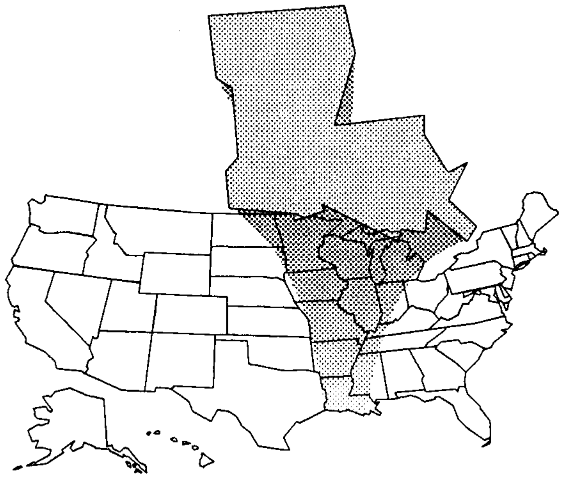
Louisiana Statewide Intermodal Plan



WORKING PAPER ON WATER, RAIL, AND INTERMODAL FREIGHT TRANSPORTATION

National Ports and Waterways Institute
Louisiana State University

***Presented to*:**

Louisiana Department of Transportation and Development

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FOREWORD

This report presents material developed by the LSU National Ports and Waterways Institute within the framework of the study and report for the Louisiana Statewide Model Intermodal Plan. The Institute's participation has concentrated on the freight component of the study with emphasis on rail, ports, waterways, and intermodal connections between these modes of transportation. The Institute also has taken a leading role in public outreach efforts for the entire study encompassing all modes of transportation.

The results of the Institute's analyses are reflected in the overall findings and reported in the Statewide Intermodal Plan. However, the material included in this document also presents information which, for a variety of reasons, is not included in the overall report. It is intended that presentation of this more detailed information and analyses will be helpful to the State and its constituencies involved in the marine and rail freight transportation sectors.

The objective of the work performed by the Institute was to determine how to enhance the competitive position of Louisiana freight transportation by taking better advantage of available capacity and improving intermodal efficiency provided by State facilities. The material presented in this report proceeds from forecasting future demand; to the adequacy of existing facilities and capacity needs for the future; to organizational, marketing and investment requirements; to comparative analysis of the Louisiana freight terminal productivity and costs; and culminates in a strategic assessment of future threats and opportunities in sustaining and expanding the Louisiana transportation market share.

This presentation is an integration of the Institute analyses and input provided by the State transportation community. In the process of our work, we always considered our responsibility to accurately reflect and incorporate the views and intentions of transportation users and providers in the marine and rail sectors.

We, therefore, express deep appreciation to many executives from the Louisiana Department of Transportation and Development, ports, railroads, other providers of intermodal freight services, and their customers who shared with us their wisdom and experience.

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EXECUTIVE SUMMARY

FREIGHT INTERMODAL TRANSPORTATION: PORTS, WATERWAYS AND RAIL SCOPE

The scope of effort has focused on intermodal connections between marine and rail transportation. The emphasis has been on transshipment facilities where intermodal transfers occur. In the marine and rail sector these intermodal linkages take place at ports and rail-highway terminals.

The focus on terminals reflects the unique position of the State of Louisiana which is geographically endowed with some of the most heavily utilized navigable waterways in the nation and the world as well as one of the few links in the nation's east-west transcontinental rail system. The state's economy is uniquely oriented to extractive industries and by-products associated with petroleum. The availability of low cost river and ocean transportation has transformed the state into a crossroads for commerce between other states, countries and modes of transportation with respect to river, deep water and rail intermodal exchanges of cargoes.

The emphasis of the study was on addressing the critical intermodal aspects germane to the geography, production, consumption and trade flow patterns that characterize the demand and supply for water and rail transportation. Much of the low value high volume bulk commodity movements through the ports and waterways system is based on availability of sufficient low cost capacity to transfer grain, coal and semi-finished goods from barge and rail to deep water vessels.

Marine and rail intermodal terminals serve as unique linkages to move high value non-regional goods through Louisiana gateways. The cargoes are heterogeneous and the service requirements are diverse. Louisiana ports compete locally, regionally and nationally for these cargoes which frequently have significant implications for related economic activities, including industrial development and diversification of the non-extractive manufacturing and service industry sectors. Accordingly, port facilities and related investments are a major impetus to economic development across the state.

In the sections to follow the major findings of the study will be reported for the critical components of greatest concern and impact for the future development of the state as it relates to marine and rail intermodal transportation. The basic building block components will be presented as the critical variables in determining the future development of the existing water and rail intermodal resources, systems and investments in Louisiana with respect to: (1) Market Demand; (2) Capacity; (3) Accessibility; (4) Institutional Challenges and Investment Needs; (5) Productivity and Cost Analyses; and (6) Competition and Strategic Outlook for Market Share.

1. MARKET DEMAND

The long run orientation of the terminal facility capacity analyses required commodity sector forecasts that would reflect the U.S. in general and Louisiana trade flows in particular. Commodity forecasts were developed for major Louisiana intermodal cargoes. The emphasis was on dry bulk commodities, grain and coal, for the marine sector and trailers/containers for the rail-highway sectors.

For non-bulk commodities the application of market demand analysis is limited by the specificity of cargo handling requirements that affect the demand for marine facilities as much if not more than demand for generic categories of cargo such as "steel". Moreover, similar cargo may have multiple handling options such as midstreaming or wharfage. Therefore, the marine sector component analysis of demand had to consider broader cargo handling trends within the context of commodity specific forecasts. This element of market demand added considerable complexity to the use of historical data and trends in the analysis of capacity.

The marine sector also had to consider the competitive position of the U.S. in world markets and Louisiana in U.S. trades. For example, adjustments were made to long run projections for export coal and containers to reflect a weakening world market for the U.S. (coal) and changing trade route growth rates for containers and the role of the Gulf coast in U.S. container trades relative to Atlantic and Pacific coast ports.

All forecasts begin with 1990 commodity flow data as the base year except as noted for marine terminal specific handling requirements. The historical data were projected without including possible cyclical components and aberrations in the time series since 1990. In the short run it is possible that cyclical shifts in demand may not track well with annual forecasts for particular years. For example, substantially <u>decreased</u> demand for U.S. export coal reflected in reduced lower Mississippi coal exports in 1993 and 1994 or significantly increased U.S. and lower Mississippi steel imports in 1993 and 1994 are not specifically incorporated into the long-run projections. Implicitly it is assumed that high and low cyclical aberrations within each commodity group will tend to cancel each other out over the duration of the forecast. Where this is not to be expected due to anticipated demand or supply shifts the long run forecasts have been modified.

A conceptual model was developed and exercised, linking origins and destinations by modes of transportation to transshipment nodes in Louisiana. Origin and destination locations were based on Business Economic Area (BEA) units for major production consumption centers in and adjacent to Louisiana. Otherwise BEA units were aggregated elsewhere at the state level or for groups of states.

The demand projections reflect average annual <u>long run</u> anticipated rates of growth for three scenarios: (1) trend or most likely; (2) low or pessimistic; and (3) high or optimistic. The results of the projections are summarized for 2000, 2010 and 2020, coinciding with ten year intervals during the overall thirty year time frame of the analysis. The "near term" projections to 2000 and beyond to 2010 are used most often for capacity analysis relative to short and longer term investment planning horizons.

The forecast element of the commodity analysis was based on the most current information of actual trends and expected behavior of supply and demand components. However, in some instances the time series trend analysis required further insight and inspection to decipher opportunities or threats to Louisiana for major commodities. Accordingly, Louisiana market analyses were done for important commodities. Where applicable the competitive analysis differentiated between different sectors or trade routes, such as containers, as part of an assessment of the strategic outlook for market share that could affect Louisiana (refer to chapter IX). The competitive analysis in reality reflects a sensitivity analysis of the steady state projections for 1990 to 2000 and 2001 to 2020.

Overall, the demand projections are conservative, reflecting moderate growth in grain and slower growth in containers and coal than forecasted for the U.S. due to changing Gulf Coast competitive circumstances and U.S. overall demand, respectively. Since there are no readily available disaggregated projections generally beyond a short term, such as 2000, the commodity growth rates represented extrapolations of anticipated trends between 1990 and 2000. The underlying growth rates were adjusted downward beyond 2000 for all commodities in general and particularly for export coal and containers, to incorporate long run uncertainty and discount for the effects of steady state compound rates of growth over thirty years.

2. CAPACITY

This study focused on developing measurements of the capacity of the unique transshipment facilities at marine and rail-highway terminals throughout the state. While elements of capacity specifications exist for some components of the state's intermodal transshipment facilities, this study is the first comprehensive assessment to define overall capacity by relevant sectors for the network of marine and rail facilities in the state.

The major findings are that the state currently has sufficient capacity in marine and rail-highway transfer facilities to accommodate present and immediate projected demand for bulk commodities and general cargos at the five deepwater ports and seven rail-truck terminals in the state. Although sufficient capacity exists at present, it appears that expansion will be required in the bulk sector, particularly grain, and to a lesser extent coal. Most of the grain capacity will focus on modernization of existing facilities, primarily by alleviating forthcoming bottlenecks in vessel unloading (barge). The coal sector seems to have abundant capacity for the existing and future off-shore flows (domestic transshipments and exports). However, opportunities for new trade flows potentially available to Louisiana through imports may require revision of facilities and handling requirements.

The general cargo sector in the ports has been a volatile component of Louisiana trade and investment in marine facilities. Currently, there is abundant capacity in overall break bulk general cargo transshipment capabilities. However, some capacity shortages may appear at particular localities such as handling labor intensive bagged cargos at Lake Charles City Docks. Future growth in the container trade will require new capacity at the existing infrastructure at New Orleans France/Jourdan Roads.

For several reasons the marine container segment is particularly volatile and subject to a number of investment and market opportunities that make projections of capacity and investment requirements considerably more speculative beyond the immediate business cycle and related short run planning horizons. The problems related to growth of container cargoes at France and Jourdan Roads are linked to several concerns beyond the scope of this study such as draft limitations and siltation of the Mississippi River Gulf Outlet (MRGO) as well as replacement of the existing deep draft lock between the Mississippi River and the Industrial Canal.

The rail-highway transfer facilities in the state all have abundant capacity for the duration of the study until 2020. Moreover, these facilities can easily accommodate incremental expansion. The major facilities at New Orleans, primarily on the east bank, are relatively modern and can incorporate significant increases in throughput. Opportunities for consolidation and sharing of capacity are discussed in the competitive opportunities section of this study.

The basic "stock and flow" terminal transshipment capacity orientation employed in this study did not explicitly incorporate the linehaul components of rail and waterway infrastructures. With few exceptions, these railroad and waterway “long link” elements have practically no capacity limitations in the context of existing levels of utilization. (The few port, waterway and railroad network weak links or bottlenecks identified by industry sources and for which non-federal authorities have responsibility are described in Appendix 3). However, relatively short links of access connections between trunkline infrastructures and associated terminals were explicitly incorporated into the capacity analysis as part of the accessibility component of intermodal systems. Moreover, particular impediments to waterway and rail access either in the short connecting links or trunkline infrastructures were incorporated as part of the institutional challenges and investment needs component of the analysis. Where access impediments were project specific or beyond the scope of the state little or no analysis was performed.

3. ACCESSIBILITY

The analysis of intermodal connections for marine and rail terminals by definition includes the sufficiency of the local linkages between the facilities and the high to unlimited corresponding capacities of the rail and water infrastructures as principle components of the intermodal plan. Accessibility has a myriad of dimensions, ranging from physical to institutional. Where appropriate both were developed largely from primary data and field observations.

In general highway access issues for the marine and rail sectors are related to the characteristics of the areas served. In New Orleans the primary issue is existing congestion and future road capacity for the urban components of the Interstate system, I-10 and connections, required for interurban and cross town traffic flows. The Port of New Orleans with pending projects at Tchoupitoulas Corridor and Jourdan Road will have sufficient local access capacity for truck movements between the Crescent City Connection and the Mississippi River Terminal Complex and between I-10 and US 90 at France and Jourdan Roads, respectively. However, the Tchoupitoulas Corridor will not address the need for enhanced road capacity for access from the west via I-10 to the River Terminal Complex.

Forecasts of road traffic unrelated to marine and rail-highway traffic were not prepared as part of this scope. For most access links vehicles for other sectors represented the majority of the traffic, particularly on congested arteries such as I-10. Therefore, any growth in traffic from these sectors, primarily automobiles and other commercial users not related to marine and rail-highway terminals, will determine the composition of access relative to future levels of congestion. Service levels on segments that already exhibit constrained volume capacity ratios will continue to deteriorate in the absence of new capacity.

The rail-highway terminals have different access orientations depending on location and traffic flow. In general CSX and NS facilities at Gentilly Road and Florida Avenue, respectively, have attributes of "near dock" intermodal connectivity in terms of drayage times and convenience to the France/Jourdan Road marine container transshipment facilities. The IC rail highway facility at Napoleon Avenue is well situated to accommodate planned container development of the River Complex. Otherwise the IC facility has to rely on I-10 for access to the marine berths. The KCS facility has the most congested access options to reach the existing marine container facilities at France and Jourdan Roads. The west bank rail-highway terminals at Avondale are largely unrelated to the east bank marine container terminals contingent on SP and UP use of east bank facilities such as CSX at Gentilly for high volume port related "bridge" traffic. Highway access to St. Bernard public marine facilities is also congested.

Most of the other public marine facilities in the state have more rural or small urban access characteristics and associated arterial highway infrastructure. The access issues are more related to the sufficiency of maintenance of existing infrastructure and potential increases in non-port utilization of adjacent streets and roads for which port access is important but nevertheless minor contributor of local traffic. Notwithstanding growth in other vehicles the volume capacity ratios for most of these accesses are sufficiently low such that future growth can be accommodated well beyond the "near term" such as 2000.

Rail access at the deepwater ports of Baton Rouge, Lake Charles and New Orleans is characterized by a variety of detailed institutional and historical relationships that have evolved over time. The bulk and general commodity orientation of these ports has sustained rail carload service at a time when the concept of single or loose car railroad operations is being rationalized via abandonments, amalgamations, and short lines. Nevertheless, for various reasons Louisiana deepwater ports have maintained a level of organizational and service rigidities that have not kept pace with overall rail system developments. Consequently, access improvements are possible at all locations but may require different combinations of leadership, sacrifice, and insight to overcome resistance to institutional and operational changes. Marine and local rail access issues are seldom related to infrastructure. For the most part the impediments are related to cost and volume relationships between different institutional service providers and arrangements.

The rail access issues between different trunkline intermodal terminals are similar to access to marine facilities. Each railway customarily maintains its own terminals where there is sufficient volume as in New Orleans. Otherwise the bulk of the state cannot sustain modern rail-highway facilities except through special circumstances such as Shreveport. Direct linkages between different rail-highway terminals will not be effective unless sufficient volume exists for "run through" trains or shared facilities. New Orleans is a major east-west run through location which has sufficient volume to foster relatively efficient west bank rail access to the marine container facilities at France/Jourdan Roads via CSX rail highway facility at Gentilly. Unfortunately, efficient east-west rail access is constrained by a host of institutional, operational and infrastructural considerations among competing and cooperating railways. Otherwise shared rail access to different intermodal facilities is limited primarily by the lack of volume relative to highway drayage substitutes (rubber tire interchanges). Opportunities to enhance rail intermodal access to the New Orleans marine container facilities are discussed as part of the competitive opportunity assessment.

4. INFRASTRUCTURE, INSTITUTIONAL AND POLICY ISSUES

4.a Rail

Input from maritime and freight rail users and providers as described in Chapter II was used to formulate a series of "challenges" facing related segments of the state's intermodal transportation network. The issues and perspectives of different challenges to development of Louisiana's marine and rail intermodal freight sectors were heterogeneous, ranging from national, regional and statewide institutional concerns to particular investment projects. Only the major "challenges" with respect to recommended programs and infrastructure financing are summarized here. For more detail the reader is referred to Chapter VII and related appendix.

For the freight rail sector the most pressing challenge was to make substantive progress on improving the safety of rail-highway interfaces. Increased annual funding, ranging from \$6 to \$9 to \$12 million is recommended, depending on the growth scenario (low, trend and high, respectively) for expanding rail/highway grade crossing safety programs. A freight rail intermodal grant program of \$3 million per year shared equally by the state and railroad and a loan fund for light density rail line rehabilitation are recommended. Other freight rail recommendations include \$0.5 million for resolution of the institutional and operational impediments to railroad cooperation to develop a plan to revamp East Bridge Junction east west rail gateway access. Another institutional issue particular to private freight rail is a recommendation to study the public sector role in enhancing rail access amid perceptions that inefficiencies may exist that if remedied could significantly enhance economic development.

4.b Marine - Infrastructure

Infrastructure financing requirements for public ports has been developed in conjunction with capacity analyses (refer to Chapter V), as well as considerations of access impediments and competitive opportunities and threats. The ports were also queried about specific future capital investment plans relative to maintenance or expansion. Based on a composite of past investment trends, present and projected capacity utilization and future maintenance requirements state infrastructure financing requirements for New Orleans and all other public ports were developed for three scenarios adopted for the overall intermodal plan associated with low, trend and high demand for three periods: (1) actual 1990 to 1995; (2) 1995 to 2000; and (3) 1995 to 2020.

It is anticipated that the investment trends in the period 1995-2000 would be continued for the period 2000 to 2020 although possibly reflecting different assortments of projects with respect to both rehabilitation and expansion of facilities. The recommendations recognize the substantial commitments already underway at New Orleans and reflect different levels of anticipated growth. Under the low growth scenario state funding would be limited to the existing port priority program level of $15 million per year. The emphasis would be preservation and rehabilitation of existing facilities. Under the trend level of growth state financing requirements would be $24.5 million per year, reflecting $8 million for the Port of New Orleans and a ten percent increase in state port priority funding, $1.5 million, to $16.5 million per year (matched by a minimum 25% port share). The high growth projections, reflecting increased demand and expansion to accommodate new market opportunities (refer to Chapter VII), would require $45 million state financing annually during 1995 to 2020.

The proposed capital investments by public ports are for an amalgamation of different purposes with respect to existing facilities (rehabilitation or expansion) as well as new capacity. The precise distinctions between these categories vary for cargoes and ports as well as new market opportunities and can change in response to market developments. Therefore, the investment projections do not represent a comprehensive conclusion of future overall requirements among ports. The projections may change as the composition of rehabilitation, expansion and new market opportunities fluctuates in response to specific developments.

Financing requirements are modest with respect to current average annual levels of port investment during 1990 to 1995, $35 million, reflecting $20 million in TIMED program funds annually for the Port of New Orleans and $15 million annual for the port priority program. It is expected that the TIMED funds begun in 1990 will terminate in 1995 and New Orleans will provide its own funding. Under the "low" scenario state port financing would **decrease** (by $20 million) from an annual average of $35 million. Average annual state port financing would also decrease from current levels (by $10.5 million per year) under the trend projections.

State port financing would increase (by $10 million) relative to current levels only under the high projections. The increase would essentially represent continuation of the level of annual funding under the TIMED program to New Orleans, $20 million, and an increase of the existing port priority program from $15 to $25 million. In total, including the state and other sources of financing, annual investments in public ports will average approximately between $40 million for a low growth scenario to $50 million for trend scenario and to $72 million for high growth scenario.

4.c Marine - Institutional and Policy

The marine sector identifies a number of recommended programs to improve the utilization of Louisiana ports for attracting more cargos to take advantage of available capacities and efficient intermodal services. The recommendations include: (1) develop north/south trade opportunities; (2) regional public port marketing programs; (3) port intermodal services directory; (4) "ship Louisiana" campaign followup; (5) establishment of port/intermodal transportation specialist position in one of the state agencies; (6) joint marketing mission trips; and (7) cargo pooling. The total cost of these various enhancements to the use of the ports is $0.5 million per year.

The study recommends state participation in developing and then applying a methodology for public landside access cost sharing to facilitate the development of intermodal connections for important marine and rail-highway sectors of Louisiana. The methodology would provide for shared funding of "intermodal" projects which might not otherwise receive adequate attention and ranking from traditional modal funding sources. The landside access multimodal funding criteria would allow for intermodal projects that relate to different funding sources to be evaluated and funded jointly.

The port sector also recommends state participation in several federal studies related to Corps of Engineers analysis of waterway infrastructure requirements. The state would participate via cost sharing as well as to define state interests in existing and improved conditions. The total cost (federal and state share) of the studies is estimated to be approximately $5 million of which the state share is estimated to be nearly $1.9 million. The studies would analyze the following important issues affecting future Louisiana port investments: (1) Mississippi River Gulf Outlet (MRGO) bank erosion/stabilization feasibility; (2) Deep draft lock feasibility for Inner Harbor Navigation Canal (IHNC); (3) Lower Mississippi River 55 foot channel feasibility; and (4) feasibility of improvements to other navigable waterways in the state..

5. PRODUCTIVITY AND COST ANALYSIS

An essential element of a determining future statewide marine terminal intermodal requirements is assessment of the comparative productivity and costs to users of these facilities compared to the competition. Port competition is a hybrid mixture of cost and service. Cost competition is particularly important for much of the bulk and semi-finished cargos handled at Louisiana ports. Therefore, part of the study focused on a cost and productivity assessment for Louisiana shippers compared to competing ports.

The port comparisons included all port related costs from the vessel steaming time from the sea buoy to loading and unloading at berth, including specific examples of pilotage, wharfage, cargo handling productivities, etc. The port cost comparisons focused on vessels and cargos germane to Louisiana ports.

The major findings are that Louisiana public ports appear to be competitive in handling and productivity rates for general cargos compared to other Gulf ports such as Houston and Gulfport. The major cost disadvantage of New Orleans is associated with the greater port access steaming time from the sea buoy compared to Houston. If the cost of vessel steaming time is excluded New Orleans is actually a lower cost port call than Houston. Cost of cargo handling in New Orleans is actually lower than Houston but is about ten percent higher than Gulfport. For containers New Orleans is competitive with Houston but has higher costs than Miami.

The micro level port cost and productivity findings support that Louisiana ports are operating within well defined market niches relative to cargos and trade routes. The major concerns for Louisiana ports are a host of variables over which they have no control. Chapter IX discusses interport competitive opportunities and threats which are often far beyond the influence of the state. An important factor but not in a category within state control is future navigation conditions on the MRGO, relative to draft and vessel size, and possible relationship between financing a modern deep draft lock at the entrance to the Industrial Canal and future navigation on the MRGO. Natural impediments to navigation on the Mississippi relative to weather and vessel streaming times are conditions over which the state cannot readily respond. Similarly, changes in operation or cost recovery for federal projects, such as discharges of Missouri River water to sustain unimpeded shallow draft navigation on the Mississippi and barge user fees, affect Louisiana trade flows but are outside state control. Finally, the smaller population and manufacturing base of the New Orleans area in particular and its container hinterland in general is sometimes viewed as a "natural" competitive disadvantage compared to Houston if container lines tend to desire only one Gulf port call.

6. COMPETITIVE AND STRATEGIC OUTLOOK FOR MARKET SHARE

A series of strategic assessments were made of existing and future production, consumption and distribution requirements for major commodity markets germane to Louisiana ports. The scope of each commodity review and outlook was to identify threats and opportunities to Louisiana ports and, where practical, perform a quantitative or qualitative assessment of the magnitude of the impacts for Louisiana. The "industrial review" approach was used for coal, grain, containers and non-containerized general cargo.

The competitive outlook for the coal sector is for continued cyclical aberrations but no major changes in Louisiana exports. Although demand will increase the overall market shares of different sources of coal and port ranges will remain virtually unchanged. Although controversial, Louisiana coal market share does not appear to be significantly affected by expanded coal terminals or top-off, given abundant existing capacity. Deeper drafts on the Mississippi may positively affect the competitive position of Louisiana coal exports. Alternatively, the possibility of increased federal user fees for barges on the Mississippi River system may have a negative impact. Overall, these elements do not appear to lead to major substantive shifts in demand for Lower Mississippi River coal exports.

Virtually unnoticed has been the minuscule but rapidly growing coal import market for major utilities near the Southeast and Gulf coasts. The potential for Louisiana coal imports and domestic blending is too premature to assess. Nevertheless, based on examples of imported coal shipments handled elsewhere such as Jacksonville and Mobile, this cargo would represent significant new business and potential for Louisiana, offering attractive back-haul opportunities for the barge industry.

The grain sector will continue to exhibit consistent growth. Louisiana's premier national competitive position in grain is largely a function of US international competitive position and to a lesser extent low cost domestic barge transportation. All indications are that the US share of world grain markets will remain stable and continue to grow. Although the barge sector may experience real cost increases relative to equipment and federal user charges, the overall impacts are expected to be of minor impact on Louisiana as the major low cost point of transshipment for this commodity.

The containerized trade is far more volatile related to local and national developments. The major trade lanes that support the New Orleans container trades, Northern Europe, Puerto Rico and South/Central America, all have distinct competitive profiles relative to Louisiana. The overall assessment for each is as follows:

(1) Northern Europe: This is the most potentially volatile both with respect to size and possible reallocation to other ports, primarily South Atlantic competition. The continued shifts to load centering and larger vessels portray distinct possibilities that one or more liners will divert vessels or cargo or both to ports outside the Gulf.

(2) Puerto Rico: This is among the most stable of the important markets for transshipment at Louisiana. However, much of the trade is bridge related (mini-bridge and macro-bridge) and can be diverted to other ports such as Houston in the Gulf or Jacksonville in the southeast. Slower growth in this market and stability of the operators and vessels will favor Louisiana. The introduction of new larger vessels or possible redeployment of existing vessels could negatively impact Louisiana due to the MRGO limitations and the non-local nature of much of the cargo together with the small size of the local Louisiana hinterland.

(3) Central/South America: This market has the largest anticipated rate of growth. However, the overall market size is small compared to Northern Europe and Puerto Rico trades. Therefore, even with major growth in this market, possible losses of the Northern Europe trade are still important threats. Unlike Northern Europe and Puerto

Rico, this market does not appear to be moving toward jumboization of vessels or load centering. Both of these considerations favor New Orleans and other Louisiana ports that can serve niche markets through small vessels and specialized services such as river ocean vessels and mixed general cargo and container services. The possibilities of new innovative services such as cross Gulf ferries may offer significant new traffic to Louisiana ports. The long run growth of trade with Mexico and the strategic location of the domestic waterways system linking Canada and the Mississippi and Ohio River Valleys with Mexico pose significant opportunities for deep and shallow draft ports in Louisiana.

The intermodal assessment and outlook for rail-vessel container interchanges is that little changes appear to be warranted at this time. Two of the largest rail intermodal yards relative to access to France and Jourdan Road facilities have the drayage characteristics of "near dock". At the present time none of the railways has sufficient volume to justify construction of a separate port facility. Moreover, the nature of the rail intermodal terminal network in New Orleans is not particularly conducive to complex terminal operations involving both domestic and Port-handled or "bridge" international traffic of more than one railroad. The overall situation is more diffused with possible expansion of container capabilities at the Mississippi River Terminal Complex. For the time being a France Road on dock or near dock intermodal yard seems unlikely to be feasible relative to the volumes handled by the major railways at existing terminals. The feasible action appears to be to pursue existing run through train service with shared access to the CSX Almonaster intermodal terminal. In the long term, if warranted by traffic growth at France/Jourdan Roads, the expansion of the existing "near dock" type facility at Almonaster with improved access to western trunkline carriers, SP and UP, seems most feasible.

The brightest spot for New Orleans is the continued increase in demand for specialty general cargos, particularly steel imports, to a lesser degree lumber exports, and rubber imports. Although these cargoes are cyclical, the hinterland rail and barge connections at the port and handling efficiencies indicate that these cargoes will remain at New Orleans. Particularly important is the efficient direct ship to barge transfer (mid-streaming) which represents significant cost savings only available in the Lower Mississippi area. However, for all practical purposes the mid-stream direct transfers also compete directly with existing port facilities.

I. EXISTING TRANSPORTATION SITUATION

I.A FREIGHT RAIL

I.A.1 OVERVIEW, LOUISIANA FREIGHT RAILROADS

A network of privately owned freight railroads serves shippers and receivers in Louisiana, providing linkage both within the state and across North America (See map, Figure I.1 and Table I.1). This network extends approximately 2,800 miles within the state, and includes heavily used trunklines and light density lines. Seven of the nation's thirteen Class I trunkline railroads serve the state, although one, the Santa Fe, operates only as far as DeRidder on a spur line from the Texas border. Ten light density regional or terminal switching railroads operate in the state, including one owned by the City of New Orleans, New Orleans Public Belt Railroad.

According to data from the Association of American Railroads (AAR), 3,786 people were employed by the Class I railroads in Louisiana in 1991, while there were an additional 11,800 railroad retirement beneficiaries in the state that year (see Table I.2). Total railroad wages paid in 1991 were $159,120,000, with an additional $100,056,000 paid in retirement benefits.

Chemicals, pulp and paper, lumber and wood products, petroleum and mixed freight were the top five rail-carried commodities originated in Louisiana in 1991. Louisiana ranks second in the nation in originating rail chemical traffic. Farm products (predominantly grain for export), chemicals, coal (for both export and power generation), mixed freight, and nonmetallic minerals were the top five rail-carried commodities terminated in Louisiana that year. A total of 87,171,357 tons of cargo were carried by the railroads in Louisiana in 1991 (See tables I.3 and I.4).

The principal challenge faced by Louisiana railroads which requires public sector action is the many safety and operating impacts of roadway grade crossings of railroads. This challenge is addressed in another section of this report.

I.A.2 LOUISIANA'S TRUNKLINE RAILROADS

Railroads designated "Class I" by the Interstate Commerce Commission (ICC) are the nation's largest, having at least $250 million annual operating revenues. Generally, the nation's Class I railroads are separated by the Mississippi River into east and west bank systems, with the Huey P. Long Bridge at New Orleans serving as the only major river crossing south of Memphis (excluding the state owned rail-highway bridge crossing at Baton Rouge). Six of these "trunkline" railroads each move more than ten million tons annually into, from or across Louisiana. The Kansas City Southern (KCS) and the Union Pacific (UP) have route networks that crisscross the state. The CSX and Norfolk Southern (NS) railroads enter the state from Mississippi and proceed to the New Orleans gateway, linking there with other rail networks. The Illinois Central (IC) enters the state in Tangipahoa parish and serves Baton Rouge, New Orleans

Table I.1
Active Railroads in Louisiana
As of September 1994

Railroad(Class I in bold)	Miles
Acadiana Railway	58
Amtrak(NOUPT)	6
Arkansas, Louisiana and Mississippi Railroad	45
Atchison Topeka and Santa Fe Railroad	**22**
CSX Transportation	**35**
Delta Southern Railroad Company	82
Gloster Southern Railroad Company	21
Illinois Central Railroad	**208**
Kansas City Southern (includes MidSouth)	**915**
Lake Charles Harbor and Terminal District	13
Louisiana and Delta Railroad	86
Louisiana and North West Railroad	38
New Orleans Lower Coast Railroad	23
New Orleans Public Belt Railroad	25
Norfolk Southern Railway	**80**
Ouachita Railroad	8
Southern Pacific Lines (includes SSW)	**367**
Union Pacific	**785**
TOTAL	2,817

Source: Louisiana Department of Transportation And Development

Table I.2
Key 1991 Louisiana Railroad Statistics and Rank Among the States

Statistics	Figure	Rank
Number of Railroads	21	15th
Total Rail Miles	2,968	24th
Rail Carloads Handled	1,421,092	25th
Total Tons Carried by Rail	87,171,357	25th
Total Railroad Employment	3,786	25th
Total Wages of Rail Employees	$159,120,000	24th
Average Wages per Rail Employee	$42,029	-
Average Fringe Benefits per Rail Employee	$16,644	-
Railroad Retirement Beneficiaries	11,800	28th
Payments to Railroad Retirement Beneficiaries	$100,056,000	28th

Source: Association of American Railroads

Table I.3
1991 Top Commodities--Rail Tonnage Originated Within State/ Percent of Total

Commodity	Tonnage Originated	Percentage of Total
Chemicals	17,494,612	52
Pulp and Paper	4,029,048	12
Lumber, Wood Products	2,644,756	8
Petroleum	2,414,664	7
Mixed Freight	2,386,200	7

Source: Association of American Railroads

Table I.4
1991 Top Commodities--Rail Tonnage Terminated Within State/ Percent of Total

Commodity	Tonnage Terminated	Percentage of Total
Farm Products	7,310,758	22
Chemicals	5,470,528	17
Coal	4,281,958	13
Mixed Freight	2,997,212	9
Nonmetallic Minerals	2,316,308	7

Source: Association of American Railroads

and the Mississippi River corridor in between. Finally, the Southern Pacific (SP) stretches along the state's coast from Texas to New Orleans.

Intramodal interchange of railcars must be made between one or more trunkline or regional railroads as origins and destinations demand. Such interline interchanges require added time and careful coordination and documentation, so that movements that remain on a single railroad's route network can usually be made more efficiently. Accordingly, direct access to the networks of six trunklines at New Orleans, and to three trunklines each at Baton Rouge, Lake Charles and Shreveport, can be advantageous to rail users in these markets. Efforts by the railroads to streamline interline interchange are underway, facilitated by shipper demands and new information technologies.

The six trunkline railroads are key elements in the state's intermodal transportation system. The evolution and use of the word "intermodal" in freight transportation has meant the transport of shipping containers and truck trailers on rail flat cars. Intermodal Container Transfer Facilities (ICTFs) are operated by each of the six trunklines in the vicinity of New Orleans. A shared user ICTF has been operated by the Port of Caddo/Bossier in Shreveport since 1992. It is anticipated that this facility will be closed pending renovation of an older rail-highway terminal at Shreveport adjacent to the Kansas City Southern Deramus Yard. A detailed description and analysis of these ICTFs is presented in subsequent sections of this report.

I.A.2.a CSX Corporation

The CSX Corporation owns the nation's largest barge line (American Commercial Barge Lines), one of the largest American flag international shipping concerns (Sea-Land, providing important liner service to the Port of New Orleans), an autonomous intermodal shipping company, and CSX Transportation, one of the nation's largest railroads. CSX Transportation was formed from predecessor companies Chessie System and Seaboard Rail System. The railroad operates over 18,799 route-miles across the East, Midwest and South, and enters New Orleans from the east at Gentilly, where it operates its Louisiana classification and intermodal yards. The CSX connects across the "L & N" Bridge over the Inner Harbor Navigation Canal (IHNC) to the Norfolk Southern which provides access to the other trunklines via its "Back Belt." The CSX offers the most direct rail link to Florida and competes with Norfolk Southern for intermodal traffic in Southeast and Midwest markets. CSX has recently announced further expansion of its ICTF in Gentilly. The CSX accommodates Amtrak's *Sunset Limited* east of New Orleans.

I.A.2.b Illinois Central

The Illinois Central (IC) provides the most direct route from southeast Louisiana (East of the Mississippi River) to the principal markets of the central Midwest, and via other carriers, with Canada. The company operates 2700 route miles of main line track. Its major classification and intermodal transfer facilities are in Chicago, St. Louis, Memphis and New Orleans. Principal commodities transported by the company include chemicals, paper products, coal, and grain. Its principal Louisiana classification yard is the Mays Yard located in Harahan (near New Orleans). Its intermodal yard is located within the Port of New Orleans' Uptown River Terminal complex. Traffic density (annual tonnage per route segment) for the IC in Louisiana is shown on the map in Figure I.2. The IC accommodates Amtrak's *City of New Orleans*.

The Illinois Central provides rail service to most of Louisiana's industrial plants and grain elevators along the east bank of the Lower Mississippi River. The IC has recently applied for authority to abandon a route between Talisheek (south of Bogalusa) and Slidell, Louisiana. It has also commenced planning and feasibility analysis for construction of a new concrete viaduct across the Bonnet Carre Spillway. This new bridge will carry its own riverfront (formerly Mississippi & Yazoo Valley) and lakefront (mainline to Chicago) lines and the Kansas City Southern mainline, so that all three existing wooden trestles could potentially be abandoned. This project would allow its lakefront line to be removed, allowing room for a new north-south runway at New Orleans International Airport.

I.A.2.c Kansas City Southern

The Kansas City Southern (KCS) rail network is now the most extensive in the state, and includes routes of the MidSouth Railroad, acquired in 1993. Shreveport is the Kansas City Southern's hub, with lines radiating out to Dallas, Lake Charles and Port Arthur, Alexandria/ Baton Rouge/ New Orleans, Meridian, and Kansas City. The railroad operates approximately 2,810 route miles.

Principal commodities transported by the company include coal, chemicals, farm products, pulp and paper, food products and lumber products. The Shreveport main classification yard, Deramus Yard, is one of the largest in the state.

Following a major capital investment to upgrade the track (and increase operating speeds), an east-west line linking Shreveport with Meridian, Mississippi has proven to be the key route from the MidSouth acquisition. Via a connection with Norfolk Southern at Meridian, this line now provides the most direct rail route between two of the nation's major markets, Dallas and Atlanta. Reflecting the intermodal significance of this route, KCS and NS inaugurated in November, 1994 run-through dedicated intermodal service linking Dallas and Atlanta in 33 hours. The railroad has purchased 100 acres at Jackson, Mississippi and is planning a $30 million ICTF for that site. The KCS has recently closed its "piggyback" ramps (limited to roll-on truck trailers) at Baton Rouge, Alexandria, Lake Charles and Texarkana. A portion of KCS mainline between Kenner and Reserve may be abandoned as part of the project to replace Bonnet Carre Spillway trestles.

I.A.2.d Norfolk Southern

The Norfolk Southern Railroad (NS) operates 14,589 route miles across the Midwest and Southeast. Its network extends to rail gateways at Kansas City, Chicago, Detroit, Buffalo, Hagerstown (MD) and Jacksonville, and New Orleans. Norfolk Southern has formed a strategic alliance with the Port of Norfolk, Virginia to handle east-west containerized traffic. The NS also operates its own export coal terminal at Norfolk, which competes with Lower Mississippi River coal export terminals. Principal commodities transported by the NS include coal, paper and forest products, chemicals, automotive and intermodal. The railroad is a major stakeholder in RoadRailer, a company that uses innovative technology to carry trucks over rail lines. Traffic density (annual tonnage per route segment) for the NS in Louisiana is shown on the map in Figure I.2. The NS accommodates Amtrak's *Crescent*.

Norfolk Southern owns the "Back Belt," which is the link between eastern and western trunklines at New Orleans. The Back Belt extends from East Bridge Junction (at the foot of the Huey P. Long Bridge) to New Orleans Terminal Junction where it meets the CSX. The Back Belt is entirely double tracked and grade separated from crossing roadways within the City of New Orleans, but a critical segment in Metairie (Jefferson Parish) is single track and burdened with several heavily used roadway grade crossings.

In 1993, NS completed a major reconstruction and expansion of its New Orleans ICTF. Late in 1994, NS completed a multi-year reconstruction of its trestle over Lake Pontchartrain, allowing full axle loads and speeds of 30 miles per hour.

I.A.2.e Southern Pacific

The Southern Pacific (SP) transports freight over a route network of approximately 12,600 miles. Its Houston - Chicago line, which runs through Shreveport, belonged to predecessor Saint Louis Southwestern (SSW - also known as the "Cotton Belt"). New Orleans is the eastern extremity of SP's "Southern Corridor," which links coastal Louisiana markets (via Morgan City) with Texas and California and includes several gateways with Mexico. Principal commodities transported by SP include intermodal, chemical and petroleum products, food and agricultural products and forest products. Southern Pacific and CSX Intermodal work together for east-west landbridge traffic. For landbridge containerized cargo between Europe or the Mediterranean and the Far West, Houston has been the favored port of transfer because it is closer to California and has a larger local market that New Orleans. Traffic density (annual tonnage per route segment) for the SP in Louisiana is shown on the map in Figure I.2. The SP accommodates Amtrak's *Sunset Limited* west of New Orleans.

I.A.2.f Union Pacific

The Union Pacific Railroad (UP) operates over nearly 18,000 route miles linking Pacific Coast and Gulf Coast ports with Mexico and the Midwest. In 1982 it merged with the Western Pacific and the Missouri Pacific, which had previously incorporated the Texas Pacific and, more recently, the Missouri, Kansas, Texas (KATY). Major categories of freight hauled include chemicals, coal, automotive, farm products and food products. In 1993, coal represented 34.3 percent of its revenue ton-miles, and chemicals 20.9 percent (much of this generated in Louisiana). The Union Pacific provides rail service to most of Louisiana's industrial plants and grain elevators along the west bank of the Lower Mississippi River. Traffic density (annual tonnage per route segment) for the UP in Louisiana is shown on the map in Figure I.2.

The Union Pacific has recently inaugurated operations at its new classification yard in Livonia, Louisiana, where its principal east-west and north-south lines meet in the state. The yard will provide a large "hump" yard (equipped with a small hill to facilitate the makeup and breakup of trains with the help of gravity) to serve all of its Southeast Louisiana traffic. This facility is sited on a 555 acre tract (acquired through expropriation in 1982) and stretches five miles in length. When fully completed, the new yard will have six arrival tracks, six departure tracks, and 31 classification tracks, with a capacity of over 1500 cars, a car repair facility and a locomotive fueling facility. The total investment will have been about $58 million. Railcar sorting and train service functions previously performed at the Avondale and Addis yards will be relocated to this new yard, which may affect timely pickup/delivery of interchange cars at New Orleans. The Avondale and Addis yards will remain in use for railcar storage.

I.A.3 LOUISIANA'S RAIL GATEWAYS

There are two major hubs for railroad intramodal and intermodal interchange in Louisiana: New Orleans and Shreveport. The CSX, IC, KCS, NS, SP and UP link with each other, and with

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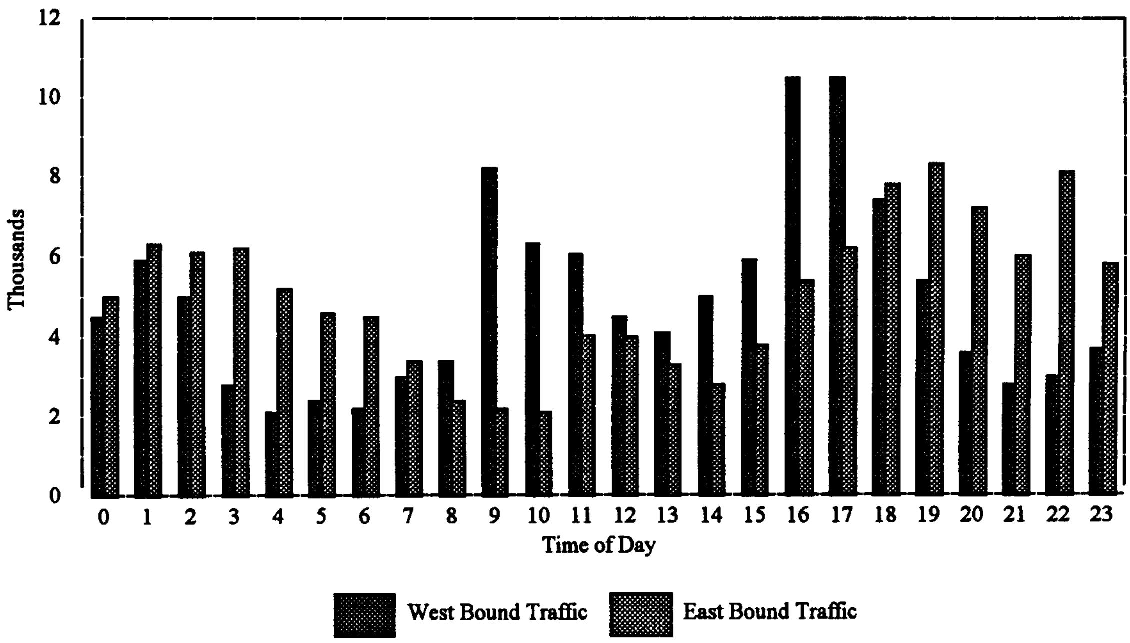
NOPB and NOUPT (the local freight and passenger terminal railroads, respectively) at New Orleans, which is the principal point of interchange south of Memphis between the major eastern and western trunklines. Traffic between these lines is both set aside for subsequent pickup by the linking carrier (traditional interchange), and "run-through" as whole trains, with just a crew transfer. The Huey P. Long Bridge, East Bridge Junction, and NS' Back Belt are the core infrastructure that accommodate this interchange. East Bridge Junction is discussed further in section VII.A of this report. Approximately 100 daily train movements are controlled at East Bridge Junction. Table I.5 presents the cumulative hourly volumes of railcars handled east and west across the Huey P. Long Bridge for five months of 1993. The data indicates peaks in east and west bound traffic corresponding to the late evening and early morning and mid-morning and late afternoon, respectively.

The railroads have in recent years begun to schedule arrival and departure of freight trains at major gateways and yards, but schedule reliability is difficult to assure within less than about a four hour window. Appendix 1 contains a discussion and tables that profile typical regular train movements that occur in and out of the New Orleans gateway for each of the linehaul railroads as of March, 1994. There is also corresponding data for the two largest trunklines operating in Shreveport.

Table I.5
Cumulative Hourly Railcar Crossings
Huey P. Long Bridge, May - September, 1993



Source: New Orleans Public Belt Railroad

Louisiana Class I Railroad Network

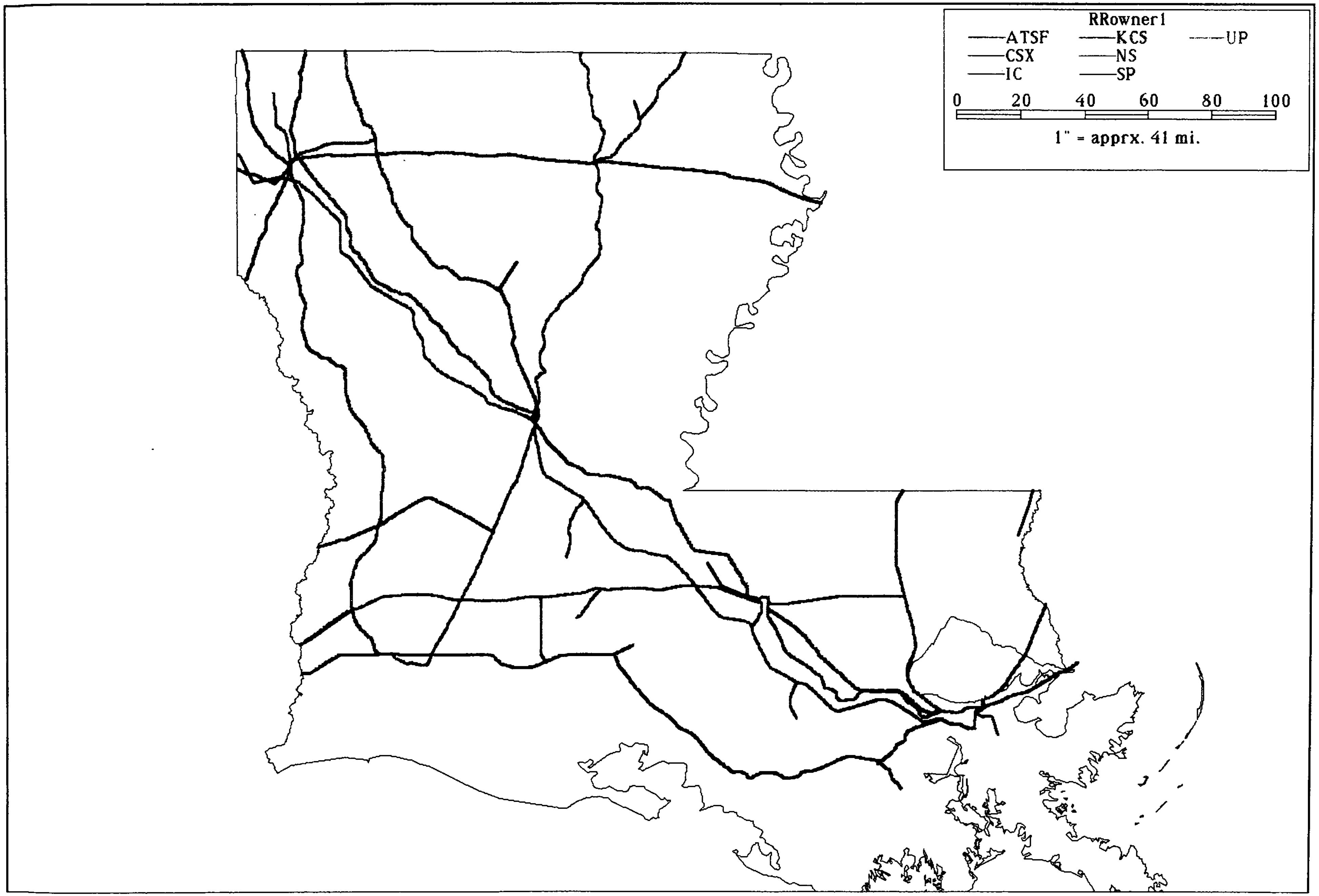
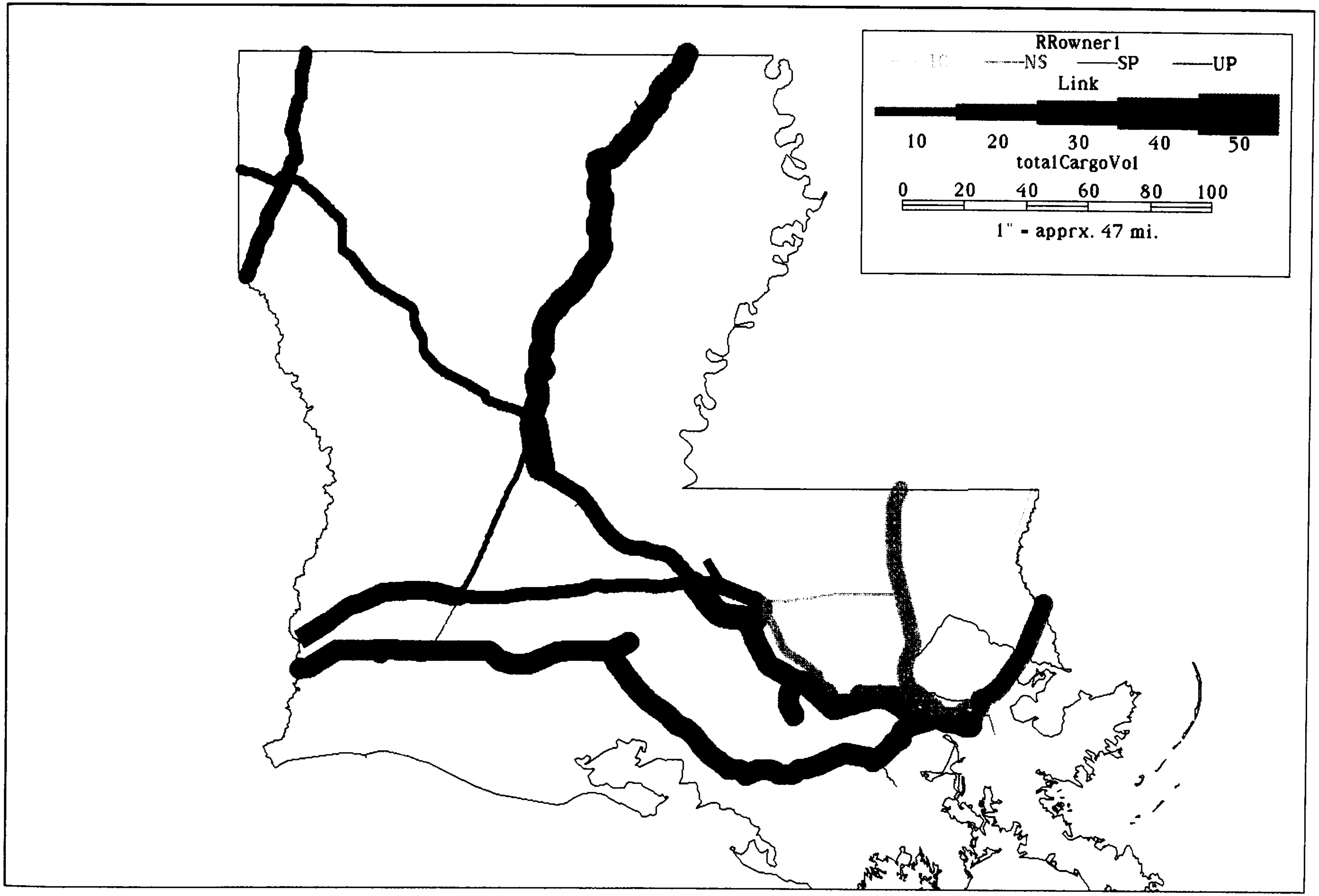


Figure 1.1

Figure I.2
Rail Traffic Density, 1993
in Million Gross Tons (As Provided By Operating Railroads)



Source: Illinios Central, Norfolk Southern, Southern Pacific and Union Pacific

I.B. PORTS AND WATERWAYS

I.B.1 OVERVIEW, LOUISIANA PORTS AND WATERWAYS

The ports and waterways system in Louisiana is a vital component of the U.S. transportation network. In terms of U.S. foreign commerce, Louisiana is the point of departure for 19 percent, or 187 million tons, of the total (the state handled 319 million tons, or 5%, of the national domestic freight total). The Lower Mississippi River region, stretching more than 270 miles inland, handles 86 percent of the Louisiana's foreign commerce. The state has four major deep water port areas involved in international commerce: South Louisiana (38% of the state's total), New Orleans (28%), Baton Rouge (20%), and Lake Charles (14%). The jurisdiction of the Port of South Louisiana, which receives almost half of all deep draft ship calls made along the Mississippi River, ranks first in total cargo volume of U.S. waterborne foreign commerce for 1993, according to the U.S. Bureau of the Census; the Port of New Orleans ranked fourth, the Port of Greater Baton Rouge ranked sixth, and the Port of Lake Charles ranked eleventh.

In terms of transportation by mode, Louisiana is second only to Hawaii in the percentage of its total manufactured freight moved by water, according to 1990 figures. Freight modal shares for Louisiana are as follows: Water - 72%, Rail - 14%, Trucks - 13%. Four of the major commodity groups transported in the state use waterborne transportation more than any other mode: Petroleum and Petroleum Products (92% of the total amount transported), Coal (90%), Farm Products (84%), and Chemicals (42%). The two primary industrial corridors in Louisiana (the lower Mississippi and Calcasieu River regions) are located along major navigable waterways, due in large part to accessibility of waterborne transportation, which offers the least expensive means (in comparison to all other modes) of receiving raw (bulk) materials and shipping manufactured products.

I.B.2 MAJOR NAVIGABLE WATERWAYS

I.B.2.a Mississippi River

Louisiana's key role in the U.S. transportation system is dictated by its strategic location at the mouth of the Mississippi River. The Mississippi River and its tributaries drain an area of 1.25 million square miles in 31 states and two Canadian provinces, an area which represents about 41 percent of the total land area in the contiguous 48 states. The Mississippi River system includes the Ohio, Missouri, Illinois, Arkansas, Tennessee and Red Rivers. It also includes the Tennessee-Tombigbee Waterway (the Tenn-Tom) to the east, which is connected by the Gulf Intracoastal Waterway along the coast and the Tennessee River at the Tenn-Tom's northern end.

Appendix 2, Table 2.6 indicates a ten year time series of tons of freight carried annually on different segments of the Mississippi River. The annual tonnages carried on the River by segment are approximately as follows: 200,000 through the Passes; 300,000 between New Orleans and the Passes; 350,000 between Baton Rouge and New Orleans; 400,000 between Baton Rouge and the Passes; 180,000 between Cario, Illinois at the mouth of the Ohio River to Baton Rouge; 450,000 overall Mississippi River System; and 475,000 Mississippi River, Minneapolis to Mouth of Passes. Currently, the channel between Cairo and Baton Rouge is maintained at 9 feet deep and 300 feet wide at low water. The section from Baton Rouge to New Orleans is authorized for maintenance at 45 feet deep by 500 feet wide, and 45 feet by 1000 feet from New Orleans to the Head of Passes. A study of the river channel from Baton Rouge to the Head of Passes (completed in 1981) recommended that the Mississippi River be enlarged to a depth of 55 feet with a bottom width of 750 feet; that a turning basin be provided upstream in Baton Rouge, and that measures be taken to mitigate the effects of saltwater intrusion into the lower River. The project is authorized under the Second Supplemental Appropriations Act of 1985, and cost-sharing provisions were formalized under the Water Resources Development Act of 1986. The local sponsor, the Louisiana Department of Transportation and Development (LADOTD), has cost-sharing requirements of 50 percent for both construction and maintenance of more than 45 feet.

With deep-draft capability on the lower River from Baton Rouge to the Gulf, the surrounding area has established itself as one of the most attractive locations for large-scale industrial development in the United States. With waterborne commerce affording the least-expensive means of transporting bulk commodities (as well as providing running water for industrial effluent), commercial interests since the industrial revolution have sought water frontage capable of handling the largest cargo ships of the time. Currently, the lower Mississippi corridor is one of the two primary industrial areas in the state of Louisiana, in large part due to the deep-draft shipping activity occurring for 236 river miles inland.

I.B.2.b Gulf Intracoastal Waterway (GIWW)

Appendix 2, Table 2.6 contains a time series of tonnages transported on different segments of the GIWW and the Atchafalaya River and Morgan City to Port Allen component of this system. The Corps maintains the following channel dimensions on the GIWW through Louisiana: for the main route, 12 feet deep by 150 feet wide from Lake Borgne Light No. 29 to the Inner Harbor Navigation Canal, and 12 feet by 125 feet wide from the Mississippi River to the Sabine River; for the alternate route from Morgan City, 12 feet deep by 125 feet from Morgan City to the Mississippi River at Port Allen; for the alternate route from Plaquemine, 9 feet deep by 100 feet wide from Plaquemine to Indian Bayou; and for the Franklin Canal, 8 feet, deep by 60 feet wide from Franklin to the GIWW. Total volume of freight transported on the GIWW annually exceeds 100 million tons, with over half of the tonnage being petroleum products; chemicals and crude (unprocessed) materials were also significant portions of the total.

I.B.2.c The Atchafalaya River

Over the history of the Mississippi River, it has been changing its route to the Gulf. By 1951, the Mississippi River Commission's geologists reported that the Atchafalaya was becoming the primary channel to the sea. With this change, the Atchafalaya Basin faced the prospect of disastrous floods, while the Mississippi River from Baton Rouge to the Mouth of Passes faced problems with drinking water and waste disposal into what would be a tidal estuary. As a result, a federal law was passed in 1954 to provide for control structures at Old River, transforming the Atchafalaya River into a controlled floodway/spillway. A 75 foot wide, 1190 foot long navigation lock was constructed in order to provide navigation for barge traffic between the Atchafalaya, Ouachita-Black, Red and Mississippi Rivers.

The channel currently maintained on the Atchafalaya River is 12 feet deep and 125 feet wide, extending from the Gulf Intracoastal Waterway at Morgan City to the Mississippi River via the Atchafalaya and Old Rivers. As a shortcut from the Gulf to the Mississippi above Baton Rouge, the Atchafalaya affords travel savings of 172 miles over the Mississippi River route, easing congestion at the Port of New Orleans. Large offshore drilling platforms built by industries in the area typically use the waterway as a means of transport to the Gulf. Total annual volume of freight carried annually on the Atchafalaya River is approximately 10 million tons. Petroleum products make up over one-half of the total tonnage; agricultural products is another major commodity group transported on the waterway.

A current impediment to navigation that has been identified on the Atchafalaya involves the clearances of rail bridges crossing the river. The Krotz Springs, Melville and Simmesport railroad bridges have been identified by the towing industry as the most often hit bridges in a geographic area that encompasses 2100 miles of navigable waterways. The swing-draw rail bridge at Krotz Springs is particularly of concern, as it lies less than one-half mile downstream from the U.S. 190 bridge that has a support pier in perfect alignment with the draw opening on the rail bridge. Since the current of the river runs at a 45 degree angle to the bridges, many barge operators refuse to use the Atchafalaya and favor an alternate route (the Morgan City-Port Allen Route begins in Baton Rouge at the Port Allen Lock and goes through the Bayou Sorrel Lock into Morgan City) instead.

