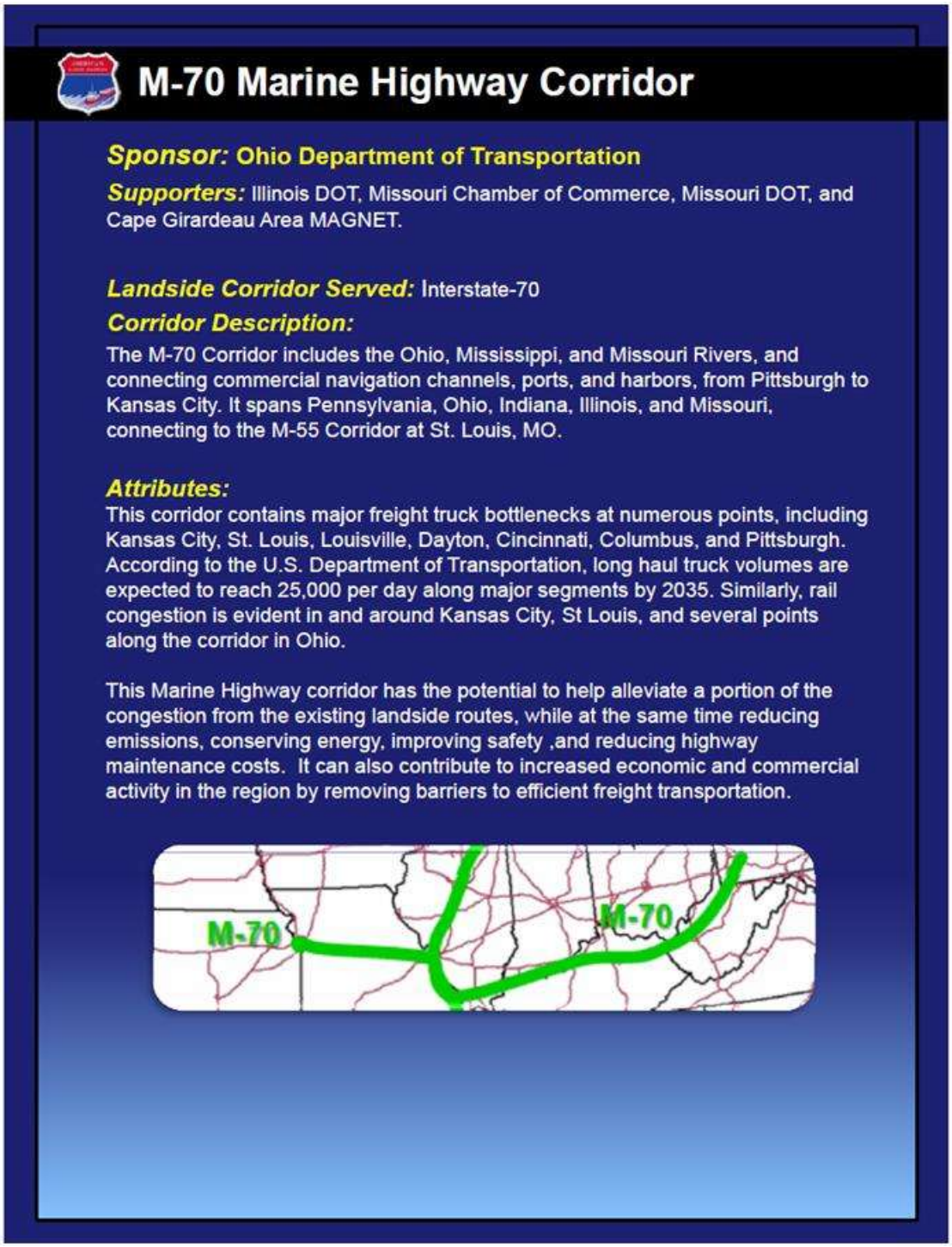
corridor is an alternative to the I-70 highway. Similar to the M-55, portions of the corridor are along lock-served waterways. The long term development of the M-55 and M-70 corridors may generate opportunities for new cargoes at the Jefferson County port, including containerized cargo moving by barge as discussed earlier in Sections 1.9 and 2.3 of this Report.

Figure 2-8: M-55 Marine Highway Corridor



Source: MARAD

Figure 2-9: M-70 Marine Highway Corridor



Source: MARAD

2.5 Market Opportunities and Facility Planning

This update of the trade level forecasts continues to support the findings of the Phase I study. The project site is in a relatively mature cargo market with the major bulk commodities having average annual growth rates in the low single digits. However, such low growth is still projected to generate significant additions to regional cargo tonnage over the 30-year planning horizon. This growth is expected to require investment in existing and new terminal handling facilities. The Jefferson County port sites offer an attractive proposition - the availability of a waterfront property with joining backlands for development and good transport connections – for long term market needs.

Similarly, modest projected growth of the regional containerized cargo market will still generate significant new volumes over the 30-year planning horizon. This growth may offer opportunities for the establishment of a niche container-on-barge service and terminal for the St. Louis/Eastern Missouri region. Other possible drivers are long-term concerns over the fuel costs, environmental impacts and congestion of competing transport modes. However, container-on-barge service must overcome challenges such as equipment balances, transit times, and container handling costs to be consistently competitive with alternative modes.

Based on the interview responses, the opportunities for the Jefferson County port sites can be delineated as shown in Table 2-9. The primary opportunity, classified as "Early Adopters" would be shippers within a reasonable truck distance of Jefferson County port who would achieve an immediate cost saving from using a terminal at this location. A challenge from a market development view point is more distant shippers with established shipping channels and requirements for rail service to Jefferson County ports. Shippers who have an established network of terminals along the river (asphalt, heavy oils, etc.) are less likely to consider a new terminal location unless their existing facilities face future constraints.

Table 2-9: Summary of Market Opportunities Based on Interview Responses

Opportunity Examples			
Priority	**Early Adopters**	**Medium Term Prospects (Requires substantial marketing effort)**	**Long Term Prospects (Requires population or industry expansion)**
High Shippers located in proximity to the Jefferson County port	Aggregates Sand Scrap		
Medium Shippers who find an advantage using the Jefferson County port design features		Grain shippers requiring storage Missouri River Shippers Coal Shippers	
Low Future population expansion or manufacturing in the Jefferson County port area			Cement Liquid bulk Container-on-barge

Source: TranSystems

The medium term shippers either find an advantage in Jefferson County over the potentially more congested ports in St. Louis or need a sole concession, dedicated terminal that fits their medium term business plans: large grain shippers needing rail access, Missouri River shippers needing an alternative loading site to overcome low-flow Missouri River conditions, and coal and coke exporters that want a dedicated, rail served terminal for high volume operations. In the long term, a general cargo terminal would allow flexibility to handle containers should such a service be established as well as handling cement, bundled lumber, steel and other unitized cargo as demand develops. Additionally, a long term need for import of liquid petroleum or fertilizer may support development of a dedicated liquid bulk facility.

Important elements for planning are bulk storage and loading/discharge facilities, and tug/barge support services. A summary of the different requirements raised by respondents, as well as the importance of each requirement, is presented in Table 2-10. The provision of environmentally state of the art facilities capable of meeting ever increasing environmental regulations would be viewed as positive, if not a requirement. Terminal design that facilitates expeditious spill containment, or reduces/eliminates dust and particulate matter during cargo handling operations would be considered an advantage.

Table 2-10: Summary of Project Development Factors Based on Interview Responses

Market Sector							
Factor	**Aggregate / Sand / Cement**	**Scrap Metal**	**Grain & Ag. Products**	**IP Grain**	**MO River Shippers**	**Bulk Liquids and Chemicals**	**Container-on-Barge**
Cargo Storage / Handling							
Open Storage	M	H	L		M		
Load/Unload Conveyor	H		H		H		
Grapple / Magnet		H					
Grain Silo			H		H	—	
IP Load Facilities				H			
Container facilities				H			H
Liquid Storage Tanks						H	
Terminal Piping						H	
Tug and Barge Services							
Barge Storage	M	M	M	M	M	M	M
Barge Cleaning	M	M	M	M	M	M	M
Emergency Services	M	M	M	M	M	M	M
Fleeting Service	H	H	H	H	H	H	H
Land Transport							
Rail Access	M	M	H	H	H	H	M
Rail Avoiding St. Louis	M	M	H	H	H	H	H
Truck Access	H	H	H	H	H	H	H
Priority Level: Low, Medium, High							

Source: TranSystems

In the Phase I study, the overall implications for long-term facility planning at the Jefferson County port sites were:

- Designate waterfront property for cargo related activities including cargo handling, cargo storage and barge services.
- Designate selected upland properties for port industrial uses including warehousing related activities.
- Designate selected upland properties for commercial uses, either related or unrelated to cargo activities. Such uses may include warehousing, manufacturing and commercial facilities.

The above findings can be refined for the initial phase of development. With a focus on "Early Adopters", the identified market opportunities could generate up to 700,000 tons of dry bulk cargo per year (Table 2-11). Realization of these opportunities will require negotiations with individual shippers on specific volumes, service needs and costs. Based on the information provided by interviews, the opportunities would require a basic bulk terminal facility, offering open storage and barge loading, with possibly a requirement for rail access. The equipment required for barge loading will be driven by the types of commodities – conveyors for aggregates and sand, and a grapple and magnet for scrap metal.

Table 2-11: Market Opportunities for Short Term Facility Planning

Commodity	Throughput per Year	Terminal Storage	Barge Loading
Aggregates	Up to 300,000 tons	2 acres	From storage to barge using covered hopper / conveyor system
Sand	Up to 250,000 tons	None (open storage and/or a silo is optional)	Direct from truck to barge using covered hopper / conveyor system
Scrap Metal	Up to 150,000 tons	3 to 4 acres	From storage to barge using a grapple and a magnet (direct from truck to barge is an option but using storage is preferred)
Total Above	**Up to 700,000 tons**	**5 to 6 acres**	

Source: TranSystems derived from interviews

3 RECOMMENDED DEVELOPMENT PLAN

3.1 Introduction

The Phase II Recommended Development Plan is an elaboration and refinement of the findings that were developed during the Phase I planning process. In Phase II, a detailed market assessment for specific cargoes was applied to alternative plans for the Jefferson County port to develop a recommended approach that is feasible under a realistic set of economic expectations. Additionally, each site along the Mississippi River was evaluated as part of an overall system of port and inland transportation assets that can function together as a single port entity. This Recommended Development Plan takes a long term perspective in the analysis of land use and future economic growth with targeted early "seed projects" along with mid-term and long-term development options.

3.2 Recommended Uses

The Jefferson County Port Authority potential development sites at Herculaneum, Crystal City and Pevely represent a broad spectrum of riverfront and upland properties with a variety of existing uses, attributes and limitations. At the same time, the commercial market for riverfront and upland commercial activities is generally defined by the current operations in St. Louis and by the local transportation infrastructure. Therefore, there are multiple determinants of the possible site uses including the following factors:

- Current and projected demand for river port facilities
- Potential demand for related upland commercial development
- Existing site configuration, elevation, terrain and environmental values
- Inland transportation connectivity
- Waterways and navigation conditions
- Commercial and residential activities adjacent to the site

In a previous phase of analysis, a broad survey of these issues was taken to develop an overall land use plan with conceptual development alternatives for each site. From that analysis, ten recommended port uses and nine recommended upland developments were identified and evaluated for their site compatibility and their potential to augment river port development. These recommended uses were subjected to the Phase II interview-driven market evaluation described in Section 2 and the following commercial port and upland opportunities were selected for inclusion in the Recommended Development Plan:

- Public dry bulk terminal for export of local aggregate and industrial materials
- Public general cargo terminal for import and export of building materials, industrial goods and unitized or containerized freight
- Public or sole concession dry bulk silo storage grain export terminal
- Sole concession mechanized dry bulk export terminal
- Sole concession liquid bulk import terminal
- Upland distribution center for truckload or containerized freight
- Upland warehouse and manufacturing "flex space"
- Upland warehousing and rail access for rail-dependent carload freight
- Upland professional office space and business park

The market for upland development is somewhat more difficult to speculate as current economic conditions have created a surplus of commercial space throughout most of the country. Therefore, none of the upland developments are considered likely in the early phases of this Recommended Development Plan. The highest commercial rents and the lowest vacancies in the region are currently found in the properties

considered as flex space that combine warehousing, manufacturing and office areas in a single building. As the local economy develops in the medium term, demand for commercial space will recover and flex warehousing/manufacturing space along with truck in/out distribution operations will be viable where a combination of land availability, highway access, and compatible site uses make them possible. If container-on-barge operations are going to be viable in the St. Louis port region, this activity will occur at a river port that is in proximity to upland warehousing, manufacturing and distribution centers, and has good local road and interstate access. Longer term, the growing use of rail carload and intermodal traffic will create a need for rail car unloading and warehousing facilities. In the same time frame, the growth of commercial and industrial employment in the region will likely spur development of dedicated upland professional office space in a business park setting.

3.3 Ancillary Facilities

The identified Jefferson County port sites will be improved as a combination of port, port dependant and upland commercial uses. Investment in these uses will be driven by private capital commitments to the improvement of river cargo traffic for local private industry. Therefore, the ultimate success of the Jefferson County port sites as port and commercial developments will depend on its attractiveness to private industry. Ancillary facilities play a significant role in attracting and facilitating river port cargo as well as upland economic development. They are also necessary components of an integrated regional port system and ancillary facilities that will be attractive to freight services and light manufacturing enterprises are common to many of the potential uses.

The upland developments planned for the Jefferson County ports focus largely on commercial freight and light manufacturing uses that can benefit from having good highway and rail access as well as adjacency to the commercial river port. The exact footprint and configuration of these upland facilities will largely be determined by the needs of the private commercial developers and users that locate there. However, local community amenities such as parks and public access sites are also important in their role of attracting and maintaining a qualified work force as well as enhancing the overall quality of life in the area.

3.3.1 Fire and Public Safety

Organized response to incidents involving fire, chemical spill or injury accident is necessary to reduce the risk and related insurance rates for commercial developments. The following Jefferson County emergency response providers are located within the vicinity of the proposed port sites as shown on Figure 3-1:

- Police
- Fire
- Hospital

The emergency responders would be prepared to respond to industrial incidents including chemical spill, petroleum product fires, hazardous emissions and other related issues of public safety and workplace accidents. This preparation not only includes training but also the appropriate equipment such as protective suits, respirators, foam fire suppressants and other specialized industrial safety gear.


Proposed Port Sites
Pevely Site
Herculaneum Site
Crystal City Site
Railroads
BNSF
UP
PVTX
Police Station
Fire Station
Hospital
0 0.25 0.5 0.75 1 Miles
Figure 3-1: Emergency Responders
Jefferson County Port Study
TranSystems
Z
61
55
21a
67

3.3.2 Barge Handling and Fleeting

Over ninety percent of Lower Mississippi River trade is movement of exported (down-river) or imported (up-river) cargo with international destinations or origins. Of the up-river barge movement, approximately eighty percent of the barges are empties being repositioned from transshipment ports in South Louisiana back to the St. Louis area. These barges will be cleaned, repaired and stored while awaiting a down-river cargo. Additionally, loaded barges will be held near the terminal awaiting a down-river tow. Therefore, staging and handling barges is an essential component of river port operations.

There are two fundamental types of push-boat used in most Lower Mississippi River barge operations. The long haul traffic between the up-river terminals and the South Louisiana ports is handled by "line boats" of 6,000 to 10,500 horsepower or more, that can push 30 to 40 barges at one time. Barge handling at the terminal, or shunting for short distances between terminals, is accomplished by smaller, 1,200 horsepower to 2,000 horsepower "switch boats." The overall operation of marshalling, switching and shunting barges is generally referred to as "fleeting."

3.3.2.1 Line Boats

Line boats as shown in Figure 3-2 are owned and operated by river shipping companies that contract for freight with cargo owners. Many of the line boat operators also own and lease barges for specific commodities or customers. Line boats are kept operating continuously, often taking fuel and changing crew members while en-route. As these boats are generally home-ported and maintained at the South Louisiana ports, there would be no ancillary facilities required in Jefferson County to support line boats.

Figure 3-2: Typical 10,500 Horsepower Line Boat

Source: TranSystems

3.3.2.2 Switch Boats

Switch boats as shown in Figure 3-3are used to position barges in and out of the fleeting or storage area and to help build or break down a line boat's tow. At the major terminals in St. Louis, an entire tow of 30 to 40 barges is often assembled for the line boat to take down-river. However, at the smaller terminals, only a few barges would be added or extracted from the tow. In this operation, the line boat would hold the tow in position against the current, often using a mooring point or "cell" in the process. A switch boat would then either extract the needed empty barges or deliver loaded ones and assist in lashing the barges into the overall tow.

Figure 3-3: Typical 2,000 Horsepower Switch Boat

Source: Panaramio

Often a switch boat will be associated with a specific port to handle their barge movements. However, for terminals with very small volumes, the switch boat may be called from another port when barge switching is necessary. Relocation of a switch boat from a distant port could cause delay and increased barge fleeting costs; therefore, it will be highly desirable to maintain sufficient barge traffic to justify a full-time switch boat for the Jefferson County ports.