Usage of the alternate route has caused problems at the Bayou Sorrel Lock, which is only 600 feet long and requires most tows to make two trips through the passage. In May 1994, the average wait for lockage at Bayou Sorrel was 30 hours. As a result, the U.S. Army Corps of Engineers is currently evaluating whether to replace or remodel the lock. The replacement of the rail bridges over the Atchafalaya is the subject of a "Bridge Focus Group," convened by the U.S., Coast Guard, with participants representing LADOTD, private industry, the bridge owners and the Coast Guard.

I.B.2.d Inner Harbor Navigation Canal And Mississippi River Gulf Outlet

Appendix 2, Table 2.6 contains a time series of the tons of freight handled by the Inner Harbor Navigation Canal (IHNC) and the Mississippi River Gulf Outlet (MRGO). The IHNC handles approximately 25 million tons of freight annually, linking the Industrial Canal with the Lower Mississippi River. Currently, two problems for commercial navigation in the Industrial Canal are undergoing intensive study. Engineering and economic feasibility studies are being conducted for the replacement of the existing lock (75 feet wide, 640 feet long, 31.5 feet deep). A location between Claiborne and Florida Avenues in New Orleans has been identified by the local interests as the best alternative, and completion of site studies are anticipated by 1995. Continuing debate over the size of the lock is also being examined in the lock replacement study; the Dock Board wants a deep-water lock to allow deep-draft navigation into the Canal, but the Corps of Engineers has maintained that a lock of approximately the same size as the old one is sufficient.

Another navigation impediment being addressed by the Port of New Orleans involves the rail bridges over the Canal. The horizontal clearance of 75 feet along the Canal has resulted in tows frequently colliding with the bridge supports. The Port of New Orleans has obtained Truman-Hobbs (an act of Congress which provides funding to alleviate impediments to navigation) funding for the replacement of the Florida Avenue rail bridge (connecting Norfolk Southern and New Orleans Public Belt trackage) over the Canal. The Port is seeking additional funding for replacement of the Seabrook (Norfolk Southern) and the L&N (CSX) bridges; replacement of the St. Claude Avenue bridge is being included in the lock replacement study.

Straight-line access from the Industrial Canal to the Gulf was accomplished through construction of the Mississippi River-Gulf Outlet (initiated in 1958 and completed to full dimensions in 1968), providing a direct route to the Gulf that is about 37 miles shorter than the River route. The Outlet (also referred to by its initials, MRGO) decreases sailing time, leading to faster ship turnaround time. For navigational purposes, the Industrial Canal has a turning basin which lies at its intersection with the MRGO. Total annual volume of freight carried on the MRGO ranges between 6 to 7 million tons. The MRGO is maintained at a depth 36 feet by 500 feet wide to the open waters of the Gulf where its dimensions increase to 38 feet by 600 feet. The size of the MRGO is sufficient for medium size container vessels, approximately 2000 TEU. Larger container vessels usually cannot efficiently use the MRGO in a fully loaded condition.

I.B.2.e Red River

Under the Rivers and Harbors Act of 1968, nine navigation locks and dams were authorized to create a 9 foot deep by 200 foot wide shipping channel from the Mississippi River to Daingerfield, Texas. To better coordinate the state's role in managing the waterway, the Louisiana Constitution was amended in 1965 to authorize the formation of the Red River Waterway District. The segment between the Mississippi River and Shreveport was completed in 1994. This stretch includes 236 miles of navigation improvements and 225 miles of channel stabilization works.

I.B.2.f Calcasieu River

Currently, the Calcasieu offers a shipping channel maintained at 40 feet deep by 400 feet wide from the jetties at the mouth of the river to Lake Charles (river mile 34.3). The Corps of Engineers also maintains an approach channel 42 feet deep by 800 feet wide to provide deep-water access from the river to the Gulf. A mooring and turning basin, as well as a ship channel to Cameron, are important navigational improvements made to the waterway. Appendix

2, Table 2.6 contains a summary of tons of cargo handled on the Calcasieu River and Lake Charles segment of the GIWW. The Calcasieu River, coinciding with Lake Charles deep draft port facilities, handles approximately 45 million tons of cargo annually.

I.B.3 MAJOR DEEP DRAFT PORTS

Appendix 2, Table 2.6 indicates the annual tons handled at the four Mississippi River port segments in Louisiana: New Orleans; Baton Rouge; South Louisiana; and Plaquemines. The latter two port areas were separately designated in 1990 for tonnage statistics compiled by the Army Corps of Engineers. The four port districts handle a total of approximately 400 million tons annually.

I.B.3.a Port of New Orleans

The Port of New Orleans has historically been one of the primary load-center ports in the country. The port's strategically advantageous position near the mouth of the Mississippi River, at the River's junction with the GIWW, has enabled New Orleans to act as the connecting point for deep-sea and inland system traffic.

The Port of New Orleans has 334 piers, wharves, and docks located within its jurisdiction (an area of 22 miles spread along the Mississippi River, the Industrial Canal and the Mississippi River-Gulf Outlet). The Port offers 22 million square feet of cargo handling area within its various facilities. In 1992, 2,461 ocean carriers called at the Port of New Orleans (a 5% increase from the 2,344 calls in 1991). The total general cargo handled by the Port in 1992 was 7,448,751 short tons. Bulk cargo handled at Port facilities in 1992 totaled 24,298,408 short tons. The U.S. Army Corps of Engineers reports total traffic tonnage for the jurisdiction covered by the Port of New Orleans (including the Jurisdiction of the St. Bernard Port, Harbor, and Terminal District) of 66.38 million tons in 1992.

Primary import commodities at the port for 1992 were (in order of tonnage): iron and steel, coffee, forest products, natural rubber, cordage and twine, refrigerated cargo, synthetic rubber, and construction and building equipment. Major export commodities for 1992 were (in order of tonnage): forest products, iron and steel, bagged grains and flour products, sugar, soybeans and soybean products, vegetable oils, fabric (includes raw cotton), polyethylene, melamine, urea resins, and synthetic rubber.

With the Louisiana Legislature's passage of the Transportation Trust Fund amendment in 1989, the Port of New Orleans was granted $100 million of state money over a five-year time period (matched by $115 million in port-generated revenues) for a capital improvement program to ensure the port's vitality into the 21st century. Included projects provide for the construction of modern, specialized port facilities and the modification of existing facilities to provide expanded berthing and cargo storage capacity. The projects are divided into six sections:

Mississippi River Facilities - includes the construction of 3,170 linear feet of heavy duty bulkhead and 13 acres of marshalling areas between the Nashville Avenue and Napoleon Avenue Wharves (resulting in 10,000 continuous linear feet of bulkhead along the river); replacement of the front apron of Napoleon Avenue Wharf "C"; construction of an open wharf, 767 linear feet long, in front of the Milan Street Wharf; construction of approximately 30,000 square feet of wharf deck upstream of the Milan Street Wharf; a 50-foot wide connection between the Harmony Street and Louisiana Avenue Wharves; a study of the Tchoupitoulas Corridor; the demolition of the existing transit shed on Louisiana Avenue Wharf "F" and construction of a larger shed; concrete paving of 2.8 acres of upland area connected to Louisiana Avenue Wharf "F"; and railroad track improvements.

France Road Terminal - includes the construction of a floodwall to protect against terminal flooding; modifications and refurbishing to meet tenant requirements at Berths 1 and 4; paving to those areas at Berths 5 & 6 that have not been surfaced due to settlement in the area; site preparations at port property adjacent to France Road Terminal; construction of an intermodal terminal for transfer of container carrying rail cars to the France Road Terminal; and the construction of a guarded entrance to the terminal.

Jourdan Road Terminal - includes the installation of steel sheet pile breasting dolphins to permit berthing for RO/RO vessels; and modifications at the terminal to meet tenant requirements.

Maintenance - includes general facility maintenance and bridge maintenance for the St. Claude Avenue, Florida Avenue, L&N, and Seabrook bridges.

Equipment - includes the purchase of a container crane installed at France Road Terminal Berth 6 and the purchase of cranes at France Road Terminal Berths 4 and 5.

Miscellaneous Projects - includes Rivergate asbestos abatement, port security, generic terminal improvements, joint ventures, Commerce Park (a proposed commercial industrial park in Jefferson Parish), planning for a new office building, warehouse storage, and land acquisition.

Major public facilities at the Port are shown in Appendix 2, Table 2.6.

I.B.3.b St. Bernard Port, Harbor and Terminal District

The Board of Commissioners of the St. Bernard Port, Harbor, and Terminal District owns two parcels of real estate in the industrial corridor along the Mississippi River: the Chalmette and Arabi Terminals. The Chalmette Terminal (the former Kaiser Aluminum Chalmette Works plant site) consists of 216 acres with 3,000 linear feet of river frontage, various buildings left from the old Kaiser facility, various utility systems (electrical, sewage treatment, drainage and water distribution). The Arabi Terminal (formerly known as the Chalmette Slip) consists of a 1,700 foot long channel, 300 feet wide and 30 feet deep, off the Mississippi River with two working docks. Dock No. 1 (leased to Bulk Materials Transfer, Inc.) is 1,300 feet long by 150 feet wide, much of which is used for open storage (the leasee has a 15-ton crane operating on-site). Dock No. 2 (leased to Kaiser Aluminum and Chemical Corporation) is 1,680 feet long and 150 feet wide and has a 92,500 square foot warehouse on the dock (with a ship-side apron 27 feet wide) that was constructed by Kaiser.

Operations at the Arabi Terminal are controlled by Bulk Material Transfer, Inc. (BMT) and Kaiser Aluminum and Chemical Corporation. BMT currently handles approximately 100,000 tons annually, with small-lot grain shipments accounting for most of the tonnage. Kaiser ships approximately 350,000 tons of material annually from the Arabi Terminal in support of its international alumina operations, ranging from raw materials to various consumer items (to sustain its overseas plant operations). In addition, Kaiser also generates as many as 70 additional vessel calls and approximately 350,000 tons of third-party cargoes annually. The port was allocated $10.2 million within the federal ISTEA legislation. This money, with a local match provided in part by the Louisiana Port Construction and Development Priority Program, will be primarily used to fund the rehabilitation of Dock No. 1 and Dock No. 2, (both over 90 years old and in need of repair). Other improvements outlined in the Port's Master Plan include the development of a container terminal and marshalling yard at the Arabi Terminal, development of a dock to handle general cargo and bulk materials at the Chalmette Terminal, construction of a new port office building, site improvements at the Chalmette Terminal, and construction of a paved access road from St. Bernard Highway to the Arabi Terminal.

I.B.3.c Port of Baton Rouge

The Port of Greater Baton Rouge is a deepwater port extending for 87 miles along both banks of the Mississippi River. The port offers one of four sites in the Greater Baton Rouge area designated as a Foreign Trade Zone. For 1992, the Port reported total tonnage handled at its facilities was 9,745,392 short tons, with the following tonnage figures for the various facilities: General Cargo Docks No. I and No. 2 - 586,501 tons; Grain Elevator - 876,416 tons; Liquid Bulk Terminals: petroleum - 1,451,111 tons, molasses - 283,577 tons; Barge Terminal - 79,980 tons; Burnside Terminal - 5,425,755 tons; and Midstream Facilities - 1,042,052 tons. Major commodities handled were: crude oil and petroleum products, coal and coke, grain and farm products, iron and aluminum ores, molasses, fertilizers, calcium and phosphates, ammonia and potash, and forest products. The U.S. Army Corps of Engineers reports total traffic tonnage for 1992 of 84.7 million tons for the jurisdiction governed by the Board of Commissioners for the Port of Greater Baton Rouge.

Projects undertaken in the last five years by the Port of Greater Baton Rouge through the Louisiana Port Construction and Development Priority Program include: addition of 66,500 square feet of cargo storage space and 7,500 square feet of eave to cover the railroad tracks that connect the transit shed complex at General Cargo Docks No. 1 & No. 2; replacement of underground piping, original dock lines and repairs to the storage tanks at the molasses terminal; construction of an elevated concrete dock at the General Cargo Docks 400 feet long by 35 feet wide, a 420 foot by 25 foot apron extension to improve access to the new ramp, and a 380 foot by 25 foot railway track cover; rehabilitation of the one million gallon water tank, replacement of buried water and fire mains and replacement of the sprinkler system in Transit Shed No. 1; and construction of a 1600 foot by 30 foot road way, loading ramp, 500 feet of bulkhead and a shell parking area at the Barge Terminal.

Major facilities of the Port are shown in Appendix 2, Table 2.6.

I.B.3.d Port of South Lousiana

The Port of South Louisiana, offering deepwater frontage along 104 miles of the Mississippi River between Baton Rouge and New Orleans, ranks at the top for all U.S. ports in terms of export tonnage and total tonnage handled within its jurisdiction. Over half of the 7,000 deep-draft vessels that enter the Mississippi annually call at public and private facilities in the port's jurisdiction.

The majority of the private terminals located along the industrial corridor of the lower Mississippi River are within the three parish area that is the jurisdiction of the Port of South Louisiana: St. James, St. John the Baptist, and St. Charles. The port's facility directory lists five dry bulk terminals that are currently leased to private operators (the facilities are financed by Industrial Revenue Bonds issued by the port) and one general cargo terminal, the Globalplex Intermodal Terminal. The Globalplex, whose operations are subcontracted by the port to Holden Springs, Inc., is a 200-acre site with a wharf 454 feet long by 43 feet wide. There are two 9-ton Peco gantry cranes with a capacity of 340 tons per hour each, one 80-ton barge-mounted crawler crane, and one 200-ton barge-mounted Lima crane. The facility offers 300,000 square feet of covered storage, and there is a designated Foreign Trade Zone area within the complex.

Projects that are being undertaken by the Port of South Louisiana in conjunction with the Louisiana Port Construction and Development Priority Program include: modification of the conveyer belts at the Globalplex dock to increase the unloading/transfer rate of the system and a modification at the dock to provide a dual-lane, double-ended truck access ramp; addition of a barge-haul cable and winch, relocation of the existing barge-haul system, a new barge vacuuming device, new pneumatic conveying equipment and new barge positioning structures at one of the dry bulk terminals (leased to Louis Dreyfus Inc.); and a 156 foot dock extension, an overpass over River Road, a lift and a 9-acre concrete pad for storage at the Globalplex terminal.

I.B.3.e Plaquemines Parish Port, Harbor and Terminal District

The Plaquemines Parish Port, Harbor, and Terminal District was established by act of the Louisiana Legislature in 1954 with jurisdiction coextensive with the Parish of Plaquemines. There currently are no public docks located within the District, but there are several private facilities, including two major coal terminals, located along the river. The primary commodities transported included coal (over 50% of the total), petroleum products, and food and farm products. The only project undertaken by the port (in conjunction with the Louisiana Port Construction and Development Priority Program) is to provide Marine Spill Response, Inc. (a leasee of the port) a channel from the Mississippi River, a 304 foot dock, a 64 foot bridge, a 200 foot by 200 foot loading area, and a connecting road from the dock to Plaquemines Parish Road (which connects to LA 23). Further study is being conducted by the District to determine the best site for the eventual construction of a public dock facility, though no timetable has yet been established.

I.B.3.f Port of Lake Charles

The Lake Charles Harbor and Terminal District was created by act of the Louisiana legislature in 1924, with jurisdiction over 203 square miles of Calcasieu Parish. The port is located approximately 30 miles inland from the Gulf of Mexico on the Calcasieu River Ship Channel. The port currently has operations at two facilities:

City Docks - 5,385 feet water frontage, 30 to 51-foot wide apron, 851,448 square feet of waterfront transit sheds, bulk cargo facilities: Bulk Terminal 2 (also called the Lake Charles Public Grain Elevator) has 800,000 bushel storage capacity, Bulk Terminal 3 has a silo with a 2,500 short ton capacity, Bulk Terminal 5 has a creosote barge unloading facility and a one million gallon steam heated creosote tank, and Bulk Terminal 6 has three 100,000 gallon tanks;

Bulk Terminal No. 1 - 1,140 feet water frontage, has a travelling shiploader and a travelling unloader (clam-bucket type), six calcinated coke silos with 2,600 ton capacity each, four raw coke open storage pad each with 20,000 ton storage capacity, and one concede open woodchip storage pad with a 50,000 ton capacity.

Bulk Terminal 7, on the east bank of the River, and Bulk Terminal 4 in Westlake are also port owned facilities, but they are leased to private operators who manage the facilities to suit their own needs. The port also has properties along the Industrial Canal, approximately 12 miles south of the general cargo facilities. Some of the Industrial Canal sites have been leased to industries or marine operators who have built their own facilities, but much of the land is currently vacant.

The port reports over 800 ship and barge calls at its facilities in 1992. Total general cargo handled at port-owned facilities in 1992 was 1.5 million short tons; bulk cargo handled at port facilities was 4.132 million short tons in 1992. Eighty-six percent of the tonnage handled by the port in 1992 was for export markets. The primary commodities handled by the port in 1992 were: petroleum coke (over 55% of all tonnage handled), ore, liquid bulk, woodchips, rice, flour, and forest products.

Projects undertaken by the Port of Lake Charles in conjunction with the Louisiana Port Construction and Development Priority Program include: installation of a petroleum coke, barite ore and woodchip handling facility at Bulk Terminal No. 1 to achieve adequate emission control; replacement of the roofs on Transit Sheds Nos. 1-6, renovation of transit sheds 4-6, renovation of the rail line leading to the port, and installation of a new grade crossing at Ryan Street; construction of conveyers to improve loading capacity at Bulk Terminal No. 1 to a sustained average of 4,000 tons per hour; and construction of a new ship berth approximately 800-900 feet long and a 100,000 square foot (approximate) transit shed at the City Docks (plans are still being modified). Port projects being financed solely by the port includes: construction of a 600 foot wharf and 75,000 square foot transit shed at City Docks; construction of three access ramps to the cranes at City Docks; and reroofing of two transit sheds at City Docks.

I.B.4 SHALLOW DRAFT PORTS

Louisiana's extensive waterway network provides the opportunity for many smaller communities in the state to participate in waterborne commerce as a means of facilitating economic development in their area. As a result, the state has fifteen active shallow-draft ports operating on various navigable inland waterways. These ports often function as a landlord, leasing out various parcels of land under its control to industrial tenants who maintain their own maritime facilities and operations. Shallow-draft ports typically own public docks and waterfront land which they lease to private sector operators; their primary function is to construct and maintain various port facilities that are either leased to industrial tenants or provided to area shippers (at a reasonable cost) as a public-sector service. Louisiana's shallow-draft ports also serve the commercial fishing industry.

Shallow-draft ports serve maritime commerce along several Louisiana waterways. The Mississippi River North of Baton Rouge is served by: (1) Lake Providence Port Commission (established in 1958 with a jurisdiction of East Carroll Parish); (2) Madison Parish Port Commission; and (3) Pointe Coupee Port, Harbor, and Terminal District.

Major facility projects being undertaken by these Mississippi River ports (with funding from the Louisiana Port Construction and Development Priority Program) include:

Lake Providence Port Commission - construction of a bulk handling facility with a conveyor system and purchase of a 75-ton crawler crane, port access road improvements, a sanitary sewer system upgrade, an operations center and truck scale; construction of two 67 foot diameter by 40 foot high liquid storage tanks with all necessary equipment. Madison Parish Pott Commission - rehabilitation and repavement of a 1.8 mile two-lane asphalt road that leads from the U.S. Highway 65 to the port; improvement to the rail line serving the port facility (and its two primary tenants: Bunge Corp. and Complex Chemical).

Shallow draft ports along the GIWW and the Atchafalaya River include: (1) Abbeville Harbor and Terminal District (established in 1954 with jurisdiction over all of Wards 3 and 7 and the western portion of Ward 2 in Vermilion Parish; (2) Port of Iberia District (established in 1938 with jurisdiction over all Ward 6 and parts of Wards I and 2 in Iberia Parish; (3) Greater LaFourche Port Commission (established in 1960 with jurisdiction over Ward 10 in LaFourche Parish; (4) Greater Krotz Springs Port Commission (established in 1956 with jurisdiction over St. Mary Parish; (5) Morgan City Harbor and Terminal District (established in 1952 with jurisdiction over all of east St. Mary Parish; (6) Twin Parish Port Commission; and (7) West St. Mary Parish Port, Harbor and Terminal District (established in 1974 with jurisdiction in areas of St. Mary Parish not covered by the Morgan City Harbor and Terminal District.

Various port projects being undertaken by these coastal ports (with funding from the Louisiana Port Construction and Development Priority Program) include:

Greater Krotz Springs Port Commission - reconstruction of the existing roadway on top of the levee running adjacent to LA 105, and site improvements to 28 acres of land at the port;
Greater LaFourche Port Commission - construction of 1000 feet of new bulkhead, a marshalling yard, four combination crane pads, RO/RO ramps, access roads and dredging; construction of approximately 900 feet of bulkhead along Bayou LaFourche and an access road leading to it; construction of 600 feet of additional bulkhead; extension of 300 feet of bulkhead;
Morgan City Harbor and Terminal District - construction of a new bulkhead on the east bank of the Atchafalaya River; construction of an 80 foot by 300 foot section of wharf, purchase of a mobile crane, fork lift and miscellaneous handling equipment;
Port of Iberia District - installation of approximately 442 feet of bulkhead along Commercial Canal, approximately 330 feet of bulkhead along Slip 4, approximately 305 feet of bulkhead along Slip 1, and bulkhead on Lots IA & IB of property leased to Bayou Pipe Coating Company; addition of a low pressure sewer system to serve existing tenants; stabilization of the slip leased to Bayou Pipe Coating/C.E. Natco-, installation of a water system extension to serve the port;
Twin Parish Port Commission - construction of a new slip measuring 200 feet wide by 400 feet long, grading of approximately 16 acres to be used as a fabrication yard, bulkheading 250 feet of the new slip for a docking area, and constructing a 900 foot access road into the port;
West St.. Mary Parish Port, Harbor, and Terminal District - construction of dock-side rail facilities, an additional warehouse, concrete loading dock and marshalling area for container, break-bulk and general cargo, and a rail spur to enhance the operations of the public rail and truck scale; construction of a 100 foot bulkhead, a 200 foot by 200 foot concrete storage slab, a conveyor belt off-loading system and bagging equipment; and construction of a 2,450 linear foot rail spur extension with one turnout at the port.

Ports which currently have facilities along the Red River and are awaiting the completion of the federal project to provide navigable depth include the Caddo-Bosssier Port Commission (established in 1976 with Jurisdiction of Caddo and Bossier parishes) and the Alexandria Port Authority. Projects undertaken by these ports, in conjunction with the Louisiana Port Construction and Development Priority Program, include:

Alexandria Port Authority - construction of a 60 foot by 100 foot elevated dock and a 30 foot by 200 foot elevated roadway;
Caddo/Bossier Port Commission - construction of a 600 foot barge dock, a 5-acre asphalt open yard for storage, a petroleum berth, an 8,400 linear foot access road, an 8,800 linear foot rail spur, water wells and a sewage plant.

Other shallow-draft ports in Louisiana serve traffic as follows: (1) Calcasieu River via West Calcasieu Port, Harbor, and Terminal District (with authority over Ward 4 of Calcasieu Parish and the Houston and West Fork of the Calcasieu River) and Vinton Harbor and Terminal District; (2) Mermentau River via the Mermentau River Harbor and Terminal District; and (3) Lake Pontchartrain via the South Tangipahoa Parish Port Authority - known as Port Machac - with jurisdiction over Wards 6, 7, and 8 of Tangipahoa Parish. The only projects at these ports funded through the Louisiana Port Construction and Development Priority Program are all located at the South Tangipahoa Port Authority (Port Manchac): construction of a 2,150 foot railroad spur with 600 feet of run-around track; construction of a 75,000 square foot distribution warehouse; and construction of a 40 foot by 125 foot dock and the purchase of a heavy lift machine with a 6-ton capacity.

II. IDENTIFICATION OF STRATEGIC INTERMODAL CHALLENGES THROUGH USER/PROVIDER PARTICIPATION

II.A OBJECTIVES AND APPROACH

An important element in freight and intermodal analysis is the identification and definition of strategic issues and opportunities by Louisiana's transportation users and providers. The assignment was made challenging by the statewide scope of the effort, and by state and federal mandates that intermodal planning efforts should address, among other concerns, freight movements; connections, choice, competition and coordination among modes; and non-capital intensive management considerations.

Louisiana's Department of Transportation and Development (DOTD) customer focus places emphasis on direct input from users and providers for problem identification and resolution. Intensive data collection and analysis activities are carried out concurrently to provide a quantitative basis for demand projections and infrastructure capacity assessments. This section describes the multi-faceted outreach program developed to serve as a catalyst with all port and intermodal users and freight logistics service providers. Although the outreach program was designed and carried out to address both passenger and freight perspectives, this report focuses only on users and providers of services associated with surface freight movements. Detailed findings of the outreach efforts pertaining to passenger and air transport perspectives can be found in the Statewide Intermodal Transportation Plan. The strategic challenges applicable to the freight rail and port sectors that resulted from this outreach approach are outlined in Chapter VII.

II.A.1 USER/PROVIDER OUTREACH PROGRAM

Given the wide array of public and private interests, the statewide and long term scope of the state's intermodal plan, and time and budgetary constraints, the needed industry outreach was built principally on a series of focus groups: modal and intermodal advisory councils. These were complemented on the one hand by interviews of selected individuals, and on the other by a newsletter and public statewide conference which extended communication more broadly.

The risks of distortion inherent to any public participation process, resulting from unequal expression of varying points of view, were recognized and accepted. Balance among interest groups was sought in the appointment of advisory council members and through a multifaceted approach using several complementary channels of communication. To the extent possible, objective quantitative analysis was performed to validate input from users and providers. Extensive public review of the state's Draft Final Intermodal Plan will be provided through a series of regional meetings statewide prior to adoption of its recommendations.

Two decisions further circumscribed the scope of our user/provider outreach efforts: (1) recognition that freight movement played a larger role in Louisiana's economy than in the majority of other states, and should therefore be given adequate attention, and (2) a determination that this statewide plan would focus on intercity trips, leaving local transportation planning to metropolitan organizations.

Collateral benefits of our user/provider participation methods were also considered. It was recognized, first, that the group meetings provided for in our outreach program would not only serve our planning needs, but also provide opportunity for participants to gain an understanding of each other's modal and intermodal perspectives. The evolution of intermodalism has been based on expanded understanding both of user needs and the respective roles and capabilities of various service providers, which has resulted in new partnerships. A second collateral benefit was that participation of industry leaders in shaping the plan provided them a sense of plan "ownership", increasing the likelihood that the required constituent support for any necessary legislative or executive branch actions to adopt recommended changes in the state's transportation policies and programs would be forthcoming. Elements of the user/provider outreach program are described in section II.B below.

II.A.2 DEVELOPMENT OF CHALLENGES STATEMENT

Louisiana's statewide Intermodal Transportation Plan recommends a series of strategies and actions responsive to challenges identified by direct users and providers of the state's intermodal transportation system. The plan is directed to <u>strategic</u> issues (those with broad and long term applicability, or which address change or competition) in all modes and at their interfaces, and for both passenger and freight movement. Generally, the plan does not address the feasibility of individual projects. It provides general direction for investment programs, consistent with economic development and quality of life goals; identifies methods to obtain the optimum yield from limited resources; and suggests forms of cooperation among public and private providers to better serve users. The strategic challenges for which responsive actions have been considered were defined as issues (unresolved problems or deficiencies) or opportunities (problem solutions, promising intermodal partnerships or prospective gains toward public goals such as economic development or quality of life).

Statements of intermodal challenges were solicited across a range of action areas, following a "systems performance" approach modelled on the evolution and practice of intermodal freight transportation. Intermodalism advanced in the freight sector as a result of the competition among modes for shareholder capital. In the mostly private sector freight system, capital contributions are optimized through management action in the areas of operations (including information management), organization, institutional factors, marketing, and even within the public policy framework. Investors (and astute transportation managers) also recognized that the individual modes vary in their comparative efficiency, depending upon cargo handling requirements and trip characteristics. Intermodal trips, by taking advantage of the respective efficiencies of multiple modes, would yield higher return on capital if the efficiency of the intermodal exchanges could be enhanced.

Efficient transfer of cargo among modes was made possible by the introduction of a modular package - the shipping container. But this change in capital equipment, while necessary, was not sufficient to achieve an effective system of intermodal freight transportation. Innovations in operations (including information management), organization, institutional factors, and marketing were necessary complements to the changes in facilities and equipment. Accordingly, lists of candidate intermodal challenges prepared by staff for consideration by the user/provider groups were structured in four categories: policy/institutional, marketing, operations, and facilities/equipment (infrastructure).

The role of public agencies in intermodal transportation is not clearly specified by the Intermodal Surface Transportation and Efficiency Act (ISTEA), particularly *vis a vis* the private marketplace which has driven the evolution of intermodal freight transportation. Once again, with intermodal freight transportation as a model, changing roles among various service providers can be expected. In the development of the Statewide Intermodal Transportation Plan, existing roles of state agencies were not assumed to be fixed, and actions by other parties were also to be considered. It was expected that there would be challenges for which responsive actions could or should be taken by, for instance, the state Department of Economic Development, regional port or transportation agencies, or private entities. Likewise, new roles for existing public agencies would be considered, as well as the abandonment of traditional roles.

The lists of candidate issues/opportunities were effective in conveying both the complexity of intermodalism and the scope of our strategic planning effort, and in stimulating discussion at the initial Modal Advisory Council (MAC) meetings. Input received at these meetings was incorporated into an expanded outline of topics for use at the breakout sessions of the Conference, where a larger group spent more time discussing modal and intermodal challenges. At both of these series of meetings, many comments were highly individualized and modally limited. Moreover, many statements described short-term or project-specific issues. Not surprisingly, port and marine terminal operators revealed an appreciation for the needs and prospects of the several modes and linkages among them. Many of the user and provider representatives recognized the appropriateness of addressing non- (or low-) capital intensive issues.

Statements made in keynote speeches at the Conference were included together with all other input received to date in updated statements of issues and opportunities for each for the freight-related modes, still sorted into four categories of management action. Staff then reviewed these collectively and derived a summary of statements that affected multiple modes or were intermodal. These two summary statements of "modal" and "intermodal" issues and opportunities were distributed as an interim draft for reference initially to guide data collection and subsequently in generating and evaluating alternative responsive strategies and actions.

Executive interviews were the next step in the development of these statements, and were intended to provide greater detail in the definition of challenges and justification for responsive action. As expected, the executive interviews provided some new insights and confirmed statements already recorded from others. These results supplemented previously received input by identifying affected parties, appropriate responsive actions, and the agency (or firm) which should take those actions. Once again, many statements were project-specific or tactical, but these contributed, through aggregation, to definition of strategic concerns. Based upon this additional input, what appeared to be the principal <u>strategic</u> concerns were incorporated into a more detailed statement and reviewed, revised, and ratified by the modal advisory councils.

The Intermodal Advisory Council (IAC) was initially convened prior to completion of the executive interview process, and therefore without benefit of a well-defined statement of high priority challenge statements. Moreover, members had little time to gain an understanding of the many issues, particularly those outside their own expertise. Several key strategic challenges for Louisiana surfaced or were reinforced. Some of those related to freight included the need for: an adequate intermodal capability within DOTD, an on-going competitive assessment of Louisiana's total freight transport system, and roadway/railroad grade crossing improvements. Finally, many IAC members provided written input subsequent to this initial meeting, providing extensive insight. With this input, and the interview results, clearly stated and relatively important (frequently stated) concerns began to emerge.

With the cumulative input from industry outreach efforts, Institute staff were assigned to prepare the final draft statement of intermodal challenges to be addressed in Louisiana's Statewide Intermodal Transportation Plan. Each issue or opportunity statement described the concern and its perceived impacts, and the reason for its purported "strategic" nature. Each was then characterized by: being primarily "modal" or "intermodal"; its management aspects (policy, marketplace, operations, etc.); its relative importance (limited to three levels); appropriate responsive actions; and the party with principal responsibility to take those actions. These challenge statements, and the findings of the demand projections and infrastructure capacity assessments addressed later in this report, became the focus for the "problem-solving" process of generating and evaluating alternative responses.

II.B OUTREACH PROGRAM ELEMENTS

II.B.1 ROSTER OF USER/PROVIDER INTERESTS

Special efforts were made to engage direct users and providers of all modes of transportation, freight as well as passenger, in planning and priority-setting. Many of these individuals had not had significant interaction with DOTD previously. Traditional methods to involve the "general public" in plan development and implementation, would not, by themselves, have provided meaningful input about freight movement, for instance.

A roster of intermodal users and providers possessing special knowledge and experience, and representative of the larger "general public," was sought to provide the Institute's research team access across the state to broad and diverse interests. Communication with this broad interest group during plan development was accomplished primarily through a quarterly newsletter (discussed below). Each also received mailed invitations to participate in Louisiana Intermodal Conferences.

For Louisiana, a roster of about 3,000 names was developed. These names were obtained from secondary sources. On the freight side, the various ports (both maritime and inland) were an invaluable resource. Since ports deal with several modal carriers as well as ancillary service providers, they were able to make their directories available to us, and to identify contacts with provider associations. Such associations exist in most states for truckers, railroads (trunkline and shortline), shallow and deep draft vessel agents and operators, terminal operators, freight forwarders/customs brokers, and labor.

II.B.2 ADVISORY COUNCILS

Louisiana's statewide transportation plan is both "multimodal" and "intermodal." Recognizing this, and the fact that the individual modes are the building blocks of the intermodal system, MACs were established to represent, in addition to passenger and air freight movements, a variety of surface freight interests, including trucking, freight railroads, ports, and waterways. An additional advisory council, of local planning officials, was established to obtain input on issues generally beyond the purview or capability of local agencies and to integrate statewide planning with local and metropolitan efforts.

Advisory councils served as "focus groups," representative of larger populations, for staff to work with throughout plan development. MAC members contributed to the statement of system problems, deficiencies and opportunities (solutions to problems, promising intermodal partnerships or prospective gains toward public goals); helped describe parameters of modal competition and coordination; and assisted in compiling necessary quantitative or qualitative data. With due respect for the selected individuals' time, advisory councils were convened only when a substantive agenda could be set.

Individuals recommended for appointment to the MACs by the DOTD Secretary had at least five years experience in their mode (emphasis given to management of marketing or operations over infrastructure or lobbying), were active in industry associations, and were prepared to commit the time needed to serve effectively. An effort was made to cover diverse user/provider interests and the geographic regions of the state.

The Intermodal Advisory Council (IAC) included three to five members from each MAC, once again appointed by the DOTD Secretary based upon staff recommendations. The IAC served principally in generating and evaluating alternative responses to the multimodal and intermodal issues and opportunities identified through user/provider outreach and demand/capacity analyses. The Intermodal Advisory Council may eventually be given permanent standing by the DOTD for advice and counsel during implementation of intermodal strategies and actions.

II.B.3 CONFERENCE

Louisiana's first statewide Intermodal Transportation Conference was conducted to complement other outreach activities. The Conference afforded more broadly-based input on both intermodal issues and opportunities and goals and objectives. Approximately 275 paid registrants attended, including about 55 research team or DOTD staff. Presentations by keynote speakers of national standing in their fields were sought principally in recognition of the role of Louisiana's intermodal transportation facilities and services within national and international systems. Linked intercity movements are not interrupted at state boundaries, and many intermodal issues are common across the country. The attraction these noted speakers provided for participants was an important collateral benefit.

The updated draft outline of issues and opportunities, and a draft statement of values, goals, and objectives, were included in registrant packages and provided a reference for discussion within breakout sessions. Overall, the conference was extremely successful in achieving its objectives. A comprehensive document of conference proceedings has been published and distributed.

II.B.4 EXECUTIVE INTERVIEWS

Individual interviews of knowledgeable user/provider executives were seen as a necessary complement to the group forums of our industry outreach program because they would afford opportunity for more detailed delineation of concerns. The risk of obtaining highly individualized perspectives, not useable in statewide policy or program development, was accepted for two reasons: (1) only senior executives were interviewed, individuals whose responsibilities require broad knowledge and perspective, and (2) responses would be aggregated by staff, so that local concerns would achieve status for strategic consideration only if like concerns appeared repeatedly. Interviewees were asked to identify the multimodal and intermodal issues and opportunities facing Louisiana and to suggest what could be done to remedy or exploit the situation and who was, in their opinion, responsible for implementing these changes.

The survey was conducted among 205 companies selected from a list of over 3,000 companies nationwide who have some significant stake in Louisiana's transportation system. The companies were selected to represent a spectrum of users and providers of passenger and freight transportation across all modes. Based upon the significance of freight movement in Louisiana, and the need to better define freight challenges not available from other sources, a 70/30 distribution of freight/passenger interests was sought. However, no attempt was made to draw a sample that could be considered truly representative of the state's users and providers. Rather, the intent was to include firms representing each mode for both freight and passenger, and to pick firms that seemed relatively likely to provide an executive's time for the interview. Most of the firms represented on the MACs and the IAC were included.

The interviews were conducted in two stages - first, a self-administered questionnaire to provide some profile of the interviewee, followed by the personal interview to gather perceptions and opinions. The interview focused on a series of questions which sought to identify and describe in detail concerns and recommended responses. These were as follows:

(a) What makes the concern a problem or opportunity,
(b) Who is affected and how,
(c) What actions can be taken to resolve/ameliorate the problem or take advantage of the opportunity,
(d) What benefits can be achieved by taking the action, and
(e) Who should take responsibility for these actions.

Of the 86 executives who agreed to an interview, about 75 percent were freight interests (of which two-thirds were shippers). About 75 percent of the passenger interests were users (including planning officials in that group).

II.B.5 NEWSLETTER

A newsletter, titled *Intermodal Trends*, was distributed to the approximately 3,000 individuals identified as being directly engaged users or providers of intermodal transportation in Louisiana. The newsletter enabled DOTD's executive management to convey the Statewide Intermodal Transportation Plan's objectives and scope and their commitment to the new "intermodal" direction in public transportation policy to an important readership. Articles also introduced key planning staff and a summary of their task responsibilities, presented draft goals and objectives, and provided capsule descriptions of advisory council meetings and coverage of the Conference.

A reader survey was also included in the second newsletter, intended to solicit further input on intermodal challenges and recommended strategies and actions. The survey was a one page insert, designed to be folded for return mail, but requiring postage. Unfortunately, the response was less than five percent, although this could be attributed in part to the thoroughness of the other outreach activities in identifying the issues and challenges. Statements that were submitted were not inconsistent with what we had received through other channels, but the experience placed increased importance on our personal contact with users and providers in interviews and meetings.

II.C SUMMARY

The outreach program resulted in the identification of issues and challenges that, as earlier noted, are addressed in detail in Chapter VII. The research team recognized early in the process that the success of its analytical efforts would be predicated primarily on the extent to which the issues and challenges identified were reliable and that the ultimate recommendations would be sufficiently responsive. Reliability and responsiveness would be maximized by strong industry participation. In this regard, the research team applied a variety of outreach activities to facilitate industry participation. These included establishment of the Modal Advisory Councils and the Intermodal Advisory Committee, conducting the Statewide Intermodal Transportation Conference, extensive interviews with industry executives, publication of a newsletter, and upcoming regional meetings for public review of draft recommendations. It should also be made clear that industry participation was important not only for consensus building and support for the intermodal plan's recommendations and subsequent programmatic activities, but also for enabling the team to focus its research on appropriate issues and challenges.

III. PLANNING FRAMEWORK AND METHODOLOGY

III.A INTRODUCTION

III.A.1 OBJECTIVES

This Chapter outlines the methodology applied to modelling cargo flows and evaluating the capacities of major intermodal facilities in the State. The capacity evaluation methodology will encompass railroad and marine intermodal terminals. The emphasis will be on railroad highway terminals serving containers and trailers on flat cars and marine transshipment facilities linking land (rail truck) and river modes of transport with deep sea vessels. Most of the flow analysis is based on the Interstate Commerce Commission (ICC) railroad waybill sample and the U.S. Army Corps of Engineers (COE) waterborne commerce data as presented in this report, supplemented with other data as appropriate and indicated.

III.A.2 SCOPE OF THE ANALYSIS

The analysis of intermodal freight flows undertaken by the National Ports and Waterways Institute focused on four distinct types of railroad and waterway movements that characterize freight transportation in Louisiana. The universe of Louisiana rail and waterway freight movements was defined to include flows that: (1) originated in another state or country and terminated in Louisiana (interstate terminated); (2) originated in Louisiana and destined to another state or country (interstate originated); (3) originated and terminated in other states or nations and passed through Louisiana (interstate transit); and (4) originated and terminated exclusively within the State of Louisiana (intrastate local). Data were obtained for all varieties of domestic and foreign interstate and intrastate freight movements by rail and water for Louisiana (categories 1 through 4 above). However, the major emphasis was on intermodal movements or freight transfers between one or more modes of transportation that occurred in Louisiana. Intramodal movements that originate, terminate, or pass through Louisiana are not directly examined except when they relate to issues of capacity analysis of the major links or corridors of interest, for example, Baton Rouge to New Orleans. For the purposes of this report, intramodal movements are delineated by the absence of direct transfer of cargo and/or equipment between different modes of transportation, except that waterway movements that transfer between deep draft ocean marine and shallow draft river barge modes are considered intermodal in nature.

The requirements to aggregate commodity movement data for confidentiality and ease of access severely limited the opportunities to look at particular modal corridors relative to infrastructure. For example, in the case of rail origin destination, flows are normally regarded to be proprietary unless there are three or more railroads or shippers with similar characteristics in a "corridor". However, in the case of ports and waterways, most of the corridors are multiple purpose relative to many users and providers of transportation services, such as those of the Lower Mississippi River below Baton Rouge. In these instances, corridor analyses were synonymous with major routes. However, even in this case the data did not distinguish between alternative routings of particular cargos relative to traffic between the Lower Mississippi and the Gulf Intra-Coastal Waterway which could move via the Mississippi, or alternatively by the Port Allen Morgan City "Cutoff" or by the Old River/Atchafalaya River.

The non-locking unobstructed nature of much of the waterway system in Louisiana and the wide range of capacity elasticity of rail lines relative to both trackage characteristics and operating practices facilitated attention to terminal capacity instead of corridor capacity. That is, it was assumed that the greatest potential for bottlenecks in the system would occur at the point of intermodal transfers between the modes, which are normally associated with terminals instead of corridors. This approach is somewhat unconventional since historically most transportation sector capacity and planning analysis have focused on corridors and assumed adequate terminal capacity. The approach taken in this investigation was to assume adequate corridor capacity in the absence of obvious constraints and to focus on determining terminal capacities for different kinds of intermodal interfaces in railroads and waterways.

Accordingly, the methodology develops detailed capacity measures of different interrelated transfer and storage aspects of intermodal terminals for rail-highway and marine facilities. The "capacity" orientation required communication with most of the major river and port transshipment facilities in the state as well as site visits to all rail-highway terminals to collect unpublished data on specific attributes of particular facilities. Terminal operators of different facilities were the sources of detailed characteristics of each facility, focusing on the elements that define receipt, discharge, storage, and loading of cargos with similar requirements. The information is detailed and operations oriented. It frequently requires judgement and interpretation to be useful. As was the case for individual modal corridors, sometimes the information was regarded as proprietary and was either not available or only accessible in a format not readily useful for disaggregated specification of terminal activities.

The analysis of Louisiana intermodal freight flow systems (rail and water) proceeded along three levels of aggregation and conceptualization as follows: (1) Louisiana transportation modal terminal facility capacity analysis; (2) Louisiana statewide transportation corridor link/node analysis; and (3) Louisiana regional and national competitive flow characteristics. The level of analysis becomes more comprehensive both geographically and modally as the scope of the effort shifts from links and nodes of particular modes to intermodal corridors to regional and national alternative intermodal systems.

Louisiana's pivotal geographic location for waterway and railroad intermodal systems was the driving force in defining the overall focus on intermodal terminal (transfer) capability as well as the particular commodities. Consequently, the analysis includes not only rail-highway intermodal transfers (containers and trailers on flat cars), but extends to major Louisiana transshipments of bulk cargos such as grain and coal, as well as general cargo through port intermodal facilities.

III.B TRANSPORTATION COMMODITY FLOW DATA

Base line historical cargo flows were derived through extensive processing of raw data furnished by: U.S. Army Corps of Engineers - Waterborne Commerce Statistics (WCSC); Interstate Commerce Commission (ICC) - Railroad Waybill Sample; and Reebie Associates - Transearch Data Base. The Waybill Sample and the Waterborne Commerce Statistics were obtained under strict confidentiality requirements. The data furnished were actual movements between particular origins and destinations for specified commodities. The Waybill Sample represents a stratified random sample of about three percent of all U.S. railroad billed shipments. The Waterborne Commerce Statistics in theory represents the universe of the population of all foreign and domestic waterborne transportation (100 percent sample). Transearch is a public domain commercial product that relies in part on aggregated data from the Public Use Waybill Sample and state to state summaries of the Waterborne Commerce Statistics.

The unabridged Waybill Sample and Waterborne Commerce Statistics files were obtained for all interstate (including foreign) shipments that originated, terminated, or transitted Louisiana or were intrastate (local) in nature. The raw data are not publicly available through commercial data bases such as Transearch and must be aggregated to at least a BEA (Business Economic Area) unit level of analysis to prevent disclosure of otherwise proprietary commercial information. In some instances, the level of aggregation to meet the "rule of three" stipulation[1] requires considerable aggregation across shipping categories or omission of data not protected by aggregation from the BEA level of reporting.

Under separate agreements, the study team members were obligated to aggregate the data elements to prevent identification of individual shipper or private commercial data. The raw data varied in size (from 32,000 to over 1 million records) and in scope (e.g. domestic vs. both domestic and foreign, Louisiana specific vs. regional or nation wide cargo flows). The major factors considered in aggregating the raw data were: 1) to comply with the confidentiality agreements; 2) to standardize the terms of reference for commodity classification and origin-destination points; and 3) to reach meaningful and manageable sizes of trip tables and matrices suitable for the study's purposes.

The approach adapted in modelling rail and waterway intermodal freight flows was to group homogenous commodities in "commodity groups" (for example, the grain commodity group includes all types: wheat, corn, barley, rice, etc. transported in bulk form), and to aggregate origins and destinations in relation to their geographic location relative to Louisiana. Commodities pertaining to a particular group were aggregated based on their similarities in terms of: nature of cargo, transportation and handling requirements, and average value. Appendix 3 summarizes the commodity groups defined for the study. It should be noted that commodity

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[1]Not revealing or otherwise inadvertently disclosing the same shipping circumstances such as commodity, origin, destination, railroads and routes for less than three like or similar movements such that the identity of no individual shipment can be ascertained by another participant or party to the transactions.

classifications were different among the three database sources used in the study (Waybill Sample, Waterborne Commerce Statistics and Transearch).

Origins and destinations are aggregated from the original U.S. 183 BEAs as follows: 6 BEAs in Louisiana - Shreveport, Monroe, Lake Charles, Lafayette, Baton Rouge, and New Orleans. The Louisiana BEAs are shown on the following map along with adjacent states (e.g. Texas, Arkansas, Mississippi, etc.) that are represented individually as agglomerations of statewide BEAs. States not immediately adjacent to Louisiana were combined into "super" BEAs on a regional level to reduce the complexity of the commodity flows. The combined BEAs ("super" BEAs) are also defined in Appendix 3.

BEAs are not confined to state boundaries. Some may span two states or more, particularly for major economic areas such as the Memphis BEA which evolved around river banks. It should be noted that aggregation of BEAs at the state level may produce inaccurate representation of flows for a particular individual state, nevertheless the sum of flows for neighboring states sharing jurisdiction over the same BEAs would be accurate. The flow assessments for the states of Mississippi, Alabama, and Tennessee are examples of potential individual inaccuracies at a statewide level of BEA analysis.

Rail and waterway commodity flow data are based primarily on the three data sources previously mentioned. Other secondary sources provided additional data that were also incorporated into the study, including data obtained through site visits, recent port publications, other published studies and reports, facility surveys, and direct contacts with terminal operators.

III.B.1 WAYBILL SAMPLE 1992 CARGO FLOW DATABASE

The Waybill Sample represents a stratified random sample of rail freight shipping documents (waybills) for movements originating or terminating in the U.S. The Waybill Sample data obtained for Louisiana interstate and intrastate movements for 1992 contained 32,278 records of sampled carloads representing shipments, perhaps of multiple cars or unit trains that originated, terminated, or passed through Louisiana in calendar year 1992. Commodities are identified by the seven-digit STCC (Standard Transportation Commodity Code). Each record contains waybill shipment information about origin and destination; railroad data related to routes, junctions, equipment (freight car) used, etc.; and distances, sample weights, and the sampling ratio for the shipment. A relational database system was built to extract and aggregate the flow measures (total weight and weighted average distance) in relation to the adopted schema of commodity groups and super BEAs. The developed systems provide (at different levels of aggregation) four O-D trip tables for outbound, inbound, transshipped, and intrastate flows for Louisiana.

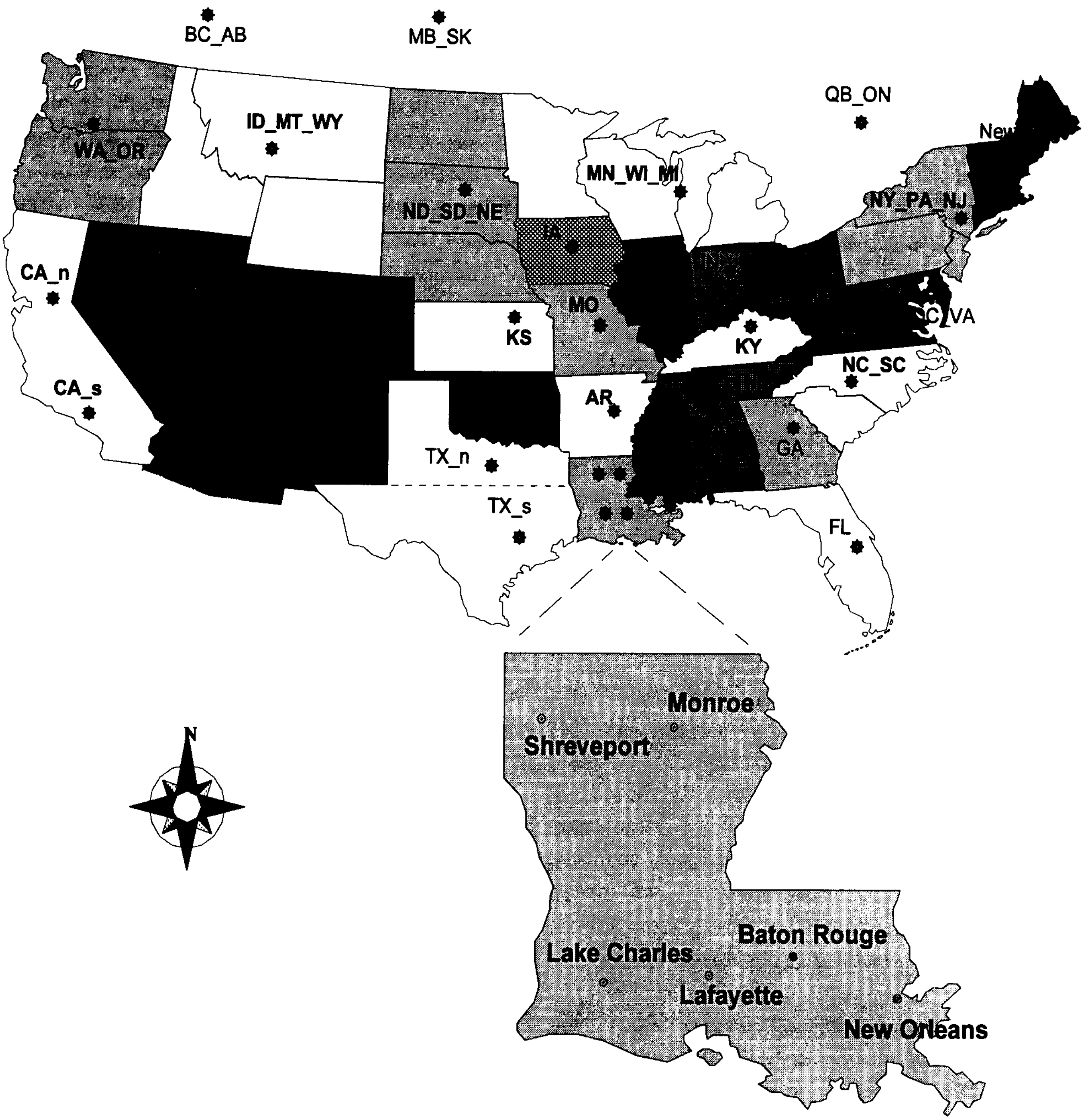

Figure III.1
"Super" BEAs Node Assignment

III.B.2 WATERBORNE COMMERCE STATISTICS CARGO FLOW DATABASE

The Waterborne Commerce Statistics data is collected and processed by the U.S. Army Corps of Engineers based on customs documentation (foreign shipments) received from Department of Commerce (U.S. Treasury) and river barge movements (domestic shipments) reported by towing companies. The data base represents a 100 percent sample of all waterborne (domestic and foreign) movements (with some minor exceptions). The structure of the Waterborne Commerce Statistics is different from the Waybill Sample. The Waybill Sample reflects railroad freight car equipment movements related to shipments, including procedures to stratify the sample to incorporate waybills that encompass more than one car (multiple car or unit train movements). The Waybill Sample reports shipments moving from an originating rail station location to a terminating station location via a route network through intermediate railroads and their connecting junctions.

The Waterborne Commerce Statistics data as processed and reported is oriented to commodity flows between river (port) docks. To the degree that the rail freight and waterborne shipments do not initially originate or ultimately terminate at the locations represented by stations or docks, respectively, these data bases do not capture the complete OD network of commodity flows, particularly intermodal flows such as rail-truck and barge-truck, barge-rail, etc. The nature of barge flows is that a greater proportion is typically intermodal compared to rail, usually requiring truck or rail to move cargo to and/or from the river. Therefore, Waterborne Commerce Statistics are useful only as accurate measures of barge dock-to-dock commodity flows which may have prior or subsequent land movements by rail or truck.

Further complications interpreting the Waterborne Commerce Statistics arise from the use of "river miles" to delineate flow origins and destinations. The river miles are relational only to a system of dock codes. Consequently, a system of linkages between river miles and corresponding BEAs or even states had to be constructed. The commodity classification used by the Waterborne Commerce statistics database is SITC (5 digit Standard International Trade Classification). The SITC is different from the STCC used in the Waybill Sample. Mapping files were manually created to convert SITC commodity classification into the two digit STCC commodity group classification applied for the study, and to map the origin destination river miles to their corresponding super BEAs.

The raw data contain 42,054 records covering waterborne shipments, receipts and through traffic for the Mississippi River System-Gulf Coast region. Each record contains information about originating and receiving locations (identified as river miles), commodity code (SITC), and tonnage. Another relational database system was built for this database to facilitate the flow analysis. This database also contains foreign and off-shore U.S. territorial shipments, which represents a major advantage compared to the other databases acquired. The mapping of river miles into state jurisdictions represented a challenge since in some cases a particular river-mile node is along the boundary between two neighboring states; therefore, the generated flow estimates may be inaccurate at an individual state level.

III.B.3 TRANSEARCH CARGO FLOW DATABASE

The Transearch database covers the four modes of transportation: rail, truck, water and air for 1990 cargo shipments. Each record contains the origin and destination for standard BEAs, 5-digit STCC commodity codes, and fields for cargo tonnages shipped by each of the four transportation modes. The data set has the advantage of including all modes of transportation for the same base year as required for the study, but it lacks identification of shipments between other states passing through Louisiana (transshipments). Another advantage of this data set is that it covers nation-wide cargo shipments which are needed to analyze the competitive position of Louisiana compared to other states. However, the Transearch data deals only in domestic cargo movements. Since a substantial portion of the cargo flows in Louisiana are waterborne imported/exported goods (direct international cargo movements), the data needs to be complemented with that portion of the Waterborne Commerce Statistics that relates to foreign and off-shore commerce in order to identify Louisiana's cargo flow patterns.

III.B.4 SECONDARY FLOW DATA SOURCES

In addition to the three data sources previously mentioned, other secondary data were also incorporated into the study. Such data were used in part to validate and complement the three major data sources, and in part to be used as the sole source for individual flows to major terminals (such information could not be reported from the basic three sources given the confidentiality restrictions). The secondary data were obtained through site visits, recent port publications and other published reports, facility surveys, and other direct contacts with terminal operators. Other studies published by the Institute for U.S. DOT 's Maritime Administration provided additional information, particularly for Louisiana international cargo flows.

III.C LINK NODE MODAL ANALYSIS

A link node modal analysis was performed to identify intermodal transfer capacities at major terminals and transshipment points. The purpose of the analysis was to identify intermodal facilities that might experience inefficiency relative to capacity problems from the perspective of congestion or possibly chronic under utilization. The intermodal transfer capacity analysis was linked with the commodity forecasts to identify intermodal terminals that might experience congestion or achieve more satisfactory utilization rates in the future over the forecast horizon.

Intermodal terminal capacity analysis reflects a nodal orientation instead of the more typical transportation planning emphasis on links and associated flows. The nodal orientation was developed in recognition of the critical transfer interfaces that must occur for intermodal systems to exist subject to some level of performance. In order to understand the performance of intermodal rail and water freight systems, the analysis focused on the transshipment functions of intermodal terminals. Given the orientation of Louisiana rail and water systems to bulk commodity flows, the terminal transshipment analysis was directed toward grain, coal, and general cargo port transshipment capabilities, capacities, and performances. Conventional rail-truck intermodal terminals for Container-On-Flat-Car (COFC) and Trailer-On-Flat-Car (TOFC) were also included in the scope of the analysis.

The level of aggregation of the terminal capacity analysis varied with respect to the specification of capacity and performance elements of different types of terminals and the intermediate linkages between the terminal facility and the line haul components of the intermodal components. The analysis was also affected by the amount of agglomeration of contiguous intermodal terminals into a "super" node. For example, the analysis of rail-truck intermodal terminals focused on all individual TOFC/COFC rail facilities in Louisiana. Some of these facilities were contiguous to each other, such as East and West Bank Mississippi River locations near New Orleans. These were also combined into agglomerated nodes to facilitate different levels of analysis.

Similar agglomeration occurred for contiguously located marine facilities pertaining to general cargo, grain and coal. The analysis of grain intermodal terminals essentially combined the lower Mississippi River grain elevators used for rail and barge transshipment to ocean vessels into contiguous groupings based on the geography of the Lower Mississippi River between Baton Rouge and the elevators below New Orleans. The coal flow analysis looked at intermodal transshipment between rail and barge to ocean vessel for coal transfer facilities on the Lower River. The general cargo terminal analysis looked at transshipment at individual ports for contiguous break bulk and containers facilities.

III.C.1 RAILROAD INTERMODAL NODES

Railroad intermodal terminals handle a variety of cargo types loaded into containers or trailers on flat cars. The majority of such cargo is classified as "containerized mixed cargo" and not otherwise specifically identified by name. In order to evaluate the throughput capacity of railroad intermodal terminals, the Institute developed a survey instrument to compile an inventory of rail intermodal terminals (TOFC/COFC) throughout Louisiana. A survey form was designed and distributed to collect capacity and physical characteristics pertaining to the operation and flows of trailers and containers through rail intermodal facilities. Personal interviews were conducted with all major intermodal facility operators to ensure the accuracy and completeness of the surveys. The data collected included measures of throughput such as: hourly rates of loading and unloading; number and types of transfer (lift) equipment; number of parking slots; track length; and schedule of gate operation for terminal access. In addition, descriptive data were collected on facility highway access in terms of local street connections with major highways.

The capacity of rail intermodal terminals is evaluated for each of the four major functional processes performed: (1) rail-track throughput; (2) transfer equipment throughput; (3) container/trailer storage capacity; and (4) gate/access capacity. Throughput formulae were developed for the four functional processes as described in Chapter V.4.

The maximum practical capacity for the overall TOFC/COFC intermodal facility is the minimum of the four calculated capacity parameters. The maximum practical (effective) capacity was compared to demand using throughput data collected from the field surveys. Due to daily and weekly fluctuations in demand, available parking slots, and crew schedules, the throughput and demand parameters were all evaluated on an annual basis in order to produce steady state evaluation measures.

III.C.2 MARITIME PORT FACILITIES

An aggregation of commodity type was performed for port facilities based on terminal configuration and handling equipment. The primary categories were general cargo, consisting of break bulk and containers, grain, and coal. Capacity analysis of port facilities was performed for each individual terminal or group of similar adjacent terminals handling the same class of cargo. The maximum practical capacity for each type of facility was then compared to present and forecasted throughput to determine utilization and possible bottlenecks over the study's planning horizon.

The literature review of port capacity evaluation revealed that few research attempts were made to quantify the practical throughput of a marine terminal in functional relationship to facility parameters. One approach (MARAD: *Port Handbook for Estimating Marine Terminal Cargo Handling Capability*) evaluates the capacity of maritime terminals by applying a hierarchical procedure using the terminal modular approach. Every single-berth terminal is first classified based on the class of commodity handled (general cargo, containers, dry bulk, coal/coke, grain, and liquid bulk). The terminal is then subclassified by type or size of storage facilities serving the terminal. A conservative estimate and an upper maximum throughput are given for every subclassification based on port surveys conducted in the late-1970's. These estimates reflect typical terminal throughput at the time under the most conservative operational limitations. They also reflect deficiencies that existed for typical terminals, particularly with respect to handling equipment and storage. Such factors have presumably been addressed during the 1980's when substantial capital investments were made for both equipment and storage.

The initial capacity estimates based on the MARAD methodology were very conservative. The authors recommended multiplying such values by 2 or 3 if high terminal utilization could be expected, or using a set of nomographs to evaluate the throughput of each berth given the actual terminal parameters. A major drawback to this approach is that the estimated terminal throughput is strongly related to the annual number and pattern of ship arrivals and that some of the impeded assumptions are quite low (utilization for some terminal modules are as low as 14 percent).

A second approach was introduced in the study, *The 2020 San Pedro Bay Ports of Los Angeles and Long Beach*. The study uses the term *Maximum Practical Capacity* to refer to estimated cargo throughput volumes which are at the high end of a realistic operating scenario. This scenario assumes that all cargo handling elements at the terminal are working at full capacity and the study devised "Standard Terminal Modules" where such cargo handling elements are "balanced" (i.e. no single element imposes a substantial bottleneck).

The ports and terminals included in the capacity assessment are categorized by the functional form (packaging)of the cargo and by the type of commodity handled. The Institute's procedure starts by identifying the terminal category, which is dictated by the functional type of commodities served. Then, given the berthage length and depth, a typical berthage capacity is evaluated. Adjustments are then applied to modify the berthage capacity based on the number of berths in the terminal and the degree of expected berth utilization. The next step is to evaluate the storage capacity. The terminal maximum practical capacity is the minimum of either the berthage capacity or the storage capacity for the terminal being analyzed. The procedure was implemented in a computerized program, and the final results are provided for the three features of capacity in each port profile (berthage, storage, and maximum practical capacities).

Chapter V describes in detail the port terminal throughput capacity methodology as applied to particular categories with unique handling characteristics: (1) grain; (2) coal; (3) break bulk cargo, and (4) general.

III.D LOUISIANA STATEWIDE CORRIDOR ANALYSIS

The second level of capacity analysis of Louisiana intermodal freight systems (rail-highway and marine terminals) focused on aggregating individual facilities into geographic nodes of major transportation corridors for bulk and general cargo flows that constitute intermodal transportation in Louisiana. The output of the analysis indicates the performance of Louisiana intermodal systems from a broader geographic orientation with respect to specific variables related to node capacities. The aggregated output recognizes that substitution among adjacent terminals, such as general cargo facilities in New Orleans or export grain elevators along the lower Mississippi south of Baton Rouge, can and does occur.

The capacity analysis is supplemented with a detailed inventory of intermodal terminal accessibility for rail and highway connections to determine local and statewide access problems and priorities that should be addressed to augment the intermodal system in Louisiana. The results of node capacities (Chapter V) and accessibility analyses (Chapter VI) will be used to affirm the existence of terminal transshipment problems related to local intermodal connections. These results are based in part on an inventory of the characteristics of rail and highway intermodal connections for TOFC/COFC, grain, coal, and port general cargo transshipment facilities in the state.

III.E LOUISIANA REGIONAL AND NATIONAL COMPETITIVE CORRIDOR CHARACTERISTICS

The third level of analysis will develop the competitive strategic position of Louisiana relative to intermodal transportation (rail/water and ports) for a limited range of commodities: (1) containers; (2) grain; (3) coal; and (4) general cargo. Each of the commodity corridors will be analyzed to identify general trends in these markets between the U.S. and relevant world areas via Louisiana and other competing ports. The focus is on what Louisiana must do to remain or become competitive based on general market trends (Chapter IX).

IV. FORECASTS OF FREIGHT VOLUMES

IV.A DEFINITION OF TRANSPORTATION ANALYSIS ZONES

The objective of this section is to provide a long run forecast to the year 2020 of major commodity movements to and from Louisiana as an input to determining demand for intermodal facilities based on commodities that affect utilization of the rail-highway and marine terminals in the state. Freight forecasts were developed for the six Business Economic Areas (BEAs) in Louisiana (Baton Rouge, Lafayette, Lake Charles, Monroe, New Orleans and Shreveport) as described in section VI. This section describes the development and application of the freight forecast parameters as applied to particular freight flows to and from the transportation analysis zones.

IV.B IDENTIFICATION OF VARIABLES FOR EXOGENOUS FORECASTING

The demand for freight transport is derived from the demand for goods and services between locations of production and sources of inputs and places of consumption. Accordingly, the locations and level of activities of various economic units directly determine the spatial dimensions of freight transportation.

Long term forecasts of transportation reflect the degree of certainty of demand for different commodities relative to their transportation characteristics. Individual commodity demand is a function of the major exogenous variables that affect consumption. Characteristically, the major variables affecting demand and long run forecasts are: (1) Government policies; (2) Economic variables; (3) General Environmental variables relevant to consumption such as population, social/cultural forces, legal, technological and institutional factors; (4) Industry variables; and (5) Firm or location specific variables.

No forecast can explicitly incorporate all the nuances of these variables in an interactive manner. Therefore, a long run forecast must reflect the major components of demand relevant to transport over a range of commodities and situations. Generally, these considerations include: (1) Quantity and type of commodities; (2) Industry structure and technology; (3) Distribution of natural resources; (4) Population and income changes; and (5) Transportation costs.

These factors interact as industry seeks to reduce its costs in the long term, relative to the physical and economic life spans of its technology and capital assets, including natural resources. Changes in industrial structure through plant relocation, market and material substitutions occur and affect demand for transportation. Technological changes and overall economic conditions are very difficult to predict for more than emerging trends relative to business cycles and capital investment programs. Therefore, long run freight forecasts are usually trend extrapolations, appropriately defined and modified, based on long run steady state projections for prevailing commodity flows.

IV.C FORECASTING PROCEDURES

IV.C.1 COMMODITY CLASSIFICATION

Commodity classification represents a compromise between units of measure of demand related to production or consumption and units of measure related to transportation. Ideally, commodity classification most relevant for transport forecasting would reflect supply or demand conditions particular to transportation handling technologies. Therefore, commodities with similar transport properties would be treated as part of one category. The basis for commodity categories would be similarity of transportation conditions and commodity demand characteristics.

These criteria were used to develop eleven commodity categories for transportation demand forecasting: (1) Farm Products; (2) Metallic Ores and Scrap; (3) Coal; (4) Crude Petroleum; (5) Nonmetallic Minerals and Products; (6) Miscellaneous Manufactured Products, including Food Products and Paper and Cardboard Products; (7) Forest Products; (8) Agricultural Chemicals; (9) Chemicals and Plastics; (10) Miscellaneous Petroleum Products (other than crude); and (11) Containers and Trailers (COFC/TOFC).

IV.C.2 COMMODITY PROJECTIONS FOR FREIGHT TRANSPORTATION

Long term annual average growth rates were prescribed for each commodity group based on recent national forecasts adjusted to reflect new assumptions relevant to each commodity/industry group in general and Louisiana regional freight traffic trends in particular. Growth rates for each major commodity category were derived for the period 1990 to 2000 based on the forecasts used by the U.S. Army Corps of Engineers (COE), Energy Information Administration of the U.S. Department of Energy (DOE) and McGraw Hill (DRI) estimates for container cargo.

For each commodity category annual growth rates were projected for three levels: (1) trend - long run secular average annual growth based on continuation of existing levels of economic activity without consideration of cyclical aberrations in any individual year of the forecast; (2) low - long run secular below average annual rates of growth based on adverse levels of economic activity corresponding to recession or chronic unemployment of resources over the forecast time frame; and (3) high - long run secular above average annual rates of growth corresponding to economic expansion commensurate with sustained full employment over the forecast time frame.

The three forecast growth rates, trend, low and high, correspond to approximations of "most likely" and allowances for sensitivity to embrace "pessimistic" and "optimistic" components, respectively. The three forecast growth rates should be viewed accordingly, as elements of the same underlying projection, appropriately deflated and inflated to incorporate sensitivity components for negative and positive adjustments, respectively.

The span of the elasticity of the trend between a lower bound (low or pessimistic) and an upper bound (high or optimistic) is particular to each commodity category in the same way that the trend projection is unique for each sector of the forecast. The span of the low and high growth rates relative to the average or trend is not uniform across commodities or for a particular category. That is one commodity for which the forecast is perceived to have a relatively high degree of certainty will reflect less of a low/high variation from the trend compared to another commodity for which the forecast is less stable owing to possible shifts in the exogenous variables. Moreover, the magnitude of the low and high deflections from the trend is particular to each commodity. A commodity may have more uncertainty for particular exogenous elements that can lead to greater or lesser deflections from the trend. Accordingly, it is entirely consistent to have a commodity that has more "up side risk" that exhibits a very small decrease in the growth rate relative to a low rate below the trend and at the same time displays a much larger high growth rate compared to the trend. Conversely, it is possible to have a commodity category that reflects more "down side" risk which would display a much larger spread between the "low" rate and the trend rate compared to the spread between the trend rate and the "high" rate.

The commodity freight growth forecasts are contained in Table IV.1 for the eleven major groups identified in section IV.B. The eleven basic commodity groupings have been stratified into fourteen categories with respect to different rates of growth between foreign (import and/or export) and domestic sectors for coal (coal domestic consumption and coal exports) and petroleum crude and products. Both petroleum categories, crude and products, have separate domestic and foreign (import) components for purposes of the forecast growth rates.

The national rates of annual growth for each commodity sector in Table IV.1 were available for the period 1990 to 2000. The macro growth rates did not reflect recent trends pertinent to the flow of particular commodities to the Gulf Coast or Louisiana. Moreover, the macro growth rates did not incorporate trends beyond 2000. Accordingly, the macro growth rates had to be reviewed relative to consistency with the Gulf Coast region in general and Louisiana in particular relative to U.S. overall trends for the years 1990 to 2000 as well as beyond to 2020.

Table IV.1
Freight Growth Forecasts by Major Commodity Groups, Louisiana 1990-2020

Commodity Group/ Component	1990-2000			2001-2020		
	Low	Med.	High	Low	Med.	High
	(percent/year)					
Farm Products Grain, corn & rice Oil kernels & seeds	1.3	1.8	2.2	1.1	1.5	1.9
Metallic Ores, Products & Scrap Primary metal products Tools, machinery & appliances Transportation vehicles & parts Industrial Scrap	0.3	1.0	1.5	0.3	0.9	1.3
Coal-Domestic Consumption	1.9	2.6	3.2	1.6	2.2	2.7
Coal-Exports	2.1	3.1	3.8	1.1	1.6	1.9
Crude Petroleum-Domestic Product	-0.8	-0.8	-0.8	-0.7	-0.7	-0.7
Crude Petroleum Imports	1.9	1.9	1.9	1.6	1.6	1.6
Nonmetallic Minerals & Products	-0.3	0.5	0.6	-0.3	0.4	0.5
Forest Products Forest & wood product Paper & cardboard product	1.0	1.3	1.5	0.9	1.1	1.3
Industrial Chemicals	0.7	1.6	2.6	0.6	1.4	2.2
Agricultural Chemicals	1.3	2.3	3.0	1.1	2.0	2.6
Petroleum Products - Domestic Products	-0.8	-0.8	-0.8	-0.7	-0.7	-0.7
Petroleum Products - Imports	1.7	2.9	4.5	1.4	2.5	3.8
Container Cargo	2.4	3.5	4.6	1.2	1.8	2.3
All Other Commodities Food products Miscellaneous manufactured products Paper & cardboard products	1.0	1.5	2.0	0.9	1.3	1.7

Two patterns of adjustments were made to the macro growth rates. First, rates for two commodities which exhibited very high national rates of growth were adjusted to reflect recent trends for the Gulf Coast and Louisiana relative to general national trends. Accordingly, the macro national growth rates for export coal and containers were reduced twenty-five percent in the period 1990 to 2000. The second pattern of adjustments to the national macro growth rates applied for the years 2001 to 2020. Two changes were made. Growth rates for all commodities except export coal and containers were extrapolated beyond 2000 with a fifteen percent reduction. That is annual average compound rates of growth for each commodity, excluding export coal and containers, were fifteen percent less than the average annual rate used between 1990 and 2000. The second change was to decrease the 1990 national annual average macro growth rates for export coal and containers by fifty percent commencing with 2001 and extending to 2020.

The final adjustments for each commodity category in Table IV.1 indicate "low" "medium" and "high" average annual growth rate for the periods 1990 to 2000 and 2001 to 2020. For all commodities except export coal and containers the average annual rates of growth for the period 2001 to 2020 are 0.85 less than the national macro annual rates of growth for the period 1990 to 2000. For export coal and containers the average annual rates of growth for the periods 1990 to 2000 and 2001 to 2020 are 0.75 and 0.50 of the national macro annual rates of growth (unadjusted) for the period 1990 to 2000.

IV.C.3 RESULTS OF FORECASTS

The preceding section indicated that eleven basic commodity groups were subdivided for forecasting purposes into fourteen strata each of which had three levels of forecasts (low, medium and high) for two time periods, 1990 to 2000 and 2001 to 2020 for six different BEAs (transportation zones) in Louisiana (Baton Rouge, Lafayette, Lake Charles, Monroe, New Orleans and Shreveport). To maintain simplicity in the analysis the divisions of coal into domestic and export sectors and petroleum into crude and products by domestic and import sectors for forecasting purposes was aggregated for presentation of the projections for each sector.

The forecasting horizon covers thirty years, each year having its own forecast based on average annual growth rates. For simplicity the forecast values have been captured for three distinct periods in the time series following the base year of 1990: (1) 2000, the year that the initial national macro projections terminate; (2) 2010 the mid-way point between the extrapolated national macro growth rates as adjusted (refer to section IV.C.2); and (3) 2020 the final year in the time series. The forecasted commodity flows for each BEA are indicated by mode of transport: (1) water-offshore, corresponding to import and export commerce via deep water; (2) water-continental, corresponding to U.S. interior, including shallow draft coastal movements and offshore (deepwater) domestic continental movements; (3) rail, corresponding to all U.S. rail movements to or from BEA in Louisiana; (4) truck, corresponding to all truck movements, including fore-hire and private to or from BEA in Louisiana; and (5) air, corresponding to all air cargo freight movements to or from BEA in Louisiana.

Tables IV.2, IV.3 and IV.4 present the total annual volumes (short tons) for freight movements originating and/or terminating in Louisiana.[1] Total annual volumes are presented for each commodoty group for the base year, 1990, and the projections for 2000, 2010 and 2020 for medium, low and high average annual growth rates. Appendix 4 contains the annual volumes (short tons) of each of the eleven commodities moving to or from each of the six Louisiana BEAs as well as all BEAs (Louisiana Statewide Total) by water (offshore and continental),

[1] Consistent with the "node" (terminal facility - versus "link") orientation of this analysis, shipments originating and terminating within Louisiana are counted twice (two moves - inbound and outbound). Overall, intrastate shipments are minuscule, amounting to less than one percent of the total Louisiana tonnage.

rail, truck and air for the base year, 1990, and for three forecasted intervals of 2000, 2010 and 2020. In general growth of each commodity will reflect linear changes over the forecast horizon for each BEA and mode of transport except where domestic and foreign components of a commodity have been treated differently for forecasting purposes. For example, coal and petroleum will have different growth rates for the water offshore and water continental portions to reflect different rates of growth developed for domestic and export coal and domestic and import petroleum, respectively.

Appendix 4 indicates the distribution of commodity tons for each of the eleven groups and mode of transport for all BEA for the base year 1990 and forecasts for 2000, 2010 and 2020. The data are presented to show modal distributions for the state for each of the forecast scenarios with respect to medium, low and high rates of growth.

Table IV.2
Medium Cargo Projections: 1990, 2000, 2010 and 2020
(tons, 000,000)

Commodity Group	1990	2000	2010	2020
Group 1	147.2	175.9	204.8	238.4
Group 2	39.1	43.2	47.0	51.2
Group 3	55.6	72.7	89.0	109.1
Group 4	149.7	171.9	194.9	222.4
Group 5	51.4	54.0	56.4	58.8
Group 6	64.3	74.6	84.7	96.1
Group 7	36.8	41.8	46.7	52.1
Group 8	13.7	17.2	20.9	25.4
Group 9	59.8	70.1	80.2	91.8
Group 10	106.5	101.6	98.6	96.8
Group 11	9.8	13.8	16.4	19.6

Note:
Group 1= Farm Products; Group 2= Metallic Ores and Scrap; Group 3= Coal; Group 4= Crude Petroleum;Group 5= Nonmetallic Minerals and Products; Group 6= Miscellaneous Manufactured Products, including Food Products and Paper and Cardboard Products; Group 7= Forest Products; Group 8= Agricultural Chemicals; Group 9= Chemicals and Plastics; Group 10= Miscellaneous Petroleum Products (other than crude); Group 11= Containers and Trailers (COFC/TOFC)

Table IV.3
Low Cargo Projections: 1990, 2000, 2010 and 2020
(tons, 000,000)

Commodity Group	1990	2000	2010	2020
Group 1	147.2	167.5	187.0	208.7
Group 2	39.1	40.3	41.3	42.4
Group 3	55.6	67.4	78.1	90.5
Group 4	149.7	171.9	194.9	222.4
Group 5	51.4	49.9	48.6	47.4
Group 6	64.3	71.0	77.3	84.1
Group 7	36.8	40.6	44.2	48.1
Group 8	13.7	15.6	17.4	19.5
Group 9	59.8	64.1	68.1	72.2
Group 10	106.5	100.4	95.9	92.0
Group 11	9.8	12.4	13.9	15.7

Table IV.4
High Cargo Projections: 1990, 2000, 2010 and 2020
(tons, 000,000)

Commodity Group	1990	2000	2010	2020
Group 1	147.2	183.0	220.2	265.1
Group 2	39.1	45.4	51.5	58.5
Group 3	55.6	77.2	99.0	127.2
Group 4	149.7	171.9	194.9	222.4
Group 5	51.4	54.6	57.4	60.4
Group 6	64.3	78.4	92.8	109.8
Group 7	36.8	42.7	48.4	55.0
Group 8	13.7	18.5	23.8	30.6
Group 9	59.8	77.3	96.2	119.7
Group 10	106.5	103.4	103.2	105.9
Group 11	9.8	15.4	19.4	24.4

Note:
Group 1= Farm Products; Group 2= Metallic Ores and Scrap; Group 3= Coal; Group 4= Crude Petroleum;Group 5= Nonmetallic Minerals and Products; Group 6= Miscellaneous Manufactured Products, including Food Products and Paper and Cardboard Products; Group 7= Forest Products; Group 8= Agricultural Chemicals; Group 9= Chemicals and Plastics; Group 10= Miscellaneous Petroleum Products (other than crude); Group 11= Containers and Trailers (COFC/TOFC)

V. FACILITY CAPACITY AND REQUIREMENTS

V.A CAPACITY CALCULATION METHODOLOGY

V.A.1 DEFINITIONS AND CATEGORIZATION

This chapter includes a capacity assessment of Louisiana's intermodal freight terminals. The terminals assessed include: (a) the deep-draft terminals for dry (non-liquid) cargos, and (b) the intermodal, rail/truck terminals for containers and trailers. The facilities and access infrastructure requirements of the State's shallow-draft ports are discussed along with those of the deep-draft ports. Cargo handling activity in the shallow-draft ports is relatively small in comparison with the deep-draft ports. However, their role in cargo collecting and feedering to deep-draft ports is very significant. Along with cargo handling function, the shallow-draft ports are major contributors and facilitators of local economic development.

The ports and terminals[1] included in the capacity assessment are categorized by the functional form (packaging) of the cargo and type of commodity handled there. Accordingly, the capacity analysis includes 5 generic types of terminals, 4 are involved in water/land transfer and one in land/land transfer. The terminals under consideration are:

- Coal terminals for handling bulk coal;
- Grain terminals for handling bulk grain;
- General Cargo terminals for handling neo-bulk, breakbulk and some containers;
- Container terminals for handling containers and trailers; and
- Intermodal yards for handling containers and trailers between trains and trucks.

The above categorization of the terminals by cargo form does not always coincide with the categorization by commodity employed in the demand section. For example, grain can be handled as bulk; as breakbulk (when stuffed in bags); or as containerized (when the bags are stuffed in containers). Grain can thus be handled in three types of terminals: a grain terminal, general cargo terminal, and container terminal.

Consequently, there is an inherent inconsistency in definitions between the demand and supply sides. This may adversely affect comparisons between demand and supply of facilities, the key element of the intermodal plan. The difference in cargo definitions may be especially pronounced if shifts in cargo form develop in the future (e.g. previously bagged grain shifts to containers).

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[1]The term "port" relates to both a geographic location and institutional entity. It usually encompasses a harbor, stretch of coastline, or river under the control of one organization. The term "terminal" relates to an operationally independent facility within the port. For example, the Port of New Orleans includes about 10 terminals concentrated in two locations.

To partially mitigate this problem, and where the demand data taken from national sources (Transearch/Reebie data base) seemed inappropriate, throughput data taken directly from the terminals' reports served as the basis for demand projection.

V.A.2 METHODOLOGY

This section presents a brief description of the methodology employed here for capacity assessment. The section only dwells on the general components of the methodology, those that apply to all types of cargos. A more detailed description of the methodology as modified to fit the specific characterization of each terminal is included in the following sections.

V.A.2.a Limitations in the Application of Existing Methodologies

Port capacity has been a recurrent subject in professional literature. Still, there is no widely-accepted calculation methodology and/or universal standards to determine terminal capacity. A major research effort in this area was conducted by the U.S. Department of Transportation, Maritime Administration (MARAD).[2] MARAD's methodology is based on defining 9 "modules" according to cargo type and terminal throughput. However, MARAD's modules only remotely resemble Louisiana's terminals. For example, MARAD's coal module, defined as a "dry-bulk, open-storage, high-density" terminal, has a typical throughput of only 1,000,000 tons/year. This is well below the throughput of Louisiana's major coal terminals, which have an annual capacity ranging from 8 to 21 million tons (see section V.B.2). Another problem with MARAD modules is that they do not relate to terminals that transfer cargo between barges and ships, a prime operating practice of Louisiana terminals. Finally, the determination of capacity in MARAD's modules is based on the *actual (average) throughput* as reported by a small sample of U.S. ports. MARAD's methodology does not provide judgement on the capacity of terminals or on the *potential* number of ships that the terminals are *capable* of processing.[3]

V.A.2.b Stock & Flow Approach

In light of the problems with MARAD's methodology, the study team developed its own methodology to better fit the State's specific terminal situation. The approach is based on a Stock & Flow (S & F) analysis of terminal operations and the related facilities. The terminal facilities are categorized either as:

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[2]See: U.S. Maritime Administration, *Port Handbook for Estimating Marine Terminal Cargo Handling Capability*, 1979 and the updated version in 1986, by Moffat & Nichol Eng.

[3]Other capacity related publications suggest a methodology based on queuing theory, using theoretical probability distributions for ship arrival. However, the operational assumptions in this methodologies fit an era of non-communication, where ship arrival was basically a random event. See: UNCTAD, *Port Development*, New York, 1978, TD/B/C.4/175.

- Flow Processing Components -- the facilities that transfer cargos among vessels, barges, trains and trucks (loading/unloading); or as
- Stock Holding Components -- the facilities that store cargos during the transfer.

In the simplest terminal, only direct transfer takes place (e.g. between barge and ship). In this case, the terminal only includes one flow component, with no stock holding components.

The methodology has three steps: (a) the terminal is "converted" into a schematic network of S & F components; (b) the capacity of each component is calculated using a simple algebraic formulation; and (c) the capacity of the most limiting components is identified as the capacity of the entire terminal (the "weak link").

V.A.2.c Capacity of Flow Processing Components

The formula for calculating the capacity of the processing components is the product of two basic factors:

- Effective Transfer Rate
- Effective Working Time

The effective transfer rate is usually expressed in tons/day and relates to the gross productivity during work time. The effective rate is calculated by taking the *nominal* rate as given by the manufacturer (tons/hour) and reducing it to reflect discontinuities and interruptions *during* work. For example, in calculating the capacity of the vessel loading component in a coal terminal, the nominal loading rate is reduced to account for preparations before and after loading (opening the hatches, positioning of equipment) and interruptions during the loading (blending, end of piles, vessel trimming, vessel survey, hatch shifting, operator change, equipment breakdowns). Effective rates are usually 60 - 70% of the nominal rates.

The effective working time, usually expressed as days/year, relates to the number of days that each terminal component can be expected to work per year. For example, in the case of the vessel loading component, the time calculation is based on defining the typical *vessel cycle time*. The vessel cycle time includes 3 elements:

- Working Time -- the time that the vessel is at berth and working (actually loading cargo);
- Preparation Time -- the time that the vessel at berth but *not* working because of non-cargo activities, usually before/after working time. Typical preparations include berthing/unberthing, customs, immigration, open/close hatches, inspection, equipment staging/removal, etc.
- Inter-Vessel Time -- the time when no vessel is at berth or the berth is idle.

The need to account for the inter-vessel time is because of the inherent irregularity in ship arrival. The port planner allocates inter-vessel time (time in-between ships) in order to reduce waiting time of vessels. The effective working time is calculated by taking the total available time (e.g. 365 days per year) and subtracting the preparations and inter-vessel times. *Berth utilization* is defined here as the ratio between work time and cycle time.

Estimation of the inter-vessel time is the key for the calculation of the vessel cycle time and the capacity of the entire component. There is no standard way of calculating the inter-vessel time allocation. The amount of time allocated for this purpose depends on the relative values placed on ship and berth times. The allocation is affected by type of service (liner vs. non-liner), location of terminal vis-a-vis access channel and anchorage, and length of working time. For the purpose of capacity estimation in this study, inter-vessel time is assumed to be related mainly to the length of effective time. For example, in the case of a coal terminal, the inter-vessel time is assumed to be half of the effective time, but no less than a half day. Figure V.1 shows the formulas used for capacity calculations of flow and stock components, including their affecting factors. Figure V.2 presents an illustration of vessel cycle.

V.A.2.d Capacity of Stock Holding Components

The formula for calculating the capacity of the stock holding components is the product of two basic elements:

- Effective Static Capacity
- Effective Turnover Rate

Dynamic Capacity of Flow Component (Tons/Year) =

Effective Transfer Rate (Tons/Day) X Effective Working Time (Days/Year)

Affecting Factors:
[Preparations & Interruptions] *[Interval between Vessels]*

Dynamic Capacity of Stock Component (Tons/Year) =

Effective Static Capacity (Tons) X Effective Turnovers (1/Year)

Affecting Factors: *[Operational Flexibility]* *[Peaking]*

Figure V.1
Port Capacity in Stock & Flow Framework

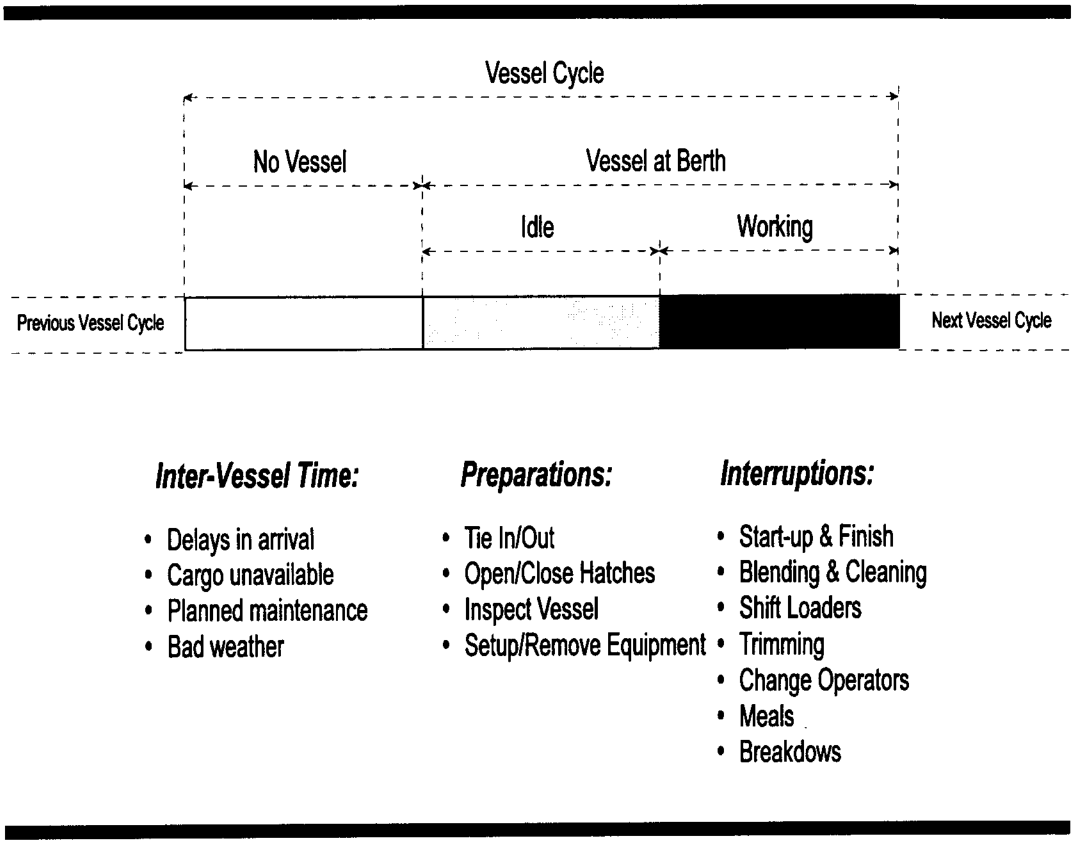

Figure V.2
Vessel Cycle Analysis

The effective static capacity is usually expressed in tons (or TEUs) and relates to the physical capability of the component to store (hold) cargo. The effective capacity is calculated by taking the *nominal* capacity and modifying (reducing) it to account for reserves (empty storage space) required to insure efficient operations. The reduction is usually on the order of 10 - 20%.

The effective turnover rate is the inverse of the effective *dwell time*, the time that the cargo is stored at the terminal. Effective dwell time is calculated by taking the *average* dwell time and increasing it by a *peak factor*. The peak factor accounts for the fluctuations in cargo flows and the resulting temporary accumulation. Average dwell time changes between cargos and trades, ranging between 2 and 30 days. Peak factor values usually range between 1.1 and 1.5.

V.A.2.e Weak Link

A terminal is a network of S & F components. The most restrictive terminal component determines the capacity of the entire terminal. As will be seen later on, there is no uniformity amongst the terminals even in the same cargo group, with each having different restricting components. An exception is the general cargo terminal, where the berth capacity exceeds by far the capacity of the shed and open storage. A large gap in capacity suggests, perhaps, that reexamination of the overall terminal structure is needed.

The assumption underlying the weak link approach is that each of the terminal components is *independent*, so that its capacity is not infringing on the capacity of the other components. This admittedly is a simplistic assumption and only intends to facilitate capacity calculations. The independence assumption is employed in all terminals except for coal, where barge unloading and ship loading use the same yard equipment (the stackers and reclaimers being fed by the same conveyance system).

Finally, most of the terminals under consideration operate below their calculated capacity. This is a common situation in ports as well as in other transport industries and the result of long lead time required for construction of major terminals. Terminal operators interviewed had difficulties envisioning full capacity situations. Therefore, some of the results of the capacity calculation which assess situations with full capacity utilization may appear to contradict figures quoted in other sources.

V.B COAL TERMINALS

V.B.1 DEFINITIONS AND CATEGORIZATION

Louisiana coal terminals can be categorized according to two criteria:

- **Type of users** -- terminals can either be single-user, called hereafter *industrial terminals*, serving a processing plant or a utility; or multiple-user, called hereafter *cargo terminals*, serving many shippers.
- **Type of installations** -- terminals can include facilities that are either shore-based (*fixed terminals*) or mounted on barges (*floating* or *mid-stream terminals*).

Figure V.3 presents a tree diagram with Louisiana Coal terminals categorized according to the above criteria. Appendix 5 includes a table with a detailed description of Louisiana's main coal terminals, including their facilities and equipment. The data in Appendix 5 are taken from the U.S. Army Corps of Engineers (COE) Port Series. The COE data, along with complementary data compiled directly from terminal operators, serve as the basis for the capacity calculations in the following sections.

V.B.1.a Industrial Terminals

Single-user coal terminals are usually not stand-alone terminals but part of a larger industrial complex. The terminals are essentially the water-related loading/unloading facility of a processing plant that receives/sends its raw materials/products by water. Such terminals do not

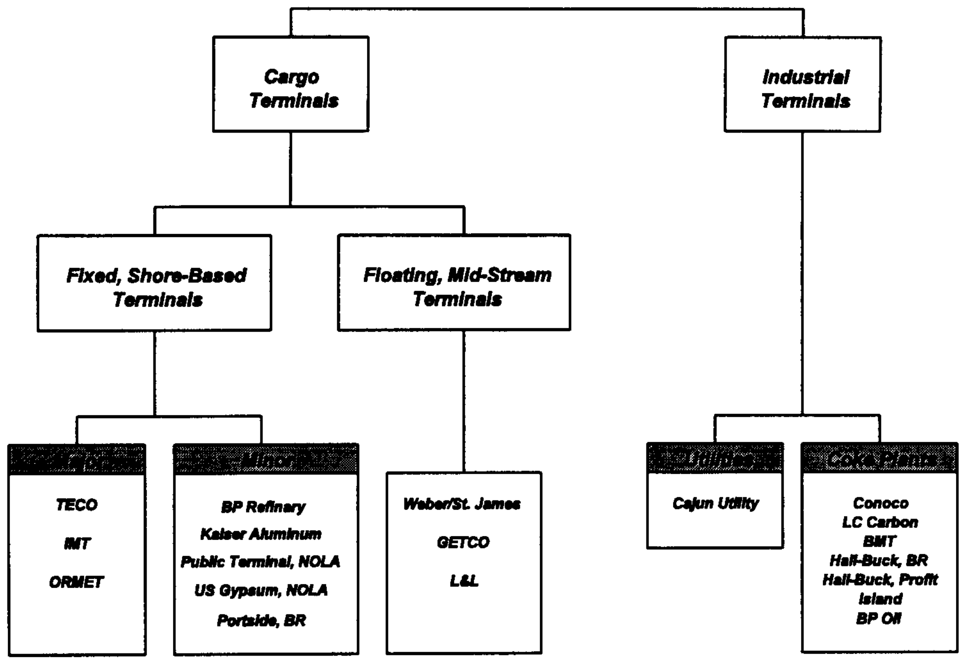

Figure V.3
Coal Terminal Categorization in Louisiana

usually serve the general public for shipment or receipt of coal. They also do not usually participate in the U.S. export of mined coal, but handle petroleum coke. In terms of facilities, however, they can handle coal since coke and coal are handled in a similar fashion.

The statewide intermodal plan, as reflected in the demand forecast, is focused on export terminals and has a limited interest in the industrial coal (coke) terminals and their capacity. Consequently, the capacity assessment in this section does not include industrial terminals; it only relates to cargo terminals. Cargo terminals are sometimes called public terminals. However, the term public in this case only relates to users (shippers) and *not* to ownership of land and/or facilities, which can be either public or private.

One terminal, Lake Charles Public Terminal 1, handles only coke, and is a public (and multi-commodity) terminal. The terminal, however, does not have a barge unloader. Most of its capacity is already taken by coke. Consequently, it is not included in the overall assessment of the state coal terminals.

V.B.1.b Major, Minor, Fixed and Floating Terminals

Louisiana's coal terminals of interest are the cargo terminals, both fixed and floating. As seen in Figure V.3, the state's fixed terminals are further divided into 3 major and 5 minor terminals.

Louisiana has three major fixed coal terminals, TECO, IMT and Ormet, which are responsible for handling almost all coal shipments. Each of the majors has several units which are in effect "sub-terminals". The main units are based on high-capacity, continuous loading equipment; secondary units are based on grab cranes; and there are also various floating units. A capacity analysis for the main units, by terminal components, is presented in the following sections. The minor terminals handle limited volumes of coal, usually together with other dry bulks. Additionally, some of them are partially serving as industrial terminals. Therefore, an analysis of the capacity of each minor cargo terminal is not warranted.

Louisiana also has 3 independent floating terminals according to the COE listings. However, more floating terminals can be easily assembled using available standard equipment such as deck barges and portable cranes. Floating terminals are used for direct transfer, have no storage facility and their operations involve only one flow, from barge to ship. The capacity calculation of a floating terminal is simple and only relates to the transfer capacity of the cranes, similar to the unloading component of the major terminals.

The next sections begin with an analysis of the three major fixed terminals, then continue with a more appropriate analysis of the other cargo terminals.

V.B.2 CAPACITY CALCULATION

V.B.2.a Major Terminal Fixed Facilities

Stock & Flow Approach. Figure V.4 presents a schematic block diagram of a coal terminal. The terminal consists of three basic components: barge unloader, ship loader, and storage yard. The coal flows either directly from barge to ship or, indirectly, through the storage. Most of the transfer is indirect, with the percentage of direct transfer ranging 20 - 30%. It should also be noted that the unloader and loader cannot work simultaneously to/from the yard since both are served by the *same* yard machine, called stacker/reclaimer.

Berthage with Ship Loader. This component includes the terminal facilities that are involved in ship loading, including yard reclaimers, yard to berth conveyors, and on-dock loaders, either travelling or fixed. The annual loading capacity (tons/year) is calculated by multiplying the daily *effective* loading rate (tons/day) by the number of *effective* working days (days/year).

Daily effective rate is calculated by taking a nominal rate and reducing it to reflect discontinuities and interruption during the operations. In coal loading, reductions in the nominal rate are mainly because of interruption in the two end points of the operations: (a) at the storage,

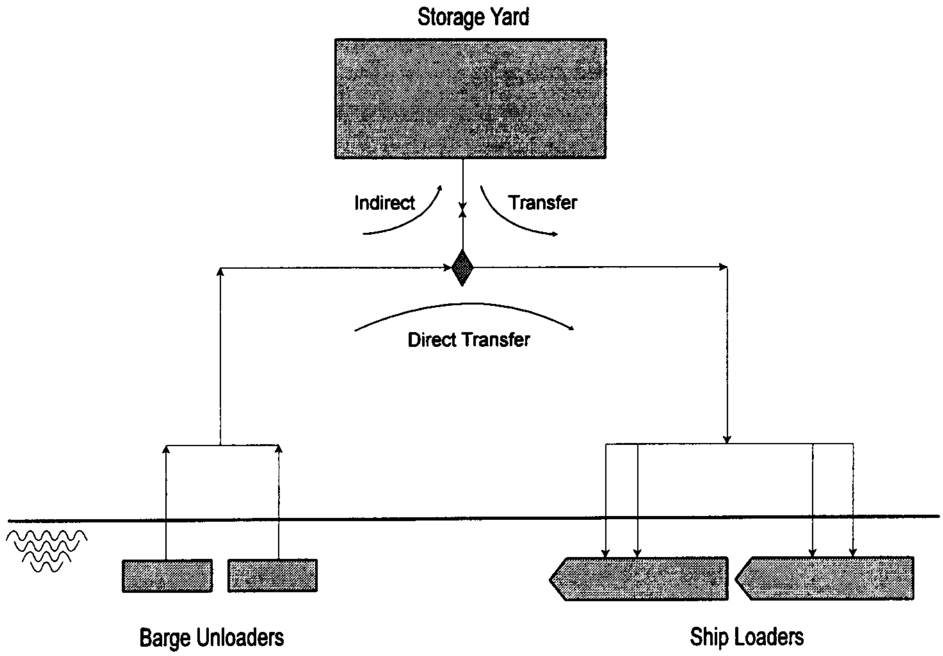

Figure V.4
Coal Terminal: Conceptual Layout and Stock & Flow Diagram

where the reclaimer is interrupted due to blending and cleaning at the end of piles; and (b) at the ship, where the loader is interrupted due to trimming, draft survey and hatch shifting. In addition, there are general interruptions due to equipment breakdown, change of operators, etc. Typically, the effective rate in coal loading is about 1/3 of the nominal loading rate.

The number of effective days is a function of the ship arrival pattern. Coal loading, especially in the large shore-based terminals where mixing and blending are common, requires elaborate preparations. First, different types of coal are purchased according to the specifications of export coal. These types may be purchased in different places and in different times. Then, the coal is transported to the terminal by a combination of trains, trucks and barges, a process that may take 10 days. Finally, several weeks before loading time, a ship is fixed on the international market, mostly on an affreightment basis.

As seen above, the process of terminal accumulating and ship loading of coal involves long-term planning. Coal ships of 80 - 100,000 DWT have a high daily cost of about $15,000. Consequently, shippers try to minimize ship waiting by making sure that the cargo is available and a berth is ready when the ship arrives. Ships do not arrive randomly and without notification, but they also do not follow a fixed schedule. Arrival of ships, under such circumstances, can be described as *semi-scheduled* since, despite planning, there are still some uncertainties regarding the exact day to begin loading. Therefore, the ship is given a "window" of several days within which it should show up ready for loading. This window is taken into consideration while planning the operations. Each ship is allocated a block of days, which includes the expected loading time plus a margin for delays (slack time). There is no common standard for calculating this margin. Generally, it can be assumed that the margin is a function of the expected length of loading time (i.e. larger ships require wider margins). The assumption taken here, based on discussions with operators, is that the inter-vessel time is about 1/3 of the berth time. Accordingly, the ship's cycle time is 1.5 of the expected berth time. Berth time, the overall time that the ship requires at the loading dock, includes the time required for loading and for preparations, mainly for berthing/unberthing, customs, immigration, etc. Ship preparation time is assumed here to be fixed and equal to 8 hours. Under these assumptions, the ship's cycle time is 2.9 days of which the effective loading time is 1.6 days. Accordingly, the expected berth utilization of a 1-berth terminal is about 55%. If a terminal has two berths but one ship loader, the utilization can be increased by 10% reaching 61%.[4]

Table V.1 presents the capacity calculation of the three major fixed terminals. TECO, the largest terminal among the three, has a continuous 1,880-ft dock that can accommodate two large ships. The dock is served by two continuous loaders, one travelling and one stationary, each with an effective rate of about 2,000 tons/hour. The travelling loader mainly serves large ships while the stationary loader is mainly used by ocean-going, push-barges for shipping coal to a utility in Florida. The capacity estimate for TECO's ship loading is at about 11.1 million tons/year for the travelling loader and 7.6 million tons/year for the stationary one, or a total of 18.8 million tons/year.

Table V.1
Capacity of Coal Loading Terminals (tons/year)

Component	TECO	IMT	Ormet	Total
Vessel Loading	18,809,400	17,081,900	5,422,900	41,314,200
Barge Unloading	18,401,500	11,973,900	2,522,400	32,897,800
Annual Capacity of Storage	46,794,900	12,634,600	4,445,500	63,875,000
Annual Terminal Capacity	18,401,500	11,973,900	2,522,400	32,897,800

IMT has a similar set of facilities, including a 1,044-ft dock with a travelling loader and a 794-ft dock with a stationary one. IMT's loading capacity is calculated at about 17.1 million tons/year. Ormet is a much smaller terminal with an 877-ft dock, stationary loader, and a calculated capacity of about 5.4 million tons/year. Ormet is a general purpose dry-bulk terminal whereby coal accounts for about 1/3 of total throughput. Therefore, Ormet relevant capacity is only considered at about 1.8 million tons/year. Altogether, the vessel-loading capacity of the three

[4]This is because some of the preparations can be done on the arriving ship while the previous one is still loading. Also, the utilization rates change according to the vessel size.

major terminals for coal is about 41.3 million tons/year. The capacity of floating terminals and minor fixed terminals will be discussed in the section on unloading capacity.

Storage. Storage of coal is done in open piles staged on concrete pads or compacted soil cement. Loading coal to the pile and unloading it from the pile is usually done by a combination machine called "stacker/reclaimer". The amount of coal held in storage is a function of the required ship loading operation. If the entire ship is loaded from storage, using the so-called indirect loading, the entire ship's load should be stored on the terminal *before* loading starts. The reasons for having the cargo ready on terminal are not only to assure uninterrupted loading but also for performing mixing and blending while loading. However, in reality, about 25% of the cargo is transferred directly from barges, using the same belt system and continuous loaders that also serve the storage yard. The direct transfer reduces the need for on-terminal storage.

The storage yard needs to hold more than one vessel load of cargo. This is because the unloading process of coal from barges and accumulating it on terminal typically extends over 30 days, while ship loading only takes 2 - 3 days. The coal in storage belongs to several ships with different future arrival times. For example, if the operating pattern involves 30 days of accumulation, and ship loading takes place every 2 days, the stock may include loads belonging to 15 ships. It can be mathematically shown that the so-called *operational inventory* required under such an operating pattern is equal to 8 ship loads. In reality, the stock held on-terminal is considerably larger. The additional stock is result of the uncertainty in coal purchase and its on-time arrival through the inland waterways system. The need to blend and mix coal from various sources further adds to the stock held on terminals. It is estimated that the total quantity of stock required is about 30% higher than the quantity needed for operational inventory. Finally, it is estimated that some 20% of the available storage space is needed as an operating reserve to facilitate efficient operations.

Under the above assumptions, and accounting for the extra capacity added by the direct transfer, the three terminals have a combined storage capacity of 63.8 million tons/year. The storage capacity of these terminals is by far larger than their loading capacity. There is an apparent over-capacity of storage, at least in the case of TECO. Some shippers take advantage of the available storage capacity, using the waterfront coal terminals as permanent storage where they keep their coal in expectation of future price changes. All terminals have large land reserves that can be easily developed into additional storage, especially for long-term purposes where front loaders can be used instead of stackers/reclaimers.

Berthage with Barge Unloader. The capacity calculation of barge unloading is similar to that of ship loading, and based on the product of effective transfer rate and effective working time. The barge arrival pattern, which determines effective time, is erratic (in contradiction of ship arrival which is semi-scheduled). However, barges are relatively inexpensive and can be kept waiting for several days at a fleeting place nearby the terminal. In fact, the coal inside the waiting barges can be considered as part of the terminal inventory. The underlying assumption is that a sufficient supply of barges is available, which is not always the case especially when demand rises. Nevertheless, in most cases the fleeting of barges allows for an almost continuous and uninterrupted use of the unloader, resulting in a higher berth utilization rate for barges than that assumed for ships.

The stackers that receive the coal from the barges, however, are also used as reclaimers to load ships. Therefore, in certain situations there is a conflict between barge unloading and ship loading. Since ships' time is by far more expensive than that of barges, the barges are usually forced to wait. This loss of working time is more pronounced at TECO, where for each unloader there is one stacker/reclaimer. At IMT, there are 2 stackers/reclaimers serving one unloader.

Under the foregoing assumptions, TECO's unloading capacity, with its 2 continuous unloaders, is estimated at 18.4 million tons/year; IMT's, with one unloader, at 12.0 million tons/year; and Ormet's, which uses a crane-based unloader, at 2.5 million tons/year. The total unloading capacity of these three terminals is 32.9 million tons.

Total Capacity. The common characteristic of all the three major terminals is that the capacity of their unloading components is the most restrictive one and, as such, the determinant of their overall capacity. Accordingly, the capacity of these terminals is estimated at 32.9 million tons/year, using their main, fixed installations. Since the determining factor is barge unloading, increasing the share of direct transfer cannot increase the capacity of these terminals (but can reduce cost). It should be noted that the above estimate is considerably smaller than the 40 million tons/year capacity estimate by MARAD in a recent study.[5]

The detailed capacity calculations for the three major coal terminals are included in Appendix 5.

V.B.2.b Other Terminals

Floating Terminals. The basic configuration of a floating terminal includes a whirly crane mounted on a deck barge. The crane is equipped with a clam shell, and can be based on a travelling crawler or, in a more permanent arrangement, on a fixed high-pedestal. The deck barge is tied to the loading vessel while the unloading coal barge is tied to the deck barge. An improved configuration of the floating terminal includes an intermediate storage bin, with a scale, sampler, and a continuous ship loader. Another possibility is to use a fixed-boom gantry with a trolley instead of a whirly crane. Each configuration has a different transfer rate and related annual capacity. For simplicity, the capacity calculation here only relates to the simplest configuration based on a whirly crane with a 27 cu-yd clam-shell and an effective transfer rate of about 500 tons/hour. The resultant annual capacity of such a terminal is about 2.4 million tons/year. Appendix 5 presents the calculations.

[5]U.S. Department of Transportation, Maritime Administration, *Existing and Potential U.S. Coal Export Loading Terminals*, January 1992, p. 16.

There are about 5 active floating terminals operating on the river, 2 of them are included within the major fixed terminals and 3 are independent. The two that belong to the fixed terminals are IMT's Coal Monitor 1, which has some limited blending capacity, and TECO's top-off ocean-going barge. Based on the rough estimate of 2.4 million tons/year capacity per terminal, these 5 terminals have an annual capacity of about 12 million tons/year. In contrast, the MARAD study identified 15 floaters with a total capacity of 56.5 million tons/year. The MARAD study does not specify, however, whether these terminals are dedicated to coal or they handle other dry bulk cargos. Also, the assumptions and the formulas employed in the capacity calculation are not elaborated in the MARAD study.

Direct Transfer Cranes in Major Terminals. The major fixed terminals include, in addition to floating terminals, direct transfer cranes. These are dock-mounted gantry cranes (TECO, Ormet) or whirly cranes (IMT) that can directly transfer coal from barge to ship, or vice versa. It is understood that these cranes, however, are mainly used for handling *non-coal* dry bulk. Nevertheless, these cranes *may* be used for coal, especially in case of a surge in demand.

Evaluating these terminals' capacity is difficult because of their mixed usage for handling coal and other cargos. Also, each crane system has different technical specifications. Consequently, no calculation of capacity is conducted at this stage except for a rough estimate of about 0.5 million tons/year for each terminal, or 1.5 million tons/year for all three of them.

Minor Fixed Terminals. The minor fixed terminals include a wide variety of facilities and equipment. They usually are not dedicated coal terminals, and some of them are not active on a regular basis. Therefore, calculating their coal handling capacity is difficult. As before, a rough capacity estimate is about 0.5 million tons/year per terminal, or a total of 2.5 million tons/year for the five terminals.

V.B.2.c Total Capacity

Table V.2 presents a summary of the capacities of Louisiana's coal terminals by category. As seen in the table, the overall capacity is about 50 million tons/year, with 40 million, or 80% in the three major terminals. This capacity estimate is about half of MARAD's estimate of 113 million. As already stated above, if needed, the capacity can be increased by: (a) using terminals currently employed for non-coal dry bulk; and (b) introducing additional floating terminals.

Table V.2
Capacity of Louisiana Coal Terminals

	Tons/Year
Major Terminals	
Main Installations:	
TECO	18,401,488
IMT	11,973,913
Ormet	2,522,386
Total	32,897,787
Fixed Cranes:	1,500,000
Floating Terminals	4,800,000
Total Major Terminals	39,197,787
Floating Terminals	7,200,000
Minor Fixed Terminals	2,500,000
Total Louisiana	**48,897,787**

V.C GRAIN TERMINALS

V.C.1 DEFINITIONS AND CATEGORIZATION

Louisiana's grain terminals (or elevators[6]), unlike coal terminals, are involved only in transferring cargo between transport modes, and not in industrial processing. Louisiana's grain transfer terminals include three types of elevators: (a) land-based elevators that serve local consumption and production; (b) water-based, shallow draft elevators that either serve local consumption or feed deep-draft elevators; and (c) water-based, deep-draft elevators that are directly involved in export. The main concern of grain movement through the state is for export elevators.

Louisiana's export elevators are first classified according to their type of facilities, fixed or floating. Then, they are further classified here according to the *hinterland* that they serve. Two types of elevators are defined:

- **Major Elevators** -- elevators that serve the national export market, with most of the grain shipped in by barges from remote production areas; and
- **Regional Elevators** -- elevators that serve locally-grown grain, mostly shipped in by trucks.

The export elevators are located along two different waterways: the 45-foot Mississippi River and the 36-foot Calcasieu River (Lake Charles). The channel draft dictates vessel size which, in turn, affects terminal capacity.

Figure V.5 presents a tree diagram of Louisiana elevators included in the capacity calculation. As the figure shows, the capacity analysis encompasses 17 elevators, 11 of them fixed and 6 floating. Among the fixed elevators, 9 are considered as major and 2 regional. Appendix 5 presents the physical characteristics of the elevators analyzed in this section.

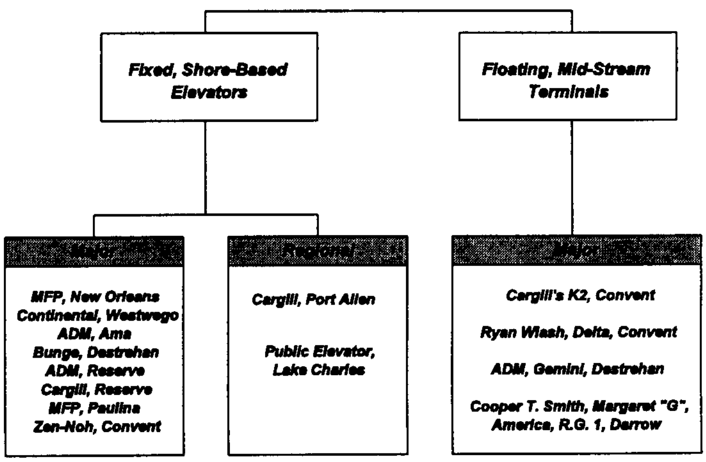

Figure V.5
Grain Terminal Categorization

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[6]The term "elevator" relates to the vertical storage common in grain, which is fed from the top and requires lifting or elevation of the grain. However, the term is also used for any grain terminal, including those with no storage, as the case with floating elevators.

V.C.2 CAPACITY CALCULATION

V.C.2.a Major Elevators

Stock & Flow Methodology. The major stock & flow components of a grain terminal are similar to those of a coal terminal. The major facility components are: barge unloader, ship loader, and intermediate storage in vertical silos. There are, however, two main differences: (a) the unloader and loader can work simultaneously to/from storage; and (b) in addition to barge unloaders, there are rail and truck unloaders and their related facilities (service and storage trackage, switching mechanism, car dump for rail and truck). Figure V.6 presents a schematic illustration of a grain elevator.

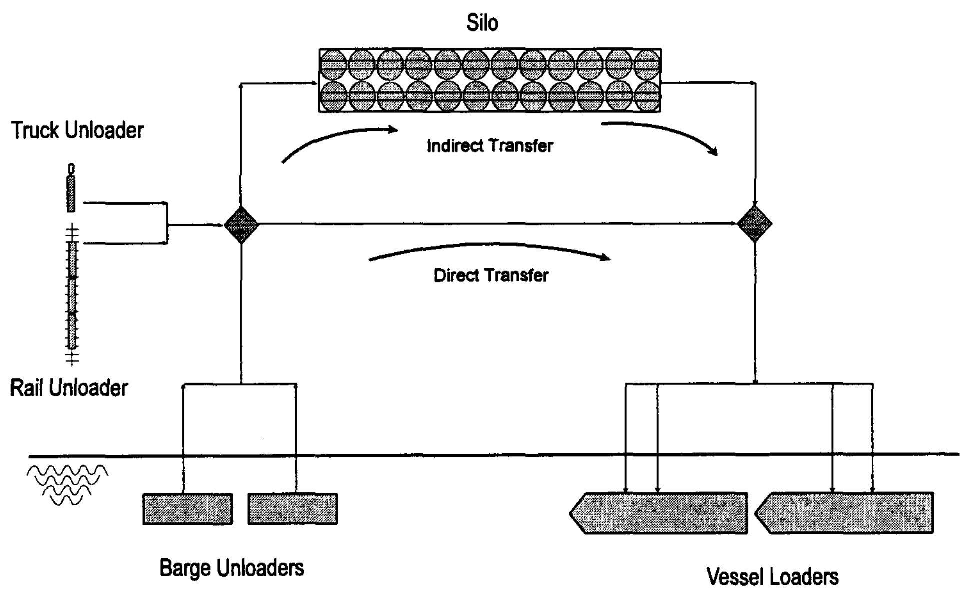

Figure V.6
Grain Terminal: Conceptual Layout and Stock & Flow Diagram

Direct & Indirect Transfer. The main operation of an elevator is indirect transfer of grain from barge to ship through an intermediate shore-based storage. Direct transfer is very limited because grain usually requires on-site processing. That is, following the discharge from barges (or trains/trucks) the grain is weighed, sampled, and cleaned. Then, while in storage, the grain is dried and blended to achieve buyer specifications. The blending, especially, mandates the use of large and segregated storage that rules out direct loading except for rare situations (e.g. specialty grain). For the purpose of capacity calculation, it is assumed that direct transfer only amounts to about 5% of the overall throughput (vs. 25% for coal).

Table V.3 presents the capacity calculations of the 8 major elevators in Louisiana. A discussion of specific considerations for the capacity calculation of each component follows.

Table V.3
Capacity of Major Grain Elevators (tons/year)

Component	MFP Myrtle Grove	Continental Westwego	ADM/ Growmark AMA	Bunge Destrehan	ADM/ Growmark Destrehan	ADM/ Growmark Reserve	Cargill Reserve	MFP Paulina	Zen-Noh Convent
Ship Berthage	5,609,960	22,055,179	8,847,770	8,847,770	8,019,513	8,788,098	22,545,521	7,489,280	14,845,445
Barge Berthage	7,292,108	10,021,440	10,245,873	5,948,101	7,292,108	7,292,108	13,318,500	8,520,253	13,535,518
Storage	17,688,462	9,988,085	15,477,404	19,200,825	14,740,385	11,792,308	20,046,923	5,896,154	11,409,058
Limiting Capacity	**5,609,960**	**9,988,085**	**8,847,770**	**5,948,101**	**7,292,108**	**7,292,108**	**13,318,500**	**5,896,154**	**11,409,058**

Berthage with Ship Loaders

Effective Loading Rate. The ship's loading rate of grain is more uniform and less interrupted than that of coal. Grain is stored in vertical silos that allow more steady flow as compared with coal, which is stored in open piles served by reclaimers. Also, in most modern elevators, the vessel is fed from dedicated shipping bins, where the grain is stored after processing, ready to be shipped. Still, the effective rate reported by elevators ranges between 70 - 75% of the nominal rate (vs. 33% in coal). This also reflects a recent trend, where ships are taking several types of grain, called "mix loads", that adversely impacts loading rates (as well as storage utilization). The effective daily throughput in a large elevator averages about 30,000 tons (per berth). Accordingly, a typical ship of about 50,000 DWT is loaded within 30 - 40 hours, including the elapsed time from berthing empty to de-berthing full.

Effective Working Time. Ship arrival patterns at grain elevators are more orderly than that in coal terminals. This is because grain has a higher value than coal; its storage requires more expensive installations. Also, extended storage of grain, in the hot and humid climate of Louisiana, may result in spoilage. Long-term on-site accumulation of grain is, therefore, uncommon. Consequently, the typical cycle time of a grain ship is shorter than that of coal, including a tighter ship arrival schedule.

The orderly operation of grain transhipment is reflected in the assumption on inter-vessel time, which is 0.2 of work time in grain (vs. 0.33 for coal). Accordingly, the full cycle-time of a typical ship of about 50,000 DWT, including berth time and inter-vessel time, ranges 48 - 60 hours.