By interview with Mississippi River barge operators, it was determined that two to four barges per day (roughly equivalent to 500,000 tons per year) would be the minimum volume to justify a full-time switch boat at any given port. Ideally, if Herculaneum or Crystal City has dedicated switch boats, then other nearby terminal operations could share a single switch boat to optimize its utilization. At Herculaneum, the current is quite strong during high river stages. Therefore, a switch boat stationed there should be of higher horsepower.

3.3.2.3 Hopper Barges

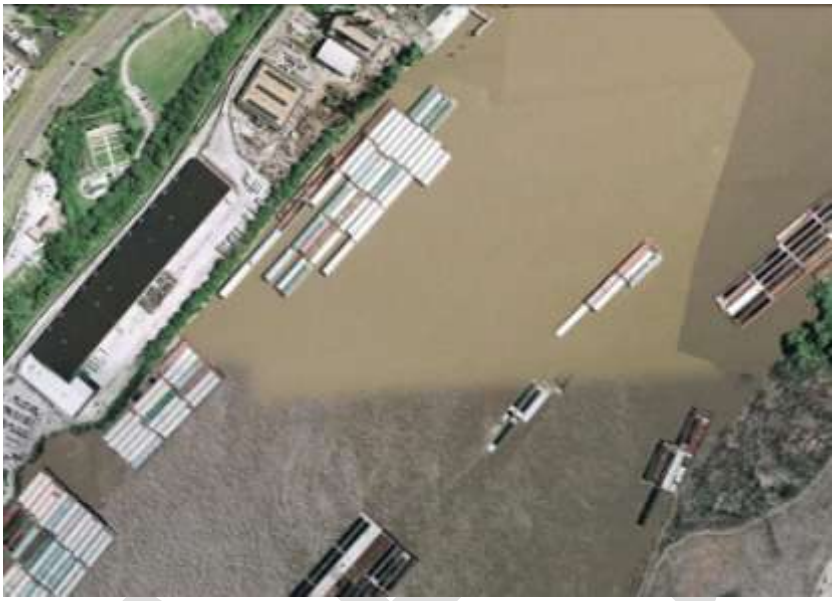
Although there is a broad variety of barges used on the Mississippi River, the most common size and type is known as a "jumbo hopper barge." This barge is normally 200 feet long, 35 feet wide and 12 to 14 feet from deck to bottom (not including the coaming or hopper covers). A loaded jumbo hopper barge will draw from 9.0 to 12.0 feet, depending on the cargo density and carry 1,500 to 2,300 tons. Empty barges will draw about 2.0 feet. The jumbo hopper barge should be taken as the "design vessel" for terminal layout, barge fleeting areas and other ancillary facilities.

3.3.2.4 Barge Fleeting

Barges at the port, both empty and loaded, are referred to as being "in fleet." Figure 3-4 presents an example of typical barge fleeting in St. Louis. The required barge capacity of a given fleet is highly variable and depends on the nature of cargo being handled and on the frequency of barge movements. However, small fleets generally range from 30 to 60 barges. Common practice is to provide anchored mooring buoys or permanent cells along the river to hold the barges in fleet. With six barges moored side by side, five fleeting positions would support 30 barges for every 1,000 feet of river shoreline. Fleeting areas may be found on both sides of the river and must avoid the USACE channelization wing dams and be clear of the normal navigation channel. Additionally, fleeting must be planned with upstream navigation in mind which does not always follow the deeper, faster flowing main channel.

Mooring cells are larger structures (10' to 30' in diameter) constructed of interlocking sheet piles driven in a circular or "cell" configuration. Cells are backfilled with aggregate and concrete and represent a permanent structure in the river. Buoys are anchored in place and may be moved if necessary, although the anchors may become buried too deep to be recovered. Cells are costlier than buoys, but may be necessary at the Jefferson County ports due to the river current.

Figure 3-4: Typical Barge Fleeting in St. Louis



Source: Google Earth

3.3.3 Barge Cleaning and Servicing

If barges are to be fleeted and dispatched from Jefferson County, then a small facility will be required to perform cleaning and servicing of the barges prior to loading. This can consist of a permanent float with bridge access or a bulkheaded shoreline with two barge spots of 200 feet length. For most operations, the facility should be capable of cleaning four barges per spot per day. The float should support a small crane that can place a skid-steer loader in the barge hopper to remove waste cargo. Cleaning and servicing would include power-wash and sweep of the hopper interior plus minor welding and repair of damage above the empty water line. Cleaning of tank barges is not expected to take place at the Jefferson County port sites.

Waste cleaning water can be retained in a holding barge or pumped to the shore for disposal. Solid waste may be trucked inland for disposal or may be sold to a salvage company. The barge cleaning facility would likely include a mooring for one or more switch boats. This mooring would take up one end of the service float or may require a small dedicated pontoon of 80 feet to 100 feet in length. The switch boat could be fueled from the shore by tanker truck, or could run to St. Louis for fuel. In either case, a permanent fueling float would not be required.

3.4 Preliminary Environmental Review

The Regulatory Branch of the US Army Corps of Engineers (USACE) coordinated a request for preliminary feedback and comments for the future planning and permit submittals for the Jefferson County's interested in developing the three port locations. The Phase I document as well as the draft site layouts presented to the public at the September 2010 public open house were presented to various agencies including multiple branches/divisions within the USACE, Missouri Department of Conservation, Missouri Department of Natural Resources, Inland Marine Services, US Environmental Protection Agency (EPA), and US Fish and Wildlife Service. The establishment of a port at any of the proposed sites will trigger the need for additional review and comments through a Section 10 Rivers and Harbors Act and Section 404 Clean Water Act Individual Permit process, including the distribution of a public notice. The following sections regarding each port site offer summaries of the written comments received from US Army Corps of Engineers Regulatory and Hydrologic & Hydraulics Branches, US EPA Regions 5 & 7 NEPA Team/Interstate Water, USFWS Ecological Services of the Marion Illinois Sub-Office. Additional feedback from the USACE Strategic Initiatives Coordinator was also received and is summarized in Section 4.6.3.2 regarding federal aid and the likelihood of developing projects using one of these programs.

From a Regulatory Branch standpoint, any of the three proposed Jefferson County port sites will likely draw a lot of scrutiny during the regulatory permitting process due to their potential impact on wetlands, waterways, potential critical habitat, federal and state listed species, navigation, etc. Agencies will work with the Jefferson County Port Authority through the environmental clearance process to address any environmental concerns through the design and permitting phases and collaborate on mitigation, if needed.

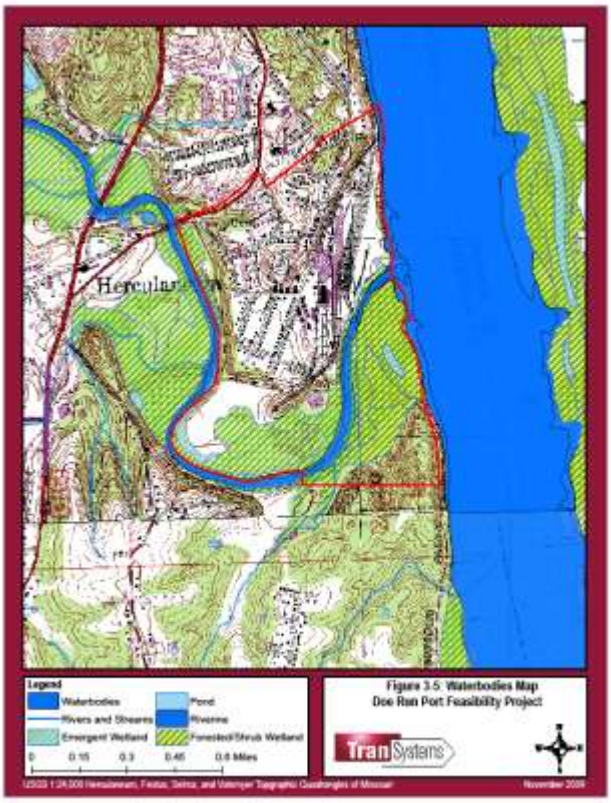
3.5 Conceptual Development – Herculaneum Site

The Herculaneum site is located at Mississippi River mile 152 and consists of approximately 4,500 feet of total river frontage adjacent to the existing Doe Run Company lead smelter and refining plant. Usable river frontage immediately adjacent to the site comprises approximately 1,800 feet located between the bluffs at the north of the site and the mouth of Joachim Creek on the south. Beyond Joachim Creek to the south, there is an additional 1,900 feet of river frontage located to the east of the UP railroad tracks. The Herculaneum site is approximately one quarter of a mile from the Herculaneum City center and will be directly accessible from Interstate Highway 55 via a new bridge connection to the McNutt Street interchange.

3.5.1 Existing Conditions

The Herculaneum site includes the nearly 150 acres of land owned by the Doe Run Company, of which approximately 115 acres is uplands and 45 acres is river frontage. This site is within the municipal boundaries of the City of Herculaneum in Jefferson County, Missouri approximately 26 miles south of St. Louis. The Doe Run Company and prior companies associated with this site have owned and operated lead smelting activities on this land for over one hundred years. Although the City of Herculaneum predated lead smelting at the site, it has built up around the smelter in response to the economic activity associated with lead reduction and refining. Recently, the Doe Run Company has been required to buy and remediate large parts of the city center that were contaminated by lead fallout from the plant. Additionally, a large part of the smelter is due to be closed within the next four to seven years and will be available for repurposing for commercial port and related4. Therefore, the Herculaneum site has a combination of available land for port development and single ownership by an entity that is motivated to put the land into economic use.

The terrain is a mix of high bluffs, lower rolling uplands, and river floodplain. As shown in Figure 3-5, it is transected by Joachim Creek which flows into the Mississippi River south of the Doe Run Company plant. This configuration of water bodies also introduces a perimeter of wetlands as well as wetlands comprising the entire area of the site south of Joachim Creek.



The UP Railroad has a line that runs from Crystal City along the riverfront, crossing Joachim Creek at Herculaneum, and proceeding north through Pevely to St. Louis. East of the UP Railroad line are approximately 38.5 acres along the river front that have been designated as port priority. An additional 21 acres of port priority land is located west of the railroad tracks on that portion of the Doe Run Company plant scheduled to be closed and demolished by 2017. However, 20 acres of the port priority land that is south of Joachim Creek includes potential wetland areas and floodplain deciduous forest lands that may incur significant environmental permitting and mitigation costs.

Therefore, of the land owned in fee-simple by the Doe Run Company, approximately 18.5 acres of waterfront, plus 21 acres of contiguous upland have been identified for potential near term and medium term port development with an additional 20 acres that could be developed in the long term, if demand for river port operations in Herculaneum can justify the mitigation costs.

Of the approximately 115 acres of uplands belonging to Doe Run Company, over half of the acreage is in large contiguous blocks, with few conflicting uses, which could support commercial development. In addition, the Doe Run Company has reserved 33 acres for continued lead processing operation and potential new lead reduction technologies. The remaining 82 acres is best suited to open space, road corridors and recreational uses.

The Doe Run Company currently maintains three existing waterfront facilities; a dry bulk unloading pontoon with caissons and a conveyor; a liquid bulk unloading facility with caissons and a pipeline; and a process water pumping station. The dry bulk unloading pontoon was originally designed to receive lead concentrate by barge for smelting at the plant. However, at this time it is not being used. The liquid bulk facility is designed to receive sulfuric acid used in the lead process. It will likely go out of use as the plant is closed. Process water is used at the plant, but use will be reduced significantly with closure of the smelting operation.

3.5.2 Alternatives Considered

In the Phase I evaluation, Herculaneum was considered as the primary river port location for Early Adopters as the 18.5 acre existing riverfront site will be available in the near term. Additionally, there is an established port use for this site and some existing facilities that may be suitable for constructive reuse.

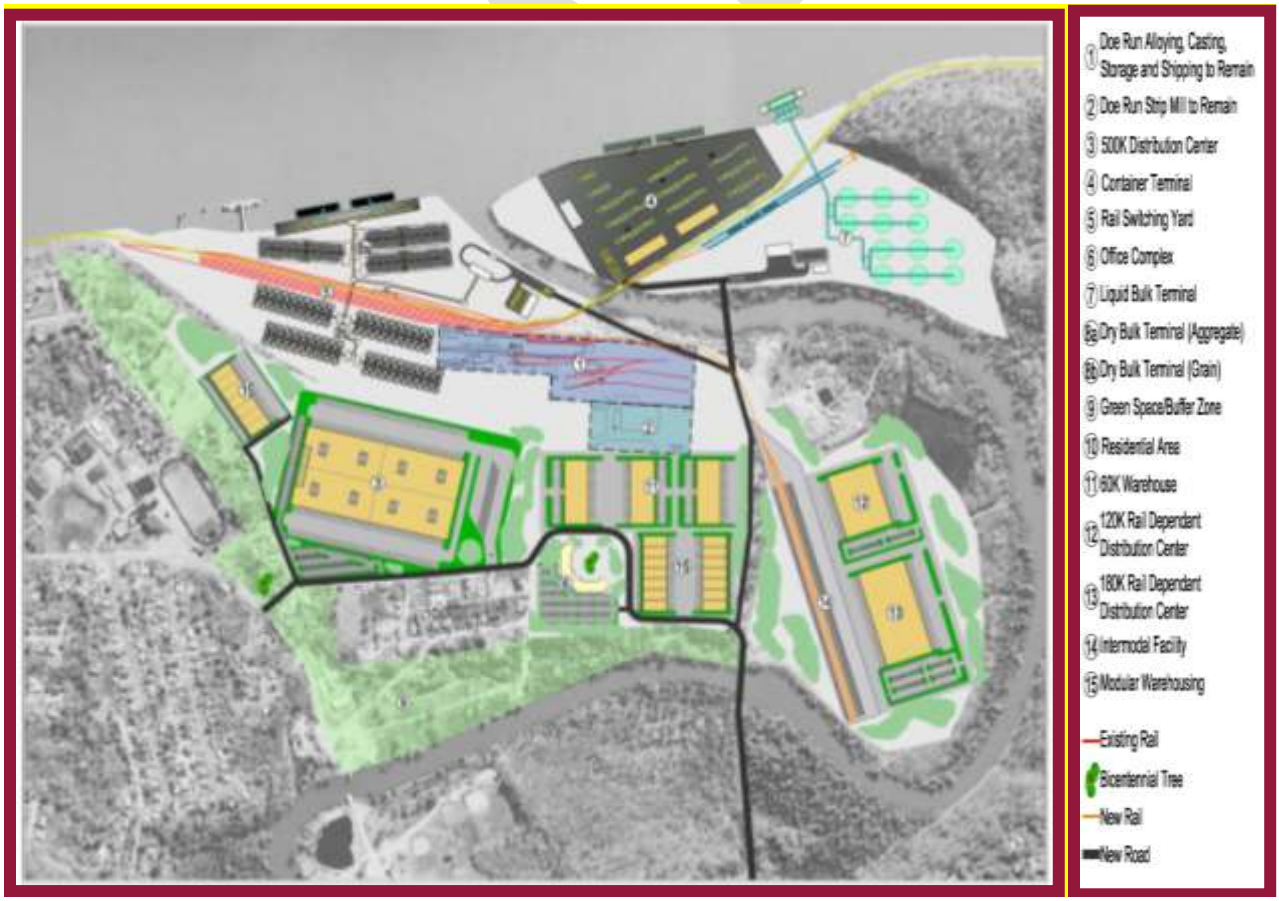
Therefore, the river front was designated for high priority port use. Areas to the south of Joachim Creek were also considered for port use on both sides of the railroad tracks. However, flood plain and wetland considerations made these areas a lower priority.

Herculaneum also has large contiguous parcels of available upland which could support near term commercial development. Therefore, a large (500,000 square feet) distribution center on the upland site was common to all of the alternatives under consideration. Additionally, a "Bicentennial Tree" had been previously designated within the development area. This tree was preserved in the alternatives that were considered and used as a focus for a future professional office center. Based on these parameters, the following two alternatives were presented in the Phase I evaluation.

3.5.2.1 Alternative 1

Alternative 1 shown in Figure 3-6 focused on developing the bulk terminal port and rail activities as a primary driver with warehousing, distribution and containerized cargo as secondary and tertiary activities. Alternative 1 also includes a liquid bulk river terminal for rail delivery of export products (such as biofuels) and small business incubator warehouses in the uplands. A rail-dependent warehouse complex with associated loading tracks for carload or containerized freight is included in Alternative 1 as well as the potential for general cargo or containerized cargo in future phases.

Figure 3-6: Phase I Herculaneum Site Alternative 1



Source: TranSystems

3.5.2.2 Alternative 2

Alternative 2 shown in Figure 3-7 focused on developing the uplands for distribution of containerized truck freight and associated light manufacturing. Two large distribution centers were proposed in this alternative with a general cargo and container terminal planned for the Early Adopter phase of development. The primary driver of this scenario is the potential relationship between river transportation of containerized freight and highway transportation of truckload freight as catalyzed by the warehousing and distribution operations as well as by local demand by the light manufacturing developments. Dry bulk and liquid bulk were considered for later phases of development in Alternative 2.

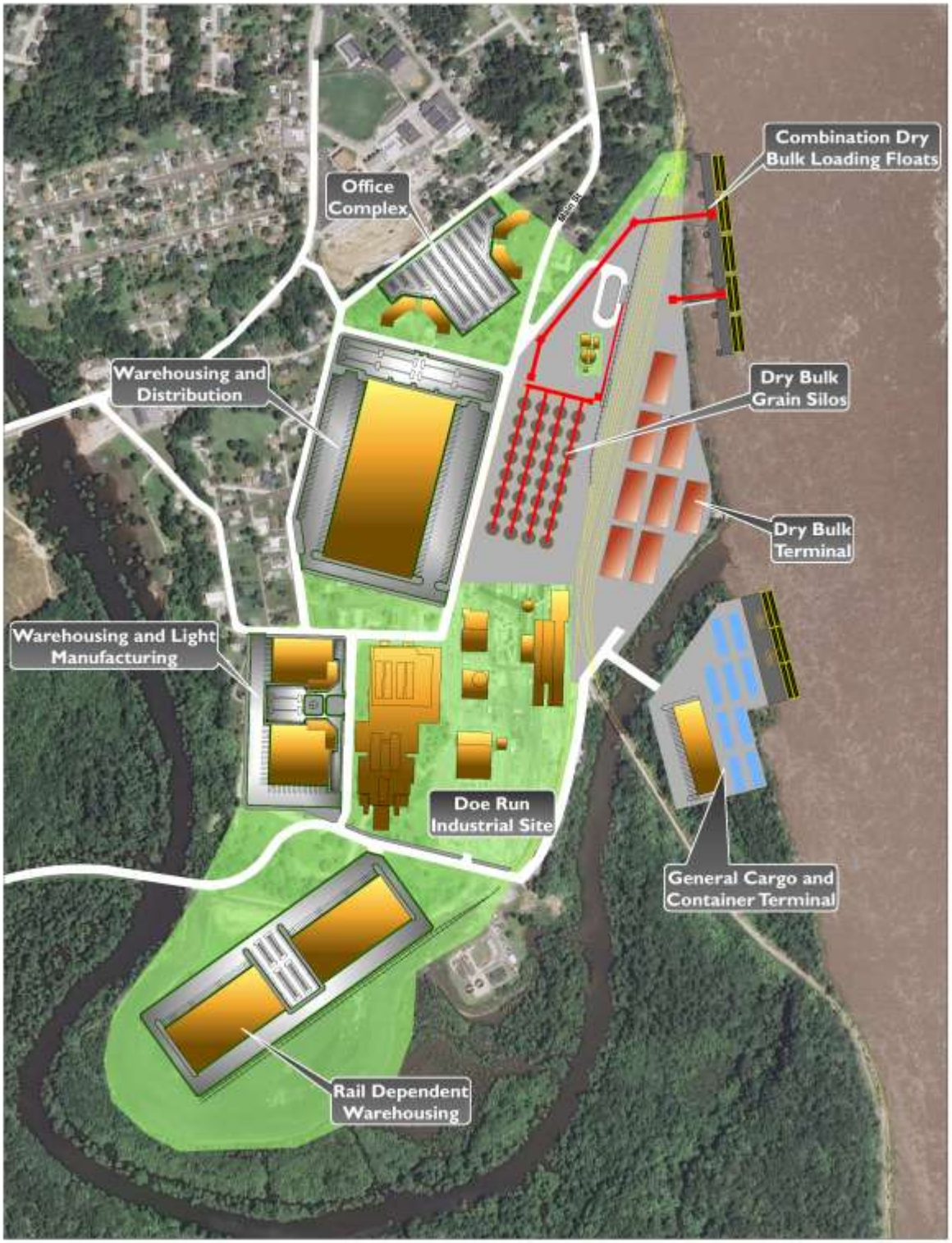
Figure 3-7: Phase I Herculaneum Site Alternative 1

Source: TranSystems

3.5.3 Recommended Plan

Subsequent market analysis of river port and upland development demand shows that the Early Adopters will be bulk commodity shippers on the river front and there will be limited demand for early phase, upland developments. Therefore, the scenario of promoting river transportation of containerized freight by developing upland distribution channels is probably not viable in the near term. The recommended plan shown in Figure 3-8 is a modification of Phase I's Alternative 1 and focuses the river port development on a near term plan for creating a public terminal to export dry bulk commodities that will serve the identified current needs of local industry.

Figure 3-8: Recommended Plan for Herculaneum Site



Recent analysis by the Doe Run Company shows that the new technology, lead reduction plant could be constructed adjacent to the existing mill and would have good adjacency for fabrication and distribution of lead products. Therefore, the proposed upland developments were reoriented to accommodate this new plan, with the professional office complex shown in the earlier alternatives being moved to the north of the site. Warehousing and manufacturing flex space was reconfigured as well to retain the Bicentennial Tree and to preserve the existing church and associated buildings along Station Street.

In the medium term, a sole concessionaire could be found for development of a silo dry bulk grain export terminal that makes use of the rail and highway connectivity at Herculaneum. In support of the rail activities, additional car storage tracks could be built on the existing smelter slag pile that is scheduled for closure by that time. The grain terminal is favored at the repurposed Doe Run Company site over a potential green field site in Crystal City due to the superior soil foundation bearing capacity found in this area of Herculaneum. Foundation bearing capacity is essential due to the high unit loads developed under grain silo structures. In this medium term phase, regional economic growth is projected to favor development of new upland mixed use warehousing and manufacturing flex space. Therefore, this activity, as proposed for Alternative 2, would likely be viable for the upland Doe Run Company properties. Similarly, medium term economic growth will also favor new distribution center developments that have good connectivity to the interstate highways and a ready labor force available.

In the long term, the recommended Herculaneum plan includes the opportunity for rail dependent warehousing adjacent to the storage tracks constructed in the medium term to support rail car switching and unloading at the grain silos. Additionally, development of the property south of Joachim Creek for general cargo and containers could take place in this time frame. However, such development would require significant mitigation. The site at Crystal City may be a better location for general cargo and containerized freight if developed within the targeted time frame. Finally, in the long term scenario, professional office space is proposed for the bluffs to the north of the Doe Run Company properties where it would act as a buffer between the proposed industrial uses and the existing residential areas. The liquid bulk terminal has been eliminated from the recommended Herculaneum plan as it is better situated at the Pevely site.

To support the recommended river port terminals and upland developments, the interior road network has been realigned to some degree. Station Street, Main Street, Joachim Avenue, and many of the residential streets have been maintained in their original configurations. However, Church Street has been realigned and School Street has been improved as a new access route for heavy truck traffic to the Doe Run Company Plant and new river port terminals. Most automobile traffic will continue to use the existing access at the Joachim Avenue Bridge. Additionally, a dedicated access and internal circulation plan is provided for the Doe Run Company lead plant operations to provide a single point of entrance and egress and facilitate truck washing operations. Truck traffic to the new, public dry bulk terminals would cross the UP Railroad line on School Street at the existing at-grade crossing, while truck access to the grain silos would be developed from Station Street to Main Street and Ferry Road (currently out of use). If a general cargo terminal is constructed south of Joachim Creek, then a new bridge, adjacent to the existing rail bridge, will be required for vehicle access.

Full build-out of the Herculaneum recommended development plan will result in three river port terminals that include two fixed dry-bulk barge loaders at the north end of the site and a quay wall berth for the general cargo terminal to the south. These terminals are described in more detail in the following sections:

3.5.3.1 Herculaneum Public Dry Bulk Terminal

The purpose of the public dry bulk terminal will be to receive dry bulk commodities such (for example, aggregate, sand, and possibly scrap metal) for shipment by barge to downstream ports on the Mississippi River. The terminal is designed to load materials that can be delivered by truck, stored in an open yard and handled by front end loaders or conveyors to the barge loading point. The open storage area may be subject to flooding during extreme river stages (approximately 10-year events). Therefore, it is designed for materials that would not suffer measurable damage from exposure to weather or inundation. Terminal particulars include:

- Heavy truck access road with scales for measuring cargo delivery and empty truck tare weights
- The access point would also include a small administration building with facilities for the terminal workers.
- Twelve acres of heavy pavement for surface storage of cargo and for circulation and operation of dump trucks and front end loaders
- A dump pit with grizzly designed for a variety of materials up to 24 inches across (prepared scrap size)
- An elevated conveyor from the dump pit to the barge loading point with a gross rating of 800 tons per hour and a net rating of 600 tons per hour
- A grapple and magnet to load scrap from storage to barge
- A fixed cellular cofferdam support structure with a movable loading spout capable of loading 600 tons per hour into either of two barges rafted together
- Barge mooring floats with approximately 500 feet of barge berthing

3.5.3.2 Herculaneum Silo Grain Terminal

The purpose of this terminal will be to receive wheat, corn and other granular agricultural products for shipment by barge to downstream transloading or transshipment ports on the Mississippi River. The terminal is designed to load products that can be delivered by rail or truck, stored in a mechanized silo complex, and handled by conveyors to the barge loading point. The silo storage site will be constructed on fill and elevated above the 500 year river flood level. Terminal particulars include:

- Rail car unloading track with two hopper car dump pits, each having a capacity of 1,000 tons per hour
- Heavy truck access road with scales for measuring cargo delivery and empty truck tare, and one dump pit having a capacity of 1,000 tons per hour
- The truck scale area would also have an administration building for documentation and terminal worker facilities
- Thirty two silos that are 90 feet in diameter and 80 feet high, having an approximate capacity of 8,000 tons each
- A head house with elevators and scales that can load the silos at a gross rate of 4,000 tons per hour and discharge the silos at a gross rate of 1,500 tons per hour
- An elevated conveyor from the head house to the barge loading point with a gross rating of 1,500 tons per hour and a net rating of 1,000 tons per hour
- A fixed cellular cofferdam support structure with two movable loading spouts capable of loading 1,000 tons per hour into either of two barges rafted together
- Barge mooring floats with approximately 500 feet of barge berthing

3.5.3.3 General Cargo and Containerized Freight Terminal

The purpose of this terminal will be to load and unload unitized or containerized freight to barges for upstream or downstream traffic between the deepwater ports at the mouth of the Mississippi River. The terminal is designed to handle materials that can be delivered by truck, stored in an open yard or enclosed warehouses, and handled by cranes, forklifts or reach-stackers at the barge wharf. The open storage area will be above the 100-year flood elevations and the warehouse will be elevated above the 500-year flood stage. Terminal particulars include:

- Heavy truck access road with scales for measuring cargo delivery and empty truck tare
- Approximately 6.5 acres of heavy pavement for surface storage of unitized cargo and for circulation and operation of cargo handling equipment
- A transit shed warehouse having 75,000 square feet of storage
- The warehouse would also include a small administration area with facilities for the terminal workers
- Two mobile harbor cranes for loading and unloading barges
- A fixed cellular cofferdam supported barge mooring wharf with a quay wall that is 600 feet long and approximately 100 feet wide

3.5.3.4 Summary of Herculaneum Terminal Throughput Capacities

Terminal throughput capacities were estimated based on assumed parameters that include site constraints and standard equipment operating metrics. These capacity estimates are intended to provide a broad range of potential development options that can be used to evaluate the suitability of the site for specific users. However, detailed terminal operating parameters and associated infrastructure capabilities will depend on the specific needs of the shipper and terminal operator.

Maximum practical capacity (MPC) is the high end on a reasonable operating scenario. Continuous operation at this level is generally not economically sustainable and the lower "Sustainable Capacity" is used to estimate the most probably level of continuous operation. All bulk throughput capacities are measured in US short tons. Unitized or containerized cargo is measured in twenty-foot equivalent units (TEU). The estimated capacity is given in the following table with the full capacity model appended to this report:

Table 3-1Herculaneum Throughput Capacity Estimates

Terminal Type	Units	Maximum Practical Capacity	Sustainable Capacity
Public Dry Bulk Terminal	Tons/year	1,749,803	1,312,352
Silo Dry Bulk Grain Terminal	Tons/year	1,506,000	1,129,500
General Cargo Unitized Freight	TEU/year	45,438	34,079
General Cargo Loose Freight	Tons/year	304,167	228,125

Source: TranSystems

3.5.3.5 Herculaneum Manufacturing and Warehousing Flex Space

The purpose of the manufacturing and warehousing flex space is to provide combined office, production and shipping facilities for value-added activities such as light manufacturing, sub-assembly preparation, repackaging and localization. The space is designed to receive and ship freight that can be delivered by truck, and requires storage and processing. Building particulars include:

- Heavy truck access road and truck circulation with a total of 68 cargo loading bays in two buildings
- A total of 175,000 square feet of storage and manufacturing space in two buildings (100,000 square feet and 75,000 square feet)
- Two three story office areas with a total of 51,000 square feet for administration, R&D labs, and clean-room space in two buildings
- A total of 200 automobile parking spaces for staff and visitors at the manufacturing and warehousing flex space complex

3.5.3.6 Herculaneum Warehousing and Distribution Center

The purpose of the warehousing and distribution center is to receive truckload and container load freight that arrives in the area by intermodal or interstate truck traffic, and re-pack the freight into unitized loads for specific local and regional destinations. Future distribution center operations could include containerized import and export cargo shipped by river barge. Building particulars include:

- Heavy truck access road with internal truck circulation and 150 cargo loading bays.
- 130 trailer parking and storage spaces
- 500,000 square feet of warehousing and distribution storage space.
- A small office area for administration and warehouse worker facilities
- 350 automobile parking spaces for warehouse workers and administration

3.5.3.7 Herculaneum Rail Dependent Warehousing

The purpose of the rail dependent warehousing is to receive carload rail traffic and intermodal containerized freight and re-pack the freight into unitized loads for specific local and regional destinations. Building particulars include:

- Two warehouse units with 180,000 square feet of storage space in each unit for a total of 360,000 square feet of warehousing
- Heavy truck access road and truck circulation with 45 cargo loading bays per warehouse unit for a total of 90 roll-up truck bays
- Six rail car loading bays per warehouse unit plus approximately three acres of forklift circulation and cargo handling space
- A small office area for administration and warehouse worker facilities
- 200 automobile parking spaces shared by both units for warehouse workers and administration
- 3,600 feet of storage and loading track expandable to 7,200 feet

3.5.3.8 Herculaneum Professional Office Complex

The purpose of the professional office space is to be a stand-alone commercial office center for mid-sized to large businesses that wish to establish a business campus in a suburban area outside of St. Louis. The professional office campus is designed to be constructed in four phases depending on the needs of the owners and tenants. Building particulars include:

- Four office units, each having three floors of 15,782 square feet per floor for a total of 189,384 square feet of office space
- 580 automobile parking spaces for staff and visitors

3.5.3.9 Summary of Herculaneum Upland Development

Redevelopment of the upland areas behind the Doe Run Company lead smelter must include uses that result in capping areas of potential contamination as well as uses that do not include residential units. Doe Run Company may elect to build their new technology lead reduction plant on some of this area. The remaining area is laid out for commercial warehousing and light manufacturing that is compatible with site conditions. For the larger projects, such as the 500,000 square foot distribution center, site excavation and leveling will be required. Borrow material from this excavation will be used to raise the elevation of the silo grain storage, the rail dependent warehousing and possibly the riverfront barge terminals.

3.5.4 Herculaneum Ancillary Facilities

Over 90 percent of Lower Mississippi River trade is movement of exported (down-river) or imported (up-river) cargo with international destinations or origins. Of the up-river barge movement, approximately 80 percent of the barges are empties being repositioned from transshipment ports in South Louisiana back to the St. Louis area. These barges will be cleaned, repaired and stored while awaiting a down-river cargo. Additionally, loaded barges will be held near the terminal awaiting a down-river tow. Therefore, staging and handling barges is an essential component of river port operations.

The upland developments planned for the Doe Run Company property focus largely on commercial freight and light manufacturing uses that can benefit from having good highway and rail access as well as adjacency to the commercial river port. The exact footprint and configuration of these upland facilities will largely be determined by the needs of the private commercial developers and users that locate there. However, the ancillary facilities that will be attractive to freight services and light manufacturing enterprises are common to all of the potential uses.

3.5.4.1 Barge Handling and Fleeting Requirements

Port development planning at Herculaneum must include provision for switch boat operations, barge repair and barge fleeting. Initial terminals must be planned to include sufficient volumes of barge traffic (two to four barges per day) to justify full time switch boat operations in the area. If the Herculaneum terminals develop before other terminals in Jefferson County, then initial operations could be located there, with service to the other terminals as they come on line. Herculaneum is 2.3 miles upriver from Crystal City and 6.5 miles upriver from River Cement. Therefore, many local terminals in Jefferson County could benefit from a switch boat in the Herculaneum area.

In addition to a permanently stationed switch boat, Herculaneum would need a fleeting area for 30 to 60 barges. This activity could take place on either side of the Mississippi River and would require about 2,000 feet of shoreline. Preferably, the fleeting would take place near where barges were being loaded. It would also require USACE review of the proposed fleeting plan and a permit for installation.