As seen in Table V.3, there is a wide range of ship-loading (ship berthage) capacities within this group. The largest elevators, Continental-Westwego and Cargill-Reserve, with 2 berths each, have a capacity of about 22 million tons/year.

Storage

Effective Holding Capacity. Grain elevators cannot operate efficiently when their storage space is fully occupied since they need some free space to allow for blending and for operational flexibility. Additionally, some space is lost when, due to the many varieties of grain stored, there is not enough grain of the same type to fill all bins. This situation, called "broken storage", is becoming more common recently because more ships are carrying mixed loads. For both reasons, it is estimated here that only about 80% of the rated static storage is operationally useful (effective).

Turnovers per Year. The dwell time of grain is much shorter than coal, with a typical time averaging about 2 days. The peak factor, resulting from the need to accumulate grain for more than one ship, is estimated at 1.3. Finally, storage capacity is augmented by 5% to account for direct transfer.

Storage Capacity. The resulting dynamic capacity of elevator storage varies widely. Cargill-Reserve, which has a nominal static capacity of 170,000 tons, is calculated to have the largest dynamic capacity of about 20 million tons/year.[7] A common characteristic of all the elevators is that their storage capacity is considerably larger than their loading capacity.

Barge and Rail Unloading

Effective Unloading Rate. Unloading of grain barges is similar to coal, except that preparation time is longer due to the need to handle covers. Also, grain unloading involves more interruptions due to higher standards of inspection and cleanliness. Zen-Noh has the highest nominal rate of unloading per berth, 2,500 tons/hour, and an effective rate of 1,875 tons/hour, allowing it to unload a 1,400-ton barge in approximately 45 minutes.

Effective Working Time and Unloading Capacity. Barge unloading does not involve much uncertainty in arrival times since barges are usually supplied from a nearby fleeting area where they are inventoried. Therefore, barge berth utilization is quite high at 85%. The barge unloading capacity of the largest elevators, Zen-Noh-Convent and Cargill-Reserve is about 13.5 million tons annually. The capacity calculation is augmented by 5% to account for rail unloading.[8]

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[7]Cargill-Port Allen, which is considered here as a regional elevator, has a larger nominal static capacity of 187,500 tons.

[8]Rail unloading equals about 10% of total unloading. However, usually barge and rail unloading cannot work independently.

Total Capacity

As discussed in the general section on capacity, the overall terminal capacity is determined by the most restrictive component. In the case of grain, different elevators have varying restricting components, with about half of them restricted by loading and half by unloading. The largest-capacity elevator is Cargill-Reserve, with about 13.3 million tons/year. The capacity of all 8 major elevators is about 75 million tons/year.

V.C.2.b Regional Elevators

This terminal category includes the Public Grain Elevator in Lake Charles and Cargill's leased elevator in Port Allen owned by Greater Baton Rouge Port Commission. While technically Cargill's elevator can serve national exports, currently its main function is to serve almost exclusively locally grown products. Cargill's elevator blends Louisiana soybeans, brought in by truck, with some high-grade non-Louisiana soybeans, brought in by rail. The Lake Charles elevator fulfills a similar function for locally grown rice.

The two elevators under consideration are both old and have serious operational limitations. Port Allen's barge unloaders are in need of major repair; Lake Charles lacks a barge unloader. The two are expected to be rehabilitated and expanded in the future, but the extent of the future changes is still unclear. Consequently, no capacity calculations were conducted for these elevators except for rough estimates. It is estimated that Cargill-Port Allen can handle about 5 million tons/year while the Lake Charles Public Grain Elevator can handle about 0.5 million tons/year (assuming year-round, continuous operation).

Cargill-Port Allen, while basically functioning as a regional elevator, can serve as a major elevator because of its location and size. Previously, this elevator was used as a regional transshipment terminal. Therefore, it was estimated, that one-half of its capacity, or about 2.5 million tons/year, should be added to the capacity of the national elevators, with the rest considered as regional. Lake Charles has limited prospects to participate in the national movement of grain. The elevator is old, with limited physical capacities, especially with lack of barge handling and vessel draft. Therefore, its entire capacity is considered regional.

V.C.2.c Floating Elevators

Louisiana has 4 sites where floating elevators are active, each equipped with buoys for tying ships and a nearby barge slip for fleeting. Typically, a floating elevator includes a grab crane for unloading barges, a hopper for temporary accumulation, a scale, and a sloping or bucket conveyor feeding a chute that empties into the vessel hold. Some of the elevators also have on-board storage capacity. The floating elevator is thus capable, in addition to transferring the cargo between barge and ship, to sample, store and blend grain, though the storage and blending capabilities are *limited.*

Because of limited storage and blending capabilities, the main use of Louisiana's floating elevators is for derivatives, usually in the form of meals. The derivatives do not require cleaning, drying and extensive blending, and cannot be stored and handled well in fixed, silo-based elevators. Occasionally, especially during surges in demand, floating elevators are also used for whole grains.

The particulars of the 6 floating elevators currently active in Louisiana are presented in Appendix 5. The appendix shows that the elevators vary widely in equipment and technical characteristics. A detailed capacity calculation for each floating elevator is beyond the scope of this analysis. Appendix 5 includes an estimate of the capacity of a typical mid-size, floating elevator. The calculations only relate to vessel loading because in the floating configuration it is equal to the barge unloading capacity (no storage). The capacity of a mid-size floating elevator is estimated at about 2.7 million tons/year. The combined capacity of all 6 floating elevators currently active in Louisiana is thus estimated at 16 million tons/year.

V.C.2.d Floating Cranes

There are many floating cranes available in the Lower Mississippi. These cranes can handle grain or any other cargos from barges to ships. Also, shore cranes can be moved on to deck barges and function as floating cranes. Theoretically, these cranes have enormous capacity. However, their usefulness for grain is limited since they cannot provide for the sampling, weighing, and blending that are considered to be essential components of transshipment in this trade. Consequently, their capacity is *not* considered here.

V.C.2.e Total Capacity

Table V.4 presents the breakdown and summary of the capacity of Louisiana's elevators. The total capacity is estimated at 95 million tons/year. Most of the capacity, 75 million tons/year, is provided by the 8 major land-based elevators, with about 16 million tons/year being provided by floating elevators. The fixed land-based elevators currently handle most of the exports and are expected to handle most export growth in the future.

Table V.4
Capacity of Louisiana's Grain Elevators

	Tons/Year
Major Elevators	75601843
Port Allen	2,500,000
Total Major Elevators	78,101,843
Regional Elevators	3,000,000
Total Land-Based Elevators	81,101,843
Floating Elevators	15911660
Total Louisiana	**97,013,503**

V.D GENERAL CARGO TERMINALS

V.D.1 DEFINITIONS AND CATEGORIZATION

Louisiana's general cargo terminals[9], as included here, are all cargo terminals (not industrial terminals). The terminals can be classified according to their main cargos into 4 categories: steel, forest products, bagged cargos, and mixed cargos. Another cargo handled, containers, will be discussed in the section on container terminals. In term of installations, the terminal can be divided into fixed (or land based) and floating terminals.

There is no cargo specialization among the general cargo terminals. However, the same terminal can have different capacities (tons/year) depending on the cargo it handles. Moreover, since the heterogeneity of general cargo is wide, even within the same cargo categories substantial differences in capacities are possible.[10]. Consequently, capacity estimates for these terminals are problematic.

As mentioned above, the principal non-containerized general cargos handled in Louisiana's terminals include steel, forest products, and bagged cargos. Steel mainly includes imports of slabs and coils, transfered from vessel to barge or rail. Forest products include exports of woodpulp and linerboard, in bales, and imports of plywood, on pallets. Handling of forest products on the landside is typically from truck (export) and to rail (import). Bagged cargo mainly includes flour and rice exports, brought in by rail and truck. Mixed cargo mainly relates to shipments carried by Ro/Ro (roll on/roll off) services that bring in and take out a wide variety of commodities.

The other general cargos that are not described above have similar handling systems (and capacity) to one of the above cargo categories. For example, handling baled rubber imports resembles that of baled forest products; handling coffee bag imports resembles that of rice bag exports.

The methodology for calculating the capacity of general cargo terminals includes two steps: (a) calculating the capacity of a series of single-cargo terminals; and (b) calculating the capacity of the actual terminal assuming a specific cargo mix. The latter is based on current cargo composition with the underlying assumption of no major changes in the future.

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[9]The terminals are also called "breakbulk" though the term "breakbulk" is erroneous since these terminals mainly handle neobulk and containers.

[10]For example, the steel category includes many forms of cargos, each with its own handling requirements and related capacity.

V.D.2 CAPACITY CALCULATION

V.D.2.a Fixed, Land Based Terminals

Stock & Flow Approach. Figure V.7 presents a typical stock & flow diagram of a general cargo terminal. The terminal's main components are the ship berthage, open and covered storage (shed and yard), and the loading ramps for trucks and rail. Unlike the bulk terminals discussed in the previous sections, general cargo terminals operate in two directions, with the berth handling both inbound and outbound cargos from/to ships and barges. Likewise, the rail and truck ramps serve both incoming and outgoing cargos. The main handling equipment used includes cranes for vessels and forklift trucks for trucks and rail.

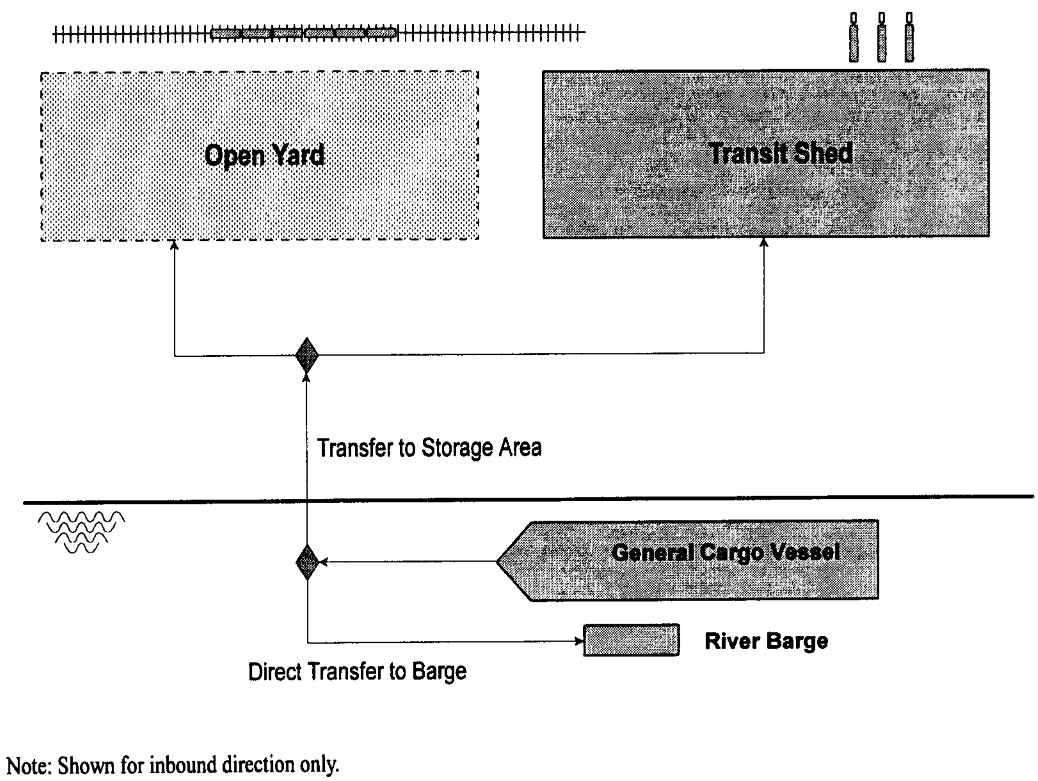

Figure V.7
General Cargo Terminal: Conceptual Layout

Direct & Indirect Transfer. A unique feature of some of the general cargo terminals is the ability to work direct and indirect transfer simultaneously. In such a mixed operation, common for steel imports, some of the cargo is handled to the land-based terminal, and some overboard to a barge, using floating cranes. The same floating cranes are used for direct transfer in mid-stream.

Ship Loading/Unloading. Table V.5 presents the berth capacity calculation of a 1-berth land-based terminal. As seen in the table, the effective transfer rate varies according to size (weight) of the lifted unit, and the difficulties in assembling the unit and attaching/disattaching it to the crane. Steel, the heaviest cargo, has an average transfer rate of 300 tons/hour; loose bags, the smallest cargo unit and the most labor intensive, averages 50 tons/hour. The number of gangs per ship varies, averaging 2 for steel (landside) and 4 for bags. General cargo is usually worked only during day light, with the shifts frequently extended to 10 and 12 hours. Sometimes, 2 shifts are used.

Table V.5
Capacity of General Cargo Terminals by Cargo Category

		Cargo Category				
Component	*Unit*	*Bagged (Export)*	*Woodpulp Prod. (Export)*	*Steel Prod. (Import)*	*Mixed (Imp./Exp.)*	*Steel Prod. - Floating (Import)*
Ship Berthage:						
Nominal Transfer Rate per Crane	Tons/Hour	50	250	300	120	300
Rate Modifier[1]		0.8	0.8	0.8	0.8	0.6
Number of Cranes per Ship		4	3	2	2	2
Working Hours	Hours/Day	12	12	16	12	12
Effective Daily Transfer per Berth	Tons/Day	1,920	7,200	7,680	2,304	4,320
Vessel Load	Tons	25,000	12,000	30,000	5,000	30,000
Vessel Loading Time	Days	13.02	1.67	3.91	2.17	6.94
Vessel Preparation Time	Days	0.3	0.3	0.3	0.3	0.3
Vessel Berth Time	Days	13.32	1.97	4.21	2.47	7.24
Inter-Vessel Time Coefficient		0.5	0.5	0.5	0.5	0.5
Inter-Vessel Time	Days	6.66	0.98	2.1	1.24	3.62
Vessel Cycle Time	Days	19.98	2.95	6.31	3.71	10.87
Berth Utilization		0.65	0.56	0.62	0.59	0.64
Effective Working Time	Days/Year	235	203	223	211	230
Annual Capacity per Berth	**Tons/Year**	**450,422**	**1,464,407**	**1,711,738**	**485,803**	**993,865**

[1]To account for interruptions during work.

This intermittent operation should be contrasted with the 24-hour operation in bulk cargos. It is mainly the result of labor agreements regarding overtime, lack of fresh gangs, and insufficient lighting at night. The capacity calculation assumes no future change in the number of hours worked per day. Under these assumptions, the daily transfer rate per berth varies from 1,900 tons/day for bags to 7,700 tons/day for steel. Accordingly, handling of a 25,000-ton bag shipment takes 13 days while handling of a 30,000-ton steel shipment only takes 4.2 days.

Most of the general cargo is served by *semi-liner* services. Semi-liner services follow a fixed itinerary with some variations based on cargo availability.[11] Typical service frequencies vary from 10 days to a month. Steel and bags are usually served by *tramp* shipping, similar to bulk cargos. However, as was the case with bulk cargos, the arrival of tramp ships is planned with a tight "window", and their handling is conducted according to an agreed-upon schedule. Still, ship arrival is distinguished by irregularity and inter-vessel times are relatively long. The assumption on inter-arrival time here is 0.5 of working time, but no less than a day. The resulting inter-vessel times are 6.7 days for bags, but only 1.7 days for steel. This means, for example, that a steel berth working at full capacity can handle a 30,000-ton shipment every 5.1 days.

The largest ship handling capacity per berth is for steel at about 2 million tons/year; a bagged cargo berth has the smallest capacity at less than 0.5 million tons/year. These capacity figures are highly dependent on the number of cranes serving the vessel and hours worked per day. For example, if steel unloading is performed by 4 cranes (2 fixed and 2 floating), and the gangs work around the clock, the capacity of a steel berth can reach 4.4 million tons/year.

Storage. As was the case with vessel handling, each cargo category has its own storage density (tons/sq ft) based on its specific weight, form of packaging and stacking height. Also, one terminal can store several categories of cargos. Therefore, a static storage capacity is calculated for each cargo group. The nominal capacity has to be reduced to account for internal circulation and separation between different batches of cargos. As seen in Table V.6, steel has the largest static storage capacity with about 0.3 tons/sq ft and mixed cargo the smallest with about 0.1 tons/sq ft.

A unique feature of general cargo terminals is the existence of two types of storage: inside, in a shed, and outside, in a paved yard. In reality, the main cargo for the yard is steel, along with some mixed cargo (e.g. rolling machines). It is estimated that about 33% of the steel and 20% of the mixed cargo can be stored outside. No forest products or bagged cargo are assumed to be stored outside.

A common practice in general cargo terminals is to allow 30 days of free time. Usually, most cargos take full advantage of this period, though they do not exceed it. Interviews with operators suggest that the average dwell time is about 15 days. Peak factor is estimated at 1.3.

The dynamic storage capacity is calculated per storage unit of 1,000 sq ft of shed and/or open area. The results vary according to the cargo categories, from 900 to 2,800 tons/year. The storage capacity above only relates to indirect transfer. In terms of overall terminal capacity, a percentage has to be added to reflect the direct transfer that usually takes place in parallel to the

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[11]This is in contrast to a full liner service common in containers where the ship calls the same ports at exact, pre-determined dates.

indirect transfer. Based on interviews with terminal operators, it is assumed that about half of the steel is going directly to barges (while the vessels are at berth). No direct transfer is assumed for other cargos.

Table V. 6
Capacity of General Cargo Shed and Open Storage by Cargo Category

		Cargo Category			
Component	*Unit*	*Bagged (Export)*	*Woodpulp Prod. (Export)*	*Steel Prod. (Import)*	*Mixed (Imp./Exp.)*
Storage:					
Shed Capacity					
Shed Nominal Capacity	Sq. Ft.	1000	1000	1000	1000
Utilization Modifier[1]		0.5	0.8	0.5	0.5
Shed Effective Capacity	Sq. Ft.	500	800	500	500
Cargo Density	Tons/Sq.Ft.	0.15	0.13	0.3	0.1
Effective Static Capacity	Tons	75	104	150	50
Average Dwell Time	Days	15	15	15	15
Peak Factor		1.3	1.3	1.3	1.3
Turnovers	1/Year	18	18	18	18
Annual Capacity Per 1,000 Sq. Ft.	Tons/Year	1,385	1,920	2,769	923
Direct Transfer					
Cargo Transferred Directly		0%	0%	50%	0%
Cargo Moved Through Storage Yard		100%	100%	50%	100%
Storage Distribution					
To Shed		100%	100%	67%	80%
To Open Area		0%	0%	33%	20%

[1]To account for space used for traffic circulation and separation.

Truck and Rail Handling. No study was conducted to determine the capacity of the landside transfer facilities, including rail ramps and truck bays. Interviews with operators indicated that in most cases this component is not a capacity constraint. Landside handling was found critical only for receiving bagged cargo exports. However, the capacity restrictions there were not due to inadequate facilities, but to insufficient railcar switching and availability of labor to staff second shifts. Consequently, no capacity calculations are included for landside handling of truck and rail.

Total Capacity. For convenience, the capacity calculation for various general cargo terminals are arranged by ports, including New Orleans, Baton Rouge and Lake Charles.[12] The capacity calculation for each terminal is a function of its assumed cargo mix. As Table V.7 shows, the

[12]The terminal at South Louisiana has also been handling a limited amount of general cargo. However, since the terminal at its present layout is more oriented toward bulk handling, no capacity estimate for general cargo was included.

capacity of the berthage in all ports is far larger than that of storage. This is a common feature of general cargo terminals and a result of design constraints.

Table V.7
Capacity of Louisiana's General Cargo Terminals (tons/year)

Component	New Orleans	Baton Rouge	Lake Charles
Ship Berthage	33,347,500	5,039,900	7,271,700
Storage Capacity	6,770,900	871,700	1,310,300

The total capacity as calculated here is 6.8 million tons/year for New Orleans, 1.3 million for Lake Charles, and 0.9 million for Baton Rouge. This capacity relates to the existing layout of Louisiana's terminals. The Port of New Orleans is in the midst of building new general cargo facilities while, in parallel, disposing of older terminals. The new terminals, however, are expected to have much larger capacity than the older ones. The new capacity is *not* included in the attached tables here, but included in the long-term comparison of capacity and demand presented later.

V.D.2.b Floating Terminals

Ship Loading/Unloading. The facilities involved in direct transfer of general cargo are simple, requiring a barge-mounted crane and a set of buoys to restrain the ship's motions. Direct transfer of general cargo in Louisiana is common only for steel, though in other U.S. ports it is also done for forest products. Currently, there are several floating berths on the Lower Mississippi River, including one site within jurisdiction of the Port of New Orleans. Typically, the ship is served by an average of 2 cranes, but some times up to 4 cranes are used. Nominal transfer rates are similar to that of shore-based facilities since both use the same crane. However, because of difficulties in moving floating cranes along side vessels and getting labor in/out of barges, the effective rate is lower. The lower rate is reflected in reducing the rate modifier assumed here to 0.6 vs. 0.8 for land based terminals.

Ship arrival at floating terminals is assumed as less regular than for land based terminals. This, in turns, reduces the effective working time. Therefore, the total capacity of a floating terminal is calculated at 1.2 million tons/year (vs. 2.2 million for a land based berth).

The total number of existing floating terminals on the Lower Mississippi River is difficult to estimate since some operators use public anchorage on an ocasional basis. A rough estimate is that 3 berths are currently active in handling general cargos with a total capacity of about 3.6 million tons/year. It should be mentioned, however, that a development of a floating terminal, unlike a land based terminal, is a relatively short and inexpensive process. So, if needed, more handling capacity can be introduced within a short period.

V.D.2.c Total Capacity

The total capacity of the State to handle general cargo is estimated at about 12.6 million tons/year, including 9 million in land based terminals and 3.6 in floating ones. Once the uptown Mississippi River Terminal Complex in New Orleans is completed, including Nashville C, another 2 million tons/year of capacity will be added. However, some of the net additional new capacity will be reduced if New Orleans older terminals are closed.

V.E CONTAINER TERMINALS

V.E.1 DEFINITIONS AND CATEGORIZATION

Container terminals are cargo facilities that specialize in handling ISO marine containers, using shore-based, rail-mounted, gantry cranes. The gantry cranes are needed since most of the containerships calling at these terminals are gearless. Some container terminals also handle Ro/Ro vessels, using ramps instead of gantry cranes.[13]

All the gantry-equipped specialized container terminals of Louisiana are presently located in New Orleans, at France Road and Jourdan Road. Additionally, there is a Ro/Ro container terminal without cranes in Lake Charles that only handles trailers (chassis).

A small number of containers are also handled in general cargo terminals, mainly those at the Mississippi River complex in New Orleans. These containers are carried either on general cargo ships, or by small containerships that have cranes on-board. However, general cargo terminals are not designed for handling a large volume of containers on a regular basis since they are not equipped with gantry cranes. In most cases, the containers are handled by ship's gear, but, if needed, shore-based whirley cranes can also be used. The capacity of the general cargo terminals to handle general cargo has already been accounted for in the previous section. Their capacity to handle containers is considered in this section. Some of these general cargo terminals may be converted in the future to specialized container terminals following the installation of gantry cranes.

This section is concerned with the container capacity of three types of terminals:

- Specialized, gantry-equipped terminals;
- A ramp-equipped trailer terminal; and
- General cargo terminals that also handle containers

[13]Some containerships are mixed with deck-mounted and chassis-mounted containers, requiring both gantry cranes and ramps at the same terminal.

Line Specific Methodology. All specialized container terminals have similar configurations. The methodology for calculating their capacity is thus identical in principle, except that the calculation directly relates to the *specific* type of line(s), service(s) and vessels accommodated at the terminal.[14] That is, unlike the other types of terminals, no uniform vessels are assumed here but the *actual* vessels calling at a terminal. Likewise, the yard system assumed in these terminals is the actual system in use since it reflects the lines' requirements.

Currently, Berths 1 & 2 at France Road accommodate mainly the lines serving Puerto Rico; Berths 5 & 6 accommodate lines serving North Europe, the Mediterranean, and South America; and Jourdan Road accommodates one European service along with several small lines. The capacity calculation assumes that the terminals continue to serve similar mixtures of lines, cargo, and fleet. While lines may change terminals in the future, it is plausible to assume that the overall mixture of vessels will remain basically unchanged.

V.E.2 CAPACITY CALCULATION

V.E.2.a Specialized Container Terminals

Stock & Flow Approach. Figure V.8 presents a stock & flow diagram of a 1-berth container terminal. The main terminal components include the berth, with one or two gantry cranes, a container yard (also called marshalling, storage) and a gate. The yard stores the containers either on wheels (chassis) or grounded and stacked. In the latter, the containers are moved by top-picks, reach stackers, and straddle carriers. The gate facilities include equipment inspection lanes and a queuing space.

In addition to the main components above, some terminals include a Container Freight Station (CFS) and storage sheds for non-containerized cargo. There are also a service garage and administration buildings. All of the above mentioned facilities are excluded from the capacity calculation since they do not directly affect throughput.

There is no direct transfer in container terminals, except for the rare case when urgent boxes are transferred between vessels and trucks. In addition to vessel container handling, the primary operation, most terminals support a *secondary* operation whereby they store empty containers to provide for local exports for which the terminal functions as a regional depot.

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[14]The term line relates to the name of shipping line, e.g. Sea-Land. Service relates to the group of ships that follow similar itinerary, e.g. Sea-Land's Central America service.

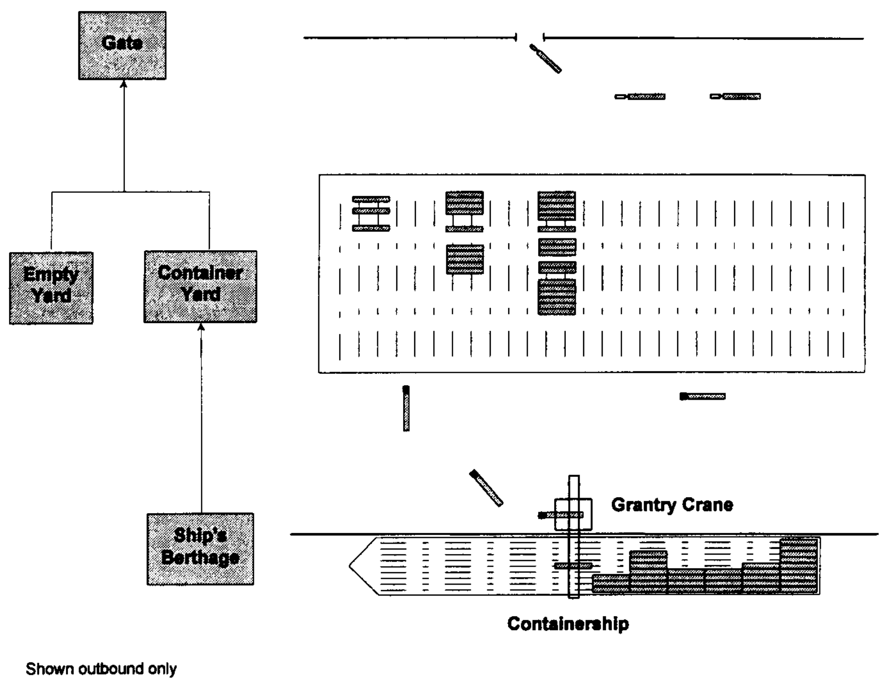

Figure V.8
Container Terminal: Conceptual Layout and Stock & Flow Diagram

Ship Berthage. Table V.8 presents the capacity calculations of the 4 specialized container terminals of Louisiana. As seen in the table, the effective transfer rate ranges between 20 and 35 container moves/hour, reflecting the differences in vessel configuration and number of moves per vessel.[15] For France Road terminals, it was assumed that 2 gantry cranes are used simultaneously to work a ship, while for Jourdan Road only 1 crane is assumed. This simply reflects what is currently available and what container ships calling there require. A 2-shift operation is assumed, similar to prevalent practices in New Orleans. Under these assumptions, the daily transfer rate ranges from 300 to 1,050 moves/day per berth.

Most of the containerships calling at New Orleans are handled within one day. All services are liner with a typical frequency of 7 days. Based on interviews with operators, it was assumed that the required inter-vessel time is about 2 shifts. This time is mainly required for re-assembling equipment (chassis) and not because of ship delays which can be mitigated by working during nights.

[15]Container activity is measured here in moves (or boxes) for handling, and in TEUs (Twenty Foot Equivalent Units) for storage. Total capacity is measured in TEUs/year.

Table V.8
Capacity of Specialized Container Terminals

Name		France Road			Jourdan Rd
Location		Berth 1	Berth 4	Berth 5 & 6	
Operator Name	Unit	Sea-Land	PRIMMI	NOMC	Ceres
Ship's Berthage:					
Effective Transfer Rate	Moves/Hour	35	35	30	20
Cranes per Berth		2	2	2	1
Effective Transfer Rate per Berth	Moves/Hour	70	70	60	20
Working Hours	Hours/Day	15	15	15	15
Effective Daily Transfer per Berth	Moves/Day	1,050	1,050	900	300
Vessel Load	Moves	900	900	600	200
Vessel Stay	Hours	12.86	12.86	10	10
Preparations	Hours	3	3	4	4
Inter-Vessel Time	Hours	12	12	16	16
Vessel Cycle Time	Hours	27.86	27.86	30	30
Berth Utilization		0.46	0.46	0.33	0.33
Number of Berths		1	1	2	1
Effective Time	Days	152	152	220	110
% of 20-foot		10%	10%	40%	50%
TEUs/Move Multiplier		1.9	1.9	1.6	1.5
Berthage Capacity	TEUs/Year	303,854	303,854	316,800	49,500
Storage:					
Container Yard Area	Acres	60	36.73	48.21	10
Weighted Density	TEUs/Acre	90	90	196.67	250
Nominal Static Capacity	TEUs	5,400	3,306	9,481	2,500
Fraction Required for Empty Boxes		0.15	0.15	0.2	0.2
Empty Boxes	TEUs	810	496	1,896	500
Loaded Boxes	TEUs	4,590	2,810	7,585	2,000
Modifier for Operating Margins		0.8	0.8	0.8	0.8
Effective Static Capacity		3,672	2,248	6,068	1,600
Avg. Dwell Time	Days	4	4	7	10
Peak Factor		1.5	1.5	1.3	1.3
Turnovers	1/Year	61	61	40	28
Yard Capacity	TEUs/Year	223,380	136,749	243,385	44,923

Assumptions:
1. Daily Transfer Rate assumes 2-shift operations.
2. Berth 5 & 6 is assumed to be capable of working only 2 Lo/Lo ships, each with 2 cranes.
3. Remote yards are included in static capacity (for Berths 1 & 2).
4. Storage of empty boxes is required for outbound.

The berthage capacity ranges from about 50,000 TEUs/year for the 1-berth, 1-crane Jourdan Road terminal to about 317,000 TEUs/year for the 2-berth, 2-crane terminal at France Road, berth 5&6.

Storage. As mentioned above, the container yard is used for two purposes: (a) for holding containers loaded/unloaded to/from vessels; and (b) for holding empty containers needed for local export. The percentage of empty boxes in storage is estimated at 15-20% of the total boxes. The space required for the empty storage is taken at the expense of the space dedicated to the vessel-handling activities. The effective static capacity is a function of the overall yard space and storage density. Typical densities range from 90 to 200 TEUs/acre. The static capacity varies from 1,600 TEUs at Jourdan Road to 6,070 TEUs at France Road.

Average dwell time varies according to line and services. For the high frequency Puerto Rican services, dwell time is estimated at 4 days with a peak factor of 1.5 to reflect the high probability of vessel "bunching". The dynamic storage capacity ranges from 45,000 TEUs/year for Jourdan Road to 243,000 TEUs/year for Berth 5 & 6. The storage capacity is considerably smaller than that of the berth and thus determines the terminal's capacity.

Gate. The gate is not considered here as a constraint since it can be easily expanded.

Total Capacity. The total capacity of the specialized terminals in New Orleans is about 650,000 TEUs/year. Currently, the Port of New Orleans is in the midst of negotiations with the operator of Berth 1 regarding the expansion of the container yard. This may result in some increase in capacity, perhaps by about 20,000 TEUs/year. Also excluded here is the future expansion due to the construction of specialized terminals within the River Complex. A planned 2-gantry berth, supported with 20 acres of yard, may have capacity of about 100,000 TEUs/year.

V.E.2.b Non-Specialized Terminals

No capacity calculation was conducted for the Lake Charles terminal because of its specific layout. This terminal can only handle trailers carried on multi-deck barges, using a floating ramp. A rough estimate of the terminal capacity is 100,000 TEUs/year. Also, no calculation was conducted for the container capacity of the general cargo terminals on the Lower Mississippi River in their present configuration. A rough estimate puts their capacity at about 30,000 TEUs/year.

Table V.9
Capacity of All Container Terminals

Location	TEUs/Year
France Road	603,514
Jourdan Road	44,923
Total Specialized	648,437
Mississippi River	30,000
Lake Charles	100,000
Total Louisiana	778,437

V.E.2.c Total Capacity

The total capacity of all Louisiana specialized and non-specialized container terminals is 780,000 TEUs/year, with 650,000 TEUs/year at specialized terminals, as shown in Table V.9. Improvement of Berth 1 in France Road and development of a small terminal in the River

Complex may increase this capacity to roughly 860,000 TEUs/year, assuming 10,000 TEUs could still be handled at non-specialized terminals.

V.F INTERMODAL TERMINALS

V.F.1 DEFINITIONS AND CATEGORIZATION

Intermodal terminals transfer containers and trailers between trains and trucks. The terminals have no direct links to water modes. However, indirect links to the water mode exist since part of the intermodal terminal activity involves handling ISO marine containers. In fact, about half of the yard activity relates to marine containers and the other half to domestic trailers (for convenience, both hereafter are referred to as "boxes").[16] The intermodal yards of Louisiana are presently concentrated in two locations: New Orleans and Shreveport.

There is much similarity in the facilities and operations of intermodal yards and container terminals since both handle boxes. The main difference is that the intermodal yards have *ramps* instead of berths. Consequently, the methodology for calculating the capacity of intermodal yards is similar to that employed for container terminals.

V.F.2 CAPACITY CALCULATION

V.F.2.a Stock & Flow Approach

Figure V.9 presents the stock & flow diagram of an intermodal yard. The main yard components include a ramp, a storage (or marshalling) yard, and a gate. The ramp consists of one or more working tracks for staging the trains and a concrete pad for staging and moving the box-handling machines and for temporary staging of boxes. The storage yard and the gate are similar to those of a container terminal. Also, as is the case in the container terminal, direct transfer is rarely done.

V.F.2.b Ramp Capacity

Effective Transfer Rate. Appendix 5 presents the capacity calculation for the 8 active yards in Louisiana. The effective transfer rate per machine as quoted in the appendix is based on operators' estimates, with the highest at 25 moves/hour and the lowest at 6 moves/hour. The number and type of machines reflect the actual situation at the yards. Additional machines can

[16]More accurately, intermodal yards handle three types of units: ISO marine containers, domestic containers and domestic trailers. Some of the ISO containers can carry domestic cargo and, when mounted on chassis, function as trailers. Likewise, the domestic trailers/containers may carry international cargo.

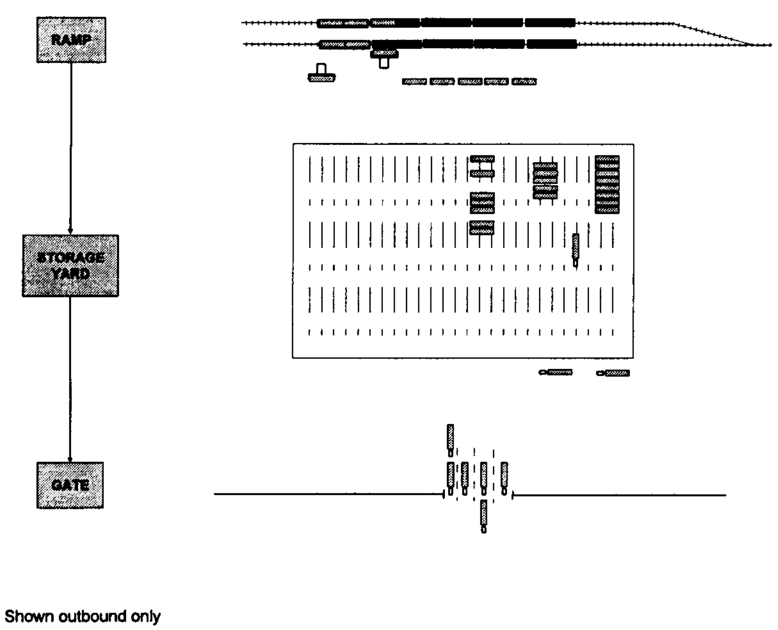

Figure V.9
Intermodal Terminal: Conceptual Layout and Stock & Flow Diagram

increase the transfer rate and capacity.[17] Currently, most of the yards work only two shifts per day, or 16 hours. The effective daily transfer as calculated here assumes no change in the current situation. The resulting daily transfer rates vary from 96 boxes at the smaller, 1-machine yard of KCS in Shreveport to 1,152 boxes at the 4-machine yard of NS in New Orleans.

Effective Working Time. The size (number of cars and boxes) of trains handled in the yard is calculated according to the length of the working trackage in the present layout. Also, the number of boxes per track-length reflects the present mixture of single and double-stack equipment. Therefore, the assumption here is that the ramp handles the maximum size train that can be accommodated, regardless of the trains that actually call there. This is quite different than the assumptions on size of containerships in container terminals, which were based on those that

[17]There are hidden constraints, however. Typically, each machine requires about 1,000 feet of trackage to assure efficient handling. Accordingly, the number of machines is constrained by the length of trackage. However, this constraint was not encountred in any of the yards.

actually called there.[18] The train's cycle time and its equivalent, the annual effective working time, are estimated by assuming an inter-train time of 1 hour along with a switching time of 3 hours (in and out).

Annual Capacity. The resultant, annual capacity of the ramp varies from 23,000 boxes/year for the KCS facility in Shreveport to 232,000 boxes/year for the CSX facility in New Orleans.

V.F.2.c Storage Yard

Effective Static Capacity. The yard system of most intermodal yards is all-wheel, whereby all marine containers are always kept on chassis and handled as trailers. Sometimes, due to the lack of chassis, boxes are temporarily grounded. However, in most cases only empty boxes are grounded and stacked. Stacking also saves on storage space.

The capacity calculation relates only to the trackside yard, the yard that *directly* supports (and constrains) the transfer activities of the ramp and the gate. Some intermodal yards provide auxiliary services to shipping lines, including storage and repair of containers and chassis. These activities usually take place in areas not adjacent to the ramp (satellites). Therefore, these areas are not included in the capacity calculation.

The number of yard slots assumed here is based on the operators' data and not on a theoretical calculation of density, as in container terminals. The number of slots is a function of yard layout and reflects the actual working patterns of the operators. Also, it is assumed that only 80% of the yards' static capacity can be effectively utilized in order to allow operational flexibility. Accordingly, the static capacity of the yards varies from 240 boxes at the KCS in Shreveport to 1,136 boxes for UP in Avondale.

Turnovers per Year. Average dwell time in intermodal yards, as reported by operators, is about 2 days. This time is considerably shorter than the time reported in container terminals of between 4 and 7 days. The main reasons for the shorter dwell time are: (a) domestic trailers are not inspected by Customs; (b) many intermodal domestic moves are intra-company (between two branches) with pick-up times scheduled shortly after train arrivals; (c) most of the marine containers are drayed directly to the container terminals in a pre-planned fashion.

Storage Capacity. The dynamic storage of the yards varies from 34,000 boxes/year for the KCS yard in Shreveport to 159,000 boxes/year for UP yard in Avondale.

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[18] This is because the length of the train can be changed to suit the length of the ramp, unlike the size of the vessel that is pre-determined for all practical purposes.

V.F.2.d Gate Capacity

The gates in the intermodal yards do not usually constrain capacity and, if needed, can be easily expanded. Therefore, no capacity estimate is provided for the gate (as was the case with container terminals).

V.F.2.e Total Capacity

Storage capacity is the determining factor in most cases, except for KCS in Shreveport and UP in Avondale. The total capacity in New Orleans yards, including UP and SP facilities at Avondale, is currently 477,000 boxes/year. Currently, Shreveport capacity is 65,000 boxes/year. It should be noted that in cases where the limiting component is the ramp, additional handling machines can be acquired at relatively low cost. Also, it should be noted that the yards are assumed to be active only during 2 shifts/day, unlike container terminals that usually work the containership continuously.

The capacity calculations above relate only to the current yard layouts. CSX has recently announced plans to substantially increase capacity, including both trackage and storage. This expansion may increase considerably the total overall capacity for New Orleans. Another future change in yard capacity relates to the possible *reduction* in capacity following the expected consolidation of the two Shreveport yards. This consolidation of the partially utilized yards is intended to enhance efficiency.

V.G DEMAND / CAPACITY COMPARISON

V.G.1 DEFINITIONS AND CATEGORIZATION

The demand/capacity comparison includes 5 types of terminals:

- Coal terminals for bulk coal;
- Grain terminals for bulk grain;
- General Cargo terminals for neo-bulk, breakbulk and some containers;
- Container terminals for containers and trailers; and
- Intermodal yards for containers and trailers.

The base year is 1990 for coal and grain where the source of data is Transearch/Reebie files. For general cargo/container terminals and intermodal yards, the base year is 1993 and 1994, respectively, where demand (throughput) data were obtained directly from terminal/port statistics.

The terminals are combined into four regional groups, which also correlate with the definition of BEAs in Chapter IV on demand: New Orleans, Baton Rouge, Lake Charles, and Shreveport, see Table V.10. However, combining regional capacity does not necessarily mean that the terminals

Table V.10
Summaries of Demand/Capacity

COAL

	1994 Capacity	1990 Reported		2000 Med. Forecast		2010 Med. Forecast		2020 Med. Forecast	
BEA	Tons/Year	Tonnage	Utilization	Tonnage	Utilization	Tonnage	Utilization	Tonnage	Utilization
New Orleans	38,175,401	17,885,215	47%	23,747,132	62%	28,515,812	75%	34,277,786	90%
Baton Rouge	10,722,386	3,298,747	31%	4,473,967	42%	5,221,777	49%	6,094,885	57%
Total	48,897,787	21,183,962	43%	28,221,099	58%	33,737,589	69%	40,372,671	83%

GRAIN

	1994 Capacity	1990 Reported		2000 Med. Forecast		2010 Med. Forecast		2020 Med. Forecast	
BEA	Tons/Year	Tonnage	Utilization	Tonnage	Utilization	Tonnage	Utilization	Tonnage	Utilization
New Orleans	66,252,461	46,844,537	71%	55,993,386	85%	65,174,933	98%	75,862,681	115%
Baton Rouge	30,261,041	24,025,732	79%	28,718,014	95%	33,427,067	110%	38,908,288	129%
Lake Charles	500,000	60,000	12%	71,718	14%	83,478	17%	97,165	19%
Total	97,013,502	70,930,269	73%	84,783,118	87%	98,685,478	102%	114,868,134	118%

GENERAL CARGO

	1994 Capacity	1993 Reported		2000 Med. Forecast		2010 Med. Forecast		2020 Med. Forecast	
BEA	Tons/Year	Tonnage	Utilization	Tonnage	Utilization	Tonnage	Utilization	Tonnage	Utilization
New Orleans	10,370,865	4,182,116	40%	5,320,820	51%	6,359,988	61%	7,602,109	73%
Baton Rouge	871,680	628,491	72%	799,616	92%	955,783	110%	1,142,450	131%
Lake Charles	1,310,319	867,438	66%	1,103,623	84%	1,319,163	101%	1,576,799	120%
Total	12,552,864	5,678,045	45%	7,224,059	58%	8,634,935	69%	10,321,358	82%

CONTAINERS

	1994 Capacity	1993 Reported		2000 Med. Forecast		2010 Med. Forecast		2020 Med. Forecast	
BEA	TEUs/Year	TEUs/Year	Utilization	TEUs/Year	Utilization	TEUs/Year	Utilization	TEUs/Year	Utilization
New Orleans	678,437	366,518	54%	466,313	69%	557,385	82%	666,244	98%
Lake Charles	100,000	91,704	92%	116,673	117%	139,460	139%	166,696	167%
Total	778,437	458,222	59%	582,986	75%	696,845	90%	832,940	107%

INTERMODAL

	1994 Capacity	1994 Reported		2000 Med. Forecast		2010 Med. Forecast		2020 Med. Forecast	
BEA	Units/Year	Units	Utilization	Units	Utilization	Units	Utilization	Units	Utilization
New Orleans	477,040	313,992	66%	385,976	81%	461,358	97%	551,463	116%
Shreveport	64,815	12,048	19%	14,810	23%	17,703	27%	21,160	33%
Total	541,855	326,040	60%	400,786	74%	479,061	88%	572,623	106%

in the same region are substitutable. That is, in reality there are usually institutional arrangements that prevent the free shifting of cargo between terminals. For example, most grain terminals are operated by grain trading companies and usually only handle the cargos of their parent company; most container terminals are operated by shipping lines and usually handle only their specific cargos. Nevertheless, there is an option for long-term re-allocation of cargos amongst terminals. Therefore, the comparison of the combined capacity with demand provides an overall perspective on the ability to accommodate future growth. The following review of the demand/capacity relationships is organized by terminal types, according to the above list.

V.G.2 COAL TERMINALS

The 1990 utilization of Louisiana's coal terminal capacity is relatively low, at 43%, see Table V.10 and Figure V.10. The annual rate of coal terminal throughput growth reflected a composite of export coal and domestic transhipment (primarily to Florida). The composite rate of coal transhipment growth for Louisiana was 2.9% and 1.8% for the periods 1991-2000 and 2001-2020, respectively. Assuming an annual increase in demand as specified, and no change in capacity, full utilization (100%) will not be reached within the planning time horizons. About 1/3 of this capacity, however, is provided by floating terminals and cranes using a direct, barge-to-vessel transfer. The floating installations are limited in terms of blending capability which, in turn, limits their overall usefulness. Therefore, it seems that some capacity expansion of the fixed terminals should be contemplated within the next 10 - 15 years. In addition, there will be a need to preserve currently available capacity by rehabilitating and replacing major components of existing terminals. The situation may change if the export-oriented terminals are required to handle large volumes of imported coal (see Chapter IX on strategic factors). In this case, there will be a need to substantially expand existing facilities, including construction of ship unloaders and, in some cases, additional berthage.

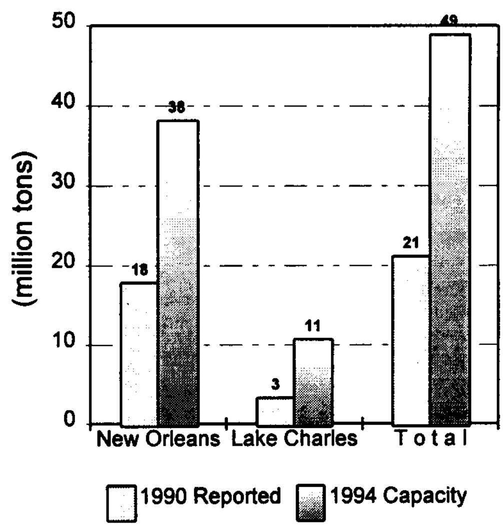

Figure V.10
Coal Terminal Utilization

In summary, in the absence of large imports, Louisiana terminals can cope well with present and mid-term demand, without additional facilities. Also, by introducing more floating terminals and floating cranes, these terminals can successfully cope with short term surges in demand. Some additional capacity to fixed terminals may be needed in the long term.

V.G.3 GRAIN TERMINALS

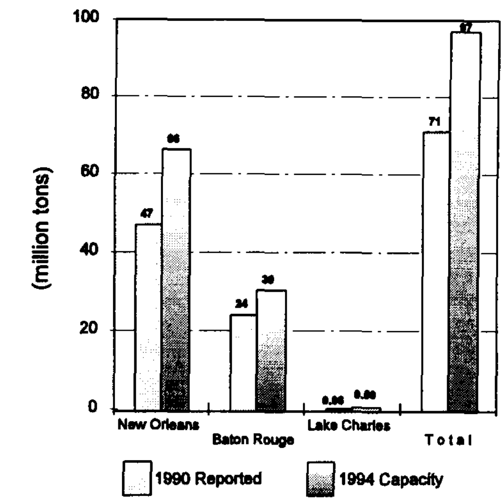

Figure V.11
Grain Terminal Utilization

The current grain terminal utilization is relatively high at 73%, see Table V.10 and Figure V.11. Full utilization is expected to be reached around the year 2002 if current capacity remains unchanged. It appears, therefore, that the terminals are at a point where planning for additional capacity expansion is due, even though the forecasted future annual grain growth rate is quite low at about 1.8% for 1991-2000 and 1.5% for the period 2001-2020. Based on interviews with terminal operators, it seems that the added capacity is *not* expected to be supplied by developing *new* major terminals on the River. Instead, the required capacity will be provided mainly by modernization of existing older terminals. This will include the replacement of major terminal components such as barge unloaders and ship loaders and perhaps additional storage to accommodate the growing needs to segregate and blend.

Most River terminals have sufficient land reserves for supporting any necessary expansion. Also, since all the major terminals are part of larger, well-financed grain-trading conglomerates, it seems that no direct support of the State in related investments is necessary. Finally, it should be mentioned that since land transport is not primarily used to supply these terminals, mitigation of land access constraints is unnecessary.

V.G.4 GENERAL CARGO TERMINALS

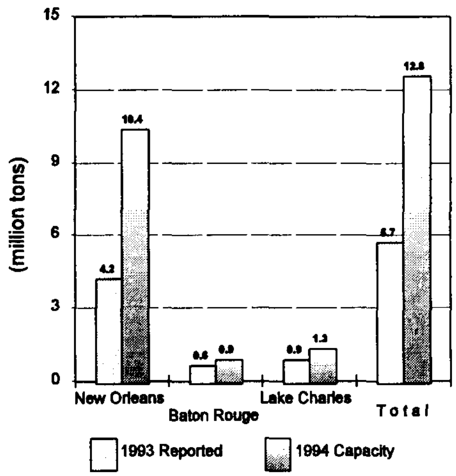

Figure V.12
General Cargo Terminal Utilization

The overall utilization of Louisiana's general cargo terminals is low, at 45% when current (1994) capacity is compared to 1993 throughput (refer to Table V.10 and Figure V.12). Demand is expected to grow at an average annual rate of about 2.5%. Despite this relatively high rate of projected growth, demand is not expected to reach capacity until the end of the time horizon of this study, in year 2020.

Terminal utilization is especially low in New Orleans, at 40% for both floating and shore terminals (58% for shore terminals only). New Orleans has recently completed its first stage expansion project that added, among others, the

Nashville B terminal with three berths and 140,000 sq ft of shed space. Therefore, even with the recent (1994) surge in general cargo, New Orleans utilization of its general cargo (shore) terminals is estimated at about 60 - 70%. It should be noted that the recent gains in New Orleans throughput were mainly in semifinished steel (slabs) that are mostly transferred directly to barges either overboard while the vessel is at berth or in a mid-stream installation. In both cases, the operations do not use shore terminals.

Future utilization may rise following the Port's plans to close down older inefficient terminals. But, in parallel, New Orleans is pursuing further expansion of the uptown River complex that may add considerable capacity there (at Milan and Nashville C).

The situation in the two other deep draft ports, Baton Rouge and Lake Charles, is not much different: both have utilization rates in the 65 - 75% range (1994). Baton Rouge has recently experienced a slight decline in its general cargo, following the overall decline in woodpulp exports due to a surge in domestic consumption. If and when needed, Baton Rouge is planning to add another transit shed, behind the connecting dock, which may boost capacity by about 15%.

Lake Charles has experienced recent growth in demand for general cargos. While currently most of Lake Charles's volume consists of bagged cargo, future growth in demand is expected to include a larger share of forest products. The port is presently completing a new shed for this cargo that, together with existing shed 15, will be able to accommodate future growth until the end of this decade. As to the longer term future, the trend in the main cargo, bagged goods, is unclear, making difficult prediction of future facility needs.

V.G.5 CONTAINERS

The overall utilization of Louisiana's container terminals is quite high at about 68% (refer to Table V.10 and Figure V.13). All terminals, except for one Ro/Ro terminal in Lake Charles, are concentrated in New Orleans. Amongst New Orleans terminals, Berths 1 & 4 are at especially high rates of utilization, and Berth 1 is in need of expansion. The utilization of berths 5 & 6 is much lower. Perhaps some terminal re-arrangement should be considered to better balance utilization. The terminal at Lake Charles is currently operated at close to full utilization.

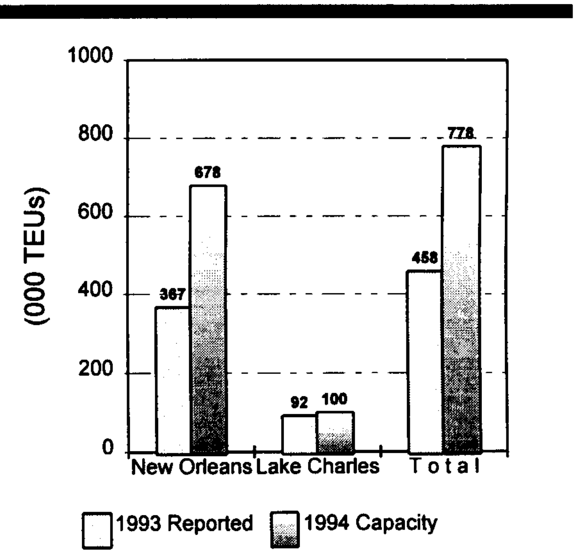

Figure V.13
Container Terminal Utilization

There are presently two relatively-minor expansion projects under discussion: Berth 1 at New Orleans and Lake Charles both involve yard expansion. These expansion projects will accommodate short-range growth. To accommodate long-range growth, forecasted in the range of 2.5 - 2.8%, New Orleans especially will need further expansion, probably around the year 2000. The development of a multi-purpose terminal in the uptown River complex may only delay this time frame by a year or two.

The most critical decision is *where* this expansion should take place. Logistical considerations, mainly the option to share in cranes, gates, and road access, favor expansion in conjunction with the existing terminals at France Road. However, the access channel to France Road is too shallow even for present containerships, and will be even more limiting in the future following the growth in containership size and draft (see more discussion in Chapter IX.B). This suggests that a favorable future site will be on the River.

In summary, while no short-term capacity problems are expected (assuming implementation of pending expansion plans), substantial, long-range expansion may be needed, including the construction of an additional terminal. Preliminary planning efforts toward locating an appropriate site should be initiated in the near future.

V.G.6 INTERMODAL YARDS

The overall utilization of Louisiana's intermodal yards is low at about 60% refer to Table V.10 and Figure V.14). The highest utilization is experienced at the largest yard, CSX at Gentilly. All other yards are at a very low level of utilization, especially those on the west side of the River. CSX has recently announced plans to expand the yard to about 50% of present capacity. With demand growing at about 1.90% per year, the expanded CSX yard, along with the other New Orleans yards, will have sufficient capacity for the next 10 - 15 years.

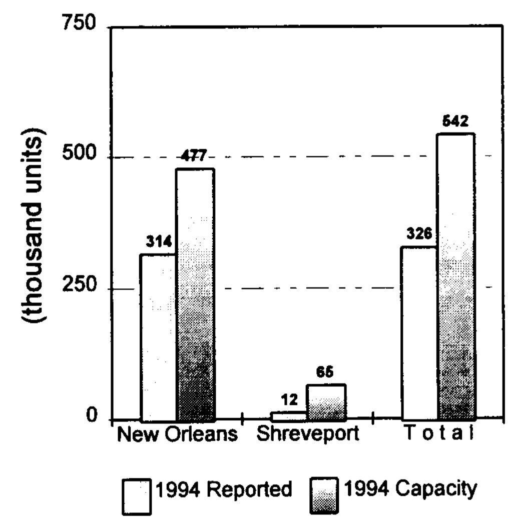

Figure V.14
Intermodal Yard Utilization

There is, however, a possibility of future consolidation of the intermodal activity, which may involve the termination of some of the 6 yards in New Orleans. In this case, the consolidated yard will be in need of added capacity as described in more detail on the strategic outlook for intermodal activity (see Chapter IX.C).

Figure V.16 summarizes the capacity utilization for the different terminal types through the time horizons considered for this study.

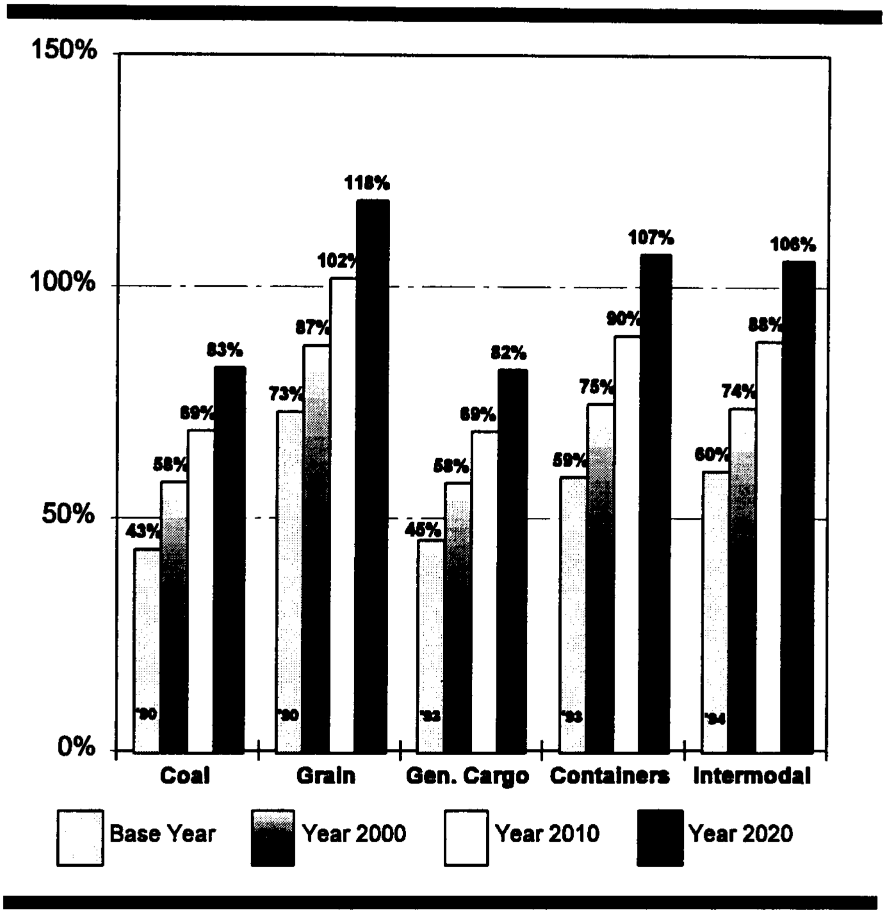

Figure V.15
Statewide Capacity Utilization

VI. ACCESS TO MARINE AND RAIL INTERMODAL TERMINALS

The objective of this chapter is to identify locational attributes which affect the capacity and performance of different intermodal transfer facilities but may not be explicitly identified and quantified in mathematical formulae or specifically incorporated in the capacity analyses (refer to chapter V). These near site or off site locational attributes have implications for the analyses of productivity and cost (chapter VIII) as well as Louisiana's competitive position (chapter IX) and the direction (priority) of investment needs and funding sources (chapter VII).

VI.A INVENTORY OF LOCAL ROAD AND RAILROAD CONNECTIONS

An inventory of the characteristics of local access roads and rail spurs, including highway and trunkline connections, for Louisiana marine and rail public intermodal terminals was performed. A questionnaire was distributed to every public port and rail-highway terminal in the state. The survey sought to identify the number and type, including physical characteristics, of road and railway access linkages directly to each facility and the corresponding attributes for major highway and railway arteries adjacent to each facility. Local road and railway connections were developed for ten public ports (Baton Rouge, Shreveport, New Iberia, Port Fourchon, Lake Charles, Krotz Springs, Morgan City, New Orleans, St. Bernard and Port Manchac) and eight rail-highway intermodal terminals (six at or near New Orleans and two at or near Shreveport).