3.5.4.2 Barge Cleaning and Servicing

A facility will be required to perform cleaning and servicing of the barges prior to loading. This would consist of a permanent float with bridge access and two barge spots of 200 feet length. The facility should be capable of cleaning four barges per spot per day and must be expandable to eight or ten barges per day. A portion of the facility must support a small crane that can place a skid-steer loader in the barge hopper to remove waste cargo. Waste cleaning water can be retained in a holding barge or pumped to the shore for disposal. Solid waste may be trucked inland for disposal or may be sold to a salvage company. The barge cleaning facility would likely include a mooring for one to four switch boats. This mooring would take up part of the service float or may require a small dedicated float of 80 feet to 100 feet in length. The switch boat could be fueled from the shore by tanker truck, or could run to St. Louis for fuel. In either case, a

permanent fueling float would not be required. The barge cleaning and servicing could take place at either Herculaneum or at Crystal City depending on where suitable shoreline can be developed.

3.5.4.3 Fire and Public Safety

Organized response to incidents involving fire, chemical spill or injury accident is necessary to reduce the risk and related insurance rates for commercial developments. The local Fire Department should have staff trained to respond to industrial incidents including chemical spill, petroleum product fires, hazardous emissions and other related issues of public safety and workplace accidents. The Fire Department must also have equipment such as protective suits, respirators, foam fire suppressants and other specialized industrial safety gear.

Figure 3-9: Proximity to Emergency Facilities and Response

In conjunction with the Fire Department paramedics, private ambulance services must have staff, training and equipment to evacuate work-related injuries. Currently the Herculaneum Fire Department has a station that will be less than one mile from the Doe Run Company properties when the connecting road is completed this year.

In addition, the commercial development will be approximately 7.2 miles or about 15 minutes from Jefferson Regional Medical Center, a full service hospital in Festus. This combination will ensure good response time and will not likely require additional infrastructure to support the project. Although the local police department is adjacent to the Doe Run Company properties, it is anticipated that routine security response will be met by private commercial security companies.

Therefore, the only additional fire and public safety measures that could be required may be specialized equipment and training as necessary for specific new industries. This would be particularly applicable if significant liquid bulk or other flammable cargos are to be handled at the new river terminals.

Source: TranSystems

3.5.5 Preliminary Environmental Review Comments

As noted earlier in this report, impacts to forested wetlands at the Herculaneum could be fairly substantial if full build-out is implemented and this preliminary review suggests finding mitigation near the project vicinity would be difficult. Therefore, Phase II conceptual site development incorporated modifications to minimize the impacts to wetlands to the greatest extent possible. Namely, the primary operations for Herculaneum reside north of Joachim Creek with latter phase options to the south. It has yet to be determined as to whether the forested wetlands to the south will be disturbed for future port facilities. Wetland areas must be delineated and classified before the regulatory permit process could be initiated.

Figure 3-10: River Structures Near Herculaneum – Proposed and Existing

Source: USACE

This port site is located across from a planned Navigation and Ecosystem Sustainability Program (NESP) project along the Illinois bankline; proposed structures are shown in blue in the graphic provided to the right in Figure 3-10. Agency guidance suggests the depositional patterns along the Missouri bankline should remain unchanged as the NESP project should not have any effect on the flow or depositional patterns along the Missouri bankline. There is plenty of depth in river at this location but the navigation channel is located along the Missouri bankline. This may restrict how far the facility can extend into the river. The docking facility is also located on top of an existing structure. There is agency concern about the potential conflict with the proposed NESP Herculaneum Side Channel Restoration project aimed at providing habitat for fish, wildlife and the endangered pallid sturgeon. In addition, increased navigation and fleeting resulting from the port in this area proposed for restoration will have to be investigated further.

Phase II development of the Herculaneum port facility concept has considered the existing river training structures and proximity to navigation channel thus far. Details of the potential impacts of the proposed riverfront operations, fleeting and navigation will be developed in future phases of facility design.

Finally, a concern is the contaminants issue at the Herculaneum site and potential release/redistribution of contaminants into adjacent water bodies which could expose aquatic resources to harm. Additionally, any maintenance dredging needed within the vicinity of the proposed port could result in redistribution of contaminants. Conceptual planning through Phase II acknowledges the special circumstances of the property to be addressed through encapsulation and unique grading requirements to be detailed in future phases of development, coordinated with the EPA and included in the contractor's mandatory special provisions well in advance of project implementation.

3.5.6 Herculaneum Navigation Issues

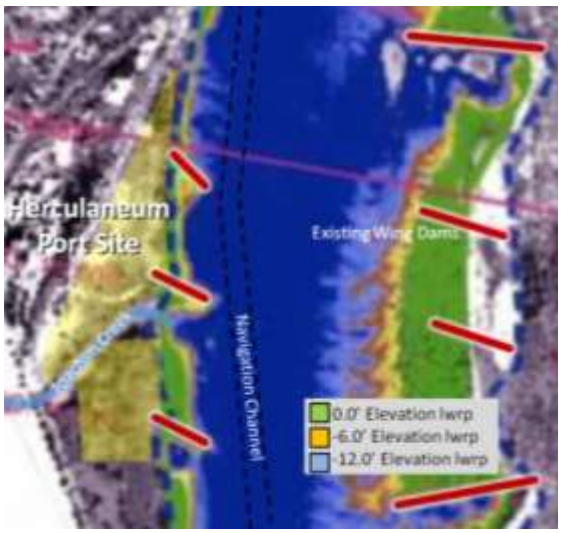
The Mississippi River is approximately 2,000 feet wide at Herculaneum and the channel centerline, or thalweg, is 500 feet from the western shore where it passes the Doe Run Company plant. Therefore, the strongest currents and the deepest channels are also found on the Herculaneum side of the river. Generally, downstream traffic follows the channel line on the western shore, and upstream traffic takes advantage of slower current and back eddies on the eastern shore.

Herculaneum is located at river mile 152 above the Ohio River[6] (AOR) in what is considered the Upper Mississippi River region. The site is downstream of Lock #27, the lowest set of locks on the Mississippi River. Therefore, full tows of approximately 37 barges can be received in this area. Soundings in the vicinity of the Doe Run Company site show a relatively steep drop-off to 20 feet below normal water elevation. This depth is sufficient for any river traffic found on the Upper Mississippi.

During high flow stages on the Mississippi River, current velocities in the vicinity of Herculaneum may constrain barge movements and will require higher horsepower switch boats than are normally used in the St. Louis area.

Figure 3-11: Herculaneum Wing Dam Locations

Three wing dam structures visible as red bars on Figure 3-11 have been constructed at Herculaneum by the USACE to channelize the Mississippi River at this location. The Two wing dams north of Joachim Creek will constrain the location of new port and barge fleeting facilities. Downstream of Joachim Creek there is a single wing dam that must be considered in the design of a general cargo, quay wall wharf along the river. The locations of these wing dams along the Herculaneum stretch of the river should be marked with buoys or pylons to warn switch boats operating in this area of the exact positions of these submerged obstructions.



Source: USACE

3.5.7 Conclusions

The Herculaneum site will be available for port development within the near term time frame and has an existing history of industrial river port uses. Therefore, it is well suited to development by the Early Adopters that need a public dry bulk terminal. Initial development costs will be lower than other sites, as there will be little mitigation and site preparation required along the river front. The location is also well suited for conversion to silo storage at the repurposed lead smelter site as it can receive cargo from either rail or truck.

Development of the Herculaneum uplands will only come to pass when market conditions warrant. However, the uplands too, have several features that will promote commercial uses. Foremost is the planned freeway access route directly connecting the Doe Run Company properties with Interstate 55. Secondarily, the site has contiguous properties available for development and an owner that is motivated to promote this development. Finally, the upland uses may benefit from their adjacency to the river port facilities being developed in the area.

[6] All river miles referenced in this report are defined as miles above the confluence of the Ohio River and the Mississippi River, and were obtained from the U.S. Army Corps of Engineers.

3.6 Conceptual Development – Crystal City Site

The Crystal City port development site is located at Mississippi River mile 149 and is immediately adjacent to the city center. The land is held by multiple owners. Adjacent to the site and southwest of the BNSF rail line, is a property that was formerly owned by Pittsburg Plate Glass (PPG). This property held a plate glass and automotive glass plant for many years and gave Crystal City its name. The site has since been vacated and is considered a brown-field due to the presence of glass shards and other contaminants in the soil. Currently a development company owns the former PPG site and has plans to build an iron ore reduction plant on the property for which the possible completion date or ultimate viability is not presently known.

Highway access to the Crystal City port site is presently limited and vehicle traffic must pass through the city center. This is not considered a viable option for commercial port operations by the local community. Therefore, a new truck route and highway connection must be established if any significant amount of cargo is to be trucked into the port. In contrast to the highway access, rail access to the Crystal City site is very good with two Class 1 railroads passing immediately adjacent to the property. Significant port development at Crystal City will depend on rail delivery of bulk cargo. Additionally, bulk cargo connected with operation of the iron ore reduction plant may also drive development of the Crystal City port.

3.6.1 Existing Conditions

The Crystal City site consists of approximately 6,500 feet of total river frontage. Behind this river frontage there is approximately 410 acres of flat lowland that is bounded on the north and west by the UP rail line and BNSF rail line. To the immediate south, the land is bounded by Plattin Creek where it flows into the Mississippi River. This lowland area is totally within the Mississippi River flood plain and was created by filling a small ox-bow as part of the channelization of the River. Currently, 235 acres of this property is under cultivation and the remaining 175 acres comprise a tract of deciduous forested wetlands that has been determined to have significant environmental value. This forested tract lies between the river frontage and the remainder of the property.

The terrain is flat river floodplain bounded by low bluffs. Plattin Creek is the principal site drainage connecting several areas of seasonal or perennial standing water with the Mississippi River. The UP Railroad has a line that runs from St. Louis, though Pevely and Herculaneum to the Crystal City port site where the UP line intersects the BNSF rail line. A UP industrial spur passes through Crystal City, but ends at a chlorine gas plant a few miles south of the city. The BNSF rail line connects south out of St. Louis via a track that runs parallel to Interstate Highway 55 and enters Crystal City from the west. This rail line intercepts the UP line, south of the port site and continues south across Plattin Creek and along the river front to Ste. Genevieve and beyond.

Since the river frontage at Crystal City is bounded by low lying wetlands and deciduous forest, there are few locations that are favorable for port development. Therefore, a "slack-water" notch has been proposed for the Crystal City site that would allow barge access to the interior of the property and give some protection from river currents for shifting and switching of barges. Excavation of the notch would generate some of the borrow material required for raising the overall port site elevation above the flood level. However, construction of the notch will impact the riverfront wetlands and will require significant mitigation measures.

Figure 3-12: Crystal City Wings Development Site

Source: Wings Enterprises, Inc.

In addition to the existing site uses, Wings Enterprises, Inc. proposes to construct an iron ore reduction plant on the former Pittsburg Plate Glass factory site as outlined in Figure 3-12. This reduction plant would receive iron ore from their Pea Ridge mine by slurry pipeline and process it into raw iron for smelting elsewhere. Product shipment and import of fuel are planned to be by rail and barge traffic. Wings has acquired the Pittsburg Plate Glass property and has options on other parcels, some of which are within the boundaries of the Crystal City port development site. The Wings Enterprises proposed rail unloading tracks and river port site could be incorporated into the overall port plan for the Crystal City port development. This integration of the two plans would reduce environmental impacts and achieve higher utilization of the new rail and port facilities.

3.6.2 Alternatives Considered

Three alternatives were created in Phase I. These alternatives addressed three possible suites of project drivers and site development goals. Primary considerations in the creation of these alternatives were: slack water harbor notch configuration, rail loop track geometry and connectivity, general cargo and containerized cargo compatibility and site utilization for value-added economic development. Although it was understood that wetlands and environmental constraints will be a significant element of the site development plan, specific wetland locations and potential impacts were not determined at the Phase I planning stage. The three alternatives under consideration are briefly described in the subsequent paragraphs.

3.6.2.1 Crystal City Alternative 1 – Maximum Slackwater Harbor

The first Crystal City alternative shown in Figure 3-13 proposes an "L" shaped slackwater barge harbor that is oriented primarily north and south. This configuration was intended to develop a port layout that made maximum use of the river barge operations. The L-shaped harbor would create a peninsula on the east side that could support a significant barge and tug services terminal as part of a regional Jefferson County Port fleeting operation. The margins of the harbor included contiguous quay walls for public break-bulk, merchandise cargo and project cargo uses. The layout would also favor "double loading" with potential fleeting areas on the Mississippi River side and cargo uses on the slackwater side. This alternative places the loop track to the south with possible liquid bulk, dry bulk and rail dependant warehousing within the loop.

Figure 3-13: Phase I Crystal City Site Alternative 1

Source: TranSystems

The Alternative 1 layout allows a greater concentration of port uses at the site by providing a long quay wall and extended waterfront land for cargo handling and storage. This alternative has the highest level of port use of the three under consideration.

3.6.2.2 Crystal City Alternative 2 – Mixed Use Warehousing and Bulk Cargo

Alternative 2 shown in Figure 3-13 was created with a single, rectangular harbor to allow a broader mixture of uses including expanded warehousing and liquid bulk with less emphasis on the slackwater harbor notch. This configuration would also create a "North Port" and a "South Port" wherein the bulk cargos would be primarily handled at the North Port and the container and merchandise cargo along with tug and barge services would be located at the South Port. Constructing the site this way would be more favorable for a phased development that creates bulk cargo capacity early in the construction sequence with area set aside for future development.

Figure 3-13: Phase I Crystal City Site Alternative 2

Source: TranSystems

In this configuration, the North Port, with its more conventional river port uses, could be built in the early phases with construction of South Port activities being dependant on later demand for barge services and merchandise cargos. Warehouse construction would be solely dependent on the level of demand.

3.6.2.3 Crystal City Alternative 3 – Maximum Container and Light Manufacturing

A smaller slackwater barge harbor is also considered for Alternative 3 shown in Figure 3-14. In this configuration, the mix of uses would favor light manufacturing in conjunction with a larger and denser container terminal with reduced barge services. This alternative would also be configured with a North Port and a South Port to facilitate phasing and to enhance functional adjacencies. However, additional land would be dedicated to manufacturing and warehousing in conjunction with the South Port merchandise cargo activities.

Figure 3-14: Phase I Crystal City Site Alternative 3

Source: TranSystems

The Alternative 3 terminals and upland developments are much more dependent on demand for unconventional cargo as well as on local manufacturing growth in the region. Therefore, this alternative would be favored if market trends shift in favor of increased manufacturing and demand for barge delivery of merchandise cargo. Therefore, success of Alternative 3 would be solely dependent on the level local economic growth.

3.6.3 Recommended Plan

The Phase II environmental review included interviews with the USACE and other regulatory authorities regarding river port development at Crystal City. In these discussions, it was revealed that impacts on the riverfront area of deciduous forest were strongly discouraged. Therefore, the recommended plan shown in Figure 3-15 developed a reduced slackwater harbor footprint with port infrastructure only present at the head of the harbor. Although an area of approximately 25 acres of deciduous forest would be impacted, the remainder would not be developed. This recommended approach reduces the area available for barge and switch boat servicing and requires that fleeting be carried out along fixed cells, either within the harbor or along the outer bank.

Figure 3-15: Recommended Plan for Crystal City Site

In order to minimize the riverfront area that is impacted by excavation of the slackwater harbor, a relatively steep bank must be maintained within the harbor by means of rip-rap shore protection. On the upstream side of the notch, the rip-rap is extended out into the Mississippi River to function as an enlarged wing dam. This wing dam would reduce sedimentation within the notch and protect the harbor entrance from river currents. However, the exact wing dam impact on sedimentation and current flows must be verified by hydrological modeling studies before a final harbor configuration can be designed.

The detailed market evaluation in Phase II also had a direct impact on the refinement of the alternatives. River port services at Crystal City will more likely fall into the medium to long term time frame and will include mechanized dry bulk and public dry bulk. General cargo and containerized barge services are more likely to take place in later phases of development. However, if the slackwater harbor is constructed, an early use of the general cargo terminal site would likely be for barge repair and switch boat berthing. Most of the development would be in support of the mechanized dry bulk terminal. Designed for 8,000 foot unit trains, the dry bulk rail loop track could be served by either BNSF or UP railroad. Six barge loading points could load over 3,000 tons per hour onto barges for down-river export.

The river port cargo terminal construction costs at Crystal City will be considerably higher than those at Herculaneum as there will be land acquisition costs, site preparation and fill costs, rail construction, excavation and dredging, shore protection and mitigation costs that are not found at Herculaneum. However, the scale of project is significantly greater and can support much higher annual throughput than can be achieved at Herculaneum. Therefore, a primary driver of the Crystal City port will be the future need for a new high capacity, rail served bulk export terminal in the St. Louis region. Only bulk cargos have the potential to justify the higher development costs, and only when terminal tonnages total three to six million tons per year can the cost of infrastructure possibly be supported by the terminal fees charged against the cargo.

Secondary and tertiary site developments would include a public dry bulk terminal with open wharf areas for handling larger sized material such as scrap steel and quarry stone by crane and grab or magnet. This terminal, served by cranes rather than conveyors, could also handle imported bulk materials for local construction and industry. Later phases could include the general cargo and containerized freight terminal with warehousing and potentially a value-added flex space manufacturing and warehousing complex. The success of the secondary and tertiary uses would depend largely on how well highway access and internal truck circulation could be developed.

Full build-out of the Crystal City recommended development plan will result in three river port terminals that include a general cargo terminal with transit shed warehousing at the north side of the harbor, a crane-served bulk materials cargo terminal on the south side and a mechanized, high capacity bulk material export terminal with a six position barge loading berth in the middle. These terminals are described in more detail in the following sections.

3.6.3.1 Crystal City Mechanized Dry Bulk Terminal and Rail Loop Track

The purpose of this terminal will be to receive coal, pet-coke, iron ore, and other high-volume, dry bulk products for shipment by barge to downstream transloading or transshipment ports on the Mississippi River. The terminal is designed to receive cargo by rail in unit train loads of up to 8,000 feet per train in open gondola type rail cars. Cargo is transferred, stacked and reclaimed by mechanized equipment. Barge loading will be by multiple belt conveyor system with three moveable loading spouts on a finger pier designed to accommodate six barges at one time. Terminal particulars include:

- Rail car receiving loop track with two rotary gondola car dumpers, each having a capacity of 3,000 tons per hour
- Rail access to both the UP and the BNSF lines with sufficient storage track to receive a full train of loaded cars (approximately 10,000 tons) and depart a full train of empty cars
- Five bulk material stacks, each having a capacity of approximately 28,000 tons, for a terminal total storage capacity of 140,000 tons
- Five portal stacker-reclaimers, each having a net capacity of 3,000 tons per hour stacking and 1,200 tons per hour reclaiming
- A head house with conveyors and scales that can load the stacks at a net rate of 6,000 tons per hour and reclaim from the stacks at a gross rate of 3,600 tons per hour
- An elevated conveyor from the head house to the barge loading point with three belts, each having a gross rating of 1,500 tons per hour and a net rating of 1,200 tons per hour for a total net barge loading rate of 3,600 tons per hour
- A finger pier barge berthing structure with three movable loading spouts, each capable of loading 1,200 tons per hour simultaneously into two barges on opposite sides of the pier with six total barge berthing/loading positions at the pier

3.6.3.2 Crystal City Public Dry Bulk Terminal

The purpose of the public dry bulk terminal will be to receive scrap metal, building stone and coarse aggregate for shipment by barge to downstream ports on the Mississippi River. The terminal is designed to load materials that can be delivered by truck, stored in an open yard and handled by wheeled equipment and mobile cranes on a quay wall barge loading wharf. The terminal could also be used unload barges by mobile crane. The open storage area is designed for materials that would not suffer measurable damage from exposure to weather or inundation. Terminal particulars include:

- Heavy truck access road with scales for measuring cargo delivery and empty truck tares and a small administration building with facilities for the terminal workers.
- Fifteen acres of heavy pavement for surface storage of cargo and for circulation and operation of dump trucks and front end loaders
- Two mobile harbor cranes having a net duty cycle load capacity of 15 tons.
- Material handling equipment to include grabs, clamshell buckets or magnets as needed.
- A 600 foot fixed cellular cofferdam quay wall with a minimum deck load capacity of 1,000 lbs/sq.ft.

3.6.3.3 Crystal City General Cargo Terminal and Transit Shed Warehousing

The purpose of this terminal will be to load and unload unitized or containerized freight to barges for upstream or downstream traffic between the deepwater ports at the mouth of the Mississippi River. The terminal is designed to handle materials that can be delivered by truck, stored in an open yard or enclosed warehouses, and handled by cranes, forklifts or reach-stackers at the barge wharf. The open storage area will be above the 100-year flood elevations and the warehouse will be elevated above the 500-year flood stage. Terminal particulars include:

- Heavy truck access road with scales for measuring cargo delivery and empty truck tare
- Approximately 7.5 acres of heavy pavement for surface storage of unitized cargo and for circulation and operation of cargo handling equipment
- Two transit shed warehouses, each having 75,000 square feet of storage for a total transit storage of 150,000 square feet and one of the warehouses would also include a small administration area with facilities for the terminal workers
- Two mobile harbor cranes for loading and unloading barges
- A fixed cellular cofferdam supported barge mooring wharf with a quay wall that is 600 feet long and approximately 100 feet wide

3.6.3.4 Summary of Crystal City Terminal Throughput Capacities

Terminal throughput capacities were estimated based on assumed parameters that include site constraints and standard equipment operating metrics. These capacity estimates are intended to provide a broad range of potential development options that can be used to evaluate the suitability of the site for specific users. However, detailed terminal operating parameters and associated infrastructure capabilities will depend on the specific needs of the shipper and terminal operator.

Maximum practical capacity (MPC) is the high end on a reasonable operating scenario. Continuous operation at this level is generally not economically sustainable and the lower "Sustainable Capacity" is used to estimate the most probably level of continuous operation. All bulk throughput capacities are measured in US short tons. Unitized or containerized cargo is measured in twenty-foot equivalent units (TEU). The estimated capacity is given in the following table with the full capacity model appended to this report:

Table 3-2: Crystal City Throughput Capacity Estimates

Terminal Type	Units	Maximum Practical Capacity	Sustainable Capacity
Mechanized Dry Bulk Terminal	Tons/year	7,303,534	5,477,650
Public Dry Bulk Terminal	Tons/year	2,190,000	1,642,500
General Cargo Unitized Freight	TEU/year	59,162	44,371
General Cargo Loose Freight	Tons/year	608,333	456,250

Source: TranSystems

3.6.3.5 Crystal City Manufacturing and Warehousing Flex Space

The purpose of the manufacturing and warehousing flex space is to provide combined office, production and shipping facilities for value-added activities such as light manufacturing, sub-assembly preparation, repackaging and localization. The space is designed to receive and ship freight that can be delivered by truck, and requires storage and processing. Building particulars include:

- Heavy truck access road and truck circulation with a total of 68 cargo-loading bays in two buildings
- Two buildings having 100,000 square feet for storage and manufacturing space each for a total of 200,000 square feet
- Two three story office areas with a total of 51,000 square feet for administration, R&D labs, and clean-room space in two buildings
- A total of 88 automobile parking spaces for staff and visitors at the manufacturing and warehousing flex space complex

3.6.3.6 Summary of Crystal City Upland Development

The Crystal City site is primarily suited for rail served river port terminals. Therefore, upland development will likely be a tertiary use of the property. However, as highway connectivity and internal circulation is developed, some users may find a beneficial adjacency to the rail or port facilities, or may find that the flat, relatively unencumbered building sites server their needs.

3.6.4 Ancillary Facilities

Most of the ancillary facilities necessary for barge operation at the Jefferson County Port will need to be constructed in the early phases of development at Herculaneum to support the Early Adopter cargo terminals. These facilities would likely include a barge cleaning and switch boat mooring float somewhere in the vicinity of the Herculaneum loading floats as well as fleeting along the river, either at Herculaneum or on the Illinois side. However, construction of a slackwater notch and mechanized dry bulk terminal will require a significant increase in barge service capacity.

3.6.4.1 Barge Handling and Fleeting Requirements

Operation of a high capacity, mechanized dry bulk terminal at Crystal City will require a dedicated barge fleeting operation and may include additional capacity for barge repair and switch boat berthing. The mechanized dry bulk terminal will generate 24 loaded barges per day and justify full time switch boat operations in the area. In addition to a permanently stationed switch boat, Crystal City will need a fleeting area for 75 to 100 barges. Full barges could be held within the slack water notch and empty barges moored to cells along the nearby shore.

3.6.4.2 Barge Cleaning and Servicing

A facility will be required to perform cleaning and servicing of the barges prior to loading. This activity could take place at the public dry bulk terminal or the general cargo terminal site in the early stages of operation at Crystal City. However, longer term may require a dedicated float for this purpose. The facility should be capable of cleaning six to eight barges per day and must be expandable to ten or twelve barges per day based on a 25% to 50% rate of empty barges in requiring service before they can be re-loaded. Solid waste may be removed at the dry bulk terminal and trucked inland for disposal or may be sold to a salvage company. The barge cleaning facility would likely include a mooring for one to four switch boats.
This mooring would take up part of the service float or may require a small dedicated float of 80 feet to 100 feet in length. The switch boat could be fueled from the shore by tanker truck, or could run to St. Louis for fuel. In either case, a permanent fueling float would not be required.

3.6.4.3 Fire and Public Safety

Organized response to incidents involving fire, chemical spill or injury accident is necessary to reduce the risk and related insurance rates for commercial port developments. The local Fire Department should have staff trained to respond to industrial incidents including chemical spill, petroleum product fires, hazardous emissions and other related issues of public safety and workplace accidents. Like Herculaneum, Crystal City is very convenient to Jefferson Memorial Hospital for trauma care and emergency medical service. In addition, there are regional facilities to the north and west easily accessible via I-55 and MO 21, respectively.

3.6.5 Preliminary Environmental Review Comments

As noted earlier in this report, impacts to forested wetlands at the Crystal City site could be fairly substantial if all the potential riverfront access was developed as explored in Phase I and this preliminary review suggests trying to find mitigation near the project vicinity would be difficult. Therefore, Phase II conceptual site development incorporated modifications to minimize the impacts to wetlands to the greatest extent possible. Namely, Crystal City riverfront development has been significantly reduced. Wetland areas must be delineated and classified before the regulatory permit process could be initiated.

The Crystal City site is also located immediately downstream of Dike 149.3 R. The navigation channel is located along the ends of the dikes which may cause some eddies at the entrance to the facility. Any riverside development such as docks and fleeting should not impact on the navigation channel and should take into account river structures. However, of the greatest agency concern is the potential for excessive sediment deposition in the harbor.

Based on USACE experience, slack water ports constructed at inland locations adjacent to the Mississippi River experience continual and expensive maintenance dredging needs. Slack water ports are extremely vulnerable to deposition of suspended particles carried by the Mississippi River. The cost and management of that dredge material needs to be considered in the planning documents. Sediment testing and finding suitable locations for dredge material disposal can be a difficult task from a management and permitting standpoint. Crystal City will experience periodic sediment deposition and require maintenance dredging. Also, the harbor entrance is adjacent to the navigation channel so design will have to be coordinated with U.S. Coast Guard and the River Industry.

3.6.6 Navigation Issues

The Mississippi River is approximately 2,000 feet wide at Crystal and, like Herculaneum, the channel centerline is close to the western shore. Therefore, the strongest currents and the deepest channels are also found near the Crystal City side of the river. Generally, downstream traffic follows the channel line on the western shore, and upstream traffic takes advantage of slower current and back eddies on the eastern shore. North of the Crystal City port site, a small boat launch site at the Plattin Rock Boat Club is the source of some pleasure boat activity in the area.

Figure 3-16: Wing Dam and Channel Locations, Chrystal City

Four wing dam structures have been constructed at Crystal City by the USACE to channelize the Mississippi River at this location. The northernmost wing dam is just south of the Plattin Rock Boat Club and marks the northern limit of the port development area. Two additional wing dams are located north of Plattin Creek will constrain the location of the new port and barge fleeting facilities. One of these, as marked by an asterisk (✱) on the adjacent graphic, would be enlarged and incorporated into the slack water notch design as a siltation control measure.

Downstream of Plattin Creek there is a single wing dam that will not likely impact the operation of the terminal. The locations of these wing dams along the Crystal City stretch of the river should be marked with buoys or pylons to warn switch boats operating in this area of the exact positions of these submerged obstructions.

Data Source: USACE Mississippi River Map 101

3.6.7 Conclusions

Development of the Crystal City site and associated rail infrastructure will depend on the market for large scale bulk material export. Therefore, it will most likely accommodate the medium term to long term markets. However, the site has the greatest potential for high volume terminal development due to the available land area and the rail capacity. If the Wings Enterprises iron ore reduction plant is constructed, it may be possible to accelerate the construction of a slackwater notch and dry bulk facility to support the Wings cargo. Additionally, the Crystal City slackwater harbor would be better suited for scrap loading than Herculaneum due to the direct access by mobile cranes instead of conveyors.

3.7 Conceptual Development – Pevely Site

The Pevely site is located at Mississippi River mile 153.3 and consists of approximately 3,000 feet of river frontage adjacent to the existing Dow Chemical insulation board plant. It is approximately eight tenths of a mile from the Pevely City center and is accessible from Interstate Highway 55 via State Highway 61/67.

3.7.1 Existing Conditions

The Pevely site is divided into two parcels by the Union Pacific railroad line that runs from Crystal City to St. Louis along the western bank. The eastern parcel, which lies between the river and the railroad right of way, consists of approximately 40 acres of forested upland and wetlands. This parcel is prone to flooding during river high water events and is about 10 feet below the level of the UP railroad tracks. The 27 acre western parcel is immediately adjacent to the Dow Chemical Company plant and slopes gently to the south from the plant level, down to a small pond at approximately the elevation of the eastern parcel. The two Pevely parcels are connected by a road that passes under the railroad tracks via a small tunnel. Although passenger cars and light trucks can pass under the tracks, there is not sufficient clearance for cargo vans to access the eastern parcel and there is no other vehicle access to this part of the site.

Figure 3-1: Pevely Delta-wye Junction

Source:TranSystems

Figure 3-17 shows where the UP railroad line includes a three-way, delta-wye junction at the Pevely site where northbound traffic from the regional UP rail car repair yard in De Soto, Missouri connects to the UP main line in St. Louis. The track southbound out of this junction ends at an interchange with BNSF in Crystal City, while northbound track continues to St. Louis. This junction includes a one mile stretch of double track on the De Soto leg, as well as several small sidings for rail car storage and spur tracks serving the Dow Chemical plant. The two curves in the delta-wye that connect southbound along the river to Crystal City have a substandard radius (<625') and present a derailment hazard to traffic on that route.

Immediately south of the Pevely site there is a designated pipeline crossing of the Mississippi River. This crossing is no longer in use for liquids or gases. However, communication lines have been pulled through the pipeline and it remains in use as a cable crossing. Additionally, there are two river wing dams at the site and a third one immediately north of the site, constructed by the USACE to help channelize river flow. Any construction along the river would have to take these features into account.

In addition to the two parcels that are available to the east of the Dow Chemical plant, there are approximately 10 acres of the existing plant site could be made available for development in the future. As owner of the Pevely site, Dow Chemical Company has expressed interest in finding a compatible commercial use for the land. However, they wish to reserve a small recreational site adjacent to the pond on the south for company events.

3.7.2 Alternatives Considered

In the Phase I planning study, Pevely was considered as a secondary or tertiary priority for development, with possible use as a rail served, liquid bulk terminal if demand for such a facility could be identified. Subsequent market analysis supports this conclusion and the primary alternative under consideration is a liquid bulk loading or unloading point with truck racks, rail car racks and barge loading pontoon.

Two sub-alternatives are possible under this scenario. In one case, the terminal would have four to six large storage tanks for a homogenous product such as biofuel or liquid fertilizer which could take advantage of large scale shipping by river barge. In the second sub-alternative, multiple smaller tanks would be constructed for distribution of petroleum products by truck. The products could either arrive by rail car or by barge.

A second alternative arose later in the site and market investigation stages at Pevely. In this case, a producer of pelletized wood fuel could transload wood pellets from truck to barge for export. The footprint of the pelletized wood storage, conveyor and loading equipment is almost identical to that of a single-product liquid bulk terminal and would be interchangeable from a planning perspective.

3.7.3 Recommended Plan

The site configuration shown in Figure 3-18 favors a liquid bulk (or single product dry bulk terminal) with rail and/or truck access. Storage must be west of the UP railroad tracks to minimize impacts on the river front forested wetlands to the east. Corps of Engineers channelization wing dams along the river as well as relatively shallow draft in some areas constrains the size and location of the barge berth. A floating pontoon type of berth is recommended, as it would not need to support mobile equipment or unitized cargo and would present a minimum of shoreline impact. Current sediment modeling suggests that planned modifications to nearby channelization wing dams could increase siltation at the Pevely site. Therefore, additional modeling would be necessary to confirm and quantify the potential for sedimentation.

Along the railroad connection south, a second track is recommended to accommodate through traffic from Crystal City. This track would include a 675 foot radius curve to improve rail safety and speed along that line. The existing track would remain in place for use as a storage track for car loading at the new river terminal. A secondary spur would be added to the Dow Chemical Company loading spur and the new spur ends in two rail car loading racks to serve the new liquid bulk terminal. A new crossover on the northbound arm of the delta-wye junction would allow switching onto the secondary spur. Additionally, at least one new receiving-departing (r/d) track is possible along the eastbound De Soto connection.

Along the northern boundary of the Dow Chemical Company plant, Riverside Drive connects the Pevely site to Rt. 61/67 with access to interstate Highway 55. This road would permit tank trucks to load at racks adjacent to the rail car loading racks. A truck loop would allow queuing for service at the racks.