The data collection was supplemented where appropriate by field surveys to document the institutional and operating characteristics of intermodal access to public marine and rail-highway facilities. Access was defined relative to road characteristics which could be used to infer capacity and by the number and characteristics of rail service providers at particular locations. Case studies of land access for marine and rail highway intermodal terminals at deepwater ports of Baton Rouge, Lake Charles and New Orleans and Shreveport were performed in conjunction with this analysis. The results of the land access case studies are reported in Appendix 6.

VI.A.1 PUBLIC PORT LOCAL ROAD CONNECTIONS

Local road connections to Louisiana public ports are specified in Table VI.1. The data indicate the nearest public use road link to the each port property or facility with distinct access characteristics relative to ownership (federal, state or other designation) and total number of lanes in both directions. The proximity of each location to east-west and north-south Interstate highways is specified as well as distances for other federal highways not designated as part of the Interstate system.

Table VI.2 specifies the local road access connections between each location and the closest Interstate Highway. Local road connections are described in terms of the distances travelled and number of lanes in both directions.

Table VI.1
Louisiana Public Port Highway Connections

Port	Direct Connections	Lanes	Miles to East-West Inter-states	Miles to North-South Inter-states	Miles to Other Federal Connec-tions	Non-federal Hwy. Access
Greater Baton Rouge	I-10 LA-1	4 4	I-10: 1 I-12: 20	I-49: 75 I-55: 50 I-59: 50	US190: 4	NA
Caddo-Bossier	LA-1	4	I-20: 21	I-49: 14		LA-1
Iberia	LA-4611	2			US90: 1.5	NA
Greater Lafourche	LA-3090	2	I-10: 70	I-55: 75	US90: 60	LA3090
Lake Charles						
City Docks	Marine St.	2	I-210: 2	I-49: 75		Lake St.
South Side	LA-384	2	I-210: 8	I-49: 75		LA384
Bulk Terminal	Bayou D'Inde Rd.	2	I-10: 2.7	I-49: 75		LA108
Krotz Springs	LA-105	2	I-10: 40	I-49: 20	US190: 0.5	LA105
Morgan City	Young's Road	2	I-10: 90	I-49: 90	US90:2	LA70
New Orleans						
River Terminal Complex	Tchoupitoulas	2	I-10: 3		US90: 2 US61: 4 US11:24	Louisiana Ave.
First St., St. Andrew, Celeste, Market	Tchoupitoulas	2	I-10: 2.5		US90: 2 US61: 3.5 US11:24	Jackson Ave.
Downtown Wharves	N. Peters & Chartres Streets	2	I-10: 2		US90: 3 US61: 3 US11: 20	LA3021
Alabo, Andry	Chartres Street	2	I-10: 4.5		US90: 5.5 US61: 5.5 US11: 23	Caffin Ave.
France Road	Almonaster Ave.	4	I-10: 0.25		US90: 0.25 US61: 5 US11: 23	
Jourdan Road	US-90	6	I-10: 2		US90: 0.25 US61: 5 US11: 16	
St. Bernard	LA-46	4	I-10: 10	I-59: 30	US90: 7.7 US11: 12.7	LA46
Port Manchac	US-51	2	I-12: 8 I-10: 12	I-55: 1		

Source: NPWI Louisiana Public Port Intermodal Terminal Facility: Highway and Railway Accessibility Inventory.

Table VI.2
Louisiana Public Port Regional and Local Highway Connections

PORT	HIGHWAY NETWORK TO / FROM	LOCAL ACCESS TRUCK ROUTE
Greater Baton Rouge	I-10 LA-1	app. 1 mile via port access road, 2 lanes;
Caddo-Bossier	I-20W I-20E I-49N I-49S	US71S, Loop 3032, LA1S, app. 14 miles, 4 lanes; Loop 3132 to LA1S app. 17 miles, 4 lanes; LA175 to LA1N, app. 15 miles, 4 lanes; Loop 3132 to LA1S, app. 9 miles, 4 lanes;
Iberia	US90	LA4611 (Lewis Rd.) app. 1.5 miles, 2 lanes;
Greater Lafourche	US90	LA1S to LA3090, app. 60 miles, 2 lanes;
Lake Charles City Docks South Side Bulk Terminal	 I-210 I-210 I-10	 Lake St. to Sallier St., app. 2½ miles, 2 lanes, city streets; Nelson Road to LA384S, app. 8 miles, 2 lanes; LA108S to Bayou D'inde Rd., app. 3 miles, 2 lanes;
Krotz Springs	I-49	US190 (app. 20 miles) to LA105S, app. 0.5 mile, 2 lanes;
Morgan City	US90	Myrtle St. to Young's Road, app. 2 miles, 2 lanes, city streets;
New Orleans River Terminal Complex First St., St. Andrew, Celeste, Market Downtown Wharves Alabo, Andry France Road Jourdan Road	 I-10 I-10 I-10E I-10W I-10E I-10W I-10 I-10	 US90W to Louisiana Ave. to Tchoupitoulas St., app. 2 miles, 4 lanes (excluding Tchoupitoulas); US90W to Jackson Ave. to Tchoupitoulas St., app. 2 miles, 4 lanes (excluding Tchoupitoulas); N. Clariborne (LA39) to Elysian Fields (LA3021) to N. Peters/Chartres St., app. 2 miles, 2 lanes; Elysian Fields (LA3021) to N. Peters/Chartres St., app. 2 miles,2 lanes; N. Clariborne (LA39) to Caffin Ave. to Chartres St., app. 4.5 miles, 2 2 lanes; Elysian Fields (LA3021) to N. Claribome (LA39) to Caffin Ave. to Chartres St., app. 4.5 miles, 2 lanes; Louisa/Almonster, app. 0.25 miles, 4 lanes; US90W to Jourdan Rd., app. 2 miles, 6 lanes (US90);
St. Bernard	I-10	LA47 (I-510) to LA46, app. 10 miles, 4 lanes;
Port Manchac	I-55	US51, app. 0.5 miles, 2 lanes;

Table VI.3 indicates the type and characteristics of direct local road access to public port facilities in Louisiana along with an NPWI apportionment of total port facility cargo tons between highway and railway connections for existing facilities at Baton Rouge, Lake Charles, and New Orleans and forthcoming facilities at Shreveport(Caddo-Bossier). The cargo volumes reflect port statistics for transshipment volumes. The data do not include other local cargo that is not transshipped at the port, for example, local industrial inputs consumed in production that are not reflected in output tonnages.

Total truck tonnage through each facility has been converted to a number of loaded vehicles based on estimated modal split. For example, the main facilities at Greater Baton Rouge Port Authority adjacent to North Canal Road are estimated to generate approximately 50,000 annual loaded truck trips per year. All of these vehicles must access the port industrial area via North Canal Road, a two lane access link. The data in Table VI.3 suggest that a large number of truck movements have direct access to major public port facilities only by two lane city streets. For example, all of the truck traffic at the three facilities at Lake Charles utilizes two lane access roads.

The data in Table VI.3 also suggest the extent of port dependency on highway and rail for direct connections. Lake Charles is the most significant user of rail service with approximately 8,000 and 27,000 loaded rail cars handled annually at the City Docks break bulk facilities and Bulk Terminal, respectively. Baton Rouge and New Orleans via the River Terminal Complex are estimated to each generate approximately 5,000 loaded rail cars annually. The data for France Road container facilities do not indicate the extent of rail-highway transfer that is performed at intermodal terminals adjacent to the Port of New Orleans and handled by truck between these locations and France Road as well as River Terminal Complex. Interviews with rail-highway terminal personnel suggest that approximately 70,000 loaded intermodal units are handled annually by rail-highway transfer facilities for transshipment through Port of New Orleans container terminals at France Road. Pending development of the River Terminal Complex, rail intermodal volume for the port is is almost exclusively oriented to the France and Jourdan Road container berths.

VI.A.2 RAIL-HIGHWAY ROAD CONNECTIONS

Table VI.4 specifies the street location and network roadway connections for the eight active rail-highway intermodal terminals in Louisiana. Inactive facilities at Lake Charles, Alexandria, and Baton Rouge are excluded from the analysis. These three locations have been closed. Reopening is doubtful as there does not appear to be sufficient threshold volume to sustain profitable operations consistent with the high fixed cost structure for rail intermodal terminal operations.

The data indicates the estimated annual number of loaded vehicles that are transshipped through each facility as well as the approximate dispersion of loaded units among major connecting roadways adjacent to each facility. For example, the Illinois Central (IC) facility is estimated to

Table VI.3
Louisiana Public Port Facility Intermodal Land Connection Characteristics

Port	Local Road Connection	1990 Tons Cargo (000,000)	Mode Split (truck)	Annual Loaded Trucks (000)	Annual Loaded Railcars (000)	Notes (1)
Greater Baton Rouge	2 lane port access	1.5	70%	50	5	(2)
Caddo-Bossier	2 lane port access	0.4	80%	16	1	(3)
Iberia	2 lane port access					(4)
Greater Lafourche	2 lane state hwy.				NA	(5)
Lake Charles						
City Docks	2 lane city street	1.0	50%	25	8	(6)
South Side	2 lane state access	0.5	100%	40	–	(7)
Bulk Terminal	2 lane port access	2.7	20%	27	27	(8)
Krotz Springs					NA	(9)
Morgan City	2 lane city street				NA	(10)
New Orleans						
River Terminal Complex	4 lanes city street	3.0	90%	150	5	(11)
First,St.Andrew,Celeste,Mrkt	2 lane city street	0.6	90%	25	1	(12)
Downtown	2 lane city street	0.6	90%	25	1	(13)
Alabo, Andry	2 lane city street	–	–	–	–	(14)
France Road	4 lanes city street	2.5	95%	200	2	(15)
Jourdan Road	6 lanes fed. hwy.	0.3	85%	15	0.6	(16)
St. Bernard	4 lanes state hwy.	0.8	90%	18	0.6	(17)
Port Manchac	2 lane fed. hwy.					(18)

Notes:

(1) Local Road Connections supplied by NPWI Louisiana Public Port Intermodal Terminal Facility: Highway and Railway Accessibility Inventory; Mode Split indicates percent of cargo tons handled by truck, residual (1 - mode split percentage) handled by rail; Annual Loaded Trucks based on estimated tonnage by location; Annual Loaded Railcars based on estimated tonnage by location.

(2) Includes General Cargo docks, Molasses Terminal and Cargill Elevator, excluding auto tonnage.

(3) Based on initial cargo projections of approximately 400,000 tons in 1995/1996. Cargo projections and mode split are samples only and are subject to change based on navigation after 1994 and subsequent port development.

(4) Port tonnage receipts not available.

(5) Port tonnage receipts not available.

(6) Estimated from port statistics on truck and rail car loaded movements.

(7) Estimated from port tonnage statistics.

(8) Estimated from port tonnage statistics.

(9), (10) Port tonnage receipts by mode not available.

(11),(12),(13) New Orleans Public Belt Railroad (NOPB) carload statistics. Port tonnage for Mississippi River Terminals prorated among facilities in proportion to NOPB carloads.

(14) Port tonnage receipts not available.

(15), (16) New Orleans Public Belt Railroad (NOPB) carload statistics and Port of New Orleans.

(17) One-half of annual tonnage represents mid-stream transfer to/from barge.

(18) Port tonnage receipts not available.

Table VI.4
Railroad/Highway Intermodal Traffic

Railroad City	Street Access Location	Annual Loaded Units	Network Roadway Connections	Annual Connection Volume	Connecting Roadway Class
IC	Napoleon Ave.	50,000	Louisiana Ave.	47,500	4 lane local
NOLA			Tchoupitoulas St.	2,500	2 lane local
	(subtotal)		I-10	40,000	6 lane interstate
NS	Florida Ave.	30,000	Florida Ave.	30,000	2 lane local
NOLA	(subtotal)		I-10	27,000	4 lane interstate
KCS	LaBarre Rd.	40,000	US61	40,000	6 lane highway
NOLA	(subtotal)		I-10	10,000	6 lane interstate
			Causeway	30,000	4 lane toll bridge
CSX	Almonaster Ave.	100,000	Almonaster Ave.	100,000	4 lane local
NOLA	(subtotal)		I-10	30,000	6 lane interstate
SP	Avondale Garden Rd.	70,000	Avondale Gar. Rd	70,000	2 lane local
Avondale	(subtotal)		US90	70,000	4 lane highway
UP	Bridge City Ave. (LA18)	25,000	LA18	25,000	2 lane highway
Avondale	(subtotal)		US90	25,000	4 lane highway
SP	Intermodal Drive	7,000	US171	7,000	4 lane highway
Shreveport	(subtotal)		US171	3,500	4 lane highway
			LA3132	1,000	4 lane highway
			LA526	2,500	4 lane highway
KCS	Shreveport Blanchard Rd.	5,000	LA173	5,000	2 lane highway
Shreveport			I-220	4,500	4 lane interstate

Source: NPWI Inventory of Louisiana Rail Highway Intermodal Terminals.

handle approximately 50,000 loaded trailer or container units per year at the Napoleon Avenue location in New Orleans. It is estimated that 47,500 of the total loaded units utilize Louisiana Avenue to access this facility. The Louisiana Avenue access traffic generated by this facility predominantly uses Tchoupitoulas Street (2,500 loaded units) and Interstate 10 (40,000 loaded units). The data for each facility indicate the relative importance of major roadway connections. For example, I-10 handles about 80 percent of the IC traffic (40,000/50,000 = 0.80) compared to only about 30 percent for CSX (30,000/100,000 = 0.30). Rail-highway facilities serving the IC and NS are particularly dependent on I-10 for access. Conversely, the KCS and CSX are not heavily dependent on I-10.

VI.B LOCAL ACCESS ROAD CAPACITY

An important component of intermodal terminals is the capacity and utilization characteristics of the connecting links between the facility and the main infrastructure of the linehaul modes of transportation. For most rail and marine intermodal facilities the primary access issues are related to highway capacity. Unless rail or marine access links to intermodal transshipment facilities are shared or congested there is frequently little issue with these connections. When rail or water access issues arise, they usually involve second or third party control related to facility performance and proprietary commercial relationships. A prime example is the lack of use of potential direct intermodal rail access to France Road marine berths via the New Orleans Public Belt Railroad. Potential shared access to joint rail highway intermodal facilities will be considered in chapter IX. This chapter will focus on the existing local access links and capacity issues which are primarily related to highway routes and street operations.

The major access links for public port and rail-highway intermodal facilities as defined in tables VI.2 and VI.4 were reviewed by Louisiana Department of Transportation and Development (DOTD) to specify average daily traffic (ADT) counts to be used with generalized roadway capacities. The generalized roadway capacities furnished by DOTD are contained in Table VI.5. The "24 hour capacity" specified in ADT represents DOTD adjustments for off-peak demands for roadways. Consequently, the "24 hour capacity" ADT is not maximum throughput for 24 hours but practical throughput reflecting peak and off-peak roadway utilization characteristics.

The methodology used to assess roadway capacity utilization for connecting links to marine and rail intermodal facilities was to compare ADT counts with estimates of generalized roadway capacities. The data reflect aggregate capacity and utilization measures of supply and demand for particular access links. The analysis should not be used for investment decisions. The data are primarily useful as indicators of existing facility accessibility based on roadway congestion relative to capacity utilization of connecting links.

Further analyses beyond the scope of this study would necessitate field observations of vehicle movements and traffic flow characteristics relative to access to specific facilities via particular routes and origin destination nodes. Moreover, the ADT statistics for non-marine or rail-highway facility users would need to be projected to arrive at estimates of future access road capacity utilization.

Table VI.5
Generalized Roadway Capacities

Facility Type	24 Hour Capacity
Eight-Lane Freeway (8LF)	136,000
Six-Lane Freeway (6LF)	102,000
Four-Lane Freeway (4LF)	68,000
Urban Six-Lane Divided Roadway (U6LD)	40,000
Urban Six-Lane Undivided Roadway (U6LU)	36,000
Urban Four-Lane Divided Roadway (U4LD)	27,000
Urban Four-Lane Undivided Roadway (U6LU)	23,000
Urban Two-Lane Roadway (with left-turn lanes at major intersections) (U2LL)	15,000
Urban Two-Lane Roadway (without left-turn lanes at major intersections) (U2L)	12,000
Rural Four-Lane Divided Roadway (R4LD)	32,000
Rural Two-Lane Roadway (R2L)	12,000

Source: Louisiana Department of Transportation and Development (LADOTD)

Notes:
Volume to capacity ratios (V/C) over 0.70 in rural and small urban areas indicate congestion during peak periods.

Volume to capacity ratios over 0.85 in large urban areas indicate congestion during peak periods.

In general terms, each truck in the traffic stream is equivalent to 2 passenger cars.

VI.B.1 PUBLIC PORT ROADWAY ACCESS

Table VI.6 presents public port marine terminal roadway access relative to the estimated number of truck movements generated by each location and the 1993 ADT for the nearest access road or roads that link the facility with the National Highway System (NHS). The estimated annual loaded truck counts from Table VI.3 were doubled to reflect a worst case assumption that loaded truck movements generated an equal number of empty truck movements. The annual truck movements of loaded and empty vehicles were divided by 250 working days to arrive at an estimate of average total daily truck moves (load and empty). The daily truck movements were doubled to convert each truck in the traffic stream to an equivalent of two passenger vehicles (see Table VI.5).

The estimated daily vehicle equivalent truck traffic for each marine location was compared to 1993 ADT supplied by DOTD. The "port share" of access road ADT was computed by dividing

Table VI.6
Louisiana Public Port Access Roadway Characteristics

Port	Local Connecting Road(s)	Annual Loaded Trucks (000)	Annual Truck Moves (000)	Daily Truck Moves	Daily Vehicle Equivalents	1993 ADT (LOOTD)	Port Share (%)	Notes
Greater Baton Rouge	North Canal Road	50	100	400	800	4,269	0.19	(1)
Caddo-Bossier	LA1 South of LA3132	-	-	-	-	3,342	-	(2)
Iberia	Lewis Road	-	-	-	-	4,661	-	(3)
Greater Lafourche	LA3090	-	-	-	-	2,834	-	(4)
	LA1	-	-	-	-	3,181	-	
Lake Charles								
City Docks	Sallier Street	25	50	200	400	3,405	0.12	(5)
	Lake Street	25	50	200	400	18,250	0.02	
South Shore	LA384	40	80	320	640	9,596	0.07	(6)
	NelsonRoad	40	80	320	640	16,942	0.04	
Bulk Terminal	Bayou D'Inde Road	27	54	216	432	NA	-	
	LA108	27	54	216	432	10,660	0.04	
Krotz Springs	LA105	-	-	-	-	1,905	-	(7)
	US190	-	-	-	-	10,264	-	
Morgan City	Youngs Road	-	-	-	-	3,204	-	(8)
	Myrtle Street	-	-	-	-	4,840	-	
New Orleans								
River Terminal	Tchoupitoulas Street	75	150	600	1200	10,815	0.11	(9)
Complex	Louisiana Avenue	75	150	600	1200	23,375	0.05	
First St., St.	Tchoupitoulas Street	13	26	100	200	10,815	0.02	(10)
Andrew, Celeste, Market	Jackson Avenue	12	24	100	200	9,698	0.02	
Downtown	N. Peters & Chartres					NA	-	(11)
Wharves	Streets					NA	-	
	Elysian Fields	25	50	200	400	43,172	0.01	
Alabo, Andry	Chartres Street	-	-	-	-	-	-	(12)
	Caffin Avenue	-	-	-	-	1,487	-	
	LA39	-	-	-	-	38,104	-	
France Road	Almonaster Avenue	200	400	1600	3200	10,323	0.31	
Jourdan Road	Jourdan Road	15	30	120	240	4,299	0.06	(13)
St. Bernard	LA46	18	36	144	288	25,208	0.01	(14)
	LA47	18	36	144	288	29,935	0.01	
Port Manchac	US51	-	-	-	-			(15)
	I-55	-	-	-	-	15,167		

Source: NPWI Louisiana Public Port Intermodal Terminal Facility: Highway and Railway Accessibility Inventory and Louisiana Department of Transportation and Development (LADOTD)

Table VI.6 (continued)

Notes:

(1) Port traffic excludes non-transshipment cargoes which understates port tenant use of North Canal Road.
(2) Port not operating in 1994.
(3) No public port tonnage statistics available.
(4) No public port tonnage statistics available.
(5) All traffic assumed to use Lake and Sallier Streets.
(6) Ignores peak nature of port intermodal (RoRo) traffic coinciding with approximately weekly sailings at this facility.
(7) No public port tonnage statistics available.
(8) Port not operating.
(9) Assumes fifty percent allocation of vehicles serving River Terminal Complex between Tchoupitoulas Street and Louisiana Avenue.
(10) Assumes fifty percent allocation of vehicles between Tchoupitoulas Street and Jackson Avenue.
(11) Traffic count data not available for North Peters & Chartres Streets. All downtown port related truck vehicles assumed to use Elysian Fields (LA 3021).
(12) Traffic count data not available for Chartres Street. No public port tonnage statistics available.
(13) All France Road traffic assumed to be via Almonaster Avenue.
(14) All St. Bernard public port traffic assumed to be via LA47 and LA46.
(15) Distance traveled on US 51 is approximately one-half mile.

the estimated daily truck vehicle equivalents by ADT for the nearest location on the access link. For most access roads, the port shares of the total traffic in ADT equivalents were very low, usually less than five percent. The only accesses that have port share of vehicle ADT exceeding five percent are: (1) Greater Baton Rouge - North Canal Road; (2) Lake Charles City Docks - Sallier Street; (3) New Orleans River Terminal Complex - Tchoupitoulas Street; and (4) Port of New Orleans - France Road.

Table VI.7 presents public port marine terminal access road capacity utilization based on ADT and generalized 24 hour capacity by road type from Table VI.5. The data suggest that most of the access roads are currently operating within acceptable ranges of utilization relative to DOTD criteria in Table VI.5 Marine terminals with congested access roads would be one indication that facility performance could be impaired under existing conditions. Several locations, primarily in urban corridors, seem to be affected by road congestion that could inhibit access in a timely and cost effective manner: (1) Lake Charles City Docks via Lake Street; (2) Lake Charles South Shore via LA-384 and Nelson Road; (3) New Orleans River Terminal Complex via Tchoupitoulas Street and Louisiana Avenue; (4) New Orleans First Street, Celeste and Market wharves via Tchoupitoulas Street; (5) New Orleans Downtown wharves via Elysian Fields Avenue; (6) New Orleans Alabo and Andry wharves via LA-39 (Clariborne); and (7) Port of St. Bernard via LA-46 and LA-47.

Forecasts of ADT for major access links were not available. Generalized roadway service levels in Table VI.5 suggest that until capacity utilization approaches 0.70 in rural or small urban areas

Table VI.7
Louisiana Public Port Access Roadway Capacity Utilization

Port	Local Connecting Road(s)	1993 ADT (LADOTD)	Road Type	24-Hour Capacity (LADOTD)	Utilization (%)	Notes
Greater Baton Rouge	North Canal Road	4,269	U2L	12,000	36	
Caddo-Bossier	LA1 South of LA3132	3,342	U4LD	27,000	12	(1)
Iberia	Lewis Road	4,661	U2L	12,000	39	
Greater Lafourche	LA3090	2,834	R2L	12,000	24	
	LA1	5,091	R2L	12,000	42	(2)
Lake Charles						
City Docks	Sallier Street	3,405	U2L	12,000	28	
	Lake Street	18,250	U2L	12,000	152	(3)
South Shore	LA384	9,596	U2L	12,000	80	
	NelsonRoad	16,942	U2L	12,000	141	(4)
Bulk Terminal	LA108	10,660	U4LU	23,000	46	
Krotz Springs	LA105	1,905	U2L	12,000	16	
	US190	10,264	U4LD	27,000	38	
Morgan City	Youngs Road	3,204	U2L	12,000	27	(5)
	Myrtle Street	4,840	U2L	12,000	40	(5)
New Orleans						
River Terminal	Tchoupitoulas St.	10,815	U2L	12,000	90	(6)
Complex	Louisiana Avenue	23,375	U4L	23,000	102	
First, St. Andrew,	Tchoupitoulas St.	10,815	U2L	12,000	90	
Celeste, Market	Jackson Avenue	9,698	U4L	23,000	42	
Downtown	Elysian Fields	43,172	U4LD	27,000	160	(7)
Alabo, Andry	Caffin Avenue	1,487	U2L	12,000	12	
	LA39	38,104	U4LD	27,000	141	(8)
France Road	Almonaster Ave.	10,323	U4LD	27,000	38	(9)
Jourdan Road	Jourdan Road	4,299	U2L	12,000	36	
St. Bernard	LA46	25,208	U4LD	27,000	93	
	LA47	29,935	U4LD	27,000	111	
Port Manchac	I-55	15,167	4LF	68,0000	22	(10)

Source: NPWI Louisiana Public Port Intermodal Terminal Facility: Highway and Railway Accessibility Inventory and Louisiana Department of Transportation and Development (LADOTD)

Notes:

(1) Reflects ADT for LA1 south of LA 3132. ADT for LA1 north of 3132 are 25,064.
(2) Reflects ADT for LA1 north of Golden Meadow.
(3) Other routes to City Docks via Sallier Street exist that are probably less congested than that suggested by ADT for Lake Street.
(4) Traffic counts on Nelson Road vary by location. Statistics used here reflect ADT south of I-210. Closer to LA 384 Nelson Road ADT decline to 9,386, resulting in 78 percent capacity utilization.
(5) Classification probably overstates effective capacity for portions of city streets.
(6) Does not reflect Tchoupitoulas Street renovation and River Terminal Complex corridor project.
(7) Traffic counts on Elysian Fields vary widely by location. Statistics used here reflect ADT south of LA 39. North of LA 39 Elysian Fields ADT is reported to be 28,449.
(8) LA 39 ADT reflects segment near Inner Harbor Navigation Canal. ADT for LA 39 east and west of Elysian Fields are 33,113 and 48, 615, respectively.
(9) Traffic counts for Almonaster Ave. represent section between Louisa Street and Jourdan Road.
(10) No ADT for connection to port via one-half mile on US 51.

and 0.85 in large urban areas that congestion is not a problem. If ADT grows at rates of two percent a year there would be very little impact on existing uncongested links in Table VI.7. However, the congested links would become markedly worsened with respect to accessibility relative to indications of growing congestion, evidenced by volume capacity ratios exceeding 0.70 and 0.85 for small rural or uban areas and large urban areas, respectively. While the data in Table VI.7 suggest that most of the uncongested links will require a considerable number of years to become a problem, (unless particular local land development occurs which materially alters traffic patterns), planning and implementing a roadway capacity improvement can itself take many years, so that use should be monitored closely. The most serious problems for the ports are the growth of non-port traffic, particularly on access links that are already congested and will become worse over the near term unless changes in access are made.

VI.B.2 RAIL HIGHWAY FACILITY ROADWAY ACCESS

Table VI.8 indicates the estimated number of daily truck movements for rail highway intermodal transfer facilities in Louisiana. The estimated annual number of loaded vehicle movements have been doubled to reflect a worst case load-empty cycle to arrive at a maximum number of average daily truck flows. Weekday peaks in the traffic have been ignored. The average daily truck movements have been doubled to adjust for equivalent passenger vehicles (refer to Table VI.5). The percentage of connecting roadway traffic contributed by each facility is based on dividing "daily vehicle equivalents" by 1993 ADT as furnished by DOTD. The data indicate that most terminals except for SP and CSX contribute a minuscule amount of total ADT on connecting roadway links. CSX rail-highway traffic is estimated to contribute 15 percent of total ADT on Almonaster Avenue. SP rail-highway traffic is estimated to contribute 14 percent of total ADT on Avondale Garden Road.

Table VI.9 indicates that most of the connecting links to the urban locations of rail-highway facilities in New Orleans are heavily congested relative to ADT and generalized capacity of particular links in the network. The CSX facility has among the lowest congestion (ADT/generalized capacity) for access to France Road via Almonaster Avenue. Traffic to and from the IC is heavily dependent on I-10 as noted previously (tables VI.4 and VI.8). Local street access to the IC facility will be augmented by the Tchoupitoulas Street renovation and corridor project (refer to section VI.d.5.a). However, congestion on I-10 will continue to be a primary factor for most of the IC facility traffic that uses this corridor. Probably the worst facility from the standpoint of accessibility and congestion is the KCS. Table VI.8 indicates that all of the KCS traffic uses US 61 and then divides one-quarter and three-quarters between I-10 and Causeway Blvd., respectively, both of which are heavily congested at these locations.

Rail-highway locations in New Orleans will be particularly susceptible to growing arterial congestion unless new capacity is provided or changes in railroad access to terminals are made. Table VI.9 is indicative of growing congestion on the major arteries used by the New Orleans rail-highway terminals.

Table VI.8
Louisiana Railroad/Highway Intermodal Terminal Access Roadway Characteristics

Railroad City	Network Roadway Connections	Annual Loaded trucks	Annual Truck Moves	Daily Truck Moves	Daily Vehicle Equivalents	1993 ADT	Terminal Share (%)	Notes
IC/ NOLA	Louisiana Ave.	47,500	95,000	380	760	23,375	0.03	
	Tchoupitoulas St.	2,500	5,000	20	40	10,815	0.004	
	I-10	40,000	80,000	320	640	77,502	0.008	
NS/ NOLA	Florida Ave.	30,000	60,000	240	480	NA	-	
	Elysian Fields	30,000	60,000	240	480	28,449	0.02	(1)
	I-10	27,000	54,000	216	432	79,206	0.005	
KCS/ NOLA	LaBarre Road	40,000	80,000	320	640	NA	-	
	US61	40,000	80,000	320	640	44,742	0.01	
	I-10	10,000	20,000	80	160	138,446	0.001	
	Causeway	30,000	60,000	240	480	77,304	0.009	
CSX/ NOLA	Almonaster Ave.	100,000	200,000	800	1600	10,323	0.15	
	I-10	30,000	60,000	240	480	120,397	0.004	
SP/ Avondale	Avondale Gar. Rd	70,000	140,000	560	1120	8,156	0.14	
	US90	70,000	140,000	560	1120	57,175	0.02	
UP/ Avondale	LA18	25,000	50,000	200	400	18,963	0.02	
	US90	25,000	50,000	200	400	48,867	0.008	
SP/ Shreveport	Intermodal Drive	7,000	14,000	56	112	NA	-	
	US171	7,000	14,000	56	112	22,605	0.005	
KCS/ Shreveport	Shreveport Blanchard Road	5,000	10,000	40	80	4,355	0.02	
	I-220	4,500	9,000	36	72	23,722	0.003	

Source: NPWI Inventory of Louisiana Rail Highway Intermodal Terminals and Louisiana Department of Transportation and Development (LADOTD)

Notes:

(1) All NS Florida Avenue traffic assumed to route via Elysian Fields (LA 3021).

Table VI.9
Louisiana Railroad/Highway Access Roadway Capacity Utilization

Railroad City	Roadway Connections	1993 ADT (LADOTD)	Road Type	24-Hour Capacity (LADOTD)	Utilization (%)	Notes
IC/ NOLA	Louisiana Ave. Tchoupitoulas St. I-10	23,375 10,815 77,502	U4L U2L U6LF	23,000 12,000 102,000	102 90 125	 (1) (2)
NS/ NOLA	Elysian Fields I-10	28,449 79,206	U4LD U6LF	27,000 102,000	105 78	(3) (4)
KCS/ NOLA	US61 I-10 Causeway	44,742 138,446 77,304	U6LD U6LF U4LF	40,000 102,000 68,000	112 136 114	(5) (6) (7)
CSX/ NOLA	Almonaster Ave I-10	10,323 120,397	U4LD U6LF	27,000 102,000	38 118	(8) (9)
SP/ Avondale	Avondale Gar. Rd US90	8,156 57,175	U2L U4LF	12,000 68,000	68 84	 (10)
UP/ Avondale	LA18 US90	18,963 48,867	U2L U4LF	12,000 68,000	158 72	(11) (12)
SP/ Shreveport	US171	22,605	U4LF	68,000	33	(13)
KCS/ Shreveport	Shreveport Blanchard Road. I-220	4,355 23,722	U2L U4LF	12,000 68,000	36 35	

Notes:
(1) Does not reflect Tchoupitoulas Street renovation and River Terminal Complex corridor project.
(2) ADT for I-10 (77,502) is for segment east of US 90. Segment of I-10 west of US 90 has reported ADT of 127,762.
(3) Elysian Fields ADT is for segment north of LA 39. Elysian Fields ADT south of LA 39 are reported as 43,172. Elysian Fields ADT north of I-10 are 38,056.
(4) I-10 ADT specified for segment west of Elysian Fields. East of Elysian Fields I-10 ADT are 66,648.
(5) ADT for US 61 east of Causeway.
(6) ADT for I-10 east of Causeway.
(7) Causeway ADT for segment between US 61 and I-10. South of US 61 Causeway ADT are 53,167.
(8) ADT for Almonaster Avenue between Louisa Street and Jourdan Road.
(9) ADT for I-10 segment east of Louisa Street. West of Louisa Street I-10 ADT are 117,489.
(10) US 90 capacity rated as a four lane freeway at this location, which probably overstates nominal capacity compared to 27,000 ADT (24-hour) for Urban Four Lane Divided Roadway.
(11) ADT specified for Bridge City Avenue which may not be comparable to River Road portions of LA 18 west of 90.
(12) US 90 capacity rated as four lane freeway at this location which probably overstates nominal capacity compared to 27,000 ADT (24-hour) for Urban Four Lane Divided Roadway.
(13) US 171 capacity rated as Four Lane Freeway at this location which probably overstates nominal capacity compared to 27,000 ADT (24-hour) for Urban Four Lane Divided Roadway.

Source: NPWI Inventory of Louisiana Rail Highway Intermodal Terminals and Louisiana Department of Transportation and Development (LADOTD)

VI.C LOCAL RAILROAD CONNECTIONS

Table VI.10 contains a description of connecting railroad characteristics applicable to different public port facilities in Louisiana. All port facilities at New Orleans except as noted have equal open access to all major connecting railroads when served by the New Orleans Public Belt Railroad (NOPB). However, facilities not served by the terminal switching railroad, NOPB, have various degrees of restricted access. Access outside of the Port of New Orleans ranges from reciprocal switching between three connecting carriers at Baton Rouge to no reciprocal switching at Shreveport. Lake Charles has a combination of different local railway access conditions for the east and west bank facilities at the port. Some port owned connecting trackage is operated jointly and alternatively by linehaul railroads (Industrial Canal South Shore and Bulk Terminal). Reciprocal switching has historically existed between the UP access to the City Docks and two other railroads. However, changing railroad physical connections and commercial practices have materially altered the degree to which the City Docks are accessible to carriers other than UP for rice and other cargoes from what has been considered part of the port's natural geographic hinterland.

VI.D SUMMARY

Accessibility of Louisiana marine and rail-highway intermodal terminals appears in general to be adequate overall with exceptions, notably at New Orleans (highway) and Lake Charles (rail), for the current traffic handled by these facilities relative to local connecting roads and rail links. The intermodal facilities in the state covered within the scope of this study (marine and rail-highway terminals) exhibit different access issues and concerns based on size of the area. Accordingly, large scale marine and rail-highway facilities will be addressed separately for New Orleans and other parts of the state.

VI.D.1 NEW ORLEANS HIGHWAY ACCESS

The primary concern for highway access relative to port traffic is the existing congested links of the interstate network. Access to the port from the west via I-10 is particularly affected by this artery. The redevelopment of the Mississippi River Terminal Complex will require planned access improvements and alternatives to current truck routes through residential neighborhoods. The problems of the upriver access are at least in part addressed by the current Crescent City Connection to Henry Clay portion of the planned Tchoupitoulas Corridor. Unfortunately, upriver access from the west will not be addressed by the current plans for the Tchoupitoulas Corridor. Further refinements and extensions of the corridor seem likely, particularly if there is sustained growth in Mississippi River Terminal traffic and no other planned access improvements via I-10.

Road access to the local rail-highway terminals in New Orleans is adequate relative to the volume of units handled at any one location or for any specific destination. Planned improvements to reach Jourdan Road via US 90 with a short connection to I-10 should be

Table VI.10
Louisiana Public Port Facility Rail Connection Characteristics

Port	Trackage Characteristics				On Dock General	Connecting Railroads		Notes
	Facility	Tracks	Type	Length(ft)	Cargo Transfer	Direct	Indirect	
Greater Baton Rouge	Gen Cargo	2	Stub	1800	NA	UP	IC/KCS	1
	Gen Cargo	2	Stub	1500	NA	UP	IC/KCS	
	Apron	2	Loop	6000	Yes	UP	IC/KCS	
	Grain Elevator	4	Stub	3900	NA	UP	IC/KCS	
		6	Loop	5100	NA	UP	IC/KCS	
	Molasses Terminal	2	Stub	940	NA	UP	IC/KCS	
Caddo-Bossier	Barge Terminal	1	Stub	11500	Yes	UP	SP/KCS	2
		1	Loop	1200	NA	UP	SP/KCS	
Iberia		2	Stub	150	No	LD	SP	3
Greater Lafourche		NA		NA	NA	NA	SP	4
Lake Charles	City Docks	25	Stub	50424	Yes	UP	SP/KCS	5
	South Side	1	Stub	71861	No	UP/SP	KCS	6
	Bulk Terminal	1	Stub	7761	NA	SP/KCS	UP	7
		3	Loop	14700				
Krotz Springs		NA		NA	NA	NA	UP	8
Morgan City		NA		NA	NA	NA	SP	9
New Orleans	Henry Clay	4	Stub	1500	Yes	NOPB	*	10
	Nashville Ave	3	Stub	2600	Yes	NOPB	*	
		6	Loop	5200	Yes	NOPB	*	
	Napoleon Ave	2	Stub	4000(e)	Yes	NOPB	*	
	Louisiana Ave	1	Loop	720	Yes	IC	**	
	Seventh/Harmony	2	Stub	3000	Yes	NOPB	*	
	First St.	1	Stub	900	Yes	NOPB	*	
		1	Loop	960	Yes	NOPB	*	
	St. Andrew	1	Loop	1400	No	NOPB	*	
	Celeste St.	1	Loop	1100	No	NOPB	*	
	Market St.	2	Loop	1920	No	NOPB	*	
	Gov. Nichols St.	1	Stub	1000	No	NOPB	*	
		1	Loop	1000	No	NOPB	*	
	Esplande Ave.	2	Stub	1000	No	NOPB	*	
	Mandeville St.	2	Loop	2000	No	NOPB	*	
	Press St.	2	Stub	1400	No	NOPB	*	
	Poland St.	4	Stub	2800	Yes	NOPB	*	
	Alabo St.	3	Stub	2300	Yes	NS	**	
	France Rd 1	2	Stub	1200	No	NOPB	*	
	France Rd 4	2	Stub	1000	No	NOPB	*	
	France Rd 5/6	2	Stub	600	No	NOPB	*	
	Jourdan Rd	1	Stub	900	Yes	NOPB	*	
		2	Loop	1420	Yes	NOPB	*	
St. Bernard	Arabi 1	2	Loop	1200	No	NS	*	11
	Arabi 2	3	Loop	1200	No	NS	*	
Port Manchac	Facility 1	1	Stub	1000	Yes	IC	None	12
	Facility 2	1	Stub	2000	Yes	IC		
		1	Loop	600	Yes	IC		
	Facility 3	1	Stub	300	Yes	IC		

Source: NPWI Louisiana Public Port Intermodal Terminal Facility: Highway and Railway Accessibility Inventory

Table VI.10 (continued)

Notes:

1. Reciprocal switching exists for the IC and KCS.
2. The port is outside of the switching limits and does not have reciprocal switching.
3. The port is served directly by L&D, interchanging with SP has a connecting carrier.
4. Nearest rail service is SP public siding approximately 30 miles north.
5. Port owned rail spur operated by UP extends approximately 50,000 feet connecting UP line to City Docks. There is approximately 4000 feet of trackage within the City Docks complex, with unloading spots for about 80/50-foot box cars. Reciprocal switching exists between SP and UP. Reciprocal switching also exists between KCS and SP. There is no direct KCS-UP connection to City Docks except via SP, since the abandonment of KCS Calcasieu River bridge and all (KCS) trackage on the east side of the river that was formerly used to connect with the UP.
6. Port owned rail spur operated in alternating two year periods by UP and SP extends approximately 72,000 feet to Industrial Canal South Shore. Reciprocal switching exists between UP and SP and KCS and SP.
7. Port owned rail spur operated as part of a joint facility in alternating two year periods by SP and KCS on West Bank of Calcasieu Ship Channel.
8. Nearest rail service is UP public siding approximately 1/2 mile from port.
9. Nearest rail service is SP leased siding approximately 2 miles from port.
10. Except as noted * all NOPB connections at New Orleans provide for equal switching rates for all six trunk line carriers. NOPB charges are usually fully absorbed by connecting line haul carriers. Facilities at Louisiana Ave. and Alabo St., served by IC and NS, respectively, have different reciprocal switching arrangements between line haul carriers for noncompetitive traffic.
11. Served by NS via former Louisiana Southern subsidiary which has different reciprocal arrangements with connecting carriers for noncompetitive traffic.
12. No other rail switching available.

adequate for the volume of current and projected traffic handled by this facility. Recent actions to close the portion of France Road adjacent to the container berths to public traffic should enable the port to better control the high volume of container traffic to and from these facilities from local highways and rail terminals.

Future traffic growth for the major links at New Orleans indicates that existing problems of congestion and access to the marine and rail-highway facilities will deteriorate unless new capacity is forthcoming. The marine and rail intermodal facilities are comparatively low volume users of the major congested arteries such as I-10. However, access between the major highway arteries and these facilities should become part of planning for port facility growth. Accordingly, some degree of cost sharing or participation of different funding sources may be desirable where there are specific marine or rail-highway intermodal facility impacts, for example improvements to Jourdan Road access or improvements to east-west railroad connections for shared intermodal terminal access.

VI.D.2 NEW ORLEANS RAILWAY ACCESS

The port handles very little rail carload traffic relative to the past which has led to operating inefficiencies for the sprawling network of wharves and industries that still require service by the New Orleans Public Belt Railroad. The NOPB precept that an independent public terminal switching railroad is necessary for competitive access suffers from the lack of sufficient traffic base to sustain self-sufficient operations. Technically speaking, there are no major access problems via NOPB as long as there is sufficient non-operating income to subsidize significant operating losses.

The NOPB traffic base appears to have reached a new lower plateau with the permanent closure of the Public Bulk Terminal. Unless new sources of operating income become available other than traditional rail switching services, NOPB will be minimally self-sustaining under its existing revenue structure and organization. Without any changes in operating revenue or size of the organization supported by operations the Belt will have to continue to rely on more than $1 million a year in non-operating income to offset cash operating losses of this magnitude from railway switching.

Recent past NOPB annual operating cash deficits between 1991 and 1993 have averaged about $900,000. The loss of the Public Bulk Terminal volume, about 4000 cars per year, will primarily reduce revenues and have little impact on expenses. Therefore, it is likely that NOPB annual operating deficits, after tax accruals will increase to $1.3 to $1.4 million thus equalling or slightly exceeding non-operating revenues. Unless additional revenues are secured to replace the bulk plant account it is likely that the future of the Belt will no longer include positive cash flows. If this occurs the future of the Belt will be a function of the rate at which it consumes its existing unencumbered cash assets used to earn interest income. Once the cash reserves are diminished the Belt will enter a downward spiral that will result in a need for new subsidies from its primary users or beneficiaries or serious reconsideration of the "belt" railroad concept with perhaps major restructuring of the existing network.

Clearly, the Belt and rail access in New Orleans as historically defined by the "belt" concept is about to enter a new era. The inability of the Belt to be self-sustaining will eventually force some combination of adjustments in charges, physical plant, and organization. Further declines in traffic will only exacerbate the inevitable need for some form of restructuring or new source of subsidies to sustain the Belt.

The major rail access issue of broader interest to the railroads serving New Orleans is the ease of transfer of pre-blocked run-through trains between major east-west systems. The transfers all require use of the Public Belt Mississippi River Bridge (Huey P. Long Bridge) and must transit the obsolete East Bridge Junction. While direct links exist between NS and the west bank systems, UP and SP, access to CSX is only possible via trackage rights over the NS "back belt" line. Technically, access to CSX is possible via the river line of NOPB is possible to reach CSX. The NOPB regularly operates trains of between 20 and 40 cars from Cotton Warehouse Yard to

France Road via the river front line adjacent to the French Quarter. However, because the NOPB urban riverfront line is circuitous and plagued with numerous vehicular and pedestrian grade crossings, is is not a feasible alternative to reach CSX (an added handicap is a clearance restriction prohibiting double stack rail cars beneath the St. Claude Avenue Bridge).

Improvements to the east-west bank connection will have little impact for the port or local industry. Most of the traffic handled via the NOPB bridge between the east and west trunkline systems (CSX/NS and UP/SP) is of a "run through" variety. For several reasons the character of intermodal services to the port and the state will not materially change with improvements to the Mississippi River crossing unless originating and terminating traffic is sufficient to warrant dedicated trains and/or terminals such as a port "near" dock transfer facility. In the absence of exogenous increases in local and port intermodal traffic, the character of rail-highway terminals is likely to remain unaltered relative to changes in rail linehaul access.

VI.D.3 HIGHWAY ACCESS TO OTHER INTERMODAL TERMINALS

With the exception of New Orleans most of the other public marine terminals are in relatively rural areas or near smaller urban areas where access is more related to the isolation of these facilities from major interstate highways. The larger general commodity ports, Baton Rouge and Lake Charles, currently have relatively good roadway access. Low volume capacity ratios for most links serving these ports indicate that the future access issues for these locations and other ports seem to be more related to maintenance of local arteries that link the port with relatively unconstrained major highways.

It would be desirable to have flexibility to provide priority or assistance where appropriate for maintenance of state or local access links, respectively, which could be designated as "intermodal" marine or rail-highway connectors. Certainly, any planning for major new traffic patterns that would increase the level of utilization of these access links to the detriment of intermodal access should contain remedial measures.

VI.D.4 RAILWAY ACCESS TO OTHER INTERMODAL TERMINALS

Port facilities at Baton Rouge and Lake Charles are major bulk and general cargo users of rail service. Local rail switching and competitive access have been perceived as problems. However, for a variety of reasons, primarily volume, the ports have been unable to secure a permanent solution to service (Baton Rouge) and service and competitive access (Lake Charles). The rail service and access problems of specialty ports like Baton Rouge and Lake Charles are not unlike single location shippers who lack competitive remedies such as geographic competition to induce substitutes. Increasingly, large single system rail lines have alternatives to by-pass ports like Lake Charles where access is at issue (City Docks for KCS and SP).

Service may also suffer unless ports or their tenants have the leverage to execute service contracts that call for performance penalties and incentives that can be linked directly to transit time and car spotting, including switching. Where ports have large accounts of rail traffic with particular shippers, it would seem that they could join with the shippers in negotiating appropriate service constraints, providing for remedies or incentives, but this is likely to be a new role for port managers, which they may be unwilling or unprepared to take. For example, it was noted that seemingly part of the obstacle to restoring KCS access to the Lake Charles City Docks was the provision of storage capacity in the SP yard to accommodate increased traffic. An estimate of $150,000 was quoted as the requirement for track refurbishment for KCS use of the SP facilities. If KCS was to supply traffic such as rice at or near past historical levels, about 3000 cars and 300,000 tons per year, the upgrading expenditure could be recovered at a nominal assessment of $0.50 per ton.

Typically the service and access concerns that exist among the medium and small ports that cannot be addressed on a volume contractual incentive basis may have to be handled in a commercially innovative manner such as a partnership between the port, users, and the railway. It may be possible to set up "seed grant" demonstration grants or concessions between the parties where for a pro-rata sharing of the risk each participant assumes the opportunity for benefit as defined by user fees, etc. Viewed in this manner "access" may be defined as competitive thrusts by partnershipping.

A role for the public sector in promoting access related to cross modal funding or maintenance of existing facilities may be warranted in particular situations such as in Shreveport where there has been insufficient volume to support rail-highway terminals and institutional impediments to accumulate sufficient volume via multiple or shared access. The absence of sufficient traffic or leverage by any party may require consortiums to be developed to explore new access incentives and initiatives to define what is possible to change and to disregard the rest relative to other opportunities that the ports have.

VII. INFRASTRUCTURE, INSTITUTIONAL AND POLICY ISSUES

VII.A FREIGHT RAILROADS

VII.A.1 INSTITUTIONAL CAPABILITY AND COMMITMENT

State and metropolitan agencies are obliged by the ISTEA to consider the role of railroads in planning and programming for a more integrated transportation system. However, resource allocation for railroad purposes is very limited in the ISTEA's provisions, and no support is provided within Louisiana's Transportation Trust Fund. Louisiana DOTD, however, does administer the state's participation in the Federal Railroad Safety Program and the Federal Railroad Administration's Local Freight Rail Assistance Program, both of which are addressed below.

Historically, public sector involvement with the freight railroads has been limited to safety, rate and labor regulation. Public funding assistance for freight railroads has been negligible since the original land grants made almost a century ago. By contrast, other freight carriers have received varying levels of public assistance in development or maintenance of intercity links or terminals. Railroad response to the ISTEA has been measured, based upon its limited contribution to their interests. Nevertheless, if initiatives are taken by metropolitan, state and federal transportation agencies to protect and enhance railroad interests, the railroads will respond appropriately.

Freight railroads have a significant impact on the strength of the state's industrial and agricultural sectors, in the success of Louisiana's public ports, and on the utilization of highways. In the future, the state's freight railroads may play a role in intercity passenger transportation. Typically, however, agency staff have little knowledge of freight railroads (e.g., their role in intermodal transportation, their decision-making values and process, their public impacts). If state and metropolitan agencies are to address the total transportation system (including freight movements by all modes) in planning and resource allocation, they must be properly staffed to do so.

The public is also poorly informed about freight railroads, and this has contributed to the absence of supportive public policies. While benefits for freight railroads are limited, the ISTEA does provide opportunity for railroads to improve their standing with the public and in public resource allocation. However, the railroads must communicate their interests. An effective partnership will require that agency initiatives be complemented with contributions from rail carriers and users. Railroads should designate representatives to actively participate in agency planning, program development and capital investment decisions. Finally, railroads should improve coordination among themselves to improve efficiency on shared facilities and in interchange operations.

To facilitate an integrated programmatic approach to rail intermodal planning, the Railroad/ Highway Safety Program and personnel should be combined with the current rail program (Rail

Program Manager) and, if authorized, the added staff described below into a distinct Rail Section. This will foster close coordination, cross-training, and better personnel utilization.

DOTD's freight rail planning/program administration capability should be expanded by providing qualified staff and funding for project planning and evaluation. Three new positions are required to provide specialized knowledge and expertise of freight railroad issues and opportunities. Funding will be needed, in addition to the proposed three staff positions, for contracted professional services, office equipment, publications, training and travel. In the absence of enhanced rail staffing at DOTD, no activities beyond the *status quo* can be pursued.

The ISTEA requires state and metropolitan transportation agencies to consider the role of railroads in their efforts to better integrate and enhance the total transportation system. Historically, public sector involvement with the freight railroads has been limited to safety, rate and labor regulation. Assistance from state funds for freight rail projects is now only available through Louisiana's Port Construction and Development Priority Program, limited to projects on publicly-owned port property. Only recently has the state filled the position of Rail Program Manager (left vacant since 1986), and this remains the single position dedicated to all rail matters (highway crossings of railroads are addressed by staff in Highway Maintenance). Knowledgeable staff and a budget for other professional services will enable DOTD to address rail-related issues and opportunities. These DOTD resources could also be made available to assist regional MPOs on freight rail and intermodal challenges.

VII.A.2 RAIL/HIGHWAY GRADE CROSSINGS

Roadway crossings of railroads have long been considered, and remain principally, an issue of highway safety. More recently, with growing volumes of rail freight traffic, an emerging public interest in rail passenger service, and a desire for higher train operating speeds, rail/highway crossings are increasingly important aspects of safe and efficient railroad operations. The multiple management aspects of roadway grade crossings of railroads are to be addressed under three of the management systems mandated by the ISTEA to use resources more effectively and respond to the public's higher performance expectations, namely, Congestion Management, Safety and Intermodal Management Systems.

In the three year period from 1990 through 1992, there were a total of 512 collisions between trains and highway vehicles reported in Louisiana; 276 of these accidents resulted in injuries or fatalities (353 injuries, 51 fatalities). The state's rail/highway grade crossing improvement program is currently funded at only $3 million annually (80 percent Federal, with a 20 percent state match). Assuming 25 percent of the current public crossings can be closed, recent estimates indicate that $150 million is needed just to install active warning devices at public crossings where they presently do not exist and to upgrade some of the existing equipment.

Replacing existing grade-level roadway crossings which experience high traffic with roadway overpasses or underpasses would generate significant public safety, congestion mitigation and environmental benefits, but would require a greatly expanded investment capability. Public funding for warning improvements at private roadway crossings is not currently authorized; however, there is growing national and state concern about crossings that are not included under the existing rail/highway crossing program.

In addition to the availability of federal and state (and possibly local and private) funds for warning improvements at, or grade separations of, public and private crossings, other policy issues related to the safety or train operations aspects of crossings include:

- Closure and consolidation of crossings
- Refinements to the on-going evaluation of crossing enhancements
- Enforcement of traffic laws at crossings
- Increased awareness of rail/highway crossings as a special type of highway "intersection"
- Crossing safety education (including Operation Lifesaver)
- Coordinated crossing incident response
- Land use impacts on crossing traffic
- Investment in enhancements to private roadway crossings
- Mobilization for a potential increase in crossing signalling projects

A large increase in annual funding is needed in order to improve the safety and efficiency of both highway and railroad operations. Monies could be used to close crossings, install active warning devices, improve crossing surfaces, improve crossing approaches, and to construct grade separations. The total annual cost for this program would vary depending on the growth scenario, and is detailed later in this chapter.

DOTD already administers the existing grade crossing program and would administer the expanded program as well. Planning, preliminary engineering, right-of-way acquisition, utility relocation, and construction would be eligible for funding under this program. Funds could be used at any public crossing. Railroads should then focus their resources on addressing private crossings.

Expand Public Awareness and Law Enforcement Officer Training to Improve Safety at Rail/Highway Grade Crossings

Many drivers have little understanding of the risks at rail/highway crossings. Public education is an effective means of improving safety. An expansion of the Operation Lifesaver crossing awareness program is proposed. In addition, little enforcement of existing traffic laws regarding crossings is presently being done. It is proposed that funding be provided for officer training to emphasize the seriousness of the safety problem and to improve knowledge of relevant statutes.

The Louisiana Highway Safety Commission would administer the expanded program. Additional funding would be used for one full-time staff position, printed and video materials, public announcements, law enforcement seminars, etc.

VII.A.3 NEW ORLEANS EAST BRIDGE JUNCTION - RAIL GATEWAY CASE STUDY

East Bridge Junction (at the eastern foot of the Huey P. Long railroad bridge in New Orleans) is the principal bottleneck in Louisiana's railroad network. The Junction is owned by the New Orleans Public Belt Railroad (NOPB, an agency of the City of New Orleans), and links directly with Illinois Central trackage. Maintenance and operation of the Junction is governed principally by agreements between these two railroads. East Bridge Junction is, however, the state's major rail gateway because it provides, in close proximity, linkage among the Southern Pacific and Union Pacific (via NOPB's Huey Long Bridge), the Norfolk Southern (and via the NS, CSX), NOUPT (Amtrak), and NOPB's mainline. The actual movement of trains across the Junction involves decisions by NS, IC and UP officials. In addition, several highly-trafficked roadway grade crossings are located nearby. As a result, the safety and efficiency of both highway and rail operations (both private and public), and for both freight and passengers, are affected.

Under existing conditions and agreements, train movements through the Junction are slow and frequently delayed, resulting in increased blockage of nearby crossings, unacceptable schedules for Amtrak service, the diversion of freight rail traffic away from Louisiana, and an increase in associated costs (or loss of revenue) for all affected parties.

Steps to ameliorate the situation include a reconfiguration and reconstruction of the trackwork and associated signalling/control and crossing systems, and a reconsideration of train movement control through the Junction. The freight railroads and Amtrak have in recent years initiated discussions to identify solutions that all railroads can agree to. These discussions continue. A conceptual engineering plan for upgrading the infrastructure has been agreed to, the local MPO has been made aware of the project, and DOTD's program manager is aware of the related grade crossing issues. However, sources for the capital funding required (about $8M for reconstruction of the track intersection and control tower alone) have not been identified. No discussion of revising train control through the Junction is underway. Informal contact with U.S. Federal Railroad Administration (FRA) officials indicate a willingness to support a solution, within their constraints, if invited.

While benefits from improving the Junction's current situation will accrue to the private freight railroads, the publicly-owned NOPB (and its principal customer, the Port of New Orleans), Amtrak and its customers, and nearby roadway users are also affected. Congestion mitigation and air quality improvements can likewise be achieved, and the ISTEA's goal of a "seamless" intermodal transportation network can be advanced. Finally, a coordinated approach which addresses the many aspects of the problem, and involves public and private, freight and passenger, local, state and federal interests, can become a model for the resolution of similar rail gateway challenges elsewhere in Louisiana and the nation.

New Orleans East Bridge Junction - Rail Gateway Problem Resolution

DOTD's rail program staff should be engaged in a "facilitator" role to assist the local MPO and the private and public (NOPB, Amtrak, NOUPT) railroads in engineering analysis and negotiations leading to consensus on both (1) infrastructure and equipment renewal and re-configuration, including cost-sharing for these investments, and (2) the control of train movements through the junction, with goals of expediting trains, providing equitable treatment of all trains, and reducing overall costs of the control function. Owners and users of the Junction should be assisted in identifying and applying for public funding assistance (possible DOTD programs, above).

Funding would be provided for supporting the additional staff time, other professional services, impact studies, and preliminary engineering.

VII.A.4 LIGHT DENSITY RAILROADS

Except for the limited provisions of DOTD's Port Priority Program, no funding assistance is currently available for freight rail projects in Louisiana. The survey of freight rail issues and opportunities performed within this statewide intermodal planning process has revealed instances where public benefits from freight rail improvements, which would not otherwise be forthcoming, can be realized with targeted public funding assistance.

Light density, shorthaul, or "collection and distribution" railroad operations, for example, can have a measurable impact on local economies, but because of their cost structure such operations can often not generate sufficient direct revenue to adequately capitalize the necessary infrastructure. If appropriate maintenance and rehabilitation is not performed on such lines, rail service will eventually be discontinued. Louisiana's economic goals may be thwarted if rail shippers are charged the initial fully allocated cost of capital upgrades: traffic and jobs may be sent elsewhere. Moreover, a loss of rail service can result in a shift of traffic to other publicly supported modes (with concomitant impacts), and increase the risk of losing a right-of-way.

The magnitude and scope of the light density rail network in Louisiana are broad. Based on secondary data there appear to be only three major line segments which might be considered as "light density" candidates using the criterion of less than 5 million gross tons per mile of track (MGTM) a year. These line segments are: (1) IC between Baton Rouge and Hammond - less than 5 MGTM, spanning approximately 30 miles; (2) IC from Mississippi State line to Talisheek - less than 1 MGTM, spanning approximately 33 miles; (3) IC between Talisheek to Slidell - less than 1 MGTM, spanning approximately 17 miles (filed for abandonment); and (4) KCS (former Mid-South Rail) between Gibsland and Winfield - less than 5 MGTM, spanning approximately 66 miles. Total segment mileages from this source, excluding the IC line between Talisheek to Slidell, would be 146 miles.