Storage would be in four to eight large tanks holding approximately 900,000 barrels on the 27 acre site. The exact number and configuration of tanks would depend on the type of product being handled and the degree of product segregation required. In all cases, a containment berm would be required around the tank farm. Pumping equipment and product pipelines would also be required to connect the barge pontoons with the tanks and loading facilities. Storage expansion is possible on the 10 acre site to the west, as Dow Chemical indicated this land could be made available for development in the future.

Figure 3-18: Recommended Plan for Pevely Site

This recommended plan includes the option of constructing a rail-in, truck-out product delivery terminal that does not have river access. It also could accommodate a small mechanized dry bulk facility using truck or rail pit discharge, storage domes and conveyors to a pontoon berth to load barges for export. The mechanized dry bulk option would occupy the same footprint and probably incur similar construction costs to those of the liquid bulk terminal.

3.7.3.1 Terminal Throughput Capacities

The terminal throughput capacity was estimated based on assumed parameters that include site constraints and standard equipment operating metrics. These capacity estimates are intended to provide a broad range of potential development options that can be used to evaluate the suitability of the site for specific users. Maximum practical capacity (MPC) is the high end on a reasonable operating scenario. However, continuous operation at this level is generally not economically sustainable and the lower "Sustainable Capacity" is used to estimate the most probable level of continuous operation. All bulk throughput capacities are measured in US short tons. The estimated capacity is given in the following table with the full capacity model appended to this report:

Table 3-3: Pevely Throughput Capacity Estimates

Terminal Type	Units	Maximum Practical Capacity	Sustainable Capacity
Single Product Liquid Bulk	Tons/yr	2,008,000	1,506,000
Single Product Mechanized Dry Bulk (alternative)	Tons/yr	1,564,000	1,173,000

Source: TranSystems

3.7.4 Ancillary Facility Requirements

The use recommended for the Dow Chemical, Pevely property is a liquid bulk petroleum or fertilizer import facility with rail or river delivery. Development of this use will be driven by the commercial need for local product import. However, it is anticipated that the Pevely property will not be developed until after an operating port is established at Herculaneum or Crystal City. Therefore, switch boat service, fleeting and barge repair can take place at the adjacent ports.

Although fire and emergency services at Pevely and at the Dow Chemical plant have covered spill and chemical fire risk in conjunction with production and storage of polystyrene foam, additional training and equipment may be necessary to cover the hazards of petroleum storage and transport. An oil spill control facility will be required adjacent to the site that is dedicated to the operation.

3.7.5 Preliminary Environmental Review Comments

Wetland impacts at Pevely depend upon the operations for the facility. A swath of access to the riverfront to accommodate either conveyors for dry bulk or pipeline to pump liquid bulk may be proposed for operations for barge loading/unloading. In either case the potential impacts are much less significant than the previous two sites. Wetland areas must be delineated and classified before the regulatory permit process could be initiated.

The Pevely site is located downstream and across from previously mentioned NESP project along the Illinois bankline in an area where depositional patterns along Missouri bankline could change due to slight impacts to the depths. There is agency concern about the potential conflict with the proposed NESP Herculaneum Side Channel Restoration project aimed at providing habitat for fish, wildlife and the endangered pallid

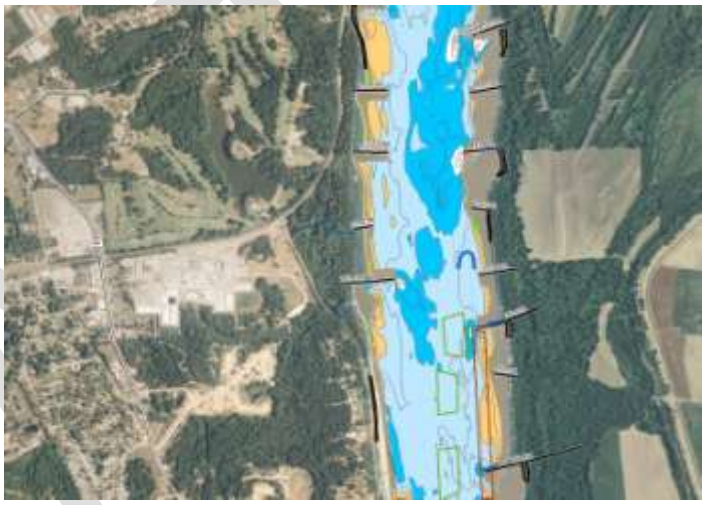
sturgeon. In addition, increased navigation and fleeting resulting from the port in this area proposed for restoration will have to be investigated further.

3.7.6 Navigation Issues

Several navigation challenges are associated with the Pevely site. Foremost, the main channel traverses away from the western shore starting just south of the site and diverges away from the river frontage. Therefore, most of the Pevely site is characterized by relatively shallow water depth of six feet or less relative to the low water reference plane (lwrp). The lwrp represents a theoretical water surface elevation profile based upon a low flow of 54,000 cubic feet per second. The reference elevation of 0.0 feet lwrp is based upon the probability that this stage and discharge will be exceeded 97 percent of the time annually.

In addition to shallow water, the existing river training structures and proximity to navigation channel must be taken into account as this site is situated within a dike field. There is some sedimentation near the bankline (blue and white on the surveys are navigable depths illustrated on Figure 3-2) and there is a dike structure (Dike 153.1 R) where there proposed facility would be located. This structure extends into the channel fairly far and since there is a dredging area immediately downstream from this location (last dredged in 2003) agencies caution the Port Authority would likely not be permitted to shorten the structure.

Figure 3-2: Dike Field near Pevely



Data Source: USACE

3.7.7 Conclusions and Recommendations

Although the Pevely site has good rail access and the site owner is interested in developing the land for port uses, there are navigation constraints and river front environmental considerations to take into account when determining its suitability for port development. Preliminary inquiry into the feasibility of redeveloping the site for dry bulk export explored the potential for barge loading in the near term. Should navigation and environmental issues be resolved, the Pevely site may be developed for this use in the Early Adopter phases. However, other local sites may be better suited for dry bulk terminal construction, in which case, the Pevely site may be developed for liquid bulk import in later phases.

3.8 Conceptual Development – La Roche Site

Phase I considered the development of a property referred to as the La Roche site. South of Festus and the River Cement loading terminal, it is a large property along the Mississippi River that formerly belonged to the LaRoche Corporation, hence the namesake. This property is located east of the existing BNSF rail line and can be accessed by an un-named track that extends east of the Dooling Hollow Road. A new roadway connection either to Highway 61/67 or Interstate 55 would be required to serve a port at this location and the current property owners are not interested in redeveloping this property at this time. For these reasons, this property was eliminated from further study.

4 STRATEGIC DEVELOPMENT PLAN

4.1 Recommended Phased Development

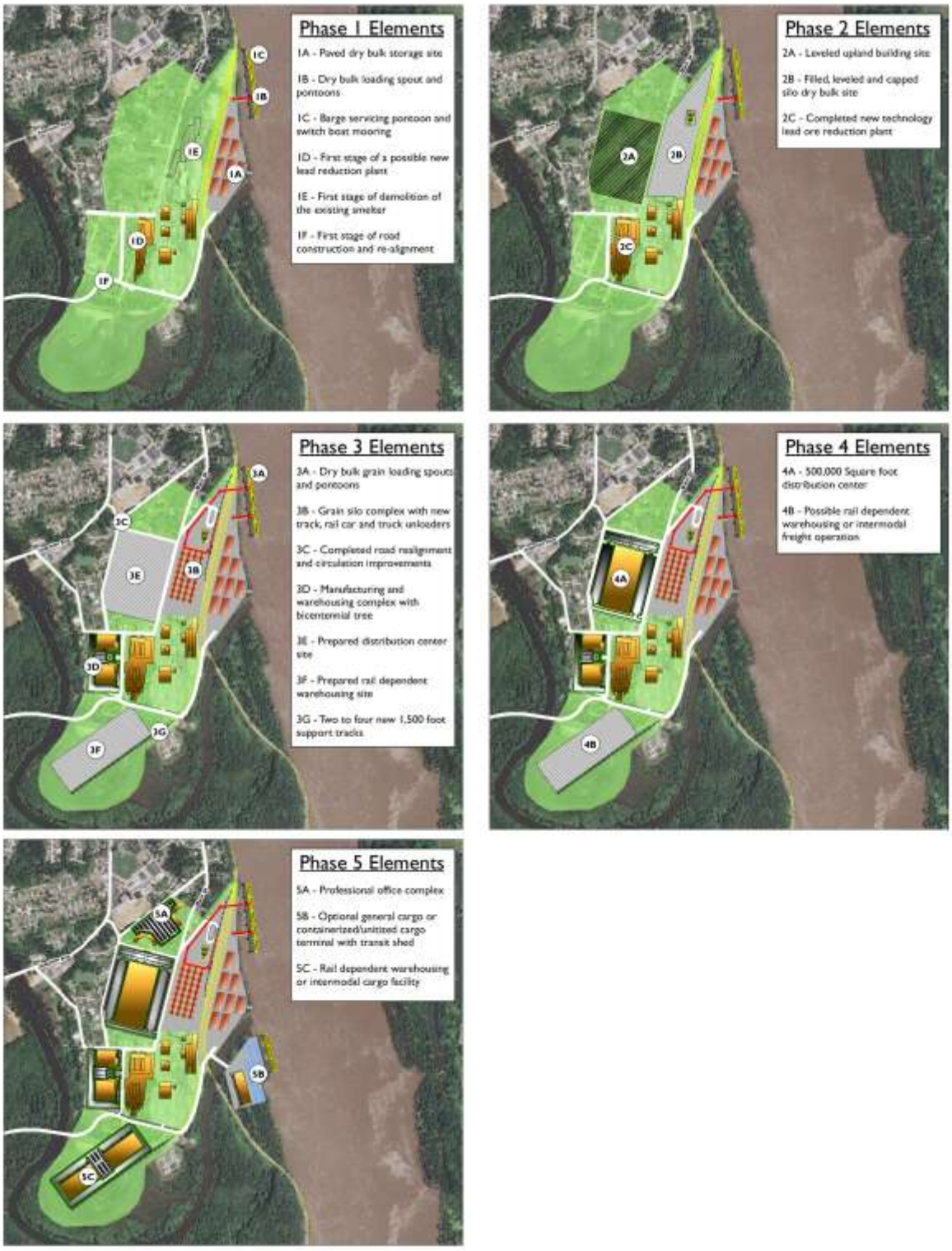
The plan for phased implementation of the Recommended Development Plan is primarily designed to track growth and development of the market for commercial activity in Jefferson County. However, other key factors will also drive the phased development program. These factors include:

- The Doe Run Company re-purposing schedule for their Herculaneum lead smelter
- Environmental permitting and remediation requirements
- Design, funding and construction of inland transportation connectors
- Fill and compaction times
- Barge traffic critical mass levels to justify ancillary facilities

The phased development program of the three port sites in the Jefferson County Port incorporates the highest and best use of each site, based on the market findings and site characteristics, within the context of the entire Jefferson County river front. The program is structured such that development of one location can proceed independently of the other locations, but also recognizes there is the potential for some synergies from coordinated development (for example, related to rail improvements or barge services). The proposed development program includes detailed phases for repurposing the Herculaneum site (Figure 4-1) and for a future slackwater harbor at Crystal City (Figure 4-2) and some phased elements to improve the Pevely site for port uses (Figure 4-3).

The development of the Jefferson County regional port is expected to take place over a 30 year planning horizon with near term needs addressed in the early phases and the longer term opportunities realized as the regional economy expands and matures. These future port and upland industries will be founded on private investment in the required infrastructure. Therefore, growth of market demand and specific company requirements will be the key driver of the timing and sequence of these developments. To evaluate this sequencing and to prioritize the port developments, the recommended port opportunities were put into three market driven categories as previously described in Table 2-9. These market driven opportunities are based on current and projected understanding of market needs. The sequencing of development is inherently flexible as market needs could shift in the future based on specific company requirements and market demands not captured in this study. For example, lower priorities based on the evaluation of market opportunities, such as containerized cargo at Herculaneum or liquid bulk in Pevely, are reserved for later in the development program. However, these options could be accelerated if the market had a specific need for one of these facilities.

Figure 4-1: Recommended Phased Development of Herculaneum Site



4.2 Phased Development at Herculaneum

4.2.1 Phase 1 – Public Dry Bulk at Herculaneum

The existing flat open riverfront at Herculaneum has a history of river port use and will present the best opportunity for the Early Adopter, dry bulk shippers to have a public terminal for river access in the Jefferson County Port. This initial development could make use of existing bulk loading pontoons and cells in the near term, with construction of purpose-built facilities later. At the same time, Doe Run Company will be closing and demolishing part of their lead smelter in conjunction with the initial phase of their new lead reduction technology. Although a decision has not been made at the time of this report, Doe Run Company may elect to construct the new reduction facility adjacent to their existing plant. A portion of the existing lead smelter will remain in operation while the new technology is being implemented.

4.2.2 Phase 2 – Site Preparation at Herculaneum

Herculaneum will follow full build-out of the new technology, lead reduction plant. At that time, Doe Run Company desires to demolish their existing lead ore refining plant and remediate the site. A portion of the existing plant that is concerned with processing lead shape and with shipping lead products will remain. A small waste water treatment plant will also remain in operation on the site. Prior to further construction, the adjacent upland will be leveled and the resulting borrow material will be used to fill and cap the site of the demolished smelter. If an excess of borrow material is available, it will be stockpiled over the existing slag spoils site to the south.

4.2.3 Phase 3 – Silo Dry Bulk at Herculaneum

The former Herculaneum lead smelting site will become the new grain silo storage complex following a period of fill consolidation and capping. If the Crystal City slackwater harbor is in operation at this time the Herculaneum pontoon will be freed up for use as a silo dry bulk loading point.

4.2.4 Phase 4 – Upland Development at Herculaneum

The Herculaneum upland development will continue with construction of a 500,000 square foot distribution center. If intermodal freight complements the distribution center, then early development of the rail cargo capabilities on the former slag pile may be possible.

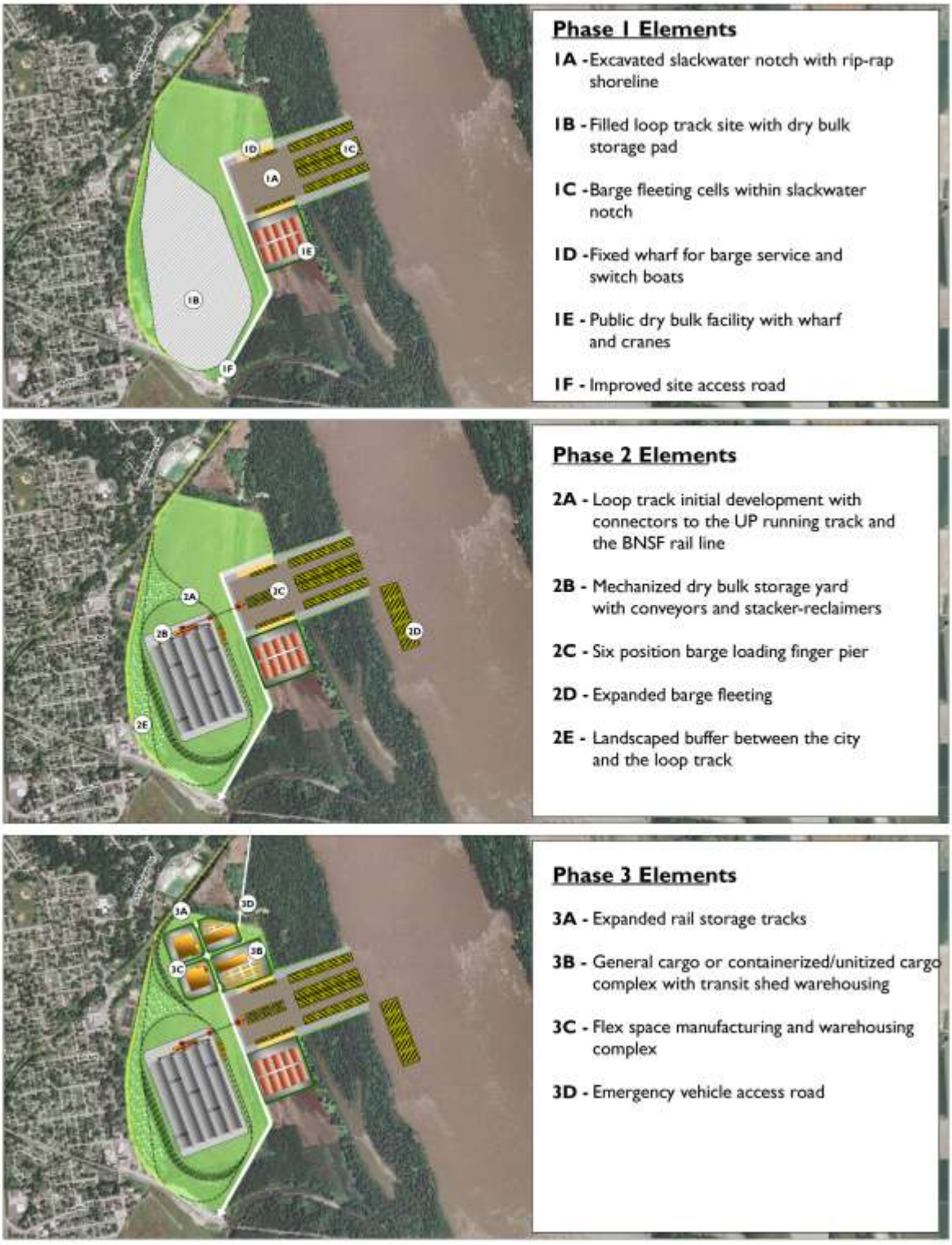
4.2.5 Phase 5 – Full Build-out at Herculaneum

Completion of the Phased Development will depend entirely on market demand and economic development in Jefferson County. Some early projects, such as the Herculaneum public dry bulk terminal, may be ready for re-development. Full build-out will include additional warehousing with professional office space to the north. If there is a local demand for general cargo or containerized/unitized cargo, then this capability will be developed south of Joachim Creek.

4.2.6 Flexibility at Herculaneum

The previous phasing offers a planning scenario to assist in focusing resources to engage interest in the most appropriate aspects of the full build-out potential operations. The full build-out plan illustrates the best uses by designating areas for specific types of facilities and operations to guide their location throughout the property (e.g. orientation to rail, riverfront, adjacent operations, etc.). However, if there is early interest to develop a facility slated for a latter phase, such as the manufacturing and warehousing (shown as 3D), this may be done in accordance with the conceptual site plan so as not to hinder the potential for other location dependent operations. The full build-out will facilitate sound planning decisions, for example, steering standard manufacturing and warehousing to the west edge of the site offering prime roadway access while leaving the slag pile location open for future rail dependent warehousing or an intermodal cargo facility.

Figure 4-2: Recommended Phase Development of Crystal City Site



4.3 Phased Development at Crystal City

4.3.1 Phase 1 – Slackwater Notch at Crystal City

In the first phase, a slackwater harbor will be cut into the shoreline at Crystal City, generating a significant quantity of borrow material. That material will be windrowed and stockpiled at the future mechanized dry bulk site in preparation for filling and construction of the dry bulk storage yard and rail loop track. A new public dry bulk terminal will be constructed in the slackwater notch along with a berth for barge servicing and cleaning. Barge fleeting may also take place within this slackwater harbor. It is anticipated the concentration of barge fleeting and servicing for the Jefferson County Port will be supported at Crystal City. This will free up the pontoon at Herculaneum for use as a silo dry bulk loading point.

4.3.2 Phase 2 – Mechanized Dry Bulk at Crystal City

In this phase of Crystal City, the loop track and mechanized dry bulk terminal would be constructed following compaction and dewatering of the site filled in Phase 1 above. The loop track would have capacity for one 8,000 foot train. Barge fleeting would be expanded to meet the increased traffic demands of the different Jefferson County Port sites.

4.3.3 Phase 3 – Full Build-out at Crystal City

Completion of the Phased Development Program will depend entirely on market demand and economic development in eastern Jefferson County. There will still be potential for new development and some early projects may be ready for re-development by that time. In Crystal City, full build-out will also include containerized/unitized or general cargo with warehousing and flex manufacturing. It is likely that only one of the two general cargo sites will be constructed. Crystal City will also need additional storage tracks to allow receiving of one full train while unloading another.

4.3.4 Flexibility at Crystal City

Section 3 outlined the combination of environmental challenges and costly capital and maintenance expenditures (e.g. slack water harbor dredging and over six million cubic yards of fill not including the factor for compaction). These challenges and the lack of existing roadway access preclude Crystal City from being the focus of the first tier of priorities for port development. This site requires extra scrutiny for the return on investment to justify the expense to prepare the site for the proposed operations. However, its site configuration, specifically the proximity to the existing railroad and the low elevation, presents the greatest potential for a loop track and a slackwater harbor, respectively. Flexibility lies in the opportunity for a motivated investor to catalyze the implementation of either of these two unique port elements at Crystal City at any stage of the 30 year planning horizon.

4.4 Phased Development at Pevely

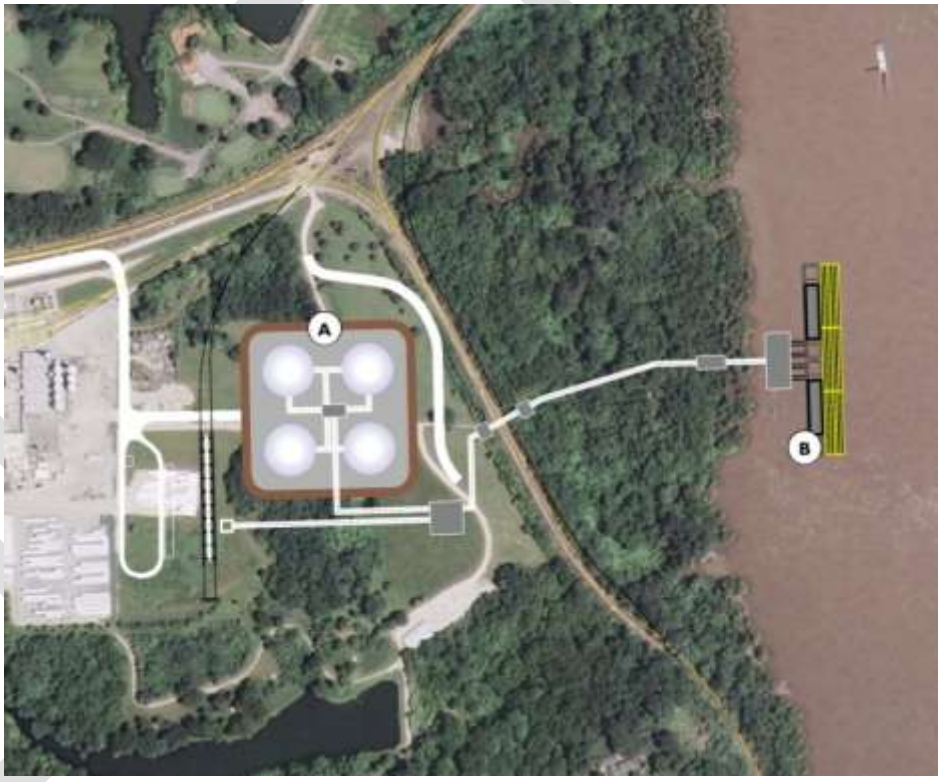
4.4.1 Phase 1 – Rail Improvements at Pevely

With increased rail traffic expected from Herculaneum and Crystal City, the Pevely delta-wye rail junction will be improved to allow siding of Dow Chemical rail cars and safe passage of northbound UP trains. The Pevely improvement will include 2,600 feet of new running track with a 200 foot trestle bridge. A new 150 foot crossover track will allow yarding into the Dow Chemical plant while through trains pass on the new UP running track.

4.4.2 Phase 2 – Full Build-Out at Pevely

In Pevely, the option of a liquid bulk import terminal (A) will likely be feasible in the later years of the planning horizon. The timing of such development is tied to the needs of private sector companies their specific business plans and requirements. However, the opportunity is there for a dedicated dry bulk exporter to use Pevely earlier.

Figure 4-3: Recommended Development of Pevely Site



4.4.3 Flexibility at Pevely

Due to the limitations for expansion, Pevely cannot produce a critical mass for regional port operations in the Jefferson County Port and, thus, is not the focus of the first tier of priorities for port development. However, the Pevely site requires less extensive reconfiguration/modification to prepare it for a single rail-to-barge/barge-to-rail user. Flexibility lies in the opportunity for a motivated investor to catalyze the implementation of either dry bulk export or liquid bulk import from Pevely at any stage of the 30 year planning horizon.

4.5 Timeline

Recommendations for potential phasing of the implementation of the Jefferson County Port were outlined in the previous sections. As noted, there is flexibility to strategically accommodate the shifts of priorities due to market demands and opportunities. The following timeline shown in the foldout on the next page illustrates the relationship among the development activities of all three sites as well as their independent phasing. The arrows in series depict the potential shifts of activities inherent to the flexibility to respond to the market and/or investors while the activity bars provide a proactive guide for progressing the sites over the long term with some that may continue into secondary phases.

Development Activity	Phase 1 (Years 1-5)	Phase 2 (Years 6-10)	Phase 3 (Years 11-15)	Phase 4 (Years 16-20)	Phase 5 (Years 21-25)	Long Term (Years 26-30)
Herculaneum						
Jefferson County Port Authority Infrastructure						
Environmental Clearance & Permitting	*Initiate Coordination with USACE for Permitting and Associated NEPA Requirements*					
Land Acquisition	*Consolidate parcels and owner-operator agreements*					
Utilities	*Existing power, sewer and water have capacity to serve port operations*		*Increase power service required to support expansion to serve industrial facilities and operations*			
Ancillary Facilities	*Identify operational requirements for barge handling, fleeting, cleaning and servicing. Identify providers*		*Shift to Crystal City for services upon completion of the slackwater harbor*			
Port Site Work	*Doe Run Company lead smelter demo for new technology and site remediation*					
Upland Site Work		*Grading: Borrow from leveling will be used as fill and cap for former smelter site and slag*	*Prepare sites for distribution and warehousing facilities*			
Roadway Access Improvements	*Begin facility road contruction and realignment*	*Complete facility roadway circulation*				
Railroad Access Improvements		*New track to serve grain silo complex*	*Spur to serve rail dependent warehousing*			
River Access Improvements	*Upgrade existing bulk loading pontoons and cells; Install servicing pontoon and switch boat mooring*		*Install dry bulk grain loading spouts and pontoons*			
Fleeting Locations	*Identify fleeting locations*		*Shift to Crystal City for fleeting*			
Tenant Dependent Facilities						
Paved Dry Bulk Storage						
Grain Silo Complex with Rail Car and Truck Unloader						
Manufacturing and Warehousing						
Distribution Center						
Rail Dependent Warehousing or Intermodal Cargo Facility						
Professional Office Complex						
General or Containerize/Unitized Cargo Complex with Transit Shed Warehousing						
Herculaneum Cost Estimate	$25.0	$20.9	$46.3	$45.3	$31.7	$ 189.2
Herculaneum Cost Estimate Total All Phases						
Crystal City					Phase 1	Long Term
Jefferson County Port Authority Infrastructure						
Environmental Clearance & Permitting		*Initiate: Coordination with USACE for Permitting and Associated NEPA Requirements*				
Land Acquisition		*Consolidate parcels and owner-operator agreements*				
Utilities		*Existing power, sewer and water have capacity to serve port operations*				
Ancillary Facilities		*Install fixed wharf for barge service*	*Install six position barge loading finger pier*			
Upland Site Work		*Fill and Compact Loop Rail and Dry Bulk*	*Install landscape buffer between city and loop.*			
Roadway Access Improvements	*Pursue Environmental Clearance through Location Study/EA*	*Improve/construct site access roadway*	*Emergency Vehicle Access Roadway*			
Railroad Access Improvements			*Install loop track with connectors to UP running track and BNSF rail line*	*Expand rail storage tracks*		
River Access Improvements		*Excavate slackwater harbor match*				
Fleeting Locations		*Install barge fleeting cells*		*Expand barge fleeting*		
Tenant Dependent Facilities						
Public Dry Bulk Facility with Wharf and Cranes						
Mechanized Dry Bulk Storage Yard with Conveyors and Stacker-Reclaimers						
General or Containerize/Unitized Cargo Complex with Transit Shed Warehousing						
Flex Space Manufacturing and Warehousing Complex						
Crystal City Cost Estimate		$83.0		$106.9	$59.2	$ 249.1
Crystal City Cost Estimate Total All Phases						
					Phases 1 & 2	
Pevely						
Jefferson County Port Authority Infrastructure						
Environmental Clearance & Permitting	*Initiate: Coordination with USACE for Permitting and Associated NEPA Requirements*					
Land Acquisition	*Consolidate parcels and owner-operator agreements*					
Utilities	*Existing power, sewer and water have capacity to serve port operations*					
Ancillary Facilities	*Identify operational requirements for barge handling, fleeting cleaning and servicing. Identify providers*		*Shift to Crystal City for services upon completion of the slackwater harbor*			
Roadway Access Improvements						
Railroad Access Improvements	*Improve junction with new running track and trestle bridge and crossover*					
River Access Improvements						
Fleeting Locations						
Tenant Dependent Facilities						
Dry or Liquid Bulk Facility						
Pevely Cost Estimate		$21.9				$ 21.9
Pevely Cost Estimate Total All Phases						

4.6 Environmental Considerations

In future phases of implementation, the majority of agencies, including various branches of the Corps, will provide a more thorough set of comments specifically discussing various aspects of the project that Jefferson County would be required to submit in their formal Department of the Army permit application and Waters of the United States delineation. Every detail of the proposed port facility would have to be shown in the permit application submittal to ensure the operations and site footprint can be analyzed for potential environmental and navigation impacts under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. The proposed port locations are all situated in sites that are potential habitat areas of several federally endangered and threatened species protected under Section 7 of the Endangered Species Act. The Fish and Wildlife Service will likely require more information and possibly detailed studies before they would approve of any of the proposed locations.

In terms of construction of all three sites comprising the Jefferson County port, construction and facility operation activities must take into account fugitive dust emissions, particularly the Herculaneum site, should there be areas of high soil lead and cadmium and other metals contamination from air deposition associated with past industrial practices. Further comment may be referenced in the written response from the EPA. Another item noted during this review is a recommendation that any tree clearing be minimized or avoided if possible to reduce impacts to potential habitat for the endangered Indiana bat and migratory birds. Any unavoidable cutting of trees with suitable roosting and brood-rearing habitat for the Indiana bat (living or standing dead trees or snags with exfoliating, peeling or loose bark, split trunks and/or branches, or cavities) will be performed only before April 15 or after September 15 when the species would not be using such habitat.

4.7 Investment Evaluation

4.7.1 Estimate of Probable Costs

The total cost for all phases of port development is estimated at $460 million (Table 4-15), comprising $189 million at Herculaneum, $249 million at Crystal City, and $22 million at Pevely. The higher cost of development at Crystal City reflects the need for substantial new facilities (for example, excavation of a slackwater harbor) compared to Herculaneum. A detailed breakdown of costs by component and phase is provided in Table 4-16. The costs cover a variety of site development requirements – land clearing, grading, paving, terminal infrastructure (e.g. barge berth, silos and tanks, etc.), buildings (e.g. warehouses), road infrastructure, and rail infrastructure. The estimated construction costs are provided as guidance and would be further clarified during the initial design of individual phases of development.

Table 4-1: Summary of Estimated Construction Cost

Port Location	Estimated Construction Cost - Full Build Out (2010 Dollars)
Herculaneum	$189 Million
Crystal City	$249 Million
Pevely	$22 Million
Total Three Sites	**$460 Million**

Source: TranSystems

Table 4-2: Estimated Construction Cost by Phase

Construction Costs (2010 $ Million)	Phase 1 (Yrs 1-5)	Phase 2 (Yrs 6-10)	Phase 3 (Yrs 11-15)	Phase 4 (Yrs 16-20)	Phase 5 (Yrs 21-25)
1a Paved dry bulk storage site	$10.5				
1b Dry bulk loading spout & pontoons	$10.2				
1c Barge servicing pontoon & switch boat mooring	$0.3				
1d First stage of road cosntruction & re-alignment	$4.0				
2a Leveled upland building site		$16.4			
2b Filled, leved and capped silo dry bulk site		$4.6			
3a Dry bulk grain loading spouts and pontoons			$5.2		
3b Grain silo complex with new track, rail car and truck unloaders			$22.9		
3c Completed road realignment and circulation improvements			$6.5		
3d Manufacturing & warehousing complex			$18.7		
3e Prepared distribution center site			$4.0		
3f Prepared rail dependent warehousing site			$4.7		
3g Two to four new 1,500 foot support tracks			$4.3		
4a 500,000 sqaure foot distribution center				$25.0	
4b Possible rail dependent warehousing or intermodal freight operation				$20.3	
5a Professional office complex					$10.9
5b Optional general cargo or containerized/unitized cargo terminal with transit shed					$19.4
Onsite Bridge					$1.3
			Phase 1 (Yrs 11-15)	**Phase 2 (Yrs 16-20)**	**Phase 3 (Yrs 21-25)**
1a Excavated slackwater notch with rip-rap shoreline			$36.9		
1b Filled loop track site with dry bulk storage pad			$5.2		
1c Barge fleeting cells within slackwater notch			$1.0		
1d Fixed wharf for barge service and switch boats			$5.6		
1e Public dry bulk facility with wharf and cranes			$20.8		
1f Improved site access road			$11.5		
Onsite roadway improvements			$2.1		
2a Loop track initial development with connectors to the UP running track and the BNSF rail line				$8.9	
2b Mechanized dry bulk storage yard with conveyors and stacker-recliamers				$96.3	
2c Six position barge loading finger pier				$1.3	
2d Expanded barge fleeting				$0.3	
3a Expanded rail storage tracks					$5.5
3b General cargo or containerized/unitized cargo complex with transit shed warehousing					$27.6
3c Flex space manufacturing and warehousing complex					$24.1
3d Emergency vehicle access road					$2.0
		Total All Phases			
1a Rail Improvements		$5.7			
1b Tank Farm Complex		$7.6			
1c Onsite & Offsite Roadway Improvements		$1.8			
1d Barge Pontoon and Cells		$6.9			

Source: TranSystems

4.7.2 Economic Benefits

The potential economic benefits from development of the Herculaneum site under two alternative development scenarios were analyzed in the *Jefferson County Ports – Phase I Feasibility Study, December 2009*. The methodology and economic multiplier assumptions applied in this earlier study have been used to determine the economic benefits, including multiplier ("ripple") effects, from the recommended phased development plans for Herculaneum, Crystal City and Pevely. Two economic impacts are evaluated: (1) from phased construction of port facilities, and (2) the annual, permanent impacts from operation of the port facilities. All dollar amounts expressed here are in constant 2010 values. The economic benefits analysis captures direct impacts and indirect impacts.