There are many other smaller segments that can be considered as light density rail lines and possible candidates for service reduction or abandonment. Four railroads (UP, NS SP and IC) supplied system density maps for their Louisiana lines. According to the maps, at least eleven branch lines of these systems would appear to be of a light density category as follows: (1) SP branch from Lake Charles to Lake Arthur - less than 1 MGTM, spanning approximately 33 miles (now only extends 2 to 3 miles beyond Lake Charles); (2) SP branch from Lafayette to Breaux Bridge - less than 1 MGTM, spanning approximately 8 miles, transfer pending to Louisiana & Delta; (3) SP branch from Lafayette to Opelousas, less than 1 MGTM, spanning approximately 22 miles (now extends only about 1 mile beyond Lafayette); (4) SP branch from Avondale to Algiers - less than 1 MGTM, spanning approximately 5 miles; (5) UP branch from Avondale to Gouldsboro (Algiers) - less than 1 MGTM, spanning approximately 5 miles; (6) UP branch from Addis to Anchorage - less than 1 MGTM, spanning approximately 13 miles; (7) UP branch from Livonia to Anchorage - less than 1 MGTM, spanning approximately 15 miles; (8) UP branch from Collinston to Bastrop (connecting with the Arkansas, Louisiana & Mississippi Railroad shortline) - less than 1 MGTM, spanning approximately 7 miles; (9) UP branch from Opelousas to Church Point - less than 1 MGTM, spanning approximately 13 miles (no longer in service); and (10) UP branch from Kinder to Lake Charles - less than 2 MGTM, spanning a distance of approximately 31 miles. Total light density branch line segment route miles from the system maps for UP and SP would be approximately 168, including the SP branch between Lafayette and Breaux Bridge, which is being transferred to a shortline operator (L&D). Active miles in operation appear to be substantially less due to recent service or physical abandonments. Total service miles for the ten branches appear to be about 88.

Total shortline route mileage operated in the state is nearly 400 miles. Short line track mileage is about 440 miles. It appears that only about one-fifth of the states shortline rail mileage has been rehabilitated and that most of the existing shortline mileage which was acquired from Class I railroads via downsizing, rationalization, and abandonment, is in need of some physical rehabilitation. Additionally, some allowance should be made for remaining light density lines of Class I railroads that may be candidates for transfer to shortline railroads. One example is the UP line from Kinder to Lake Charles, which provides the only rail connection for the SP and KCS railroads through the UP to the city docks of the Port of Lake Charles for breakbulk cargos. The major customer on the line is the Port of Lake Charles which is served three times a week by the UP.

If two-thirds of the existing light density service mileage was converted to short line use, total short line route miles would increase approximately 150 to 550. If eighty percent of this estimated total mileage required rehabilitation, there would be a requirement for almost 450 miles of track upgrading to meet FRA Class II operating standards of 20 miles per hour maximum.

Estimated average rehabilitation costs per mile were supplied by DOTD for high and low scenarios. The high scenario envisions total replacement of all components of the track structure of which the primary item is rail. The high rehabilitation cost estimates range form $240,000 to

$300,000 per mile, including labor but excluding rail crossings and signals (if applicable). The low rehabilitation cost estimates range from $65,000 to $125,000 per mile and do not include any rail replacement.

For most of the lines in question, the weight and condition of the rail is usually adequate to sustain future light density freight operations. Consequently, usually a low rehabilitation threshold cost is required to efficiently sustain future operations. Low rehabilitation costs can be presumed sufficient at approximately $80,000 per mile to include consideration for bridges. At this rate it would require nearly $36 million to rehabilitate approximately 450 miles of existing and potential short line railroad to meet FRA category II (20 miles per hour) condition.

A federally-sponsored (funded from general revenues) Rail Freight Assistance Program has existed for many years, and several Louisiana shortline railroads have been able to take advantage of the capital contributions provided. The long-term continuation of this federal program is unlikely. Available funds from this program are very limited, and eligibility requirements and application procedures, set from a federal perspective, may not address Louisiana needs. Other states have created or are considering their own local rail assistance programs.

Responsive strategies that may be considered include: a dedication of railroad fuel taxes to railroad purposes (state and federal); an industrial inducement program by the state to attract users to shortline carriers; an expansion of the Port Priority Program - with enhanced opportunities for rail; and the creation of a state-supported program to provide funding and/or financing assistance for Louisiana's local railroads.

Revolving Loan Fund for Light Density Railroad Rehabilitation

It is suggested that the state create a loan funding program (similar to the previous Federal 511 program) for light density railroad infrastructure, available to any railroad applicant. The program would be designed to address the fact that railroad infrastructure improvements are fixed and labor-intensive and therefore in many cases cannot be collateralized by a private lending institution. The program would provide a loan of up to 80 percent of the project cost for track and related infrastructure (e.g., bridges, signals, rail portion of road crossing repairs, including relocations, etc.), rehabilitation of existing lines and restoration of discontinued lines where warranted. These loans would be scheduled for repayment over a ten year period. It is proposed that this state-funded loan program accumulate at a rate of $1.5 million annually over 25 years. Loan repayments would accrete to the fund. Total funding would provide for the rehabilitation of about 450 miles of track statewide.

The loan mechanism is recommended rather than grants in order to preserve private ownership of existing rail infrastructure where feasible, apportioning the risk of unremunerative investment in largely sunk assets (track components) between the owner and the state. An infrastructure loan program tends to minimize ill-conceived investments in track which cannot generate sufficient benefits to either party, the state or the operator.

The program would be administered by the Rail Program Office of DOTD, with rules and procedures similar to DOTD's Port Priority Program. Funds would be allocated on a competitive basis among applicants. Evaluation criteria would be developed, drawing upon those used in the Federal Local Freight Rail Assistance Program and the Port Priority Program, but adjusted to reflect the program's goal of rehabilitating the state's light density railroads over the period 1995-2020.

Illustrative examples of projects which may apply for funding assistance through one or both of these programs include rehabilitation and upgrade of Bayou Sale and Abbeville spurs, Louisiana & Delta Railroad; the Delta Southern Railroad line between Lake Providence and the Arkansas State Line; and the Louisiana and North West Railroad line between Gibsland and the Arkansas State Line.

Freight Rail Intermodal Grant Program

Some light density railroad intermodal assistance can be useful and warranted where demonstrable public benefits can be achieved only through provision of dedicated equipment for special services. Examples of candidate services include the Louisiana & Delta proposal for the intermodal haul of sugar cane from field to mill; a dedicated service carrying export rice from Louisiana mills to the Port of Lake Charles; and the provision of lift equipment at rail/truck intermodal transfer facilities experiencing low volumes in the absence of such equipment (e.g., Baton Rouge, Alexandria).

All such grants would be conditioned on achievement of a return on state investment from reduced risks to life and property; reductions in other public sector expenditures such as on highway maintenance, congestion mitigation, or air quality improvements; or net revenue increases (surplus of state taxes paid less the value of state services provided) from possible economic development impacts.

An annual grant program for an initial period of ten years, and requiring a 50 percent match from the project sponsor, is suggested. The need for state assistance for rail intermodal equipment would be re-evaluated at the end of ten years. The state would maintain an equity position in equipment provided to the private sector operator for the life of the capital. The operator would be responsible for all maintenance and insurance of the replacement value.

The program would be administered by the Rail Program Office of DOTD, with rules and procedures similar to the Port Priority Program. Funds would be allocated on a competitive basis among applicants. Evaluation criteria would be developed, drawing upon those used in the Federal Local Freight Rail Assistance Program and the Port Priority Program. Funds not allocated for any reason would be shifted to DOTD's Transportation Trust Fund.

VII.A.5 SHIPPER CHOICE IN RAIL DISTRIBUTION - ECONOMIC AND INTERMODAL SYSTEM IMPACTS

Railroads and pipelines are unique among transportation systems in that the physical links that form their networks are, with rare exception, privately owned by a single carrier. While there are many airlines that operate on public airways and at public airports, many trucking companies operating over public highways, and many vessel owners operating over public waterways and at public ports, each railroad operates over the track network that it owns and maintains. (Railroads do interchange traffic with each other where their networks meet, and on some links, by special contracts, permit operations by another rail carrier.) The result is that a rail user's location on a rail network typically predetermines the single rail service provider available. The shipper may be able to choose truck, barge, or pipeline as an alternate means of distribution.

During the course of user/provider outreach efforts as part of the development of a Louisiana Intermodal Plan, some rail users (shippers and public port officials) expressed concern over the impacts of this limited choice of rail carriers on their economic competitiveness and on the publicly supported alternative networks, particularly the highway system (trucking).

In the absence of competitive rail carriers, rates and service standards must be negotiated with the given railroad, with the only outside influence being the guidelines and proscriptions of the Staggers Act of 1980 and related Interstate Commerce Commission rulings. Strictly private concerns between private transportation users and providers are not appropriate concerns of public transportation planning. However, the nature and quality of rail service can impact the public interest in three areas: the global competitiveness of industry (sustainable employment base); the competitiveness of public ports (and their users); and energy efficiency, safety, highway congestion mitigation and air quality improvement goals set forth by the ISTEA (cargo diverted to truck from rail).

The economic, legal, and policy complexities of this question place its study (much less its resolution) beyond the scope of Louisiana's statewide intermodal plan. The issue does raise legitimate public interest and "intermodal" concerns, and deserves further attention by public authorities to better define these in considering revised policy. In the interim, affected rail users and providers can initiate negotiations or other actions to ameliorate the situation within existing legal guidelines.

Study Public Role in Enhancing Rail Access

DOTD and/or Louisiana's Department of Economic Development would perform a scoping assessment to determine whether, and if so, at what level, there exists a public interest in private/public rail access to Louisiana's ports and industrial districts. The initial study effort should address: (1) the methodologies and data to be used in defining and measuring possible public interest in and the impacts of private or public rail access to the state's public ports and industrial districts; and (2) a qualitative assessment of the scope and scale of public and private benefits and costs that would indicate whether, and if so, where, public impacts are sufficient to justify study of the feasibility of alternative actions at specific sites. If there appears to be a sufficiently compelling public interest, follow-up studies would assess the feasibility of actions such as the subsidy of rail costs to shippers, partial public acquisition of selected rail operating rights, or the construction of new connecting tracks. The source of funding for such actions would have to be considered by the study.

VII.A.6 FREIGHT RAILROAD SECTOR FINANCING REQUIREMENTS

This section has identified certain responsive strategies or actions that can be applied for enhancing the state's institutional capability and commitment in the railroad sector as well as for improving rail intermodal efficiency through improvements in infrastructure. These strategies or actions were identified as a result of the extensive user/provider outreach program described in

Table VII.1
Recommended Freight Railroad Sector Programs and Financing Requirements

Recommended Programs	Estimated Financing Requirements
Programmatic Funding	
- *Reorganize DOTD Rail Activities*	no funding required
- *Increase Staffing, Rail Inspection Program*	$200,000/year
- *Expand Capability for Freight Rail Project Planning, Evaluation and Administration*	$500,000/year
- *Expand Public Awareness and Law Enforcement Officer Training to Improve Safety at Rail/Highway Grade Crossings*	$200,000/year
- *Study Public Role in Enhancing Rail Access*	$500,000 (one time cost)[1]
Infrastructure Financing	
- *Expand Rail/Highway Grade Crossing Program*	$ 6,000,000 (low growth scenario)[2] $ 9,000,000 (trend)[2] $12,000,000 (high growth)[2]
- *New Orleans East Bridge Junction - Rail Gateway Problem Resolution*	$500,000 (one time cost)
- *Revolving Loan Fund for Light Density Railroad Rehabilitation*	$45,000,000 (over 25 years)[3]
- *Freight Rail Intermodal Grant Program*	$ 3,000,000/year[4]

Notes
[1]Covers both scoping and follow-up feasibility studies.
[2]Funding is in addition to the existing level of $3 million/year.
[3]$36 million state contribution (80%), $9 million railroad contribution (20%).
[4]$1.5 million annual state contribution, $1.5 million annual railroad contribution.

Chapter II. The recommended strategies or actions can be placed in two categories: 1) programmatic funding, and 2) infrastructure financing. The first category encompasses programs designed to enhance or broaden the state's current programs supporting rail planning efforts, while the second focuses on infrastructure improvements. Table VII.1 summarizes the recommended programs and estimated financing requirements.

VII.B PORTS AND WATERWAYS

VII.B.1 INTRODUCTION

Louisiana's extensive port and waterway system linking strategically the Gulf to the large central portion of the United States will continue to provide opportunities for international and domestic trade, specifically in the North-South direction, and the related economic benefits from maritime related investment and employment. Maximizing the state's maritime opportunities currently, and for the future under competitive market conditions, remains the key strategic marketplace challenge for Louisiana as well as other neighboring states. Important trade lanes for Louisiana's ports remain those between the U.S. and North Europe, Latin America, the Caribbean Basin, the Far East, South East Asia, Mediterranean and Middle East regions. Smaller trade volumes also exist for African, India and Australia/New Zealand trade routes.

General cargo movements in North/South trade through Louisiana from Latin America and the Caribbean Basin account for about 35 percent of total general cargo imported and exported, and for New Orleans were about equal to the combined volumes of Far East and North European tonnage at 2.1 million tons for 1993. While Louisiana is poised to become a water transportation gateway for increased trade between the United States, Canada, Mexico, the Caribbean, and the rest of Latin America, other states such as Texas, Florida, Mississippi, Alabama, Tennessee, Georgia and others would also like to benefit. Competition for new international traffic created by the North American Free Trade Agreement (NAFTA) has already begun. Louisiana's comparative advantage for capturing these emerging trade opportunities will depend not only upon the cost and service competitiveness of the state's ports but also the entire freight transportation system linking roads/railways to port locations.

Marketplace initiatives that are related to the strategic challenges facing the state's maritime industry were grouped into five broad categories. The first category deals with evaluation of demand for facilities based upon both macroeconomic and microeconomic trends. This analysis and forecasts by commodity groups is presented in Chapter IV, with low, medium and high growth scenarios.

This section addresses the four other categories of ports and waterways strategic marketplace initiatives identified as important to the development of Louisiana's intermodal transportation plan which, if successful, will elevate the level of the forecasted demand, e.g. from medium to high growth scenario. These include: (1) identification of current and future trade opportunities where Louisiana has or could achieve a comparative advantage to capture this trade; (2) port partnership opportunities both within the state and abroad, that would allow for the sharing of economic, operational, and professional capabilities *between* ports for initiatives where interaction makes sense, using examples from other states as a guide; (3) institutional issues that pertain to the relationship of ports in intermodal transportation planning and in the financing of intermodal projects and (4) organization and identification of shared marketing activities for ports in Louisiana that draws upon the case history review of initiatives undertaken by other states as well as the maritime environment specific to the state.

VII.B.2 LOUISIANA'S POTENTIAL NORTH-SOUTH TRADE OPPORTUNITIES

Forecasted trade growth resulting from NAFTA will present both opportunities and challenges to Gulf coast states and their respective ports. Since excess port capacity currently exists in the Gulf region[1], there is expected to be very active competition for new international traffic anticipated. Ports such as Galveston, Houston, New Orleans, Mobile, and Tampa are all considered to play a role of gateways by major Class 1 railroads for their intermodal operations or specialized services such as rail/trailer ferry operations. Smaller Gulf ports, such as Port Bienville in Mississippi, have already benefited from niche market operations with short-sea vessel service to Mexico's Yucatan Peninsula (agricultural products, construction materials, and containers). Service to Puerto Rico from Lake Charles (Crowley Marine) is another niche market example.

Louisiana's extensive port and waterway system, main highway connections to/from population centers, and six major railroads connecting the state to the rest of the U.S. provide a significant strategic advantage for intermodal traffic growth in and through the state. New maritime systems have been identified that can take advantage of the extensive waterway system called the Maritime System of the Americas, which connects the U.S., Canada, and Mexico with Central America, the Caribbean Basin countries and the northern rim of South America.

VII.B.2.a River/Ocean and River Barge Services

A previous study by NPWI has demonstrated that river/ocean (R/O) service using smaller shallow draft vessels (3200 DWT, 250 TEU capacity) capable of navigating inland waterways as well as open water on the Gulf can participate in emerging North American trade opportunities with Mexico. A specialized market exists for higher value general cargo and bulk cargo moving in small lots by river/ocean vessel. This type of service offers the greatest potential savings compared to rail service for direct cargo movements between the lower and middle Mississippi river region up to St. Louis and the central and southern Mexican Gulf coast. Another advantage of this type of service is that it only has to capture a relatively small portion of the large and growing general cargo market to Mexico and Central America to make it a viable alternative. Additionally, R/O services can be tailored to specific logistics needs of particular shippers and commodities. R/O operations would require approximately 150,000 to 180,000 tons per year in both directions to sustain a weekly operating schedule/service.

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[1]See Federal Highway Administration, *Assessment of Border Crossings and Transportation Corridors for North American Trade; Report to Congress*, U.S. Department of Transportation, September 30, 1993, pp. 92-95.

An initial service employing river/ocean vessels was offered out of Memphis, Tennessee by American Marine Express in early 1994. Although the carrier has discontinued operations, other similar services are expected because of the benefits provided, such as avoidance of terminal costs and delays at coastal ports, lower risk of inland transport damage, and single carrier liability. Modern R/O vessels are truly multipurpose and can carry a variety of cargoes on inland waterways or coastal ranges. These vessels require drafts of only 9-15 feet and can therefore be handled by most of Louisiana's small ports. However, ports may need to provide additional facilities or services in order to accommodate these vessels, such as improved land access and connectivity to road/rail systems, storage and reefer facilities, and limited processing infrastructure (docks and sheds). A conceptual choice of alternatives of this type of service compared with rail and intermodal (rail/truck) service is highlighted in Figure VII.1.

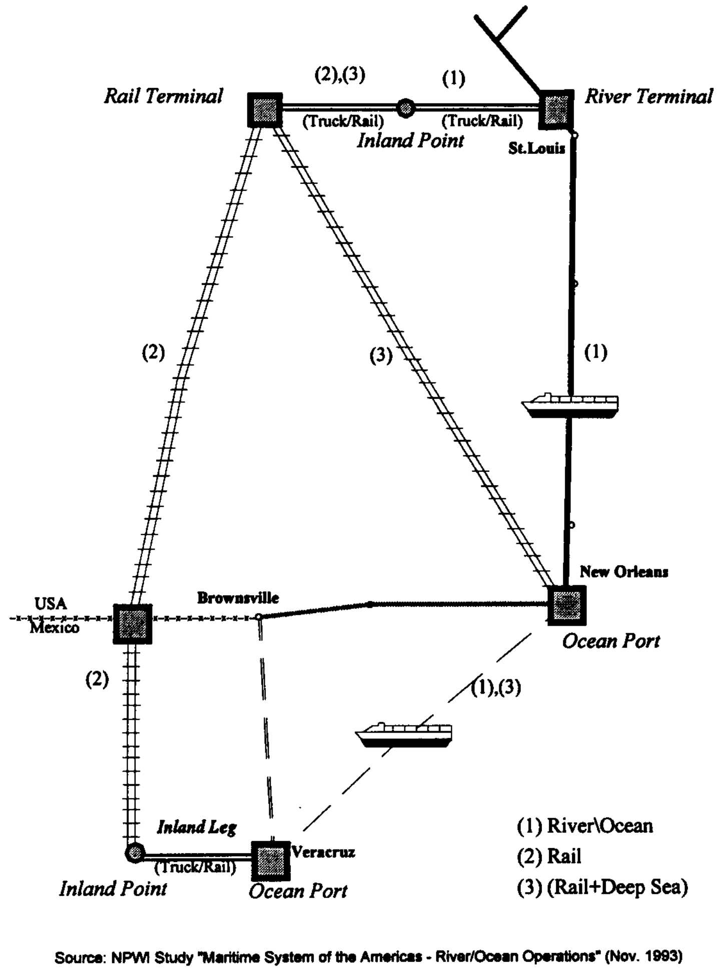

Figure VII.1
Transport Options: General Cargo

The comparative advantages of water transportation are obvious for the traditional bulk sector where typically major bulk consignments of about 15,000 tons or more would be handled by barge with transshipment to bulk vessels in the Gulf. The inland waterway has substantial cost advantages compared to unit train service for a relatively large U.S. and Mexican hinterland. Direct services by river barges across the Gulf of Mexico do not appear to be competitive with conventional barge transshipment to ocean vessel. The sustained viability of the major bulk sector for the Mid-America waterway network in expanding trade with Mexico and other Latin American countries will be determined by what extent these emerging countries become major consumers of U.S. midwest bulk commodities such as corn, wheat, soybeans, rice, iron ore, and chemicals.

The lack of warehousing facilities in Mexico and other Latin American countries combined with "just-in-time" (JIT) inventory management emerging as a desirable practice by many manufacturers, has provided the opportunity for a "floating warehouse" for commodities that could move via barge. Logistics and comparative cost advantages are not well documented, but the concept might make sense for certain shippers with limited or expensive local warehousing options.

VII.B.2.b Short-Sea/Coastal Opportunities

Short-sea/ costal services have relatively short port-to-port routes that may involve multi-port itineraries in a smaller region (i.e. the Gulf coast of Mexico). The amount of cargo generated at each call is small and usually limited to regions close to the port of call (i.e. 100 mile radius). Coastal lines provide direct services that are not part of other longer itineraries as with deep-sea carriers and can call at smaller ports using ship's gear for loading/unloading of cargoes. Lines such as Linea Peninsular operating out of Bienville, Mississippi have targeted agricultural, forest products, and containerized cargoes going to growing areas not well served by land transportation such as Mexico's Yucatan Peninsula.

Louisiana based shippers, such as Boise Cascade Corporation which maintains four active plant facilities in the state (Deridder, Florien, Fisher, and Oakdale regions), are currently using Linea Peninsular to ship liner board, plywood, paper and newsprint related products to the Progreso region of Mexico. Volumes moving by water are currently estimated at 8,000-10,000 tons annually (about 5% of total volume) but are growing rapidly since Boise began water shipments in 1993, according to company management. Two of Boise's largest plant facilities are within 100 miles of Lake Charles, and the others could possibly be served by a coastal port such as Port Fourchon with adequate draft and a strategic Gulf location.

Boise claims to be paying Linea Peninsular approximately $60.00 per metric ton on the water leg from Port Bienville to Progreso and estimates truck costs from their Louisiana plants to Mississippi's Pearlington area to add another $9.00-$10.00 per ton in transportation handling costs. They would certainly consider a closer port of call to their plants in Louisiana if direct short-sea service to Mexico was available from one of the state's ports.

The limited size of most coastal operators generally prevents them from offering coordinated intermodal services that would allow them to significantly expand their cargo and market base. Nevertheless, despite the limited market area potential for individual short-sea services, localized markets can actually be quite large. Cargoes such as steel, forest products, grains, and other dry bulk palletized or containerized cargoes could be targeted for capture from rail or truck modes to short-sea water transportation.

VII.B.2.c Ferry/Water Bridge Service

A specialized form of short-sea service that has been called an intermodal or "water bridge service" has been utilized in trade with Puerto Rico (i.e. notched deck barges, triple-deck trailer barges operating from Jacksonville to San Juan, and integrated tug/barge operations like Crowley out of Lake Charles, LA). Rail ferry service has been available until recently to the Coatzacoalcos region of Mexico from Galveston, Texas. The joint venture between Burlington Northern and Protexa used tandem towing of 2 single deck barges each with capacity of 56 railcars and service speed of 8 knots. The service, discontinued on 10/1/94, had difficulty turning a profit because of its limited initial cargo focus (grain cargoes exclusively). Also, the proposed merger between BN and the Sante Fe railroad provided a land border crossing option to Mexico's population centers not available to BN previously. Mexus Ro-Ro Line officially started in September 1994 to offer bridge service from Houston to the southeastern Mexican port of Tuxpan and has expanded its targeted cargo base to include trailers, tank cars, and non-grain traffic such as chemicals. The chartered RoRo vessels employed by Mexus have 230 trailer capacity, a ramp length of 164 feet, and service speed of around 18 knots. The service is being marketed as a supplement or slightly faster service to Mexico City compared to over-the-road trucking where congestion at land border crossings is an issue.

Trailer ferries are also common for short-sea operations in other U.S. trade routes. Totem Ocean express (TOTE) provides a bi-weekly trailer ferry service between Tacoma, Washington and Anchorage, Alaska. Several trailer services are also offered in Caribbean trade from Philadelphia, Jacksonville, and Lake Charles , but none has focused on serving the Mexican market. Seaboard Marine operates seven RoRo services to various Latin American destinations from Miami and ferry services also exist in Europe (i.e. Viamare, Italy). The formation of trailer/intermodal services, such as Mexus out of Galveston, is an emerging North-South trade opportunity for water transportation linking the U.S. and Mexico over the Gulf.

Providing an intermodal rail/trailer ferry option in Louisiana should be targeted for a larger port (like New Orleans) with excellent rail/road connections. Discussions between New Orleans port officials and the state's administration and legislature have indicated that state financial support would most likely be made available if a major transportation company were to commit to such intermodal services. Preliminary cost modeling by NPWI suggests that the RoRo vessel/ferry could provide intermodal rate savings of about 10% per unit/trailer shipment ($270-$300) for general merchandise cargoes currently moving via land transport modes from the central U.S. to the heavily populated central regions of Mexico (Mexico City, Guadalajara, etc.). This type of savings at comparable service levels with land based transport options would indicate such a service has the potential to generate new volumes of general cargo tonnage for water based modes and ports that are involved.

VII.B.3 PARTNERSHIP INNITIATIVES FOR LOUISIANA'S PORTS

Port facility/market specialization is one way to encourage partnership opportunities. This does not have to be limited to ports within Louisiana. For example, developing a partnership between the Port of New Orleans and the Port of Veracruz, Mexico to implement a cross-Gulf ferry service (port-to-port), with appropriate infrastructure and operations parameters on both ends, would enhance the long run chances of success of this type of service for both ports. Technical assistance to Mexican or other foreign ports that share strategic trade routes, shippers and vessel operators with ports in Louisiana is also possible. Technical assistance programs as a partnership strategy are currently done by other ports such as Oakland, Baltimore, Philadelphia, Charleston, Virginia, and Miami.

After years of independent actions and activities by individual ports throughout the state, the Ports Association of Louisiana, which includes more than twenty of the state's deep and shallow draft ports, is pushing for cooperation among all state ports. Collectively, the state's port network has been estimated to provide approximately 75,000 jobs directly and indirectly to Louisiana's state economy.[2] Adequate and proper funding of port projects will require port partnerships and perhaps even formal agreements that recognize regionally specific goals and objectives of the state's ports. The experiences of other states should provide some useful examples, presented for review in Appendix 7.

There are forty five separate port commissions/districts that have been created in Louisiana as of 1994. A summary of these port entities and their respective enabling legislative references are summarized in Table VII.1 There have been efforts to promote the state's overall maritime interests through the "Ship Louisiana " campaign targeted to corporate and potential maritime users. A previous study by the Institute has also indicated a significant potential overlap in port hinterlands, especially with the state's numerous shallow draft ports.[3] Figure VII.2 provides some examples of hypothetical regional overlapping hinterlands based upon each operational shallow draft port's proportional share of the state's total area. Under certain circumstances, collaboration between ports that have regional interests and perhaps overlapping market areas should be encouraged to help identify common partnership opportunities and avoid potential duplication of facilities.

Similar to the state of Washington, a more specific group of ports sharing locational and operational interests could be created formally or informally at first. The Ports Association of Louisiana (PAL) could focus its agenda on issues of statewide concern much like the Washington Public Ports Association (WPPA) does in cooperation with the more regional Puget Sound Port Association. A "letter of intent" or formal agreement between members seems

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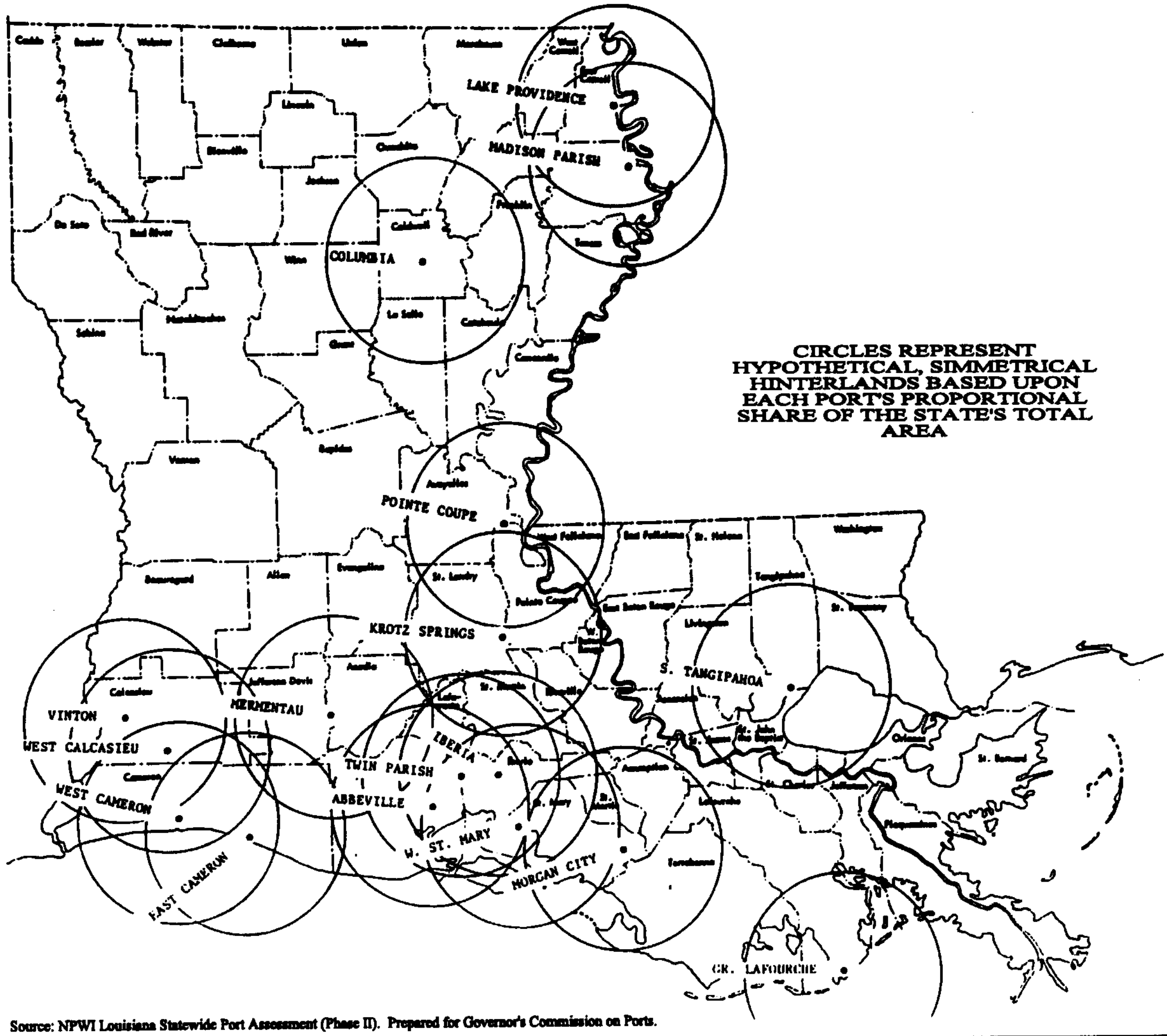
[2]*Daily Shipping Guide*, PAL (July 1994).

[3]National Ports and Waterways Institute, Louisiana State University, *Louisiana Statewide Ports Assessment*, Governor's Study Commission on Ports Phase II, 1986.

Table VII.2
Creation of Ports in Louisiana

Creating Legislation		Entity
ACT 1896,	No. 70	Board of Commissioners of the Port of New Orleans
ACT 1924,	No. 195	Lake Charles Harbor and Terminal District
ACT 1938,	No. 128	Port of Iberia District
	No. 254	Jennings Navigation District
ACT 1952,	No. 9	Greater Baton Rouge Port Commission
	No. 530	Morgan City Harbor and Terminal District
ACT 1954,	No. 253	Abbeville Harbor and Terminal District
	No. 567	Plaquemines Parish Port Authority
ACT 1956,	No. 190	Greater Ouachita Port Commission
	No. 228	Greater Krotz Springs Port Commission
	No. 466	Vinton Harbor and Terminal District
ACT 1958,	No. 450	Lake Providence Port Commission
ACT 1960,	No. 222	Greater Lafourche Port Commission
	No. 228	St. Bernard Port, Harbor and Terminal District
	No. 331	Avoyelles Parish Port Commission
	No. 447	Concordia Parish Port Commission
ACT 1962,	No. 239	Columbia Port Commission
ACT 1963,	No. 75	St. Tammany Parish Port Commission
	No. 131	Greater Jefferson Port Commission
	No. 485	Terreboune Port Commission
	No. 485	West Calcasieu Port, Harbor and Terminal District
ACT 1965,	No. 17	Red River Waterway District
ACT 1966,	No. 49	Grant Parish Port Commission
	No. 49	Tensas Parish Port Commission
	No. 369	Madison Parish Port Commission
	No. 446	South Tangipahoa Parish Port Commission
ACT 1967,	No. 23	Pointe Coupee Port, Harbor and Terminal District
ACT 1968,	No. 395	East Cameron Port Commission
	No. 396	West Cameron Port Commission
ACT 1970,	No. 92	Union Parish Port Commission
	No. 132	Morehouse Parish Port Commission
ACT 1972,	No. 444	Offshore Terminal Authority
ACT 1974,	No. 604	West St. Mary Parish Port, Harbor and Terminal District
ACT 1975,	No. 40	Natchitoches Parish Port Commission
	No. 65	South Louisiana Port Commission
	No. 66	Parishes Caddo-BossierPort Commission
	No. 294	Red River Parish Port Commission
	No. 427	Rapides Parish Port Commission
ACT 1976,	No. 196	Mermantau River Harbor and Terminal District
ACT 1977,	No. 203	Twin Parish Port District
ACT 1978,	No. 167	Assumption Parish Port Commission
ACT 1981,	No. 10*	Vidalia Port Commission
	No. 864	Grand Isle Port Commission
ACT 1985,	No. 471	Washington Parish Port Commission
ACT 1985,	No. 514	Catahoula port Commission

*Extraordinary Session
Source: Compiled by LSU Ports and Waterways Institute from Title 34 of Louisiana Revised Statutes (LSA - R. S. 34:1, et seq).



Source: NPWI Louisiana Statewide Port Assessment (Phase II). Prepared for Governor's Commission on Ports.

Figure VII.2
Louisiana Operational Shallow-Draft Ports and Possible Overlapping Hinterlands

premature for Louisiana's ports at this point but formalizing goals, commitments, and marketing strategies with regional working agendas seems like the right direction to follow. Port authorities/commissions with potential overlapping hinterlands such as West St. Mary, New Iberia, Morgan City, Krotz Springs, and others along with the state's deep-draft ports such as New Orleans, Baton Rouge, and Lake Charles should consider forming regional groups to cost share in marketing the diversity of the state's port facilities, as well as identifying cooperative projects that could avoid potential duplication of facilities or underutilized current port capacities. These types of efforts represent collaborative rather than consolidation initiatives, since each port can and should pursue cargo opportunities that can be attracted to their location/facility. Examples of regionalization might be: Lower Mississippi, inland river ports

(Atchafalaya/Red/Upper Mississippi), coastal region, etc. Formalized agreements might make sense after a reasonable period of time and success in promoting the ***diversity of the port region***.

Alternatively, the state ports could take the Columbia River integrated commodity/port approach and look for opportunities to attract or keep existing port users within the Lower Mississippi region. This might involve not only marketing the region but also determining which port district is in the best current or future position to handle the identified port customer similar to the Portland and Vancouver case example. Ports with duplicate facilities might actually be asked to close or redevelop facilities and be appropriately compensated for those actions through analysis of revenues potentially lost over a given period of time. In fact, the ports involved with the Columbia River System are considering such approaches at this time according to port staff members of participating ports.

Reduced labor costs, efficiency in land usage and storage costs, or lower overall transportation costs because of the location of the port utilized in relation to final cargo destination might be objectives to be achieved for regional cooperation between smaller and larger ports such as seen in Maryland and Georgia. Sharing data bases such as the Journal of Commerce Port Import/Export Reporting System (PIERS) and perhaps sharing the cost of PIERS subscription based upon port revenues or some other proportional parameters seems like another possible regional initiative. Technical assistance and marketing support to smaller ports from larger ports like New Orleans is already occurring on a limited basis but could be more regularly achieved through regional port associations or port partnership agreements such as those developed by Columbia River ports.

An annual or biannual facilities directory of cargo handling capabilities that provides necessary port and infrastructure details such as water depth alongside the berth(s), controlling channel depth, specialized equipment, cargo handling productivity rates, infrastructure limitations such as air draft or terminal capacity, liner or semi-liner services calling the port, area industry, and other relevant factors should be compiled and updated regularly with color maps for easy reference. Such a directory would benefit current and potential users of Louisiana's ports in planning which facilities are most appropriate for their cargoes and shipping requirements, and has in fact been requested by both shippers and transportation service providers in the past. Other states' ports have even shared such expenses with area industry and merchant groups or, as possible in Louisiana's case, perhaps with local/regional utility groups who have already expressed interest in such joint initiatives with PAL. Matching Federal grants were obtained for a similar initiative in the Columbia River System.

Broader economic development and cargo agendas may also lead to specific cooperative port projects. Oil and gas contacts and customers served over the years in Southern Louisiana (i.e. by Port Fourchon and others) could be valuable in attracting fabricators and threaders of steel pipe, tube, and sheet metal products that currently are located primarily in Houston. New Orleans could be working on such an initiative with these oil and gas contacts to enhance its already growing success in handling steel and metal related products. Similarly, New Orleans port contacts with container shippers might prove valuable to a smaller port like Port Fourchon seeking container-on-barge "floating warehouse" opportunities because of its strategic location on the Gulf for serving limited but niche markets. Attracting industries that could establish regional distribution centers in Louisiana to support Latin American trade growth in commodities such as forest products, clothing/apparel, agricultural products, and medical/dental equipment would contribute directly to increased general cargo activity processed through the state's port system. Port and economic development marketing coordination is necessary for this broader regional agenda to be successful.

Smaller ports often may not have the technical staff or the professional liaison/contacts to fully evaluate or implement a detailed proposed project in a timely manner. Larger ports in Louisiana might be in a position to better evaluate cargo flows and trade lane data, engineering specifications, facility utilization estimates, cost proposals, and other related project or opportunity details. Benefits of such alliances have been demonstrated in other states such as Maryland (Baltimore and Cambridge ports) and Washington (Puget Sound Port Group). Technical support has been provided by New Orleans to some of the smaller port members of PAL on an *ad hoc* basis, but a more formalized arrangement could prove useful to institutionalizing such activities. Combining capabilities, as demonstrated by the Portland/Vancouver example, might make a difference in retaining certain cargo opportunities for the region and state.

Cargo pooling initiatives have been undertaken by the Port of Baltimore as a value added service provided for existing and potential smaller shippers using the port. A similar process of selection of a professional cargo consolidator and joint venture arrangement with a port in Louisiana could be started. Port officials in New Orleans began talks about such an initiative some time ago, but the opportunity has not been pursued recently.

Port cooperation might identify several ways to assist shippers or steamship lines that would not be feasible or timely at only one port. Conceptual or common water transportation links such as the Maritime System of the Americas (MSA) need to be evaluated from Louisiana's competitive perspective. Specific maritime projects in the MSA region could also be pursued jointly, such as a cross-Gulf short sea trailer ferry service to Mexico which might involve Mexican Gulf ports such as Veracruz or Progreso with certain Louisiana ports.

VII.B.4 INSTITUTIONAL ISSUES

VII.B.4.a Impediments to Water Transportation

A number of additional institutional issues that could potentially affect the competitiveness of Louisiana's port system were identified. Louisiana's continuing efforts to induce greater cargo activity through its ports will likely uncover certain constraints that need to be mitigated. In the previously cited example of a potential opportunity to induce a trailer ferry service to Mexico from a Louisiana port, cost efficiencies can be maximized if customs inspections occur during the period between cargo arrival at the terminal and loading onto the vessel. Such initiatives are being evaluated by a U.S./Mexican government task force set up under NAFTA treaty initiatives established in 1994. This suggests that Mexican Customs officials would need to open an office for inspection in Louisiana (probably New Orleans) and U.S. Customs would require a parallel operation in Mexico. Additionally, the ferry system's viability and cost effectiveness can be enhanced if reduced crew sizes are permitted under certain conditions by the U.S. Coast Guard, which has final regulatory authority over such issues. The nature of these institutional issues requires a cooperative effort that adequately represents the state's port and maritime interests. This effort will have to be created and represented by a sufficient number of influential representatives to pursue and effect changes that will encompass safety, security, drug interdiction and law enforcement issues.

VII.B.4.b Institutional Relationship of Ports in Intermodal Planning

The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 defines the policy to "provide for improved access to ports and airports, the Nation's link to world commerce." This federal legislation requires that states and metropolitan planning organizations (MPOs) include port access needs in their transportation planning process. This means that state departments of transportation and MPOs will have greater responsibility and influence over the decisions on investment priorities. Ports in Louisiana have focused funding requirements at the state level through the Port Priority Program; however, MPOs will have a greater role to play in transportation planning in the future including funding issues related to port access. In addition to communicating port access needs to state officials, ports in urban areas will also have to present their requirements to metropolitan planning groups. The Port of New Orleans is already doing this through its representation on the Transportation Advisory Council, which serves as the MPO for the greater New Orleans region.

VII.B.4.c Organization and Identification of Shared Marketing Activities

Interviews with various maritime and industry officials have indicated a desire for more coordinated intermodal and port marketing efforts that promote integrated service packages as well as the diversity of the state's port handling capabilities. The "Ship Louisiana Campaign", the first statewide coordinated effort by ports, is most often cited as the type of regional or shared marketing effort that needs duplication and expansion. Examples of expanded actions include: (1) a more formalized process for exchange of facilities and operations information between ports, (2) an updated inventory of port facilities (used as a marketing piece) that reflects recent port or intermodal road/rail improvements/ additions as well as restrictions such as channel depth, air draft restrictions with regional bridges, etc., and (3) joint trade or marketing missions to strategic trading partners or regions.

Since most ports do not have the manpower or the funds available for organizing these types of activities a coordinating/liaison or "intermodal specialist" position within a state agency, e.g. DOTD has been suggested as one alternative to address items one and two above. This position would assist with statewide information collection, compilation, and distribution of materials, maps, and requests for information received concerning the state's port capabilities. On going activities might also include the identification and monitoring of products being produced in Louisiana, but shipped out through neighboring state ports. Such ongoing monitoring might have identified the previously mentioned case of Boise Cascade shipping forest products to Mexico from a Mississippi port. Investigation of intermodal and public port terminal access and related connection "switching fees" by rail lines could be another project example undertaken by this position.

Enhancing public awareness of the importance of the port industry to the state and its citizens and arranging interactions with the private sector could also be ongoing activities supported by the existing staff at Department of Economic Development. Assistance with attracting firms in targeted industries, such as the steel processing (i.e. threaders, pickelers, etc.) and fabrication industries (oil and gas related) as well as the paper and poultry industries producing tonnage for ports in the state would also be recommended shared activities with the state's ports and DED.

Direct marketing and "sales tool" investments by DED in trade show materials or a video presentation on the state's cargo handling capabilities in cooperation with PAL and regional port groups might also be considered as a follow up to the Ship Louisiana campaign. Expanded annual maritime conferences currently conducted by PAL, are another follow-up activity that could be jointly supported and promoted by DOTD, DED, State Chamber of Commerce, and the state's other maritime, educational, economic development, and transportation interests.

VII.C PORT/INTERMODAL CAPITAL FINANCE PRACTICES

A number of "maritime" states were contacted to get a general description of their capital financing practices for transportation construction programs. States contacted include Virginia, Florida, Washington, Minnesota, Oregon, and Wisconsin. The intent was to identify their approach towards evaluating and financing transportation projects, and their cost sharing policies given that more than one party or mode will benefit from the project. Additionally, in those cases where states have established separate port funds, officials were queried about how they might finance intermodal projects out of established transportation trust funds, port trust funds (for states having dedicated port funding programs), or through a new fund created solely for intermodal projects. Finally, states were asked about their financing policies for future intermodal projects and how they envision the prioritization of projects may occur. It should be emphasized that the vast majority of the states questioned indicated that the intermodal concept is still so new to them that no decision has been made on a standard policy for financing or evaluating the merits of intermodal projects or, in fact, if they should be treated any differently than highway construction program projects. This report summarizes the findings from the interviews. More detailed summaries of the interviews are presented in subsequent pages.

VII.C.1 DEDICATED CONSTRUCTION PROGRAMS

As shown in Table VII.3, the majority of states interviewed have established port construction programs similar to Louisiana's, where funds have been set aside for the port sector. These states include Virginia, Florida, Oregon, and Wisconsin. Minnesota has attempted to set up a revolving loan program, which has never been funded by the legislature, probably because ports would rather proceed through the legislative process and because even if the program was funded, there is not enough incentive to encourage ports to go the loan route. None of the states surveyed has instituted intermodal capital financing programs, although this may change after the states have completed their current intermodal planning efforts mandated by ISTEA. Washington and Wisconsin, for example, are exploring the possibility of setting aside special funding for intermodal projects.

Table VII.3
State Dedicated Construction Programs

State	*Dedicated port construction program?*	*Dedicated intermodal construction program?*
Florida	yes	no
Minnesota	no	no
Oregon	yes	no
Virginia	yes	no
Washington	no	no
Wisconsin	yes	no

All of the states having a dedicated port construction program have a cost share requirement from non-state sources, with the exception of Oregon (although cost sharing is encouraged). Generally, the cost-share can come from port, local government, federal, or private sector sources. The non-state cost share requirement is either 20% (Wisconsin) or 50% (Florida, Virginia), although Wisconsin has an additional provision in those cases where federal funds are also received (e.g. for dredging projects), in which case the cost share is reduced to 50% of the non-federal share.

VII.C.2 CAPITAL PROJECTS EVALUATION

Of the four states providing dedicated port trust funds, only three invoke a quantitative evaluation methodology for determining priorities for financing (see Table VII.4). None provides for as thorough an evaluation as what Louisiana requires, although Wisconsin invokes a more-detailed methodology that focuses on benefit cost analysis and incorporates criteria related to project urgency, project type, and cargo throughput.

None of the states uses a quantitative methodology for assessing intermodal projects, unless they are submitted as projects under port trust funds or as part of the highway construction program.

Table VII.4
Evaluation of Projects for State Funding

State	*Formal Quantitative Evaluation for Port Projects?*	*Formal Quantitative Evaluation for Intermodal Projects?*
Florida*	no	no
Minnesota	no	no
Oregon*	yes	no
Virginia*	yes	no
Washington	no	no
Wisconsin*	yes	no

*States having dedicated port funding programs.

Intermodal projects receiving federal funds have been treated in the same manner as highway projects receiving federal funds, using the Metropolitan Planning Organization planning process for identifying transportation priorities; this process tends to use a screening methodology based on certain criteria, and in some cases the criteria are given weighted factors for determining their priority. Washington has begun to place greater priority on intermodal projects than single mode ones by awarding "bonus" points for intermodal projects. Still, the prioritization of projects via the MPO route is considered more an exercise of consensus building than a purely objective one. Generally, in cases where federal funding is envisioned, none of the processes examined provides for an economic or financial evaluation of the proposed project.

Although none of the states has developed an analytical methodology specifically for intermodal projects, Washington intends to go in this direction. Over the next two years, the state will be developing its Multimodal Tradeoff Analysis Process to determine intermodal priorities versus projects involving single modes. No detailed information is yet available on this process.

The review of the evaluation process used in the states underscores an issue related to the state's ability to finance an intermodal project, regardless of its financial and economic viability. The majority of states reviewed believe that for those intermodal projects where the use of federal funds is envisioned, the project will have to proceed through the MPO planning process, just as other transportation projects. Because this planning process generally has a 5-year planning horizon, it will be virtually impossible for intermodal projects to be financed in the near future if project authorization is restricted to this process. As described later, some states do provide for alternatives, but only in the case where federal funds are not to be used. This places greater stress on the states to develop additional financing programs from their own resources, generally without federal funds, unless the federal government creates a dedicated intermodal program similar to the highway/bridge construction program.

VII.C.3 COST SHARING PRACTICES

Of the four states having dedicated port construction programs, three specifically have a cost share requirement from the beneficiary(ies) of the project (see Table VII.5). It should be noted that there is a semantic consideration when examining the cost share issue. Cost sharing percentages range from 20% to 50% from the project's beneficiary. While in some states there may not be any specified legal requirement for cost sharing in the legislation or in written policy, cost sharing will still be expected from the funding agency; the final proportion is frequently a result of negotiation as well as funding ability from state resources.

Table VII.5
State Cost Sharing Requirements for Capital Projects

State	*Cost Share Required for Port Projects?*	*Cost Share Required for Intermodal Projects?*
Florida*	yes	yes[1]/no[2]
Minnesota	no	yes[1]/no[2]
Oregon*	no	yes[1]/no[2]
Virginia*	no[3]/yes[4]	yes[1]/no[2]
Washington	no	yes[1]/no[2]
Wisconsin*	yes	yes[1]/no[2]

*States having dedicated port funding programs.
[1]if federal project
[2]if state project
[3]in the case of the Port Commonwealth Fund, which funds VPA projects only
[4]in the case of the Aid to Local Ports Program

The majority of states surveyed expect that in the future, intermodal projects will be treated in the same manner as highway projects, which normally use a cost-share arrangement, particularly if the project envisions federal funds. The general cost-share rule is for a maximum of 80 percent federal financing, and the remaining 20 percent to be shared by the state and/or local jurisdictions (including the port).

Irrespective of future intermodal policy, the review here indicates that there are many examples of cost sharing on intermodal projects. The Tchoupatoulas Corridor in New Orleans, the Hampton Boulevard project in Norfolk, Virginia, and the APL terminal expansion project in Seattle all have had or intend to have cost-share financing for construction. Further, even in those cases where federal funds may not be available, the state (assuming it is to share in the cost) will always try to secure cost sharing arrangements with the parties affected by the project, including the private sector. The Hampton Boulevard project in Norfolk, Virginia is an example of this, where the port and the state will share in the financing costs. The state expects that the city and perhaps the railroad will also share in the costs. This seems to be the rule, rather than the exception: no example was found of only the port covering the cost of intermodal improvements, at least in the case of land access routes. Detailed review of other states' practices in financing port and intermodal development projects is presented in Appendix 8.

VII.C.4 FINANCING OF INTERMODAL PROJECTS

Intermodalism has forced previously independent transportation agencies and funding programs to look at overlapping geographic, infrastructural, and budget areas and find ways to cost-share needed transportation solutions. The federal ISTEA legislation gives discretionary authority to

U.S. DOT to help fund intermodal projects. An example of such an approach is the previously cited Alameda Corridor project in California, which will provide improved rail and highway access to the ports of Los Angeles and Long Beach, because the planning and funding requirements were considered *driven by the needs of the regional transportation system as a whole.* ISTEA funding and eligibility for port related projects in Louisiana should be pursued before the 1997 scheduled refunding date for ISTEA. This would be particularly appropriate for a cross-Gulf water ferry project that could be eligible for funding under ISTEA as an extension of the U.S. federal highway system.

The current state provision for funding transportation infrastructure improvements is through Louisiana's Transportation Trust Fund and other sources such as Capital Outlay, General Revenue Bonds, etc. The use of these funds emphasizes equitable rationalization of investments to avoid unnecessary duplication. However, the various funding mechanisms have narrow interpretations along traditional modal lines. The Trust Fund and most of the other funding programs are divided between individual modes of transportation, e.g. Port Priority Program, Highway Priority Program, Rural Road Program etc.

Intermodal projects are clearly at a disadvantage within this system of limited resources. Intermodal projects can only be funded if one of the modes includes such a project in its investment priority program. However, the chances of this occurring is lessened given that the priority of an intermodal project will likely be restricted to only the particular benefits defined and accountable under the priorities of each particular mode and investment program. In reality, intermodal projects will almost invariably have higher overall transportation benefits for the State if all of the associated modes and users are taken into account for the various sectors affected.

One possible remedy for this fractured approach to transportation investment financing would be to set up a separate fund designated for projects defined as "intermodal" in scope. However, this approach would require new sources of funding that may be difficult to create within LADOTD given the large potential amounts of funding required.

If a separate intermodal fund is not available then another approach for funding intermodal projects would be to establish cost sharing mechanisms between highway, rural roads, and port priority programs. A prerequisite of the process is development of methodology to rank projects in accordance with objective indicators reflecting the project's economic and social benefits to the State. Such methodology exists and is being applied for the Port Priority Program. Similar assessments need to be developed for other elements of state sponsored financing. This is essential, first, to bring better and more effective allocation of public funds and second, to allow cost-sharing financing of intermodal projects.

Conceptually, the process of ranking intermodal projects would be based on social costs and benefits much like other public resource allocations. Projects would be identified as intermodal in scope and would be submitted only if all benefiting parties agreed to share in the total costs.

Intermodal projects would be ranked in importance by objective criteria (cost benefit, net present value or internal rate of return) and factored into existing port priority and highway priority programs along with existing rankings of other capital projects being evaluated. Intermodal projects deemed worthy of development and implementation because of joint or combined benefits, e.g. freight and passenger related, and overall merit to the state, would be cost shared by both highway and port capital investment programs based upon an allocation of benefits. Benefits would have to be defined for each contributing sector. Projects would have to show a demonstrated public benefit, have the support of all sponsoring public programs in proportion to the benefits received, and not unduly disturb the competitive balance within the private sector.

VII.D PORTS AND WATERWAYS PROJECTS FINANCING REQUIREMENTS

This report identified certain programmatic areas that the state may initiate to strengthen its commitment towards its ports and waterways sector. These relate primarily to coordinating and expanding market initiatives that would benefit the state's ports and waterways sector while at the same time preserving the diversity and independence of individual ports. Further, developing a state capability to adequately coordinate intermodal issues and rationalize state investments is viewed as a priority.

The extended outreach program described in Chapter II identified a number of areas pertaining to expanding the capacity of some of the waterway transshipment facilities in the state as well as the state's role in this endeavor. Historically state involvement in waterway transportation has been exclusively related to local terminals and facilities. Non-federal participation in navigation has been limited to provision of berth access channel connections to federally constructed and maintained public use navigation channels. However, recent emerging trends in federal-state responsibilities for water resources programs pertaining to navigation have necessitated non-federal financial participation in various aspects of waterway investments. Accordingly, non-federal entities, primarily states and local areas, have begun to assume responsibility for the non-federal share of cost-sharing requirements for public use waterway improvement projects. It is anticipated that mandatory non-federal participation in the waterway sector will continue and perhaps increase in magnitude of resources and scope of applications.

The emerging state and local (non-federal sector) involvement in waterway investment can be expected to increase. This is particularly important for Louisiana. Its waterways are considered critical links in its intermodal transportation system. Areas identified from the outreach effort are concerned primarily with a number of issues related to ways in which waterway performance could be improved. These include investigation of a deeper channel or contiguous channel segments on the Lower Mississippi between the Gulf of Mexico and Baton Rouge, bank erosion mitigation on the MR-GO, and providing deep-draft capacity in Inner Harbor Navigation Canal Lock in New Orleans.

In 1985, Congress authorized deepening the Mississippi River to 55 feet from the Gulf of Mexico to Baton Rouge to allow the use of larger vessels for the import and export of bulk commodities. Phase I of the project., which provided a 45-foot channel up the river to Donaldsonville, was completed in 1988 at a cost of $46.1 million. The state of Louisiana's share of this cost was $17.6 million. Phase II of the project, completed in December, 1994, extended the 45-foot channel to Baton Rouge at an estimated cost of $9.3 million, with the State's share being $3.1 million (25% of the construction cost). This project was a joint effort of the U.S. Army Corps of Engineers (COE) and the Louisiana Department of Transportation and Development. Future deepening of the navigation channel to the authorized 55-foot depth will depend upon a decision by the State to share in the costs of the project and of subsequent maintenance dredging. The COE is assessing the feasibility of this additional deepening, and of several intermediate alternatives (including a 50-foot channel, varying segments of the river, etc.). Costs of this study are borne by the COE. The study will identify the federal and state cost sharing responsibilities for any further deepening. LDOTD will assist in reviewing the findings of this study, and if the state Legislature constructed in 1968.

The Mississippi River Gulf Outlet (MR-GO) constructed in 1968, provides the only access for oceangoing vessels to the Port of New Orleans' tidewater maritime terminals (including its principal intermodal container transfer facilities). Severe erosion and resulting loss of vegetated wetlands are occurring adjacent to the non-leveed banks of the MR-GO. Much of the eroded material is deposited within the channel, requiring periodic removal to maintain the draft needed for navigation. If no action is taken, erosion is expected to continue, resulting in marsh loss and higher channel maintenance costs. A feasibility study has been proposed by the COE to determine the best solution to reduce bank erosion along the MR-GO. The study will provide an objective analysis of potential tradeoffs between environmental restoration and navigation outputs, and will consider, among other issues, alternative means and locations for permanent dikes, beneficial use of dredged material, vessel speed limits and restrictions, and possibly even closure of the MR-GO to commercial navigation. The COE has determined that a non-Federal (state or local) sponsor must be found to share, at 50%, in the estimated $2.34 million cost of the proposed feasibility study. The final report would include recommendations on whether Federal participation in any actions considered is appropriate, and delineate the extent of non-Federal cost-sharing that would be required.

The COE is also considering replacement of the 72-year-old lock on the Inner Harbor Navigation Canal (IHNC) at New Orleans. This lock links the Mississippi River with the MR-GO and the Gulf Intracoastal Waterway. Delays to barge movements through the lock average 11 hours and have extended as much as 36 hour. The lock is located within a densely developed residential, commercial and industrial area within the City of New Orleans. Three vital roadway crossings and one railroad crossing, of the IHNC are sited in the immediate vicinity of the lock and will be affected by the proposed reconstruction. Impacts of lock replacement on nearby land uses and residents, and appropriate mitigation measures, are being carefully considered. If Congress authorizes replacement of the lock, Federal sponsors will cover all costs related to a new shallow draft (22 feet deep) project. The Port of New Orleans, as the designated local sponsor of the planned project, has indicated an interest in providing for deep draft vessels to transit the new lock and connecting segments of the IHNC, so that oceangoing vessels can access the Port's tidewater terminals from the Mississippi River. The COE has estimated that the added cost of this alternative is $80 million and has stated that this cost would have to be bome from non-Federal (local and state) sources. Because the Port of New Orleans will be credited for the value of its property, which would be used if the shallow draft replacement of the lock is authorized, the non-Federal financial burden for the deep draft option will be less than $80 million.

Analysis of transportation benefits must be performed to support a decision by the Port and the state to commit to the deep draft lock replacement and adjacent channels. Consideration of this action will be affected by the outcome of the MR-GO feasibility study described above as it affects future access for oceangoing vessels to the Port's tidewater maritime terminals. If, for example, closure of the MR-GO is determined to be in the public interest then either deep draft vessel access will have to be provided via the IHN, or the maritime terminals located in the Port's tidewater area, and all of their landside access infrastructure, will have to be relocated in order to retain the existing intermodal transportation capacity. A feasibility study of the deep draft IHNC lock option considering both scenarios with and without MR-GO access, is estimated to cost approximately $ 0.75 million. It is recommended that LDOTD and the Port of New Orleans share this cost equally.

The capacity analysis of intermodal marine transshipment facilities in Chapter IV indicated that existing coal, grain, general cargo (breakbulk), and container terminals can accommodate demand through the year 2000. Long-range demand projections through the year 2020, however, exceed facility capacity, with expected shortages in virtually all terminal types for both bulk and packaged cargoes.

Louisiana's coal terminals have a capacity utilization rate of about 43 percent (1990), permitting them to accommodate demand to and beyond the year 2010. Therefore, no foreseeable expansion is required for coal transshipments associated with the export sector (including domestic markets such as Florida) over the planning horizon of this investigation (2020). However, possible increases in demand for import coal which although difficult to assess at this time, if realized may require some modification to the existing export-oriented terminals in the form of new ship unloaders and barge loaders.

The capacity utilization rate for Louisiana's major grain export terminals is over 70 percent (1990). Demand and capacity are projected to be at equilibrium about the year 2000. Several elevators will need to increase capacity, primarily through expanding storage and installation of higher volume ship loaders and barge unloaders. Needed capacity expansion notwithstanding, the vast majority of grain and coal terminals are privately owned and therefore expanded capabilities in these terminals would likely continue to be financed by the private sector.

The majority of public port investments in Louisiana is concerned with general cargo (breakbulk) and container facilities. Needed investment in the last five years has come primarily from the port authority and/or from the state's Transportation Trust Fund and Port Priorities Program. Private investment in such facilities notwithstanding, the public sector is expected to continue to finance any needed capital requirements for these facilities. Although existing capacity of these facilities is sufficient to meet demand to the year 2020, shorter term maintenance and rehabilitation requirements can be expected. Such projects can be initiated and completed in a specified planning horizon. On the other hand, major new "greenfield" port projects where no facilities currently exist have very long periods of development and uncertainty, particularly with respect to environmental issues. Consequently, it is difficult to specify these types of investment with regard to location and timing.