During the full, multi-year construction period, a million dollars invested in port construction could trigger $1.9 million in added economic activity (GDP) in Jefferson County, plus 21.5 jobs in Jefferson County, paying $39,000 in annual wages per job. In addition, the annual permanent impacts from operations of the fully built facilities could produce $213,815 in added economic activity, plus 5.9 jobs paying $32,900 per job.

The above figures apply for each million dollars invested in construction; therefore, the estimated total investment to develop all three sites, $460 million, has the potential to generate the following:

During the construction period (which could be phased over several years) the combined port development could generate:	
$881 Million	in added economic activity (GDP) in Jefferson County
9,912	direct and indirect jobs in Jefferson County
$39,000	annual wages per job
After construction is completed, annual operation of the combined port facilities could support:	
$107 Million	annually in added economic activity (GDP) in Jefferson County, plus
2,706	direct and indirect jobs in Jefferson County, paying
$32,900	in annual wages per job

The latest comparable data for Jefferson County show that the average wage for jobs in the county (including salaries but excluding benefits or other forms of personal income) is about $31,800; so the impacts shown above would generally create jobs paying higher than average wages.

The full economic impacts mentioned above will only be realized after the full build-out is achieved. Initial phases of each site will produce a proportionate benefit as they are developed and become fully operational. The timing of each development phase will be driven by market demand and needs over the 30-year master planning time horizon. The projected economic benefits from full build-out of each location are shown in Table 4-3, while the economic benefits by phase of development are shown in Table 4-4.

Table 4-3: Economic Benefits from Full Build-Out

	Herculaneum	Crystal City	Pevely	Total
Total Construction Cost (2010 $ million)	$189	$249	$22	$460
Economic Benefits to Jefferson County during the Construction Period				
Added Economic Activity (GDP) (2010 $ million)	$362	$477	$42	$881
Direct and Indirect Jobs (number)	4,075	5,365	472	9,912
Economic Benefits to Jefferson County from Annual Operation				
Added Economic Activity (GDP) (2010 $ million)	$68	$33	$6	$107
Direct and Indirect Jobs (number)	1,971	628	107	2,706

Source: TranSystems and Jefferson County Ports – Phase I Feasibility Study, December 2009

Table 4-4: Economic Benefits by Location and Phase of Development

Herculaneum						
Construction Costs and Economic Benefits	**Phase 1 (Yrs 1-5)**	**Phase 2 (Yrs 6-10)**	**Phase 3 (Yrs 11-15)**	**Phase 4 (Yrs 16-20)**	**Phase 5 (Yrs 21-25)**	**Total All Phases**
Construction Cost (2010 $ Million)	$25.0	$20.9	$66.3	$45.3	$31.7	$189.2
ECONOMIC BENEFITS						
Economic Benefits to Jefferson County during the Construction Period						
Added Economic Activity (GDP) ($ million)	$48	$40	$127	$87	$61	$362
Direct and Indirect Jobs (number)	539	451	1,429	975	682	4,075
Economic Benefits to Jefferson County from Annual Operation						
Added Economic Activity (GDP) ($ million)	$5	$5	$21	$55	$68	$68
Direct and Indirect Jobs (number)	93	93	497	1,617	1,971	1,971

Crystal City				
	Phase 1 (Yrs 11-15)	**Phase 2 (Yrs 16-20)**	**Phase 3 (Yrs 21-25)**	**Total All Phases**
Construction Cost (2010 $ Million)	$83.0	$106.9	$59.2	$249.1
ECONOMIC BENEFITS				
Economic Benefits to Jefferson County during the Construction Period				
Added Economic Activity (GDP) ($ million)	$159	$205	$113	$477
Direct and Indirect Jobs (number)	1,788	2,302	1,276	5,365
Economic Benefits to Jefferson County from Annual Operation				
Added Economic Activity (GDP) ($ million)	$6	$10	$33	$33
Direct and Indirect Jobs (number)	115	192	628	628

Pevely		
	Total All Phases	
Construction Cost ($ Million)	$21.9	
ECONOMIC BENEFITS		
Economic Benefits to Jefferson County during the Construction Period		
Added Economic Activity (GDP) ($ million)	$41.9	
Direct and Indirect Jobs (number)	472	
Economic Benefits to Jefferson County from Annual Operation		
Added Economic Activity (GDP) ($ million)	$5.5	
Direct and Indirect Jobs (number)	107	

Source: TranSystems and Jefferson County Ports – Phase I Feasibility Study, December 2009

4.7.3 Implementation Strategies

Major development projects generally do not achieve success (as measured by economic growth) without significant public investment as either an impetus for or strategic support of private development and economic growth. Substantial public and private infrastructure improvements and enhancements will be necessary to ensure the Jefferson County Port is brought to contemporary, competitive, and relevant development standards. The port then presents new economic drivers, around which clusters of economic development could occur. Along with public infrastructure investment, major developments generally require public incentives to initiate private investments. This will include coordinating with local and regional developers as well as national developers to bring broader insight into the proposed strategies and to begin the creation of candidate development partners for the area.

4.7.3.1 Port Authority Structure

A port authority normally takes one of three forms that define its interaction with port users, service providers and the financial community[7]:

- Landlord Port (or non-operating port): the port authority may build the berths and backlands, which it then rents or leases to a terminal operator. The terminal operator invests in cargo-handling equipment, hires labor, and negotiates contracts with shippers and barge operators for the loading, unloading and storage of cargo. Alternatively, the Port Authority may lease land to a private operator who then undertakes development and operation of terminal infrastructure. Further elements of the landlord port are:
  - Principal relationship is with the terminal operator/stevedore
  - More focus on long-term construction, planning and financing
  - Little operational control and insulated from many operating issues
- Operating Port: the port authority provides the terminal infrastructure, owns the cranes and other equipment, and hires labor for handling cargo on the terminal storage. Private stevedore companies hire longshore labor to lift cargo between the ship and the dock. Further elements of the operating port are:
  - Principal relationship with the user
  - Focus on daily operations and long-term issues
  - Direct operational control/oversight

[7] Definitions are based on information from the American Association of Port Authorities and Maritime Administration

- Limited-Operating Port: the port authority leases facilities to others, but continues to operate one or more facilities with port employees.

Most Missouri operating ports have started shifting towards a landlord structure through the granting of long-term concessions to private terminal operators. The concession process is designed to shift certain financing, construction, and/or operating risks of public terminal infrastructure to the private sector. In the study region, port authorities (for example, City of St. Louis Port Authority and Tri-City Regional Port District) are landlord ports, providing and leasing infrastructure to private stevedores and other companies.

4.7.3.2 Funding Sources

The Maritime Administration (MARAD), in cooperation with the American Association of Port Authorities (AAPA), conducts an annual survey[8] of port authorities to determine financial conditions and sources for operations and investment. While the survey focuses on coastal and Great Lakes ports, it provides broad guidance on funding sources for the Jefferson County Port.

At port authorities, capital expenditures on new construction and modernization/rehabilitation of port infrastructure principally fall into one or more of the following types:

- Cargo facilities
- Other infrastructure – Includes structures, land, and fixtures not directly related to the movement of cargo, such as maintenance and administrative facilities
- Dredging – Associated with local port expenditures on deepening or maintenance of federal and non-federal channels, connecting channels and berths, and local costs for land, easements, rights-of-way, disposal areas, and mitigation
- Security – Expenditures for all security-related capital expenditure projects (for example, fencing, access controls, lighting, surveillance, etc.

As observed earlier, the type of port operating structure will influence to what extent the port authority engages in each of the above capital expenditure categories. AAPA and MARAD identify the following methods used to finance capital investments:

- Port Revenues – Income generated by the port through its activities
- General Obligation Bonds – Issued by a state, city or local government. They are secured by the taxing and borrowing power of the issuing jurisdiction, rather than the revenue from a given project.
- Revenue Bonds – Issued by a state, city or local government to finance public works projects. Bond principal and interest are secured by the revenues of a given project.
- Loans –Short or long term.
- Grants – A contribution of cash by one government entity or organization to another. Many times these contributions are made to local governments from state and federal governments.
- Other – Includes all financing sources that were not described above, such as transportation trust funds, state appropriations, and taxes.

[8] U.S. Public Port Development Expenditure Report (FYs 2006 & 2007-11), Maritime Administration.

As part of the preliminary pre-consultation agency review of the proposed Jefferson County Ports, the US Army Corp of Engineers (USACE) Strategic Initiatives Coordinator mentioned the following several sources of funding:

> Under the Continuing Authorities Program (CAP) - Section 107 of the Rivers and Harbors Act of 1960, the USACE has the authority to develop and construct general navigation features for a small harbor or port. General navigation features (GNF) can include breakwaters and jetties, entrance and primary access channels, turning basins, anchorage areas, and structures designed to protect the channel from shoreline erosion. These are just a few examples, but funding does not cover the facilities within the port. Each project is limited to a Federal cost of $4 million, which includes project-related costs for feasibility studies, planning, engineering, design, and construction. This is a cost-shared program, with the first 100K being at full Federal expense. The remaining portion of feasibility and planning is cost shared 50/50. Design and construction is split 80/20, provided that the port will not require depths exceeding 20 feet. The 20 percent is broken down into the following. The non-Federal sponsor is responsible for 10 percent of total costs of construction of the GNF (including costs of construction of dredged material disposal facilities). The remaining 10 percent of the total costs of construction of the GNF can be offset by the value of Lands, Easements, Right of Ways, and Relocations. One of the greatest benefits of this program is the prospect of receiving future maintenance funding for a period of up to 50 years.
>
> The "Dike and Revetment" program is one of the USACE's Operations and Maintenance (O&M) programs funded at 100 percent full Federal expense. Like all programs that are 100 percent federally funded, there are definite challenges to receiving funding through this type of program. It is very dependent upon the need to maintain the navigation channel, and if there are greater needs in a different segment of the river for a fiscal year, they take a greater priority over O&M dollars. With the dike and revetment program, the COE may be able to study the need for and construct river training structures. These would be dual-purpose, in that they would help maintain the navigation channel and offer protection to your port.
>
> Also the USACE might assist with a Hydrologic Sediment Response (HSR) Model for the chosen alternative. These are table top models in which we can study the trends of the river system and transport over time. COE use these studies routinely when reviewing alternatives to reduce dredging.
>
> The Planning Assistance to States Program (Section 22 of the Water Resources Development Act of 1974) provides authority for the USACE to assist the States, local governments, and other non-Federal entities in water resource studies. These studies are cost shared on a 50 percent Federal-50 percent non-Federal basis, and generally result in receiving about 75K to 100K in Federal funding.

In developing funding and leasing strategies for infrastructure development, a primary objective of the Port Authority is to secure sufficient return to cover debt service (principal plus interest payments) and day-to-day operating expenses. The Port Authority, partly in its function as an economic development agency and often with access to lower cost financing, has a reduced financial return threshold than the private sector. Much of the benefits or return on investments for a Port Authority come from the broader economic impacts on the local and regional communities – including direct and indirect jobs, tax revenue, use of services and so forth.

4.7.3.3 Regional Funding Examples

The region's three main cargo handling ports are City of St. Louis Port Authority, Tri-City Regional Port District and Southeast Missouri Regional Port Authority (SEMO). All three agencies have used a blend of operating income, public grants, and revenue bonds to support the development of port infrastructure.

The City of St. Louis Port Authority, under the St. Louis Development Corporation, obtains revenue from the lease of city-owned waterfront property for cargo handling, storage and barge fleeting activities. The Port Authority Fund[9] was established to manage all phases of the harbor and wharf operation including enforcement of all regulations. The Port Authority also receives grants from state and federal sources; for example, a grant for security improvements under the Port Security Grant Program (PSGP) of the American Recovery & Reinvestment Act (ARRA).

Tri-City Regional Port District has funded infrastructure through income from the lease of facilities and sites, revenue bonds supported by lease payments, low-interest loans from Illinois state agencies, commercial loans, and grants from federal and state agencies. The District currently has several outstanding revenue bonds and loans from commercial banks and the Illinois Department of Transportation. The District is seeking federal stimulus funds for its proposed Rivers Edge Harbor Complex, which would provide cargo handling below Lock 27.

SEMO has received funding for infrastructure from the Missouri Statewide Transportation Improvement Program, U.S. Department of Commerce's Economic Development Agency, the Missouri Department of Economic Development's Community Development Block Grant and other public sources. Grants from the Transportation Security Administration have helped fund fencing and other security measures at the port. Funding also came through the issuance of Sales Tax Revenue Bonds. In early 1985, voters from Scott County and Cape Girardeau County passed a one-quarter cent sales tax for capital improvements[10]. The sales tax began January 1, 1986, and ended December 31, 1989. With the sales tax, SEMO issued Sales Tax Revenue Bonds in an aggregate amount of $4.85 million to be used, in addition to grants, to construct the slack-water harbor, dock, water tank, water lines, access road, rail spur, and other facilities. Additionally, SEMO leased out its public dock to Girardeau Stevedores and Contractors, Inc., a private stevedore who provides cargo handling and storage services for users of the dock.

4.7.3.4 Marketing Strategies

Marketing is a critical component of the Implementation Plan. To begin the process of successfully marketing the Port the Jefferson County Port Authority will need to begin implementing the following activities:

- Attending Port/Freight workshops and conferences
- Hosting a summit or meeting with various rail, truck and river cargo providers
- Writing press releases and other project description handouts targeted to trade organizations and publications such as: American Association of Port Authorities, Inland Waterways and Port Terminals, Waterways Council, National Waterways Conference, The Waterways Journal, Journal of Commerce, St. Louis Commerce Magazine, Site Selection Magazine and other Local Media Lists
- Hosting press conferences, editorial board meetings, press management

[9] City of St. Louis, Missouri Fiscal Year 2010 Annual Operating Plan
[10] Southeast Missouri Regional Port Authority: The Making of a Mississippi River Port 1975 – 2005, Charles David Briggs and Kristin K. Smith

To focus marketing activities to potential target tenants, the Jefferson County Port Authority needs to develop a plan to meet with potential tenants such as:

Bulk Grain
Cargill
ADM
Staley
Bungee
The Andersen's

Aggregates
LaFarge
Holcim
Cemex
U.S. Salt
Detroit Salt
Aggregate Industries
Weber

Coal
Peabody Energy Corp.
Arch Coal Inc.
Consol Inc.
Rio Tinto Energy America
Massey Energy Co.

Petroleum Products
Marathon
Shell
Exxon Mobil
BP

Ethanol Terminals
Abengoa
Motiva
US Development Group
Kinder Morgan

Fertilizer and Seeds
PCS
Agrium
Mosaic
Monsanto

Barge Companies
Cargo Carrier (Cargill)
American River Transportation Company (ADM)
ACBL (American Commercial Barge Line)
Ingram Barge Company
AEP MEMCO (American Electric Power)
Consolidated Terminal & Logistics Company

Metals
US Steel
Arcelor Mittal
Nucor
Gerdau
DJJ
Alberici Constructors (steel facility on port today)

Railroads
All Class 1's, specifically BNSF and UP
TRRA

Regional Groups
St. Louis Regional Chamber & Growth Association
St. Louis Development Corporation
St. Louis Port Authority
East-West Gateway Council of Governments
Missouri Partnership

4.7.3.5 Conclusions

The following activities will assist the Jefferson County Port Authority through the task of identifying port structures and funding sources to employ a long term development strategy:

- It is recommended that the Port Authority should operate as a landlord port, similar in purpose to other public port authorities in the region. As a landlord port, the Port Authority will generally invest in infrastructure and facilities that are then leased to private companies.
- Each proposed facility should be evaluated on a case-by-case basis to determine the extent of investment by the Port Authority. The Port Authority may only invest in the physical infrastructure (for example, the berth and storage yard for a cargo terminal), while a private operator provides the equipment for cargo handling.
- The Jefferson County Port Authority should pursue funding from a variety of sources - state and federal grants, revenue bonds, etc. – as illustrated by the review of active port authorities in the region.
- A primary objective for financing decisions will stem from obtaining facility leases that will cover the debt repayments and day-to-day operating costs incurred by the Port Authority.
- Marketing begins with initiating a variety of media and personal contacts/meetings.

5 SUMMARY OF RECOMMENDATIONS

To be completed for the final report after the comment period