There are also some strategic opportunities that may require capital investment if these opportunities are to be realized. For example, this report addresses the possible need for a deep-water terminal to accommodate the European trade's container vessels. The trailer ferry that would serve the U.S./Mexico trades would require shore facility and land access investments, while some facilities, particularly for the shallow-draft ports, may be required to capture the fresh produce trade from Central America. The nature of uncertainty related to these opportunities does not permit the delineation of specific projects within this scope of work.

Investment requirements at particular ports will vary both with respect to the time frames as well as the specificity of the projects under consideration. Future Louisiana public port intermodal investment requirements have been developed for existing and desired levels of investments for the period the 1995 to 2000 under three scenarios: low growth (existing investment level without TIME program), trend and high growth. In this period the emphasis will be on preservation and rehabilitation of existing facilities as well as on rationalizations of operations to increase efficiency and to reduce costs at existing terminals. Only modest additional infrastructure development for the purpose of increased capacity is envisioned. At the same time, it is assumed that investments will be necessary to capture new opportunities and maintain competitive positions of Louisiana ports in terms of innovative technology and services offered.

It is anticipated that the investment trends in the period 1995-2000 would be continued for the period 2000 to 2020 although possibly reflecting different assortments of projects with respect to both rehabilitation and expansion of facilities. Investment in infrastructure to expand capacity will take a higher proportion in this latter period,

The summary table below presents fund which have been or will be committed for port development programs. Actual disbursement of funds may overlap the time periods. It also should be noted that TIMED Program funds currently provided the Port of New Orleans (begun in 1990, @ $20M annually) will be discontinued in 1995. It is assumed that the Port of New Orleans will continue the current level of funding from its own and private resources. To provide sufficient funding of projects envisioned by the Port but not covered by the TIMED Program, the Port will need an additional $8M annually from the State in the "Trend" option plan. The "High Growth" option differs in its ability to provide sufficient response to potential market oppurtunities presented e.g., by NAFTA market developments, or contribution to Federal projects.

Table VII.6
Recommended Ports and Waterways Sector Programs and Financing Requirements

Recommended Programs	Estimated Financing Requirements
Programmatic Funding	
- *Develop North/South Trade Opportunities*	$100,000/year
- *Regional Public Port Marketing Program*	$150,000/year
- *Port-Intermodal services Directory*	$20,000/year
- *Ship Louisiana Campaign Followup*	$100,000/year
- *Establishing State Intermodal Transportation Specialist Position*	$100,000/year
- *Joint Marketing Missions/Trips*	$30,000/year
- *Cargo Pooling Initiative*	none/negligible
Infrastructure Financing (studies)	
- *Public Port Landside Access Cost Sharing Methodology*	$100,000 (one time cost)
- *55-foot Channel Feasibility Study between the Gulf of Mexico and Baton Rouge*	$1,850,000 (one time cost)[1]
- *MRGO Bank Erosion Feasibility Study*	$2,340,000 (one time cost)[2]
- *Deep-Draft Capacity Feasibility Study for Inner Harbor Navigation Canal Lock*	$750,000 (one time cost)[1]
- *Feasibility Studies for Improvements to Other Waterways of State Interest*	$750,000[3]

Infrastructure Financing (capital projects)	1990-1995 Current Port Investment (millions)			1995-2000 Trend Future Port Investment (millions)			1995-2020 High Future Port Investment (millions)		
	State	*Port*	*Total*	*State*	*Port*	*Total*	*State*	*Port*	*Total*
- New Orleans	20	20	40	8	20	28	20	20	40
- Other Ports	15	5*	20	16.5	5.5*	22	25	7*	32
	35	25	60	24.5	25.5	50	45	27	72

Notes
[1]Total study cost includes both federal and state share; state share is 50%.
[2]Total study cost includes federal ($1.17 million), state ($0.585 million), and port ($0.585) shares.
[3]Total study cut includes federal, if any, state and local shares; state share is 50%.
* Assumes ports to participate in the Port Priority Program at the minimum level required (25% of total investment).

The proposed capital investments by public ports are for an amalgamation of different purposes with respect to existing facilities (rehabilitation or expansion) as well as new capacity. The precise distinctions between these categories vary for cargoes, ports as well as investment opportunities and can change in response to market developments. Therefore, the investment requirements shown below do not represent a detailed list of specific projects but rather a consensus of future overall requirements among ports. This consensus may change as the composition of rehabilitation, expansion and new market opportunities fluctuates in response to specific developments.

In total, annual investments in public ports will average approximately between $40 million for a low growth scenario (current level of investments without $20 million for Port of New Orleans from TIME Program), to $50 million for trend scenario and to $72 million for high growth scenario.

The recommended expenditures and investments for the ports and waterways sector are presented in the following table. They are placed into two categories: 1) programmatic funding, encompassing programs designed to enhance or strengthen the state's and sector's marketing and institutional commitments towards the sector, and 2) infrastructure, encompassing financing for capital investments and related studies.

VIII. PRODUCTIVITY AND COST ANALYSIS

VIII.A COMPETITIVE ASSESSMENT OF PORTS

The competitive assessment of ports in Louisiana relative to ports in other states most likely to compete for cargo in similar hinterlands was divided into two basic categories: (1) existing port handling rates (ship to shore) for different commodities such as containers, steel, forest products, and dry bulk commodities, and (2) comparative costs of calling at the port that included not only port tariff costs such as dockage, wharfage, and equipment rentals but also other related costs such as pilotage and tug costs, ship-to-shore stevedoring costs, harbor fees, storage costs, agency fees, and vessel operating costs (steaming time) in making a port call at each respective port.

VIII.A.1 METHODOLOGY

In order to adequately represent comparisons at each port, three typical vessels were selected based on ship size and lot size of cargo loaded/unloaded. Cost comparisons for general cargo were limited to containers because of the uniform nature of the cargo and associated handling costs. Cost comparisons were based on a port call as a single event, and did not take into account special discounts for long term lease agreements or volume discounts/incentives based upon annual tonnage or number of ship calls per year at the port. While such special arrangements do exist for certain port customers, they are generally limited to only a few of the largest port users.

Vessels selected for port call comparisons provided a spectrum for the existing trade in New Orleans and included a small size vessel (300 TEU capacity), a medium sized vessel (1000 TEU capacity), and a larger size ship (2400 TEU capacity) that made calls at the Port of New Orleans public facility at France Road during 1994. Lot sizes selected were typical of loaded/unloaded volumes appropriate to the selected vessels. A box composition of 60% 40 ft. and 40% 20 ft. containers was used to determine total TEUs handled. A 9 ton per TEU volume measure was considered typical for area port comparisons, and was used to calculate total tonnage. Vessel operating costs were calculated based on a per hour estimate consistent with the Corps of Engineers Deep Draft Vessel Cost Guide (1993) edition.

Labor and stevedoring costs were developed from actual gang sizes and labor rates in force at each port combined with actual container handling rates provided to the Institute by port stevedoring companies operating in selected ports. All handling rates for commodities reviewed were calculated and reported on a per gross gang hour basis. Multiple gang use was not incorporated into the analysis to avoid complications in port comparisons and final costs (i.e. minimum gang guarantees vary at each port). Overtime costs were calculated at time and a half after eight hours of gang work. Continuous work was assumed until all containers were interchanged. Gantry crane costs assumed a one hour period for start-up and securing of the equipment that is typical to the industry and standard tariff rates for crane usage (i.e. no volume discounts) were utilized. Dockage and wharfage costs were calculated from standard port tariffs applied to each vessel and cargo volume interchanged and assumed no volume discounts.

VIII.A.2 COMPARISON OF PORT CARGO HANDLING RATES

Port cargo handling rates were compiled through interviews and operating reports received from various stevedoring companies operating in South Atlantic and Gulf Coast ports. Ports surveyed outside of Louisiana included : Charleston, Savannah, Jacksonville, and Miami in the South Atlantic region, and Tampa, Gulfport, and Houston in the Gulf region. Louisiana ports included the ports of New Orleans, Baton Rouge, and Lake Charles.

The cargo handling comparisons encompassed five basic commodity groupings that included (1) containers (handled by either ships' gear or gantry/mobile cranes), (2) steel (pipe and coil related cargos), (3) dry bulk cargos that were mainly grains (bagged and conveyor fed), (4) lumber (finished sheets and logs) and (5) paper related cargos (wood pulp, liner board, newsprint and computer paper).

Cargo handling comparisons focused only on ship-to-shore transfer rates of the various cargos identified at public marine terminal facilities. There are other elements of port productivity and related areas of port performance such as berth utilization, gate throughput rates, net crane productivity (includes allowances for crane downtime), and storage area throughput/utilization rates; however, data limitations prevented comparisons of these items from those ports investigated. Comparisons did segregate ship-to-shore handling rates by the method or type of operation (i.e. type of crane handling for containers; conveyor or bagged operations for dry bulk cargos, etc.).

Factors influencing cargo handling rates can also be quite complex and varied. The ship type and configuration such as the number of hatch covers and "wings" or side area hold extensions can influence hourly gang handling rates particularly with steel and containerized cargos. The equipment utilized is a major determining factor in ship-to-shore transfer rates. Container crane/gantry crane handling rates are typically two to three times faster than the use of ships' gear. Dry bulk transfer rate comparisons are likewise affected by the type of conveyor system installed. Terminal characteristics (i.e. layout and design) can also influence overall port performance. For example, aprons on the dock may not wide enough to permit the rapid removal of cargo from the transfer area under the hook of the crane. Ship-to-shore transfer rates would thus be directly and negatively affected.

Another important variable is the commodity and its characteristics. Items such as unit size, weight, shape, and density can effect actual transfer rates. Finally, the experience factor of the workforce and even demographic factors such as average age of the gang can influence cargo handling rates. An experienced crane operator, for example, will have significant influence over the "pick rate" or number of moves recorded by various port stevedoring companies. The experience of entire gangs in handling certain types of cargos will also have a major influence over recorded hourly transfer rates, and can directly influence crane downtime results. For certain types of cargos such as bagged goods, a younger workforce or gang composition will usually outperform an older workforce because of obvious physical and stamina related issues.

For example, one of the reasons given for Lake Charles' relatively high productivity rates for bagged agricultural products such as rice, flour, and animal feeds was the relatively low average age (i.e. 28 years on average) of labor employed in the gangs. Averaging 55 tons per gang hour for bagged dry bulk, gives the Port of Lake Charles over 36 percent advantage above its next closest port competitor, Gulfport, of those ports surveyed.

Containers

The Port of New Orleans, Louisiana's main container handling port, compares favorably for large scale container handling output with average handling rates between 26 to 33 moves per hour using gantry crane equipment. The period surveyed included the most recent 12 months (Sept. 1993- Sept. 1994) at the France Road public facility. Private terminal operations at the Sea-Land facility reported even higher output rates of between 35 to 38 moves per hour. Only one port in the Gulf region, Gulfport, reported higher average container handling rates between 32 to 38 moves per hour. Charleston, in the South Atlantic region, reported container handling rates between 34 to 36 moves per hour using similar equipment. A summary of comparative container handling rates (excluding ships' gear) is presented in Figure VIII.1.

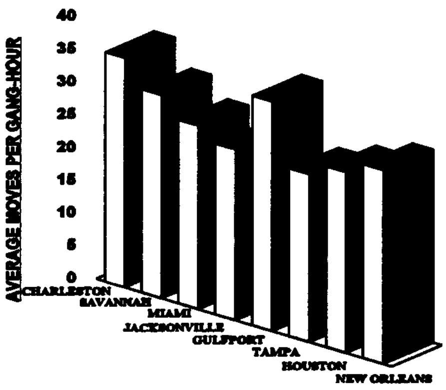


Figure VIII.1
Container Handling Rates

Steel

New Orleans and Houston have comparable and the highest ship-to-shore handling rates of ports in the Gulf region for steel products such as steel coils and pipe related cargos. Both ports average 100-120 tons per gang hour for coils and about 60 tons per gang hour for pipe. This could be one factor in the continued increase of steel tonnage through the Port of New Orleans. South Atlantic ports (Charleston, Jacksonville, and Savannah) reported higher steel handling rates between 140 to 150 tons per gang hour for coil related cargos and 65 tons per hour handled for pipes. Lake Charles and Baton Rouge have steel handling rates for coils comparable to Gulfport at about 60 tons per hour. A graphical summary of steel related handling rates (coil related cargos) by port is summarized in Figure VIII.2.

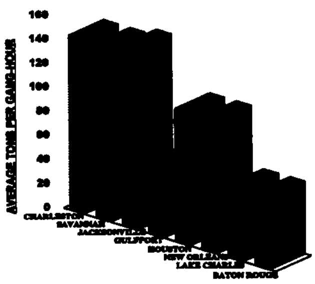


Figure VIII.2
Steel Handling Rates

Lumber Products

Handling rates for lumber related products vary significantly by the type of product (i.e. logs, plywood/finished lumber). Figure VIII.3 on the following page graphically breaks out both types of commodities among the ports surveyed. New Orleans, Baton Rouge and Lake Charles have comparable handling rates for both finished lumber at about 80 to 90 tons per gang hour versus 80,000 to 120,000 board-feet per gang hour (i.e. 80-120 tons/hr.) for log handling (1000 board feet is roughly equivalent to one ton). The Port of Baton Rouge is actually the highest of the three reporting average handling rates of about 90 tons per gang hour for finished lumber and up to 130,000 board-feet per gang hour (130 tons) for logs. Gulfport reported significantly lower numbers for both categories with 35 to 40 tons per gang hour for finished lumber and 65,000 to 90,000 board-feet (65 to 90 tons) per hour for logs. Houston reported higher handling rates for finished lumber as did the South Atlantic ports of Charleston, Savannah, and Jacksonville. These ports, however are using sophisticated conveyor systems to produce rates close to 300,000 board-feet (300 tons) per gang hour.

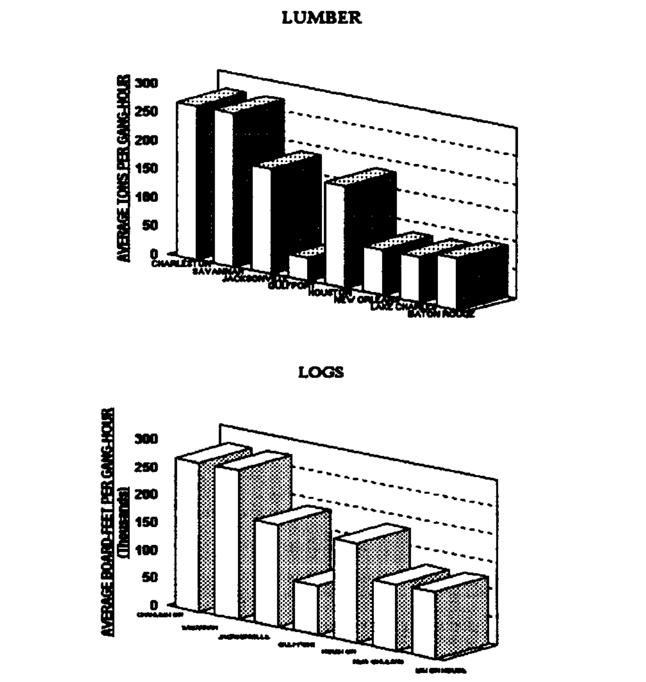


Figure VIII.3
Lumber and Log Handling Rates

Dry Bulk Cargo

Louisiana public ports, especially Lake Charles, compare extremely well for handling both bagged dry bulk cargos and dry bulk cargo via conveyor fed systems. For bagged grain cargos such as rice, flour and animal feed products, Lake Charles was reported to have handling rates of 50 to 55 tons per gang hour. This was 36 percent above rates recorded for Gulfport and over 20 percent above the handling rates reported at Houston, the next highest port after Lake Charles, reporting rates of about 40 to 45 tons per gang hour. Other ports were reported to have handling rates of between 25 to 35 tons per gang hour for bagged cargos. Lake Charles was also reported to have the highest bulk conveyor rates of about 350 to 400 tons of dry bulk product processed per hour versus other ports reporting handling rates of about 270 to 300 tons of product handled per hour. This does not allow for downtime related to mixing and cleaning. Port handling systems and gang experience are variables identified as primary contributors to Lake Charles' relatively high handling rates for handling these types of cargos. Figure VIII.4 summarizes port handling rates for dry bulk cargos.

Paper and Related Products

Cargos in this grouping generally included liner board, newsprint, computer paper and wood pulp products. Louisiana ports once again compare very favorably in cargo handling rates for paper and paper related products compared to the other ports surveyed. Baton Rouge reported the highest ship-to-shore handling rates for all types of paper related products. Liner board rates were reported at up to 400 tons per gang hour, wood pulp handled at 150 to 200 tons per gang hour and newsprint handled at about 60 to 90 tons per gang hour. Lake Charles and New Orleans reported similar handling rates of about 300 tons per gang hour for liner board, 100 to 150 tons per gang hour for wood pulp, and about 50 to 80 tons per gang hour for newsprint. Other ports such as Houston and Gulfport reported significantly lower handling rates of about 70 to 75 tons per gang hour for liner board, and 30 to 35 tons per gang hour for the other paper related products. A graphical summary of port related productivity rates for paper products is presented in Figure VIII.5.

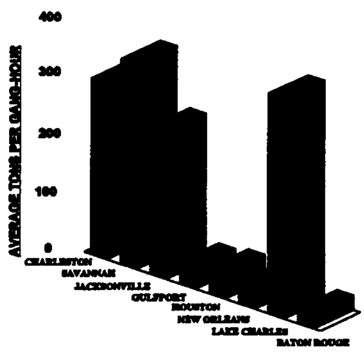


Figure VIII.4
Dry Bulk Cargo Handling Rates

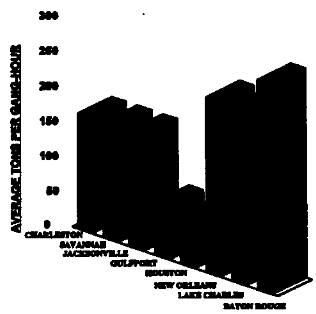


Figure VIII.5
Paper Product Handling Rates

An overall summary comparison of all product categories at the 10 ports surveyed is shown in Table VIII.1. Overall, Louisiana ports compare favorably for ship-to-shore handling rates in all product categories, with dry bulk and paper related commodities showing the strongest performance relative to other ports. Favorable handling rates are an important factor for port users but may not be the overriding determinant in selection of a port call. Total port calling costs (not just port charges), trade routes served, specific steamship line itineraries, and the size of the local market (i.e. Houston has over 5 million people in its surrounding area versus a little over 1.1 million people in the New Orleans area) are mitigating factors that certainly affect port call selection. In an additional attempt to quantify differences between ports, an analysis and comparison of port calling costs was undertaken. The results of this investigation are summarized in the next and final section.

Table VIII.1
Summary of Cargo Handling Rates by Commodity

Port	Containers	Steel	Paper/Pulp	Lumber/Logs	Dry Bulk
Charleston	34-36 moves/hr (gantry) 12 move/hr (ship's gear)	140-150 tons/hr (coils) 65 tons/hr (pipe)	liner board: 150-180 tons/hr wood pulp: 100-130 tons/hr newsprint: 50 tons/hr	270,000 board-ft/hr	300 tons/hr grains (conveyor) 270 tons/hr clay ("super sacks")
Savannah	30-32 moves/hr (gantry) 10-12 moves/hr (ship's gear)	140-150 tons/hr coils 65 tons/hr (pipe)	liner board: 150-180 tons/hr wood pulp: 100-130 tons/hr newsprint: 50 tons/hr	270,000 board-ft/hr	350 tons/hr grains (conveyor) 270 tons/hr clay ("super sacks")
Miami	26-30 moves/hr (gantry) 12 moves/hr (ship's gear)	N/A	N/A	N/A	N/A
Jacksonville	25-27 moves/hr (gantry) 10-12 moves/hr (ship's gear)	150 tons/hr (coils) 60 tons/hr (pipe)	liner board: 150-180 tons/hr wood pulp: — newsprint: 40-45 tons/hr	185,000 board-ft/hr	250 tons/hr grains (conveyor)
Gulfport	32-38 moves/hr (gantry) 15-18 moves/hr (ship's gear)	60 tons/hr (coils only)	liner board: 75 tons/hr wood pulp: 37 tons/hr newsprint: 30 tons/hr computer paper: 35 tons/hr	35-40 tons/hr finished lumber 65,000-90,000 board-ft/hr logs	35-37 tons/hr (bagged: barley, peas, popcorn)
Tampa	20-25 moves/hr (gantry) 10-12 moves/hr (ship's gear)	N/A	N/A	N/A	N/A
Houston	25-30 moves/hr (gantry) 10 moves/hr (ship's gear)	150-200 tons/hr (large coils) 100-120 tons/hr (coil) 60 tons/hr (pipe)	liner board: 70 tons/hr wood pulp: 45 tons/hr	180,000 board-ft/hr (mostly plywood)	40-45 tons/hr (bags: animal feed, grains, etc.)
<u>Louisiana Ports:</u>					
New Orleans	26-33 moves/hr (gantry only)	100-120 tons/hr (coil) 60 tons/hr (pipe)	[2]liner board: 150-350 tons/hr wood pulp: 100-150 tons/hr newsprint: 50-80 tons/hr	80 tons/hr finished lumber 80,000-120,000 board-ft/hr logs	35 tons/hr (bagged)
Lake Charles	8-10 moves/hr (mobile) 4-6 moves/hr (ship's gear)	60 tons/hr (coils only)	[2]liner board: 150-350 tons/hr wood pulp: 100-150 tons/hr newsprint: 50-80 tons/hr	80 tons/hr finished lumber 80,000-120,000 board-ft/hr logs	350-400 tons/hr (spout/unbagged) 50-55 tons/hr (bagged: rice, flour, etc.)
Baton Rouge[3]	8-10 moves/hr (mobile) 4-6 moves/hr (ship's gear)	60 tons/hr (coils only)	[2]liner board: 200-400 tons/hr wood pulp: 150-200 tons/hr newsprint: 60-90 tons/hr	90 tons/hr finished lumber 90,000-130,000 board-ft/hr (50-65 tons)	25 tons/hr (bagged)

[1] All rates are measured per-gang/per-hour (gross basis)
[2] 150 - 200 tons/hr ship's gear; 200-250 tons/hr with gantry crane; and 300-400 tons/hr with RoRo vessels/forklifts
[3] Baton Rouge has emphasis on paper handling.
Sources:
Cooper T. Smith; Stevedoring Services of America Lake Charles Stevedoring Services (Louisiana Ports); Fairway Terminal Operators (Houston/Gulfport); Continental Stevedoring (Miami/Tampa); New Orleans Marine Contractors, Inc.

VIII.B COMPARATIVE PORT COSTS

Comparative port costs were developed for five major container ports including New Orleans, Houston, Gulfport, Miami and Jacksonville. The cost analysis was limited to containerized freight because of ease of direct cost comparisons for unit sizes and volumes involved. Comparative costs included not only port charges such as dockage, wharfage, and equipment rentals but also pilotage, tug costs, ship-to-shore stevedoring costs, harbor fees, storage costs, agency fees and vessel operating costs (i.e. steaming time) involved in making a port call. Port call comparisons were treated as single events and did not consider special allowances/discounts for annual tonnage volumes or number of ship calls. Such arrangements do exist, and can lower the overall cost of a port call to steamship lines, but are usually limited to only a few of the largest port users.

Two major variables allowing for detailed cost comparisons were controlled. These included lot size (the number of containers interchanged per port call) and vessel size (small, medium, and large size vessels) based on the TEU rated capacity and other vessel related characteristics such as gross and net registered tonnages and vessel length. Further, it was assumed for practical purposes, that lot size was directly related to vessel size so that small lot exchanges were handled by smaller vessels and large lot interchanges were done with large size vessels. The practical limits of lot sizes were defined based on discussions with operations personnel at the Port of New Orleans and terminal operators at other ports.

VIII.B.1 PORT OF NEW ORLEANS

Table VIII.2 summarizes total charges for a 300 TEU size vessel (small), a 1000 TEU size vessel (medium) and a 2400 TEU size vessel (large) calling at the Port of New Orleans during 1994. A more detailed listing of the related costs components for the five ports is found in the appendix summary. Lot sizes of 100 containers for the small vessel, 350 containers loaded/unloaded for the medium sized vessel, and 600 containers interchanged for the largest vessel call were calculated from port tariffs and current operating rates provided to the Institute by the Port of New Orleans and other port service providers. Stevedoring costs were calculated based on ship-to-shore transfer costs only and did not include detention factors and yard and gate costs. Vessel steaming costs for all size vessels assumed an eight hour transit time to and from the Gulf to the France Road public facility, and the Corps of Engineers Deep Draft Vessel Cost Manual (1993) was used to estimate hourly ship operating costs. It was also assumed that all labor gangs would work until the cargo was completely loaded/unloaded, and thus overtime rates applied to the medium and large lot size and vessel size comparisons. Pilotage costs included both Bar and River pilot charges provided by New Orleans port operations personnel, and later verified for accuracy with tariff rates received from the respective pilot organizations.

NEW ORLEANS	Small Vessel	Medium Vessel	Large Vessel
Dockage and Wharfage Cost	$3,235	$10,429	$17,396
Crane Rental Cost	$2,250	$5,850	$9,900
Stevedoring Cost (ship-to-shore)	$3,360	$11,760	$23,100
Other Costs *	$5,326	$8,005	$9,974
Port Related Subtotal	$14,172	$36,045	$60,371
Steaming Cost	$10,016	$13,344	$18,720
Pilotage and Tug Hire Costs	$5,071	$8,192	$11,560
Vessel Related Subtotal	$15,087	$21,536	$30,280
TOTAL CHARGES	$29,259	$57,581	$90,651
Total Cost Per Move (inclusive)	**$292.59**	**$164.52**	**$151.09**

* include cost such as harbor fee, U.S. Govrmt fee, mooring/unmooring, steamship assessment, owners' items,

Table VIII.2
Vessel and Container Charges in New Orleans

Total port call costs ranged from just over $90,000 for a large vessel interchanging 600 containers to $57,000 for a medium sized container vessel interchanging 350 containers, and $29, 000 in total charges for a small vessel interchanging only 100 containers. Respective total cost per move ranged from about $151 per container move for the large vessel to $164 per move for the medium sized vessel and $292 for the small vessel.

VIII.B.2 PORT OF HOUSTON

HOUSTON	Small Vessel	Medium Vessel	Large Vessel
Dockage and Wharfage Cost	$4,441	$13,848	$22,831
Crane Rental Cost	$2,140	$5,992	$10,272
Stevedoring Cost (ship-to-shore)	$3,360	$13,020	$25,620
Other Costs *	$5,326	$8,005	$9,974
Port Related Subtotal	$15,331	$40,929	$68,761
Steaming Cost	$3,756	$5,004	$7,020
Pilotage and Tug Hire Costs	$4,400	$7,054	$9,711
Vessel Related Subtotal	$8,157	$12,059	$16,732
TOTAL CHARGES	$23,488	$52,988	$85,493
Total Cost Per Move (inclusive)	**$234.88**	**$151.39**	**$142.49**

*include cost such as harbor fee, U.S. Govrmt fee, mooring/unmooring, steamship assessment, owners' items, agency

Table VIII.3
Vessel and Container Charges in Houston

Table VIII.3 presents the same summary for comparison for the Port of Houston. Houston's estimated total charges per ship call are about 5% lower than New Orleans for the large vessel, about 7% lower for the medium size vessel and an estimated 19% lower for the small vessel. The higher costs associated with New Orleans are primarily the result of increased vessel steaming times to reach the port through the MRGO. Estimated stevedoring costs are higher for Houston because of lower overall cargo handling rates. Pilotage and tug hire costs are about 15% lower in Houston than for the Port of New Orleans.

VIII.B.3 PORT OF GULFPORT

Table VIII.4 presents a similar summary comparison for Gulfport. Gulfport has the lowest estimated total cost per ship call and related cost per move of all the ports surveyed. Its location almost directly on the Gulf results in virtually nominal additional steaming time. Port charges for pilotage and tug hire are also lower than other ports in the region, and average container handling rates were among the highest in the region thus reducing estimated overall stevedoring costs.

GULFPORT	Small Vessel	Medium Vessel	Large Vessel
Dockage and Wharfage Cost	$3,449	$9,858	$15,879
Crane Rental Cost	$1,800	$5,400	$8,550
Stevedoring Cost (ship-to-shore)	$2,520	$10,500	$19,320
Other Costs *	$5,189	$7,868	$9,837
Port Related Subtotal	$12,959	$33,627	$53,587
Steaming Cost	$0	$0	$0
Pilotage and Tug Hire Costs	$2,960	$5,586	$6,596
Vessel Related Subtotal	$2,960	$5,586	$6,596
TOTAL CHARGES	$15,919	$39,213	$60,183
Total Cost Per Move (Inclusive)	$159.19	$112.04	$100.30

*Include cost such as harbor fee, U.S. Govrnt fee, mooring/unmooring, steamship assessment, owners' items, agency fee, etc.

Table VIII.4
Vessel and Container Charges in Gulfport

VIII.B.4 PORTS OF MIAMI AND JACKSONVILLE

Tables VIII.5 and 6 present similar summary comparisons for the ports of Miami and Jacksonville. Both ports have very active container operations with Miami offering not only a strong demographic advantage for southeastern and local cargo distribution but also container transshipment potential for the Gulf, Caribbean, and Central American regions. Miami's total estimated costs per ship call and estimated costs per move are the second lowest of the ports analyzed, and are about one third lower than total costs estimated for New Orleans. Jacksonville, on the other hand, appears to be the highest cost port for medium and large size vessels of those ports analyzed. Port charges are generally higher

MIAMI	Small Vessel	Medium Vessel	Large Vessel
Dockage and Wharfage Cost	$2,889	$8,882	$14,664
Crane Rental Cost	$2,250	$5,850	$9,900
Stevedoring Cost (ship-to-shore)	$2,736	$10,032	$20,292
Other Costs *	$5,179	$7,858	$9,827
Port Related Subtotal	$13,055	$32,623	$54,684
Steaming Cost	$0	$0	$0
Pilotage and Tug Hire Costs	$2,978	$6,469	$9,119
Vessel Related Subtotal	$2,979	$6,470	$9,120
TOTAL CHARGES	$16,034	$39,093	$63,804
Total Cost Per Move (Inclusive)	$160.34	$111.69	$106.34

*Include cost such as harbor fee, U.S. Govrnt fee, mooring/unmooring, steamship assessment, owners' items, agency fee, etc.

Table VIII.5
Vessel and Container Charges in Miami

JACKSONVILLE	Small Vessel	Medium	Large Vessel
Dockage and Wharfage Cost	$5,181	$16,438	$27,137
Crane Rental Cost	$3,000	$8,400	$14,400
Stevedoring Cost (ship-to-shore)	$4,144	$16,058	$31,598
Other Costs *	$5,039	$7,718	$9,687
Port Related Subtotal	$17,365	$48,615	$82,823
Steaming Cost	$2,504	$3,336	$4,680
Pilotage and Tug Hire Costs	$2,978	$6,469	$9,119
Vessel Related Subtotal	$5,483	$9,806	$13,800
TOTAL CHARGES	$22,848	$58,421	$96,623
Total Cost Per Move (Inclusive)	$228.48	$166.92	$161.04

*Include cost such as harbor fee, U.S. Govrnt fee, mooring/unmooring, steamship assessment, owners' items, agency fee, etc.

Table VIII.6
Vessel and Container Charges in Jacksonville

in Jacksonville, as are the estimated stevedoring charges because of lower overall handling rates and higher downtime costs (i.e. gross gang hours charged include payments for non-working periods due to weather or mechanical problems). Crane downtime reportedly has been averaging over 8% at the port's container facilities versus about 1%-3% at the other ports surveyed. New Orleans crane downtime compares favorably at the France Road complex with about a 1%-1.5% downtime factor over the last twelve months.

VIII.B.5 COST/CALL AND COST/MOVE COMPARISONS FOR THE FIVE PORTS

Figures VIII.6 and 7 summarize the total cost per call and cost per move comparisons for the container operations analyzed at the five ports. Figures VIII.8, 9, and 10 summarize comparisons of specific cost elements/categories (i.e. dockage and wharfage, crane rental costs, stevedoring costs, pilotage and tug hire, etc.) for each port by vessel size/lot size analyzed on a per ship call basis. Figures VIII.11, 12, and 13 make similar comparisons on a per move basis.

VIII.C CONCLUSIONS

Louisiana ports appear to be competitive in handling/output rates for general cargo commodities such as bagged agricultural products, paper products, steel related commodities, and containers. When compared to the major competitor - Port Houston, all inclusive costs in New Orleans are higher due to additional steaming time. If this additional cost is excluded, operation in New Orleans will cost less than in Houston. Cost of operation in Gulfport and Miami is lower than in both New Orleans or Houston. However, New Orleans cost of cargo handling is in between the two ports, about 10% lower in comparison with Houston and about 10% higher than Gulfport or Miami. Of more concern for long term competitive advantage for cargos such as containers is the port's geographic location, draft limitations of 35'-38' along the MRGO that prevent larger ships from calling, environmental and well known weather constraints (i.e. excessive and cyclical fogging conditions), and a smaller population base to provide likelihood of increased localized general cargo opportunities for steamship operators. New Orleans is in a difficult competitive position to expand current container volumes with the close proximity of modern high volume container facilities at both Houston and Miami.

New Orleans, Baton Rouge, and Lake Charles seem well positioned to concentrate on general cargos such as steel, bagged cargos, paper and paper related products, and lumber products. The introduction of new point-to-point services such as the "Gulf trailer ferry", suggested as an emerging general cargo NAFTA opportunity with Mexico, may help Louisiana's ports to enjoy an increasing market share of containerized/trailerized North/South cargo movements between the U.S. and Latin America. The Gulf region gateway position could also improve for New Orleans or other ports in the state that solicit cargos going to and from the U.S. and the Caribbean Basin, Puerto Rico, Central America, and the rest of Latin America.

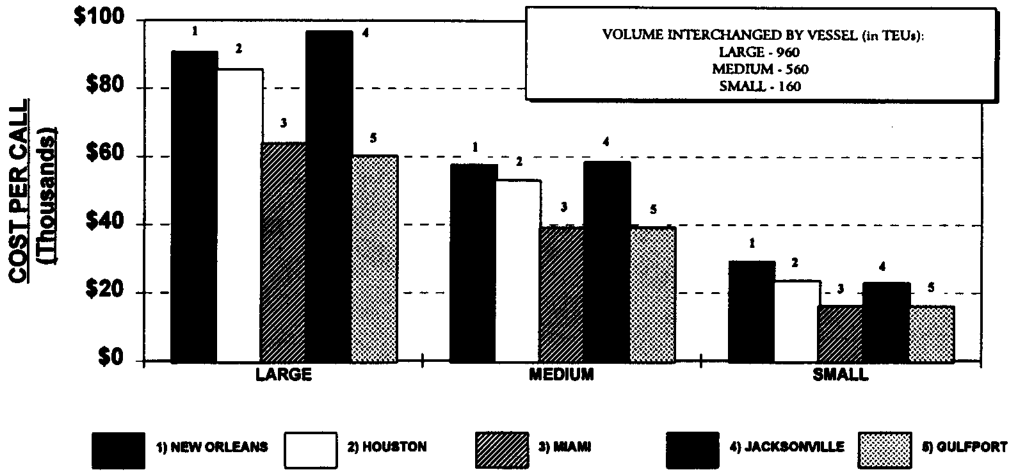


Figure VIII.6
Cost/Call Comparison of Ports (Vessel Size and Volume Interchanged)
Inclusive Comparison

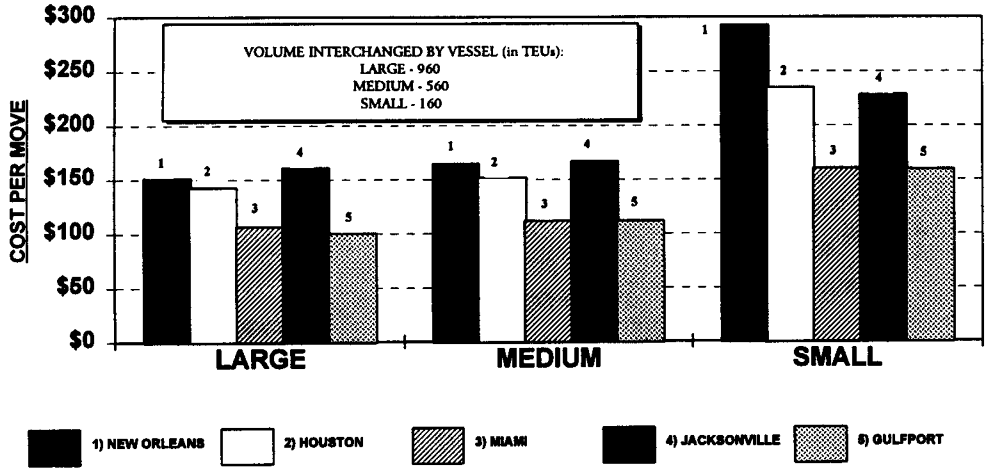
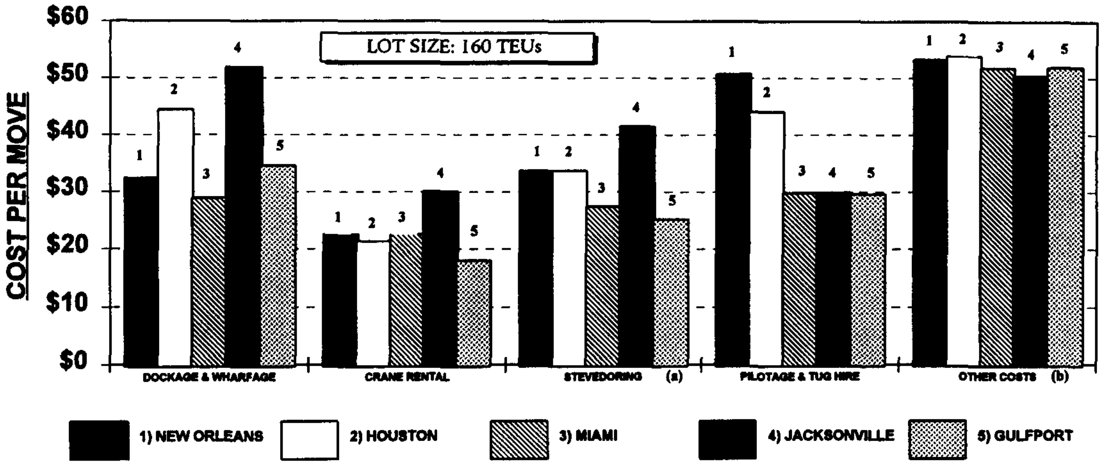
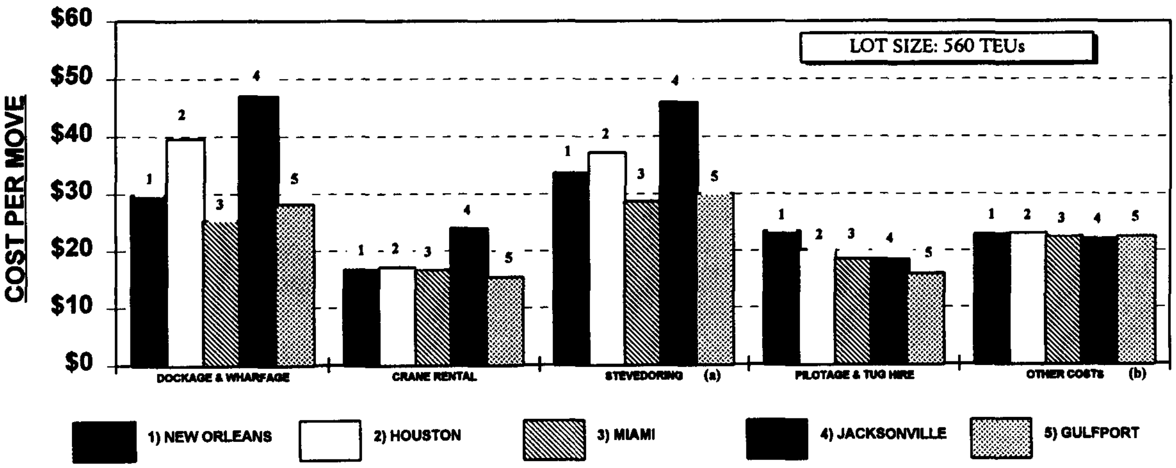


Figure VIII.7
Cost/Move Comparison of Ports (Vessel Size & Volume Interchanged)
Inclusive Comparison



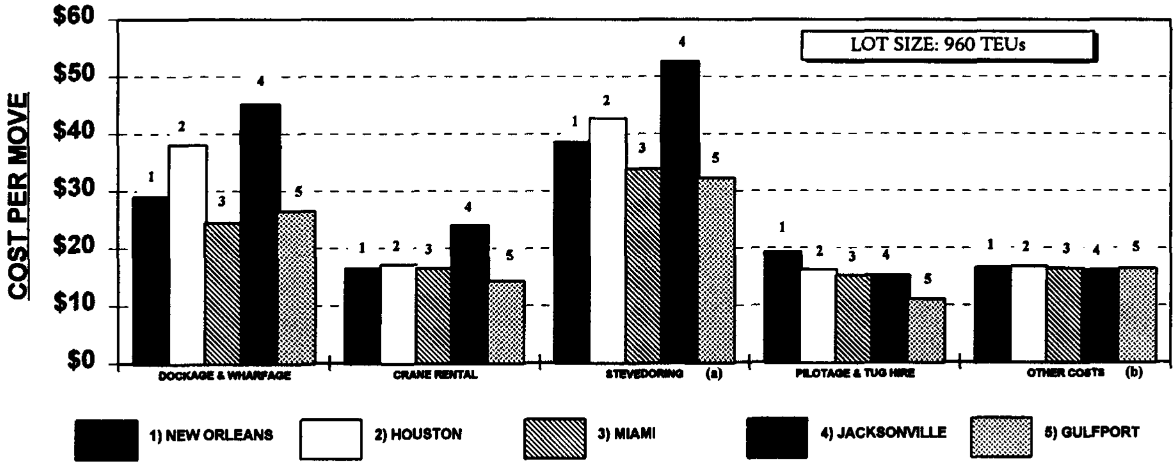
(a) Ship-to-shore only.
(b) Includes costs such as harbor fee, Govmt fee, mooring/unmooring, owner's items and agency fees.

Figure VIII.8
Cost/Move Comparison of Ports (Small Vessels - 300 TEU Size)



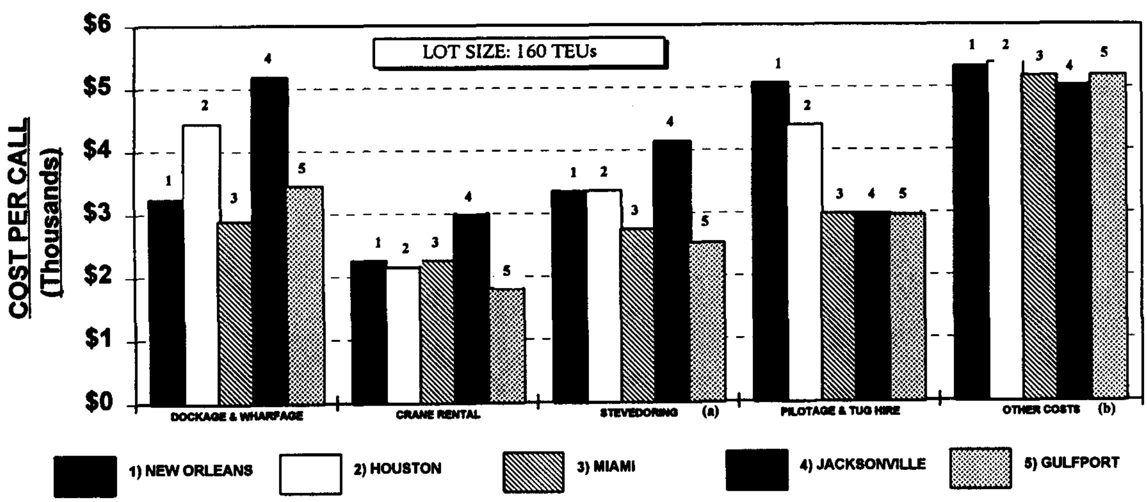
(a) Ship-to-shore only.
(b) Includes costs such as harbor fee, Govmt fee, mooring/unmooring, owner's items and agency fees.

Figure VIII.9
Cost/Move Comparison of Ports (Medium Vessels - 1000 TEU Size)



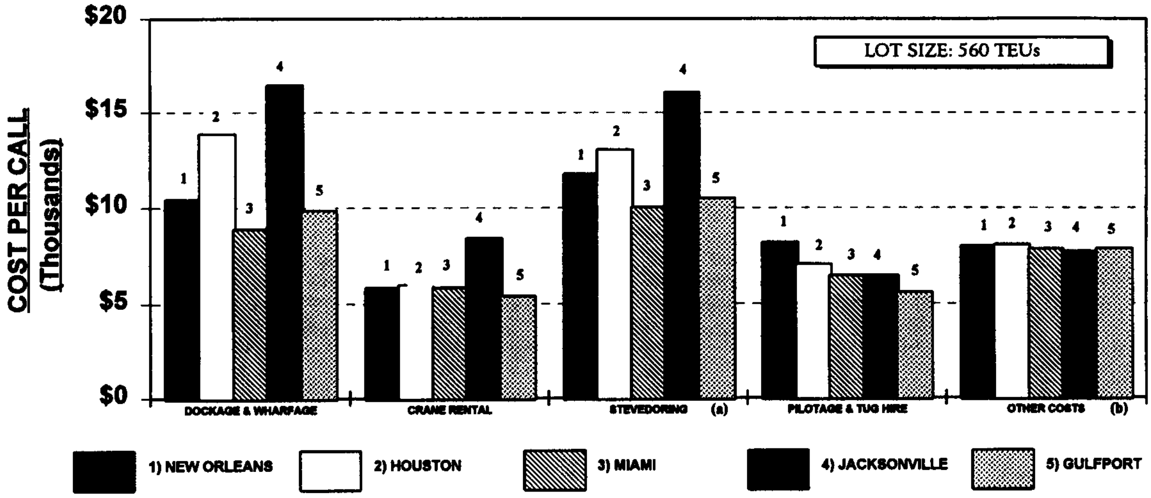
(a) Ship-to-shore only.
(b) Includes costs such as harbor fee, Govmt fee, mooring/unmooring, owner's items and agency fees.

Figure VIII.10
Cost/Move Comparison of Ports (Large Vessels - 2400 TEU Size)



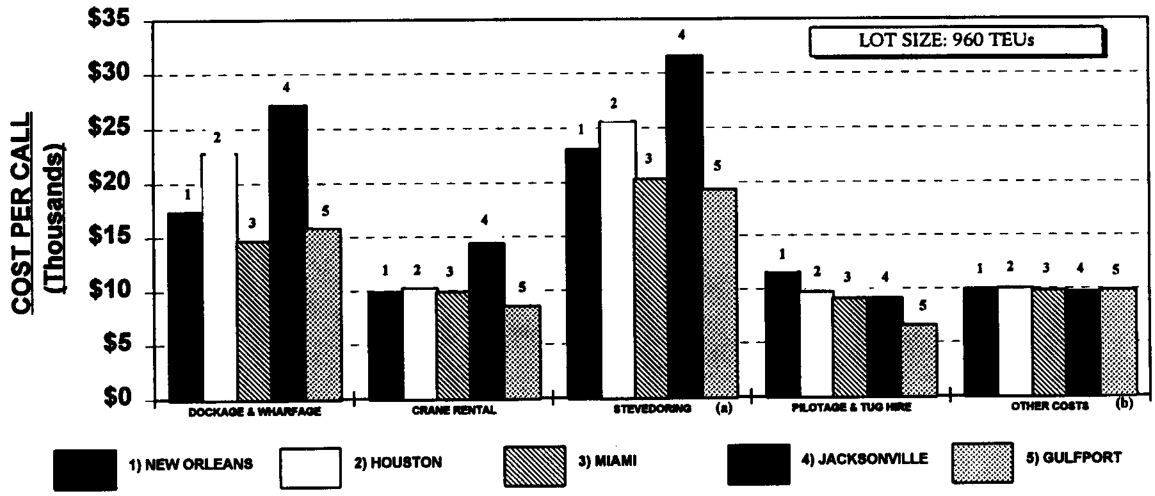
(a) Ship-to-shore only.
(b) Includes costs such as harbor fee, Govmt fee, mooring/unmooring, owner's items and agency fees.

Figure VIII.11
Cost/Call Comparison of Ports (Small Vessels - 300 TEU Size)



(a) Ship-to-shore only.
(b) Includes costs such as harbor fee, Govmt fee, mooring/unmooring, owner's items and agency fees.

Figure VIII.12
Cost/Call Comparison of Ports (Medium Vessels - 1000 TEU Size)



(a) Ship-to-shore only.
(b) Includes costs such as harbor fee, Govmt fee, mooring/unmooring, owner's items and agency fees.

Figure VIII.13
Cost/Call Comparison of Ports (Large Vessels - 2400 TEU Size)

IX. STRATEGIC OUTLOOK FOR LOUISIANA'S COMPETITIVE POSITION

IX.A COAL TRANSPORT AND HANDLING

Coal is the second largest commodity handled within the Louisiana transportation network, next only to agricultural grains. As more than 90 percent of the coal supply originated out of state and 62 percent was in transit to foreign or out of state markets in 1990, transportation and handling remains the mainstay of the industry. The major objective of this section is to analyze the structural characteristics of the industry, and to assess long term developments in coal transport and handling in the state.

IX.A.1 STRUCTURAL CHARACTERISTICS

IX.A.1.a. Coal Supply

Production in Louisiana. Louisiana produced 3.2 million tons of lignite in 1990 in two mines (Table IX.1 and Figure IX.1). The Dolet Hills mine located in DeSoto parish supplied about 2.7 million tons under long-term contracts (25 years) to two electric utilities, namely, Central Louisiana Electric Company, Inc. (CLECO) and Southwestern Electric Company (SWEPCO). The lignite is loaded onto trucks capable of carrying 85 tons and taken to a central site where it

Table IX.1
Coal Supply and Disposition in Louisiana, 1990

Supply/Disposition	Total Volume ('000 tons)	Share of Total (percent)
SUPPLY		
Production in-state	3,186	9.4
Inbound movements	30,546	90.6
Total Supply	33,732	100
DISPOSITION		
Industrial Uses	799	
Use by Electric Utilities	11,748	
Total in-state Consumption	12,547	37.2
Exports	13,017	38.6
Outbound transfers*	8,168	24.2
Total Disposition	33,732	100

* transfers to Florida through the Gulf Intracoastal Waterway
Sources: Coal & Lignite in Louisiana, by Troy, Alan A., LA Department of Natural Resources, May 1993; and Transearch Database

begins a seven-mile ride on a conveyor belt to the power plant. The Oxbow mine located in Red River parish produced 440,000 tons under long-term contract (ending in 2005) to CLECO. The crushed lignite from this mine is hauled 19 miles to the power plant in specially designed tractor trailers with a 30 ton capacity.

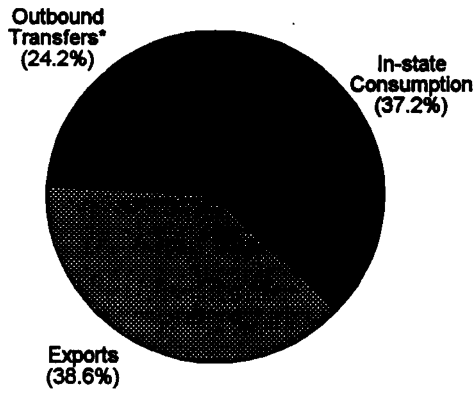


Figure IX.1
Coal Disposition in Louisiana

Inbound Movements from Other States. More than 90 percent of the coal supply totalling 33.7 million tons was inbound to the state from other producing regions. The interior coal supply region accounted for 56 percent of the supply with Kentucky and Illinois contributing for the bulk of this amount (Table IX.2). The Northern and Southern Appalachia regions supplied 32 percent of the total with major contributions from West Virginia and Pennsylvania. Wyoming, located in the North Great Plains Supply Region, supplied about 4 million tons of coal by rail to Louisiana. As Wyoming on the average supplies about 10 million tons of coal to Louisiana for domestic consumption (see State Coal Profiles 1994, U.S. Energy Information Administration), the rest came as multi-modal rail/barge movements. The bulk of these movements is transported by rail to St. Louis and transferred to barges consigned to the Big Cajun Electric Utility in Point Coupee parish.

Barge movements dominate coal inbound to the state, accounting for 85.7 percent (26 million tons) of the total supply. Five states, Ohio, West Virginia, Illinois, Indiana and Kentucky are responsible for more than 25 million tons of the annual barge traffic. The rail movements from Wyoming are largely destined to the Gulf State Utilities (GSU) plant in Calcasieu parish (2.05 million tons) and the CLECO plant in Rapides parish (1.7 million tons). A relatively small amount of 400,000 tons is transported by rail to New Orleans area. The trucking tonnage of 440,000 is intra-state movements of lignite from the mine to electric utility plant.

IX.A.1.b Coal Disposition

In-State Consumption. In 1990, 37.2 percent (12.5 million tons) of the total coal supply was consumed in-state. Coal-fired electric generating plants in the state used more than 93 percent of this coal. Six coal-fired electric generating units are operating in the state, providing more than 20 percent of the total utility generating capability. The two types of coal used in Louisiana electric utilities are: low sulfur sub-bituminous coal supplied from the Powder River Basin in Wyoming and locally supplied lignite. In 1990, 799,000 tons of coal were used for industrial purposes. The bulk of this coal was used by two industrial plants to cogenerate electricity and steam to power their facilities. The Dow coal gasification plant in Plaquemine uses over 90 percent of this coal and the International Paper Company's paper mill in Mansfield uses sub-

Table IX.2
Inbound and Outbound Coal Movements and Transportation Modes, Louisiana 1990

Origin/Destinating State	Mo:des of Transport ('000 tons) Barge	Rail	Truck	State Share of Total(%)
SUPPLY REGION/STATE				
Northern Appalachia				
Ohio	2,967	0	0	9.6
Pennsylvania	911	0	0	3.0
Southern Appalachia				
Alabama	202	0	0	0.7
West Virginia *	5,786	0	0	18.8
Interior				
Illinois	6,478	0	0	21.0
Indiana	1,196	0	0	3.9
Kentucky	8,659	0	0	28.1
Louisiana**	0	0	440	1.4
Oklahoma	123	0	0	0.4
Texas	0	275	0	0.9
North Great Plains				
Wyoming	0	3,689	0	12.0
Other	101	6	0	0.3
INBOUND TOTAL	26,423	3,970	440	100.0
Modal shares(%)	85.7	12.9	1.4	100.0
DESTINATION STATE				
Florida	8,054	0	0	99.2
Other	68	0	0	0.8
OUTBOUND TOTAL	8,122	0	0	100.0
Modal Shares(%)	100.0	0.0	0.0	100.0

*West Virginia (North) ia a part of Northern Appalachia region.
** intra-state movements
Source: Transearch Database

bituminous coal from Kentucky to substitute their primary fuel, which is bark. The lignite produced in the state is mainly used at the CLECO plant in DeSoto parish. In addition, an industrial firm is prospecting the manufacture of charcoal briquettes from lignite. This plant is expected to be in operation in the Red River parish in 1994/95 with an annual output of 240,000 tons of lignite.

Before the energy shortages in the 1970s natural gas was the fuel of choice for Louisiana electric utilities and industrial plants. Use of coal started in 1981, and the consumption was rather stable during the 1986-92 period with an annual tonnage of 10 to 12 million tons. Coal was used as the fuel to generate about 35 percent of total electricity requirements in the state during this period.

Outbound Coal Movements. The Electro-Coal Transfer Terminal (TECO) located at mile 55 AHP and the International Marine Terminal located across from TECO on the Lower Mississippi River acts as the transfer point for outbound coal to Florida. In 1990, a total of 8.1 million tons of coal was transferred from Louisiana almost exclusively to electric utility plants in Florida.

Coal Exports. The Lower Mississippi export coal terminals are the ports of choice for export of U.S. steam coal. In 1990 these terminals exported 13 million tons amounting to 38.6 percent of the total supply to the state. Almost all coal exports were supplied from Appalachia and the interior regions by barges.

U.S. coal exports and the relative market shares for various export regions are shown in Table IX.3. During the period 1988 to 1992, the Lower Mississippi coal terminals consistently handled 25 to 28 percent of total U.S. steam coal exports. However, the Lower Mississippi's share of the metallurgical coal export market was rather small, accounting for about 3 percent.

Table IX.3
U.S. Coal Exports and the Market Shares by Exporting Region

Export Region	1988		1989		1990		1991		1992	
	Million Tons	Mkt.Sh (%)	Million Tons	Mkt.Sh (%)	Million Tons	Mkt.Sh (%)	Million Tons	Mkt.Sh (%)	Million Tons	Mkt.Sh (%)
Metallurgical Coal										
Baltimore	4.4	7.8	4.9	8.3	2.8	4.9	2.5	4.3	2.3	4.3
Hampton Roads	35.7	63.2	37.5	63.8	40.4	70.1	42.1	71.8	39.3	72.8
Mobile	6.9	12.2	7.6	12.9	6.5	11.3	6.3	10.8	5.2	9.6
Lower Mississippi	1.3	2.3	2.0	3.4	2.5	4.3	2.9	4.9	2.3	4.3
LA/Long Beach	0.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	8.0	14.2	6.8	11.6	5.4	9.4	4.8	8.2	4.9	9.1
Total Metallurgical	56.5	100.0	58.8	100.0	57.6	100.0	58.6	100.0	54.0	100.0
Steam Coal										
Baltimore	2.6	8.8	3.5	10.7	4.0	10.6	6.2	15.6	6.1	15.8
Hampton Roads	4.7	15.9	6.9	21.1	9.1	24.1	10.5	26.4	8.9	23.1
Mobile	0.8	2.7	0.3	0.9	0.3	0.8	1.4	3.5	1.0	2.6
Lower Mississippi	7.2	24.3	8.2	25.1	9.3	24.7	11.2	28.1	9.9	25.7
LA/Long Beach	0.8	2.7	2.2	6.7	1.8	4.8	2.6	6.5	2.5	6.5
Other	13.5	45.6	11.6	35.5	13.2	35.0	7.9	19.8	10.1	26.2
Total Steam	29.6	100.0	32.7	100.0	37.7	100.0	39.8	100.0	38.5	100.0
Total Coal (Met. and Steam)	86.1		91.5		95.3		98.4		92.5	

Source: National Coal Association

Coal Export Terminals. The major structural characteristics of Louisiana coal export terminals are shown in Table IX.4. Normally, a wide variety of bulk products are handled at these terminals. Some of the major bulk products handled are alumina, bauxite, ores, coke, cement, fertilizers and minerals.

Table IX.4
Selected Characteristics of Louisiana Coal Terminals, 1992

Port/Terminal	Existing		Future		
	Controlling Depth (Feet)	Vessel Size(000) (DWT)	Project Depth (Feet)	Vessel Size(000) (DWT)	Serving Railroads
Mississippi River Terminals					
Electro-Coal	45	70+	55	130+	
International Marine	45	70+	55	130+	
South Pass *			60	150+	
Burnside	45	70+	55	130+	Illinois Central
Mississippi River - Midstream					
IMT Coal Monitor	45	70+	55	130+	
Cooper/T. Smith	45	70+	55	130+	
At-Sea Operation	NA	NA	NA	NA	
Lake Charles Bulk Terminal**	40	50+	45	70+	KCS; SP; UP

Source: USDOT, Existing and Potential US Coal Export Loading Terminals, MARAD, January 1992; and personal communication with terminal operators.

Terminals with shoreside facilities. The Electro-Coal Transfer Terminal originally built to service the needs of its parent utility in Florida, greatly expanded its export handling capacity in the 1980's. During those years of expansion, TECO built three ocean-going, barge mounted "topping-off" cranes for the purpose of fully loading vessels outside the main ship channel which had draft restrictions. These cranes are sparsely used, though they remain able to be recalled into service if needed. Electro-Coal's primarily soil-based cement ground storage is the largest on the river, estimated to be in excess of 4.5 million tons. Equipped with two shiploaders, the facility can also perform direct barge-to-ship operations.

The International Marine Terminals (IMT) is also a subsidiary of another Florida-based utility. Therefore, in addition to exports a part of its annual throughput is dedicated to domestic movements to satisfy the requirements of one or more of its owners. IMT has ground storage of about 1.5 million tons.

Burnside Bulk Marine Terminal is a multi-purpose terminal owned by the Greater Baton Rouge Port Commission, and leased and operated by Ormet. It is the only coal terminal on the Lower Mississippi with rail connections and serves as a transfer station between ocean-going vessels, barges, railcars and trucks. Major equipment at the site are two rail-mounted gantry cranes each rated at 1,000 tons per hour and a travelling ship/barge loader of 1,500 ton/hour capacity. Transshipment of bulk materials to railcars can be made directly from vessel or from concrete ground storage. Rail facilities include a 100-car double track, 3800 horsepower diesel yard locomotive, a 300,000 pound capacity track scale and a 100-ton truck scale.

Petroleum coke and other bulk materials are the major items handled at the Lake Charles Bulk Terminal owned and operated by the Lake Charles Harbor and Terminal District.

Mid-Stream Terminals. The IMT Coal Monitor is a floating mid-stream rig. The rig can blend coal, test for elevated coal temperatures and, if found, can run the coals through a belt-system for cooling. It also has an automatic sampling system. Cooper/T. Smith operates about six floating derricks with barge mounted cranes and clam buckets at Darrow, Louisiana. The other mid-stream operators include Ryan Walsh, Shoreside, St. James Stevedore, and River Marine.

IX.A.2. STRATEGIC OUTLOOK

Three major sectors in Louisiana utilize the bulk of the state's coal supply: exports (39%); out-of-state transfers (37%); and consumption within the state (24%) . As 91 percent of the total tonnage is inbound from other states and 9 percent is locally produced as lignite, an efficient transportation and handling system is vital to maintain Louisiana's competitive advantage in the industry. The transportation chain involves inland transportation from the mines, transfers at intermodal terminals, and shipping overseas in the case of exports. Future coal volumes handled in Louisiana will be conditioned by developments in the domestic economy as well as trends in international coal trade. Major domestic variables affecting coal use will be the relative prices of other energy substitutes and the rate of U.S. economic growth. Most estimates conclude that economic growth is more important than the price of energy substitutes in the medium term. Similarly, exports will depend on the economic growth rate of the world economy and international competitiveness of the U.S. coal industry. Overall, transportation costs comprise a large part of delivered cost of coal; however, for Louisiana, competitive costs in inland transportation, terminal transfer costs and ocean freight rates are crucial to maintain its future market share. The purpose of this section is to analyze several strategic challenges faced by the industry. The analysis is based on structural characteristics described earlier, and the most likely future developments.

IX.A.2.a Coal Supply Trends

According to the U.S. Department of Energy/Energy Information Administration (DOE/EIA), U.S. coal production is forecast to increase by 2 to 3 percent per year in the 1990's and 1.8 to 2.9 percent annually during the period 2000-2010. In terms of availability of reserves and other factors of production, all supply regions are, essentially, expected to maintain their respective production shares through 2010. Therefore, from a supply standpoint the competitive advantage of Louisiana coal suppliers may remain more or less stable. Future productivity improvements associated with technological developments in the industry are gradual, and may remain neutral without any regional bias. These trends lead us to conclude that the present coal supply patterns to the state are unlikely to change significantly.

The lignite mines in the state are located near utility plants incurring minimal transportation costs and industry sources do not indicate any significant change. CLECO maintains that lignite is the cheapest source of fuel for electricity generation, but technological and institutional factors will limit future use of lignite to modest proportions.

IX.A.2.b Modes of Transport and Costs

As indicated earlier, a major determinant in coal distribution is transport cost. From the analysis, it is evident that inland barge transportation is the mode of choice for coal in Louisiana, wherever feasible. In 1990, 85.7 percent of the coal tonnage inbound to the state was handled by barges and the rest by rail. However, a more significant fact is that out of the 4 million tons of coal that moved by rail, 97 percent (3.7 million tons) was to destinations which did not have any inland waterway access. Therefore, as it currently stands, there seems to be practically no competition for coal movements in the state between barge and rail transportation modes. The mainstay for coal transport by rail to Louisiana is the 10 million tons supplied from the mines in Wyoming. In 1990, 4 million tons of this coal came by rail to destinations where inland waterways were not available, and the rest was multi-mode. The largest multi-mode rail/barge operation (4.5 million tons in 1990) was to the Big Cajun Plant in Point Coupee parish. This coal moved 1,100 miles by rail to St. Louis and then 850 miles by barge to the plant. This operation further illustrates the preference for barge transportation, when feasible.

Inland transportation costs including transloading costs at intermodal terminals for eastern U.S. coal indicate relatively low costs for barge transportation, especially from the northern and central Appalachia regions to Louisiana (Table IX. 5). Note that the average distances and transportation costs indicated may be deceptive, as the actual tariff quotations vary within a certain range essentially based on the nature of the contract. Therefore, even if a particular mode is not price competitive on the average on a certain route, tariffs negotiated at the lower range may be competitive. For example, barge contract rates offered from the Illinois Basin to Baton Rouge/ New Orleans area range from \$8.90 to \$13.75 while rail rates to Mobile from the Illinois Basin range from \$9.50 to \$11.30 per ton. Although on the average Mobile enjoys a price advantage by rail, barge contracts negotiated at the lower range to Baton Rouge/ New Orleans are cost competitive. Further, the tariff structure has only a weak relationship to the haulage distance in both modes of transport, indicating contractual concession arrangements for variables such as volumes hauled, time length of contracts, availability of backhauls, and other factors. These tendencies tend to favor Louisiana coal terminals which essentially handle large volumes on an extensive inland waterway network with diverse cargo.

Table IX.5
Relative Coal Transportation Rates to Baton Rouge / New Orleans, 1992

Origin/Destination Area	Average Distance (miles)	Transport Rates ($/ton) Rail	Barge	B.R./N.O. Price Advantage *
N. Appalachia (Pa.,N.W.Va)				
Baltimore	340	14.56	—	—
B.R./N.O.	1921	—	14.08	0.49
Central Appalachia (E. Ky., S.W.Va.,Va.)				
Baltimore	705	18.13	—	—
Hampton Roads	484	16.5	—	—
Charleston	734	22.2		
B.R./N.O.	1648	—	15.08	1.43
Southern Appalachia (Ala.)				
Mobile	280	14.18	7.03	—
Illinois Basin (Ill., W. Ky.)				
Mobile	599	10.28	—	—
B.R. /N.O.	839	—	10.89	-0.61

*Advantage relative to the least cost alternative; negative numbers denote disadvantage.
Source: Based on estimates from Fieldson 1993 U.S. Coal Export Manual.

In terms of competition among different modes for coal transport, it is likely that the productivity enhancing technological trends will remain neutral. The historical trends do not suggest any significant inroads by one mode on the other's market share. In the long-run, pricing measures and other market responses by barge and rail operators seem to absorb the short-run vagaries keeping the modal competition and market shares at an even keel.

One of the key variables affecting the coal industry in the state and modal competition is tied up with possible increases in inland waterway fuel tax. At present , the inland waterway tax is 17 cents a gallon and it will rise to 20 cents per gallon in 1995. Estimates made by the Federal government indicate that the tax has to be increased to as much as $1/gallon to recover estimated Federal annual shallow-draft navigational expenditures related to inland waterway operation and maintenance. Barge operators and other industry sources have argued that such a tax will seriously affect their business. This level of Federal taxes on the barge industry will continue to be a key issue.

IX.A.3 COAL DISPOSITION

IX.A.3.a Domestic Market Trends

The total in-state coal consumption in 1990 was 12.5 million tons, with 11.7 million tons used by electric utilities and 0.8 million tons for industrial purposes. The enactment of Powerplant and Industrial Fuel Use Act of 1978 and the concern to conserve oil and gas at that time encouraged the use of coal as a fuel in Louisiana. The annual tonnages have stabilized at 10 to 12 million tons generating about 35 percent of the total electricity supplied during the last five years (Table IX. 6). The increase in coal consumption by electric utilities responding to favorable prices and government regulations signals the ability and willingness of the industry to use more coal under suitable economic incentives. However, a significant change in the use of coal is not expected in the near future. Ironically, gas is again the fuel of choice in Louisiana, and its use is now being promoted as more friendly to the environment than other fossil fuels. In addition, it is an abundant resource in the state, and the price is very competitive with other fuels used for electricity generation. Similar variables will affect coal use for industrial purposes in the state, indicating no significant change in the short-run.

Table IX.6
Coal & Natural Gas Consumption Patters in Louisiana and Florida

	LOUISANA			FLORIDA		
Year	Coal (1,000 tons)	Natural Gas (bil. cu. ft.)	Avg. Growth in Coal Use (annual %)*	Coal (1,000 tons)	Natural Gas (bil. cu. ft.)	Avg. Growth in Coal Use (annual %)*
1975	0	1,789	—	5,779	280	—
1980	111	1,794	—	9,543	317	10.6
1985	9,217	1,386	142.0	19,305	290	15.1
1986	10,459	1,439	13.5	18,699	289	-3.1
1987	10,391	1,501	-0.7	23,644	300	26.4
1988	12,848	1,446	23.6	24,595	293	4.0
1989	12,471	1,538	-2.9	25,447	324	3.5
1990	12,547	1,571	0.6	25,233	328	-0.8

*1975-1985 are five-year average annual growth rates.
Source: Based on data from State Energy Data Report, Consumption Estimates 1960-1990, DOE/EIA, 1992.

The outbound transfers of coal constitute 24.2 percent of the total supply, and these are in transit to utility plants in Florida (Table IX.1). Louisiana terminals are responsible for supplying about 33 percent of the total coal tonnage consumed in Florida in 1990. In 1992, Kentucky and Illinois supplied 22 million tons (more than 90 percent of the total coal consumed) to Florida, making Louisiana an important transit state for coal movements. Electric utilities in Florida have been using substantial quantities of coal for electricity generation for a longer period than Louisiana. However, coal use trends in both states exhibit similar growth patterns (see Table IX.6).

Several factors indicate that coal consumption in Louisiana and Florida may increase in the long-run. According to DOE/EIA estimates, variations in electricity demand in the 1990's are expected to be met primarily by variations in gas-fired generation. Between 2000 and 2010, however, coal is expected to become the "first fuel choice" for new power generation. This will be especially true for Florida which has limited natural gas supplies. Further, coal prices are projected to rise less than other prices during the period, making coal the dominant energy source for electricity generation throughout the 1990 to 2010 period. Therefore, long-run coal consumption estimates for Louisiana are expected to follow the national trends (one percent per year during the 1990's and 1.8 to 2.9 percent per year in the 2000 to 2010 period). Florida, with higher forecasts in population growth and economic activities may exceed the forecasted national average growth in coal use.

IX.A.3.b Competitive Environment for Coal Exports

U.S. coal exports are expected to be the fastest growing segment of the industry in the next two decades. This growth is driven by three factors: (1) declining coal production in Europe, as subsidies and trade restrictions are reduced; (2) growing electricity demand in Asia; and (3) limited capacities of other countries to increase their exports after the year 2000. Although environmental laws of the European Community favor the low-sulfur coals of South America, South Africa, and Indonesia, these exporters are expected to be near the upper limits of their capacity by 2000. U.S. coal exports are projected to range from 185 to 289 million tons in 2010, depending on the rate of world economic growth. Compared to 106 million tons exported in 1990, the average annual growth rate for the period is between 2.8 to 5.1 percent. Coal exports will represent between 14 and 19 percent of U.S. production in 2010, compared to 10 percent in 1990. Most of the projected growth in U.S. exports will occur after 2000, when the United States and Australia are the only countries still able to expand their export capabilities significantly (see *Annual Energy Outlook with Projections to 2010,* U.S. Department of Energy/ Energy Information Administration, 1992. p. 51).

Within Louisiana, with the future instate coal consumption and transfers to Florida indicating a moderate growth rate, more rapid developments are likely to occur in the export sector. In 1990 Louisiana exported 13 million tons of coal or 38.6 percent of its total supply. More than 80 percent of this tonnage was steam coal making Louisiana terminals responsible for about 25 percent of U.S. steam coal exports (see Table IX. 3). Other major competitors with Louisiana for U.S. coal exports are Baltimore, Hampton Roads and Mobile. The ports on the east coast dominate metallurgical coal exports. As metallurgical coal exports are projected to decline in the future, these ports will face stiffer competition to maintain their market share and capacity utilization levels. These ports will gradually shift to steam coal exports. It is not very likely that they can compete and sway a share of the Louisiana market, because the industry is largely stabilized from transportation costs (see Table IX. 5 for 1992 inland transportation costs).

According to the DOE/EIA estimates, coal transportation costs will remain rather stable, increasing by only 6.2 percent between 1987 and 2010. However, as the share of steam coal exports increase and exports become more homogeneous, coal importers will have a wider choice in selecting U.S. export terminals leading to tighter competition among U.S. ports.

The coal terminal in Mobile has recently increased its capacity and has undertaken a vigorous campaign to expand its market share. Apart from its proximity, several other factors make Mobile a strong competitor to Louisiana coal terminal business. In terms of exports, in 1992 Mobile handled 9.6 million tons of metallurgical coal and 2.6 million tons of steam coal. With declining metallurgical coal exports in the future, it will shift to steam coal in direct competition with Louisiana terminals. Further, Mobile is strategically located to compete with Louisiana in supplying coal to Florida. Because of the extensive waterway network, the coal terminals in the Lower Mississippi have market access to handle a greater variety of bulk materials than the Mobile terminals. This is especially true in the case of mid-stream terminals. The availability of many types of bulk cargo will result in greater economies of scale in terms of capital equipment and greater market power for Louisiana terminal operators. Further, vertical integration of IMT and TECO coal terminals ownership by Florida based utility companies will also enter into the decision making process favoring Louisiana terminals. Therefore, all indications are that Louisiana terminals will most likely retain or improve their comparative advantage vis-a-vis Mobile .

Expanding coal production in the North Great Plains Region (primarily in Wyoming) and the construction of new coal terminal facilities on the Pacific coast is another strategic challenge to Louisiana coal exports. In terms of ocean freight and distances, these ports may have a cost advantage in shipping, especially to Japan and other Far Eastern markets. Thirty percent of Louisiana exports in 1992 was destined to this region, and the share is projected to increase to 46 percent in 2010 (Table IX.7). According to the DOE/EIA estimates, in 1990 the western states exported 4 million tons (4 percent of total U.S. coal exports) and in 2010 this is projected to increase to 13 million tons (5 percent of total U.S. exports), virtually maintaining the same market share.

In 1992, the port of Los Angeles and Long Beach exported 7.4 million tons of coal (Table IX. 3). Major concerns regarding competition from the Pacific coast ports were raised when a consortium of investors consisting of coal producers, railroads, shipping companies, ports, exporters and importers invested in the construction of a 20 million ton capacity (estimated cost $180 million) coal export terminal in the Port of Los Angeles. Recently, after reevaluation of market demand and experiencing large cost overruns, the project has been downsized to 10 million tons. Overall, as market shares for coal exports from states west and east of the Mississippi are projected to remain stable, Pacific Coast Ports are unlikely to make a significant dent in Louisiana coal export trends.

Table IX.7
Coal Exports form Lower Mississippi by Destination, 1988-1992 (actual) and Projections to 2010 ('000 tons)

Destination	Year (actual)					Growth Projections*		
Region	1988	1989	1990	1991	1992	2000	2005	2010
Metallurgical Coal								
S. America	0	66	509	1,017	899	509	509	509
EEC	82	281	448	585	475	386	359	333
Other Europe	174	170	226	297	0	194	181	168
Other Med.	0	0	0	36	0	0	0	0
Japan	1,050	1,458	1,267	921	898	1,431	1,520	1,621
Other Far East	0	0	21	0	0	24	25	27
Other	5	0	0	0	0	0	0	0
Total (Met Coal)	1,311	1,975	2,470	2,856	2,272	2,544	2,593	2,657
Steam Coal								
S. America	51	829	70	74	116	63	60	55
EEC	2,807	4,226	6,112	7,169	6,772	9,657	11,918	15,280
Other Europe	123	71	32	187	62	50	62	80
Other Med.	0	0	68	0	42	107	133	170
Japan	1,066	211	257	545	538	521	788	1,129
Other Far East	3,000	2,512	2,752	3,192	2,315	5,587	8,450	12,111
Other	7	54	847	46	52	760	730	667
Total (St. Coal)	7,055	7,903	10,138	11,213	9,897	16,745	22,141	29,491
Met & St. Total	8,366	9,878	12,608	14,069	12,168	19,289	24,734	32,148

*Met Coal is based on an annual growth rate of -1.6% for Europe, 1.2% for Asia, and 0% for Other; and for steam coal 4.9%, 7.7%, respectively.
Source: Supplement to the Annual Energy Outlook 1994, EIA, U.S. Dept. of Energy, pp. 209-210.

In 1990, steam coal accounted for only 40 percent of total U.S. coal exports. The 1990 to 2010 export projections made by the U.S. Department of Energy indicate an average annual growth rate of 4.4 percent for steam coal and an annual decline of 0.7 percent for metallurgical coal, leading to a significant change in the composition of U.S. coal exports. According to the U.S. Department of Energy estimates, the share of steam coal will increase to 64 percent in 2010. This will be an advantage to Louisiana terminals which specialize in steam coal exports.

Coal exports from the Lower Mississippi terminals by destination region and by coal type are shown in Table IX. 7. In 1992, about half of the exports was destined to the EEC and 30 percent to Japan and the Far East. The Lower Mississippi coal exports through 2010 are projected based on rates of growth for U.S. coal exports (DOE/EIA 1994 estimates). Results indicate total export tonnage increasing from 12 million in 1992 to 31.5 million in 2010. According to these estimates, the Lower Mississippi coal export share increases from 12 to 21 percent during the 1992 to 2010 period. This increase is based on the assumption that traditional coal importers from Louisiana will maintain their share of imports without shifting to other U.S. ports.

IX.A.3.c Top-Off Terminal for Coal

Draft restrictions currently do not allow the Lower Mississippi coal terminals to accommodate deep-draft ships greater than 45 feet. For several years, industry sources and transportation planners have considered the feasibility of establishing cost-effective coal top-off services at the mouth of the Mississippi River. Such a facility will enable large Cape-size vessels carrying more than 100,000 tons to carry full consignments generating economies of scale. Some estimates indicate a cost differential of $3/ton savings on a 135,000 ton lot size carried on a Cape-size vessel from New Orleans to Rotterdam, compared to a 58,500 ton lot-size carried on a Panamax size vessel. Currently, coal rates to North Europe from New Orleans are around $12/ton. These are substantial savings and if realized, can affect the competitive position of coal terminals in the state.

The proponents of a topping-off facility indicate three major factors in supporting it: first, the cost savings and economies of scale associated with larger lot sizes are substantial; second, competing terminals at Hampton Roads and Long Beach with deeper drafts place Louisiana terminals at a competitive disadvantage; and third, coal from the Gulf ports has to be carried relatively longer ocean distances to its major customers such as North Europe and Japan (for example, compared to distances between Hampton Roads and North Europe and between Long Beach and Japan). Therefore, it is imperative to make this transportation segment cost effective. The skeptics of the top-off proposal base their reasoning on the following: first, as Cape-size and Panamax vessels operate in differentiated markets, it is wrong to assume cost savings from Cape-size vessel lot sizes; second, under-utilization of the existing topping-off facility owned by TECO indicates that there is insufficient demand for such services; third, an analysis of lot-size distribution of coal liftings indicates that Cape-size consignments comprise a small proportion of total coal exported even from ports which have deeper drafts, indicating various other constraints to larger lot-sizes. The proposal has not evoked much interest from the industry, perhaps, because of recent export downturns and excessive terminal capacities experienced at this time. However, the topping-off option needs to be evaluated more carefully taking into consideration the long-term requirements of the coal industry as well as economics of dry bulk carrier industry.

IX.A.3.d Coal Imports

During the past few years, the world demand for coal was weak due to recessionary conditions, especially in the EEC countries and in Japan, adversely affecting U.S. coal exports. Further, spurred by weak markets for coal exports elsewhere, some South American countries have started exporting coal to U.S. markets. Recently, the Port of Mobile contracted to handle 7 million tons of imported coal from Venezuela within the next 3 to 4 years. The imported coal is blended with local coal at the port before delivery to electric utilities based in Florida. Similarly, limited quantities of imported Colombian coal were handled at Louisiana terminals in the past. With improvements in production and export infrastructure, it is very likely that more South

American coal will enter the U.S. market. Louisiana terminals are strategically located to handle these shipments. In the short-run, Florida based utilities may use the existing out of state facilities for imports and blending with domestic coal. However, in the long-run if large scale imports become routine, it may be more efficient for Florida based utilities to import through in-state coal terminals established for this purpose. Several other electric utilities located on the inland transportation network with competitive barge access may be good prospects for imported coal. If this trend develops, Louisiana coal terminals will be able to fully utilize the more efficient, large scale coal handling systems and the under-utilized barge backhaul capacity. According to industry sources, these amounts can be handled with marginal adjustments to the existing infrastructure.

IX.A.4 SUMMARY AND CONCLUSIONS

The long-run demand for domestic coal consumption remains rather stable. However, more significant changes are likely to be confined to the export sector in the state. Coal export operations in the state are based on a well integrated inland barge transportation network and a very efficient coal transfer and handling system at the export terminals. Historically, the coal export market share for the Lower Mississippi terminals has consistently remained stable, indicating their ability to compete with other ports for exports. Although the short-run demand for U.S. coal exhibits cyclical tendencies, annual average growth in long-run export demand is projected to be 3 to 4 percent for the period 1990 to 2010. All market forecasts indicate even higher continued growth, particularly in steam coal. Therefore, demand for coal exports from Lower Mississippi terminals is expected to increase, and the comparative advantage the terminals have will lead to improvements in market share.

Coal imports, particularly from South American suppliers and blending them with domestic supplies for use in electric utilities, remain a viable option for Louisiana coal terminals. With fuller utilization of existing handling facilities and barge backhaul, Louisiana terminals are strategically placed to captureet this new market opportunity.

IX.B GRAIN TRANSPORT AND HANDLING

Farm products is the largest dry-bulk commodity group handled within the Louisiana transportation network. This broad commodity category includes all varieties of agricultural grains and oil seeds, mainly comprising corn, wheat, sorghum, rice, oats, and soybeans. Corn, soybeans, and wheat constitute more than 90 percent of the total tonnage handled. Essentially, all movements are interstate shipments of agricultural grains inbound to Louisiana export terminals from the Mid-Western states. The export terminals serve as intermodal handling points in the transportation chain, transferring grain to ocean going vessels from rail and barges. Additionally, a series of product transformation services, such as grain assembly and storage, cleaning, mixing and drying, are also performed at the terminals. Therefore, an overall strategic assessment of export grain terminals must examine long-term developments in three broad areas: (1) U.S. grain supply and demand conditions, particularly for exports; (2) transportation and handling activities in the domestic as well as ocean transport segments; and (3) strategic challenges posed by competing U.S. ports.

IX.B.1 VARIABLES AFFECTING PRODUCTION AND EXPORTS

The United States is a major producer and an exporter of agricultural grains and oilseeds. U.S. share of world production of corn for the period 1990 to 1992 was more than 40 and 50 percent, respectively. (Table IX. 8; Figure IX.2).

In terms of exports, the U.S. dominance in international grain markets is even more evident. During the same period, U.S. market share in international trade in corn and soybeans was more than 65 percent. In addition the U.S. was an important supplier of wheat and rice exports. These large market shares indicate the U.S. competitive advantage in the international market as an agricultural producer and exporter. In addition, the dominant market role played by the U.S. enhances its ability to influence outcomes in various world commodity markets from a position of strength.

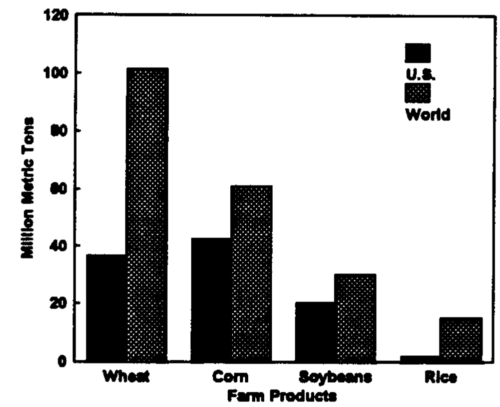


Figure IX.2
U.S. Export Shares in World Trade, Selected Crops (1992)

Government Policies. U.S. agricultural production and exports are influenced by a series of government policies targeted at domestic supply controls, price supports, and exports enhancement. U.S. Department of Agriculture (USDA) has resorted to acreage restrictions and set aside programs for a long period in order to limit grain production and attempted to maintain farm prices at higher levels. Similarly, grain price subsidy programs have been undertaken to stabilize crop prices. The U.S. actively uses export subsidies to promote sales of variety of agricultural crops. Programs include PL-480 food aid, export credits (GSM 100), export credit guarantees (GSM 102 and 103), and the Export Enhancement Program (EEP). Under the EEP, policy makers have directed that the sales be targeted to countries where the U.S. has lost market share because of export subsidies of competitors, especially the European Economic Community (EEC).

Table IX.8
U.S. and World Production and Exports of Selected Farm Products, 1990-1992

Farm Product	United States			World			U.S. Market Share		
	1990	1991	1992	1990	1991	1992	1990	1991	1992
	(000,000 metric tons)						(percent)		
Production									
Wheat	74	54	67	588	542	555	12.6	10.0	12.1
Corn	202	190	237	477	485	520	42.3	39.2	45.6
Soybeans	52	54	59	140	106	112	50.0	51.0	52.7
Rice	5	5	5	351	348	351	1.5	1.4	1.5
Exports									
Wheat	28	35	37	94	108	101	30.0	32.4	36.0
Corn	45	41	43	59	62	61	75.7	66.0	69.7
Soybeans	15	19	20	25	28	30	60.6	66.2	66.3
Rice	3	2	2	12	13	15	19.7	19.7	13.9

Source: U.S. Statistical Abstracts 1993

The general trend in recent times has been for the government to reduce agricultural subsidies in order to open up domestic agricultural markets, and to negotiate for liberalized international trade by eliminating all agricultural export subsidies by the year 2000. The recent approval of the GATT negotiations is an important trend in agricultural trade liberalization. In fact, attempts to retrieve traditional market shares under the EEP are based on the premise that negotiating with other grain exporting countries from a position of market strength enhances prospects for an agreement favorable to U.S. interests. Overall, several general conclusions can be made concerning U.S. government policies toward agriculture: (1) U.S. agriculture will improve its productivity and competitive advantage overtime, leading future grain exports and market shares to steadily increase; (2) government policies will continue to be a major determinant, exerting a significant influence on grain movements for exports; and (3) more 'open market' conditions can be expected in the future in domestic markets as well as in international agricultural trade.

International Competition-Exporters. U.S. agricultural exports face stiff competition from other exporters, mainly from developed nations; EEC, Canada, and Australia. International trade policies of these countries and their domestic agricultural policies will affect future U.S. exports. Less developed countries, such as Argentina, Brazil, China, and Thailand, are also competitors with the U.S. for grain exports. However, the past experience and perceived future changes indicate that the U.S. will continue to be a strong competitor in world grain markets.

Foreign Trade- Importers. Several factors are likely to affect the willingness and capability of foreign countries to buy U.S. grain products: (1) the rate of economic growth, and the consequent growth in purchasing power in developing countries and newly emerging independent countries in Eastern Europe; (2) the rate of growth in domestic agricultural production and the degree of self sufficiency in importing countries; and (3) the dietary preferences in importing countries, particularly the increasing share of animal protein in daily diets.

IX.B.2 GRAIN TRANSPORTATION AND HANDLING

Tonnages of U.S. grains transported by type of crop and by type of movement from 1978 to 1989 are shown in Table IX. 9 and Figure IX.3. Corn, wheat, and soybeans constitute more than 75 percent of the total grains movements. In 1989, 164 million tons were transported for domestic use and 130 million tons for exports. An analysis of trends in terms of total movements, including domestic and export components for the same period, indicates an increasing share of exports in U.S. grain production.

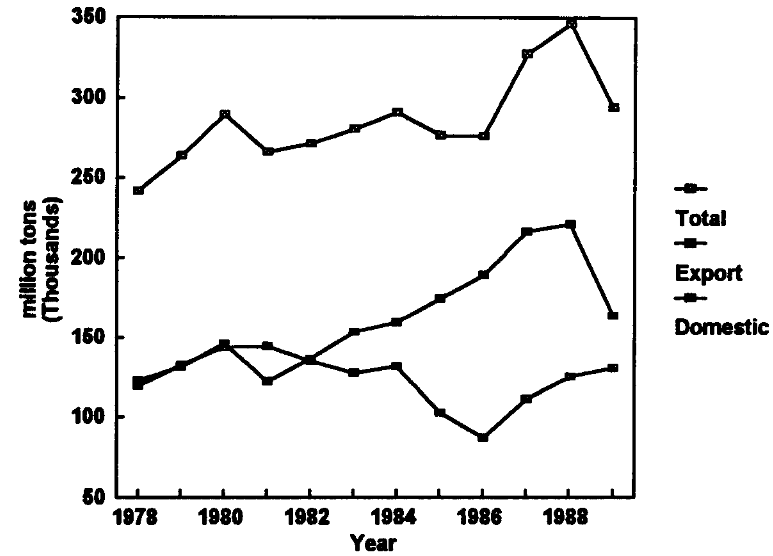


Figure IX.3
U.S. Grain Movements (Total, Domestic and for Exports)

In recent years, it is observed that the rate of growth of grains transported for domestic use is faster than for exports. This is mainly because increasing grain consumption for feed-use is taking place away from farms closer to final points of consumption. The increasing trend in ton-miles transported is likely to generate economies of scale for barge and rail transportation.In recent years Louisiana has handled roughly 50 percent of total U.S. grain exports (Table IX.10 and Figure IX.4). The state's share of the nation's total grain exports has increased since 1978 from approximately from 40 to 50 percent. World recessionary conditions in the mid 1980s (1985 to 1988) dampened demand for U.S. grain exports, reaching a low in 1986. Changes in world demand for U.S. grain seem to affect export trends through Louisiana in two main ways:

Table IX.9
Tonnage of U.S. Grains Transported by Type of Crop and Type Of Movement, 1978-1989

Year & type of movement	Corn	Wheat	Soybeans	Sorghum	Barley & Rye	Oats	All grains
				('000 tons)			
Total:							
1978	102,198	61,471	53,879	13,281	7,165	3,813	241,807
1979	122,470	59,213	56,408	13,391	7,878	4,419	263,779
1980	142,869	62,725	59,452	11,808	8,493	4,158	289,505
1981	114,028	72,829	56,889	10,611	8,314	3,479	266,150
1982	116,188	70,701	61,177	13,276	7,914	2,170	271,426
1983	122,200	72,655	58,767	13,037	10,461	3,605	280,725
1984	125,854	79,725	52,732	17,837	11,116	3,930	291,194
1985	133,187	58,697	52,050	18,908	10,245	3,893	276,980
1986	124,368	60,078	58,339	17,153	12,177	4,142	276,257
1987	165,230	67,694	61,503	16,715	12,406	3,946	327,494
1988	177,003	75,698	56,318	22,054	11,304	3,789	346,166
1989	142,112	67,977	50,212	21,448	9,427	2,950	294,126
Export:							
1978	55,162	37,584	22,822	2,680	716	206	119,170
1979	65,233	36,799	23,027	6,524	862	49	132,494
1980	69,492	39,407	24,006	8,813	1,798	107	143,623
1981	60,347	48,409	24,064	8,818	2,350	140	144,128
1982	53,780	44,954	28,081	6,630	1,522	42	135,009
1983	52,391	42,401	25,027	5,821	1,703	23	127,366
1984	53,947	46,566	21,476	7,487	2,187	16	131,679
1985	48,559	27,342	18,617	7,333	779	13	102,643
1986	29,795	27,152	23,566	4,558	1,803	34	86,908
1987	44,993	33,772	23,427	5,496	3,344	17	111,049
1988	51,211	44,640	19,674	7,140	2,405	14	125,084
1989	62,213	40,237	16,582	9,212	1,984	13	130,241
Domestic:							
1978	47,036	23,887	31,057	10,601	6,449	3,607	122,637
1979	57,237	22,414	33,381	6,867	7,016	4,370	131,285
1980	73,377	23,318	35,446	2,995	6,695	4,051	145882
1981	53,681	24,420	32,825	1,793	5,964	3,339	122,022
1982	62,408	25,747	33,096	6,646	6,392	2,128	136,417
1983	69,809	30,254	33,740	7,216	8,758	3,582	153,359
1984	71,907	33,159	31,256	10,350	8,929	3,914	159,515
1985	84,628	31,356	33,433	11,575	9,466	3,880	174,338
1986	94,573	32,926	34,773	12,594	10,374	4,108	189,348
1987	120,237	33,923	38,076	11,219	9,062	3,929	216,446
1988	125,792	31,058	36,644	14,914	8,899	3,775	221,082
1989	79,899	27,740	33,630	12,236	7,443	2,936	163,884

Source: Transportation of U.S. Grains, A Modal Share Analysis, U.S. Department of Agriculture, 1992

first, exports through the state closely correspond to national trends; and, second, when U.S. exports go through downward cycles Louisiana exhibits a higher export share, indicating relatively more stable export performance compared to competing areas of the nation.

Table IX.10
Louisiana Share of U.S. Grain Exports, 1976 to 1989

Year	Exports From Louisiana	Total U.S Exports ('000 tons)	LA Share '(percent)
1978	48,709	119,170	40.9
1979	52,477	132,494	38.9
1980	58,242	143,623	40.6
1981	61,773	144,128	42.9
1982	66,660	135,009	49.4
1983	64,272	127,366	50.5
1984	58,418	131,679	44.4
1985	50,781	102,643	49.5
1986	45,862	86,908	52.8
1987	58,727	111,049	52.9
1988	60,965	125,084	48.7
1989	67,029	130,241	51.5

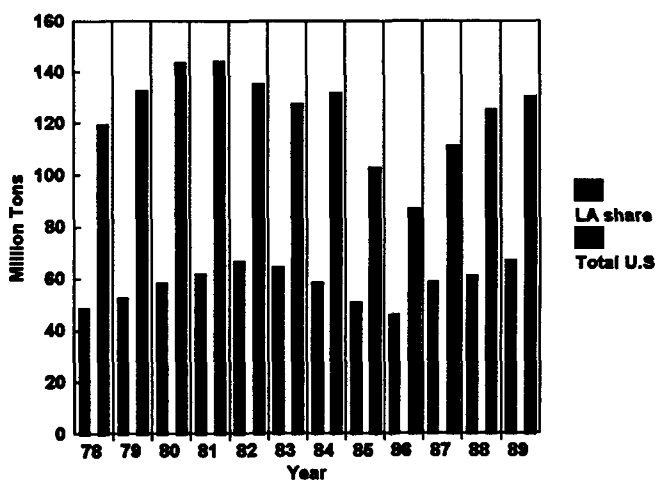


Figure IX.4
Louisiana Share of U.S. Grain Exports 1978-1989

IX.B.2.a Louisiana Grain Exports - Structural Characteristics

Total grain exports from Louisiana from 1978 to 1992 by major crops are shown in Table IX.11 and Figure IX.5. More than 95 percent of the grain tonnage exported is corn, soybeans, and wheat.

Table IX. 11
Farm Products Tonnage Exported from Louisiana, 1978-1992

Year	Corn	Soybeans	Wheat	Sorghum	Rice	Others	Total
			(IN 1000 TONS)				
1978	28,393	14,722	4,352	0	784	458	48,709
1979	31,284	14,422	4,567	0	770	434	52,477
1980	33,283	16,474	6,986	0	841	658	58,242
1981	33,307	16,281	9,816	1,155	1,034	180	61,773
1982	34,398	19,786	9,944	1,528	878	126	66,660
1983	34,326	19,656	8,000	1,320	872	98	64,272
1984	29,575	15,300	9,453	3,021	856	213	58,418
1985	28,268	13,622	4,732	3,262	765	92	50,781
1986	19,722	17,520	4,707	2,604	1,222	87	45,862
1987	30,957	18,990	5,290	2,285	1,034	171	58,727
1988	33,344	15,797	7,960	2,893	847	124	60,965
1989	39,009	12,015	11,642	2,454	1,561	348	67,029
1990	39,715	12,708	8,889	2,807	1,097	280	65,572
1991	36,212	15,216	9,192	2,338	1,038	234	64,230
1992	36,837	16,685	11,746	3,079	656	262	69,265

Source: Waterborne Commerce of the United States, U.S. Army Corps of Engineers, Various Issues

Grain export sales and service activities vary considerably from their domestic counterparts. Coordinating the assembly, inland transportation, storage, and overseas transportation of grain with sale to buyers at U.S. port elevators or at foreign ports is a specialized job requiring great skill and experience. The process becomes even more difficult because long-term sales contracts are not common in the international grain trade.

Generally, in grain exports economies of scale are significant and favor vertically integrated larger firms. The following advantages are associated with large-scale export operations typically conducted through Louisiana terminals: (1) low average fixed costs per unit of volume handled; (2) high degree of operating flexibility; (3) significant bargaining power in vessel chartering and inland transport; and (4) improved services through a worldwide marketing system.

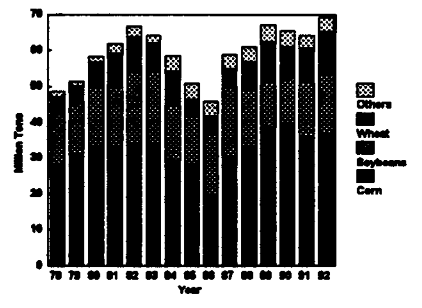


Figure IX.5
Major Farm Product Export Share From Louisiana 1978 - 1992

Origin-Destination Patterns and Modal Shares. Inbound transportation patterns to Louisiana indicate that 78 million tons of agricultural grains moved to the state in 1990, with 74 percent of this tonnage from four states: Illinois; Iowa; Minnesota; and Missouri (Table IX.12 and Figure IX.6). Barge transportation was responsible for 95.4 percent of the movements (74.5 million tons), with rail constituting 3.4 percent (2.7 million tons). All states which ship at least 2 percent of the total tonnage to Louisiana are located on the inland waterway network. In addition, more than 60 percent of the rail movements of grain to Louisiana also originate in Illinois, Iowa, and Missouri indicating the residual, but complementary role that rail plays to barge transportation in this sector.

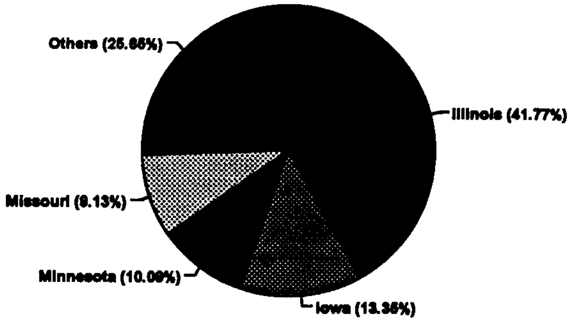


Figure IX.6
Four Largest Suppliers of Grain to Louisiana 1990

Table IX.12
Inbound Grain Movements to Louisiana by State and Mode, 1990

Origin / Destination	Mode of Transportation: Barge	Rail	Truck	State Share of Total
	(000 tons)	(%)	(%)	(%)
Arkansas	2,846	57	2	3.7
Illinois	31,581	1,031	1	41.8
Indiana	3,165	3	0	4.1
Iowa	10,000	349	74	13.3
Kentucky	2,148	16	0	2.8
Louisiana	1,389	21	369	2.3
Minnesota	7,876	0	4	10.1
Mississippi	1,848	21	69	2.5
Missouri	6,834	296	1	9.1
Tennessee	3,125	0	2	4.0
Others	3,678	893	377	6.3
Inbound Total	74,489	2,686	899	78,074.2
Modal Shares (%)	95.4	3.4	1.2	100.0

Source: Transearch Database

Commodity Types and Markets. Corn, soybeans, and wheat accounted for 94 percent of the grain exports in the period 1989 to 1992 (Table IX.13 and Figure IX.7). Corn accounted for more than 50 percent of the tonnage each year. The export shares of these crops remained relatively stable over the last 15 years. Although transportation and handling characteristics for these commodities are relatively similar, export supply and demand conditions are substantially different in the domestic and international markets. For example, in recent years the rate of domestic consumption for corn has outstripped production leaving less corn available for export markets. The demand for corn from industrial, food, and feed sectors has risen while production has been constant, exhibiting little growth in recent years, partly due to government set-aside programs. Most of the increase in domestic demand is due to projected increases in ethanol production for the gasoline additive market. This trend is expected to continue into the foreseeable future. According to USDA estimates, U.S. corn exports as a percentage of production have fallen from over 30 percent during 1989/1990 marketing year to a projected 15 percent for the 1994/95 marketing year.

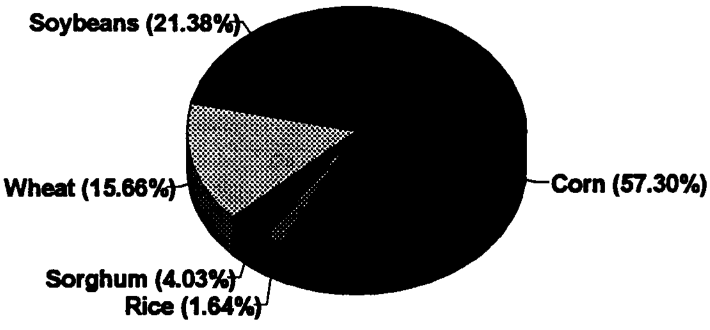


Figure IX.7
Farm Products Exports From Louisiana 1989 - 1992 (Average)

Table IX.13
Farm Products Exports From Louisiana, 1989 - 1992

CommodityType	1989	1990	1991	1992	1989-1992 Average	
			(IN '000 TONS)			(%)
Corn	39,009	39,715	36,212	36,837	37,943	57.0
Rice	1,561	1,097	1,038	656	1,088	1.6
Sorghum	2,454	2,807	2,338	3,079	2,670	4.0
Wheat	11,643	8,889	9,192	11,746	10,368	15.6
Soybeans	12,015	12,708	15,216	16,685	14,156	21.3
All Others	348	280	234	262	281	_
Total	67,030	65,572	64230	69,265	66,524	100.0

Source:Waterborne Commerce of the United States, U.S. Army Corps of Engineers, Various Issues

Widely varying international market conditions also prevail for different grains. For example, traditional export markets for U.S. corn are Japan, Taiwan, South Korea, and Russia. China and South Africa are the main competitors for exports. For wheat, Russia, other East European countries, and North African countries remain the major importers, while Australia and Canada compete with the U.S. for exports. For U.S. soybeans, Japan and countries in the Far East are the main export markets, and Argentina and Brazil are the primary competitors in the export market.

Barge and Rail Transportation and Tariff Rates. An extensive barge transportation network through the Mississippi River System provides low cost transportation access to Louisiana grain terminals. No other competing port area in the nation has such a strategic advantage for bulk grain exports. Barge transportation is particularly suitable for grain exports because of large lot-sizes and long distances involved compared to other bulk commodities. For example in 1989, more than 85 percent of a total of 67 million tons of grain transported by barge for export in the U.S. was handled at terminals on the Lower Mississippi. A substantial part of the fleet of covered barges is dedicated primarily for grain transport. Grain barge tariff rates are unregulated and largely determined by supply and demand conditions. Additions to the nation's barge fleet have been slow in recent years because of a reduction in U.S. exports in the 1980's and over investment in this sector in the 1970's. As a result about 50 percent of the total barge fleet is more than 15 years old (Table IX.14). Tighter barge supply conditions associated with relatively fixed, aging fleet together with annual variations in demand for grain transport can lead to wide cyclical variations in short-run barge rates.

Table IX.14
U.S. Barge Fleet by Type and Age, 1993

Barge Type	Number	Age-Years					
		<5	6-10	11-15	16-20	21-25	>25
Dry Covered	10,538	636	460	5,390	2,795	718	533
Dry Open	8,135	1,439	738	2,204	1,683	1,015	1,048
Other Dry*	5,297	960	410	829	1,881	362	757
Deck	3,011	189	175	691	337	380	1,158
Liquid	3,864	296	121	902	740	677	1,123
Total	30,845	3,520	1,904	10,016	7,436	3,152	4,619
Total(%)	100	11	6	33	24	10	15

* Includes scows and vessels that may be open or covered.
Source: The U.S. Waterway System-FACTS, U.S. Army Corps of Engineers, January 1994.

Barge short-run (spot) rates exhibit seasonal variations based on supply and demand conditions. However, annual average spot prices have decreased in nominal terms by about 50 percent during the period 1979 to 1993 (Table IX.15). The lowest levels in spot rates in 1984 to 1986 corresponded to low export volumes during the period, consequent with worldwide economic recession and adverse competitive conditions for U.S. exports in the world market (primarily as a result of appreciation of the U.S. dollar against foreign currencies). In the barge industry as a whole, revenue per ton-mile has steadily decreased from $.0085 in 1981 to $.0076 in 1992.[1] Faced with a relatively a stagnant market aggravated by cyclical downturn in demand and significant oversupply of equipment, the barge industry was able to survive by adopting measures to reduce costs. These measures included a significant rationalization of the industry structure, leading to reduced number of barge firms.

Table IX.15
Grain Barge Rates to Baton Rouge/New Orleans: Average Annual Percent of Tariff

Year	ORIGIN*			
(average)	Twin Cities	Middle Mississippi	St. Louis	Illinois River
	(percent of tariff)**			
1979	311	291	219	264
1980	251	233	197	228
1981	178	163	141	159
1982	148	136	117	136
1983	175	147	123	147
1984	157	137	116	138
1985	127	117	109	124
1986	130	120	103	114
1987	174	159	127	148
1988	198	182	161	176
1989	163	143	131	155
1990	156	136	114	131
1991	177	154	127	142
1992	158	142	124	137
1993	156	136	114	130

*Origins are from: Genoa, WI for Twin Cities; Keithsburg, IL for Mid Mississippi; St. Louis, MO for St. Louis; and, Lockport, IL for Illinois River.
** as compared to 1976 benchmark prices.
Source: Sparks Companies, Inc.

Empirical studies on grain transportation suggest that competition by waterways has significant effects on lowering rail tariff rates. For example, for similar line-haul distances, wheat shippers 500 miles from water competition paid rates 36 percent greater than shippers 100 miles away. Corn shippers who were 200 miles away from water competition, paid rates 6.2 percent greater than shippers 75 miles away from water competition.[2] Further, time series analysis of barge and rail rates indicate strong contemporaneous effects on rail rates in the Mid-West. One-dollar per ton reduction in barge rates was associated with, on average, a 50-cent per ton reduction in rail rates. Away from the rivers, in central Indiana, barge rate changes of one dollar per ton led to 30-

[1]Transportation in America. 1994 12th Edition, p.49, Eno Transportation Foundation, Inc.

[2]Ibid. p.32.

cent per ton price change in rail.[3] All these factors indicate the strong economic impacts of barge transportation on the Lower Mississippi grain export terminals.

Grain Export Terminals. All grain for export was handled in two major port areas in the state: (1) the river terminals along the Lower Mississippi, stretching from Baton Rouge to the Gulf handled 99.3 percent of the total export shipments; and (2) the Port of Lake Charles handled 0.7 percent. Major public port districts in the Lower Mississippi are the Port of Greater Baton Rouge, Port of South Louisiana, and the Port of New Orleans. The majority of the grain exports from the Lower Mississippi area was handled at ten grain elevators (Table IX 16). Year to year variations from 1989 to 1993 indicate a 13.3 percent decline in 1993. The market share of Lower Mississippi area grain exports of the largest four terminals was about 65 percent during the period.

Grain export activities are typically managed by vertically integrated large merchandisers, who purchase and store at their own elevators. The list in Table IX 16 includes the largest multi-national firms involved in international grain trade. Most of the exporting firms own river terminals in producing states and transport to export elevators in the Louisiana Gulf area, moving one step further in an integrated transportation network. As barge and rail transportation services for grain are necessarily for large volumes on long term contracts, grain exporters

Table IX.16
Grain Exports from Louisiana Elevators, 1989-1993

Elevator/ Location	1989	1990	1991	1992	1993
			(Million bushels)		
Zen - Noh/ Convent	461.6	521.1	480.1	507.2	392.0
Continental/ WestWego	434.3	425.5	382.2	433.5	392.0
Adm/Gromwark/ Destrahan	360.4	372.2	366.2	371.0	351.6
Cargill/ Reserve	408.8	357.7	363.3	395.2	340.6
St.Charles/ Destrehan	205.1	227.8	215.5	213.4	237.6
Louis Dreyfus/ Reserve	228.7	217.7	228.0	235.6	191.5
M.F.P/ Paulina	153.5	129.1	161.4	145.7	126.0
Bunge/ Destrehan	124.1	150.2	91.4	154.6	95.7
Ferruzzi/ Martyle Grove	41.2	56.0	161.4	145.7	126.0
Cargill/ Port Allen	26.5	54.1	17.9	28.5	26.9
Total	2,444	2,511	2,467	2,630	2,280
Annual Variability In Total (%)		4.7	-1.8	6.6	-13.3
Market Share of Largest Four (%)	68.1	66.8	64.5	64.9	64.7

Source: Compiled from data collected by the LSU National Ports and Waterways Institute.

[3] Fuller, Stephen W., et al. "Effect of Deregulation on Export Grain Rail Rates in the Plains and Corn Belt," Journal of the Transportation Research Forum, 28(1987): 160-167.

have been successful in negotiating very preferential rates from transport providers.

Grain export activities involve several distinct operations creating relatively large economic impacts in the state. Inland transport is provided by a large fleet of covered hopper barges and railcars especially utilized for grain shipments. In most cases, transfer activities from domestic modes of transport is first to an export elevator for storage and mixing of grain to meet the necessary quality requirements for export. Before the grain is transferred to ocean going vessels for export it is examined by the U.S. Grain Inspection Service. In addition to these services, grain exports support the barge building and repair industry in the state, barge fleeting activities, ship chartering, rail transport and many other ancillary transportation services.

IX.B.3 COMPETITIVE ENVIRONMENT AND STRATEGIC CHALLENGES

The competitive environment for grain transport and handling in the state is related to general developments in two broad areas: (1) competitiveness of U.S. agriculture in international trade and; (2) modal competitiveness and economics of barge transportation. The vital role that exports and barge transportation plays in the industry was analyzed in an earlier section on industry structure. The U.S. is the leading supplier of agricultural grains, controlling a substantial world market share in corn, wheat, and soybeans exports. This trend is expected to strengthen and continue, primarily under three likely scenarios: first, the competitive advantage of U.S. agriculture, which is based on a strong research program, technological innovation, and efficient management of resources, will be maintained; second, sustained world economic growth, increasing population, and trade liberalization will lead to international trade expansion; and third, under increased demand for exports, the U.S. will be able to ease current supply controls on agriculture and expand grain production.

Different port areas in the U.S. compete for grain exports. In 1985, ports in the Gulf area handled 80 percent of total U.S. exports of soybeans, 54 percent of wheat, and 63 percent of corn exports (Table IX. 17). The Gulf market share remained relatively stable over the period 1977 to 1985. Major markets for U.S. grain exports during the period shifted to East Asian countries on the Pacific Rim, Soviet Union and East European countries. Export market shares for U.S. Pacific ports increased during the period, perhaps, reflecting the effects of more exports to East Asian countries such as Japan, Taiwan, and South Korea. However, Gulf ports maintained their market shares. Major grain importers from Louisiana terminals continue to be countries on the Pacific Rim and Russia, indicating inland transportation and handling cost advantages can outweigh longer ocean transport costs.

Table IX.17
U.S. Grain Export Market Shares by Port Region, 1977 and 1985

Export Region	Soybeans 1977	Soybeans 1985	Wheat 1977	Wheat 1985	Corn 1977	Corn 1985
			(percent)			
Atlantic	10	6	12	5	9	6
Great Lakes	11	10	4	6	23	14
Gulf	77	80	53	54	67	63
Pacific	2	4	31	35	1	17
Total (%)	100	100	100	100	100	100

Sources: Current Issues in U.S. Grain Marketing, Kentucky Agricultural Experiment Station, Lexington, Kentucky, 1989. Corn Movements in the United States, Agricultural Experiment Station, University of Illinois at Urbana-Champaign, 1990.

Louisiana grain terminals accounted for 92 percent of total soybean exports from the Gulf and 94 percent of corn exports (Table IX. 19). More than 90 percent of the soybeans and corn exported through the Gulf ports was transported by barge. All barge cargo was to the Louisiana Gulf, except for about 2 to 3 percent handled in Mobile. In the case of wheat exports, Texas Gulf ports handle 63 percent, and more than 99 percent of wheat exported through Texas ports are rail shipments. Above numbers indicate the heavy dependence of the state's grain industry on barge transportation and the dependence of other ports on the Gulf on rail.

Interstate grain shipments by mode of transport for 1977 and 1985 are shown in Table IX.18. As numerous interrelated factors affect choice of modes and transport decisions, it is difficult generalize any clear trends from the aggregated data for two years. For example, the increases in trucking modal shares for all crops in 1985 over 1977 may be due to record low levels of grain exports in that year, compared to average domestic consumption levels (see Table IX. 9). Generally, increased domestic consumption favors rail and truck transport as it requires shipments to many destinations, and movements for export favor barge transport.

Table IX.18
Interstate Grain Shipment Modal Shares, 1977 and 1985

Type of Grain	1977 Modal Shares (%)				1985 Modal Shares (%)			
	Truck	Rail	Barge	Total	Truck	Rail	Barge	Total
Corn	16.3	49.0	34.7	100	21.1	46.8	32.1	100
Soybeans	25.1	29.2	45.7	100	32.0	25.2	42.8	100
Sorghum	13.9	82.8	3.3	100	32.6	47.6	19.8	100
Wheat	17.0	58.6	24.4	100	17.3	64.8	17.9	100

Sources: Current Issues in U.S. Grain Marketing, Kentucky Agricultural Experiment Station, Lexington, Kentucky, 1989. Corn Movements in the United States, Agricultural Experiment Station, University of Illinois at Urbana-Champaign, 1990. Sorghum Movements in the United States, Agricultural Experiment Station. University of Illinois at Urbana-Champaign, 1990.

Table IX.19
Gulf Port Region - Grain Export Market Shares, 1985

Port Regions	Soybeans		Corn		Wheat*	
	Volume	Share(%)	Volume	Share(%)	Volume	Share(%)
			('000 bushels)			
Eastern Gulf	29,970	6	44,197	4	3,730	1
Louisiana Gulf	462,404	92	1,013,832	94	255,784	37
Texas Gulf	9,766	2	19,457	2	433,546	63
Total	502,140	100	1,077,486	100	685,987	100

* Wheat exports are for 1983.

Note: Eastern Gulf ports: Pascagoula, MS; Mobile, AL. Louisiana Gulf ports: Mississippi River; Lake Charles. Texas Gulf ports: Beaumont; Port Arthur; Houston; Galveston; Brownsville; Corpus Christi; all in Texas.

Sources: Current Issues in U.S. Grain Marketing, Kentucky Agricultural Experiment Station, Lexington, Kentucky, 1989. Corn Movements in the United States, Agricultural Experiment Station, University of Illinois at Urbana-Champaign, 1990. Sorghum Movements in the United States, Agricultural Experiment Station. University of Illinois at Urbana-Champaign, 1990.

Access to an extensive barge transportation network providing cheaper and efficient movement of bulk grain provides a competitive advantage to Louisiana export terminals. Recent proposals aimed at full recovery of inland navigation operation and maintenance costs from the operators of vessels using the inland waterway system through a fuel tax will significantly increase transportation costs for Louisiana exports. According to the provisions of the Inland Waterways Revenue Act of 1978 vessel operators have been paying a gradually escalating fuel tax since 1980. The currently authorized fuel tax peaked at 20 cents a gallon in 1995. It is estimated that to fully recover Federal shallow-draft navigation operation and maintenance costs the fuel tax has to be increased by about one dollar per gallon.

Several empirical studies have been undertaken to assess the economic impact of waterway user charges on localities, states and regions.[4] The studies covered states which are major grain suppliers to Louisiana. For example, Illinois study concluded that: (1) increased transportation costs will lead to increased prices for U.S. grain, resulting in reduced sales and increased costs that cannot be passed to foreign buyers; (2) increased transportation costs to Gulf ports as a result of higher barge rates would lessen the advantage of the Gulf relative to East Coast and Great Lakes ports; (3) investments in facilities and growth in capacity will eventually be affected both at river-loading points and at export elevators; and (4) higher fuel costs in the short-run will create relatively greater financial hardships to small bargelines and may in fact reduce their numbers. The Minnesota study concluded that the state has to bear relatively higher costs because of longer transport distances involved. The grain movement analysis for Missouri identified a larger grain market share for rail and a possible rate increase in both modes. Therefore, the future levels of inland waterway fuel taxes will be a crucial factor for Louisiana grain exports.

Increases in inland waterway fuel taxes and consequent barge rate increases will result in market share shifts to rail transportation. Major beneficiaries of such a shift will be rail dependent port areas, particularly on the Atlantic and Pacific coasts. As barge rates increase, rail will be able to offer more attractive rates to grain shippers who are in the marginal areas with barge access. In the Gulf, all ports will improve their competitive positions vis-a-vis Louisiana ports.

In recent years, the rail industry has made significant improvements in grain transportation, especially in the areas of rate structure, cost savings through technological innovations and labor savings. Although these improvements will contribute to increased productivity, increased rail competition can adversely affect the competitive advantage of Louisiana terminals which are heavily barge dependent. In 1989, farm products was the largest commodity group for rail, generating 154.4 million tons.[5] Since deregulation in the 1980's the rail industry has initiated aggressive marketing initiatives to be competitive with barge transportation. Inflation-adjusted average rail rates declined about 25 percent in the 10 years following deregulation and average

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[4]See *The Economic Impact of Waterway User Charges on Localities, States and Regions,* National Waterways Conference, Inc., Washington, D.C., 1982.

[5]Railroads and Productivity- A Matter of Survival, Association of American Railroads, Washington, D.C., 1991, p.10.

revenue per ton mile declined by an inflation-adjusted 37 percent.[6] However, these trends do not indicate a significant shift in market shares for grain exports from the Lower Mississippi ports as it maintained a market share of about 50 percent in the latter 1980's (see Table IX 10). The decline in rail tariffs is mainly associated with increased competition in deregulated markets and productivity improvements with tighter cost controls and technological innovations. The rate structure previous to deregulation, which often had no discount for size of shipment, was replaced by lower multiple-car and unit train rates. It is estimated that tariff rates on 14 Kansas-Gulf routes declined by over 30 percent between 1981 and 1986.[7]

Deepening of the Mississippi River from Donaldsville to Baton Rouge from the existing 40 foot depth to 45 feet has been completed to allow unimpeded access by larger ships. Some industry sources believe that deeper draft is vital for larger bulk ships that carry oil, grain, and coal. With the previous 40 foot depth it was possible to handle ships carrying 50,000 to 60,000 tons. As grain lot sizes carried in international trade rarely exceed these tonnages, it is doubtful whether this will substantially affect the competitive position of state grain terminals in the near future.

IX.B.4 SUMMARY AND CONCLUSIONS

Transportation, including inland movements, handling at export terminals, and ocean transport, is an important cost component in export prices. Louisiana grain export terminals are strategically located and integrated with the sources of supply in the Mid-West by an efficient transportation network and concurrent vertical linkages in the grain marketing chain. All ten large grain export terminals have developed grain assembly networks in the U.S. and international marketing affiliations allowing great flexibility in operations and cost controls in different segments of the transportation chain. Various factors have contributed to a substantial rate reduction in barge and rail rates for grain exports in recent years. In essence, railroad deregulation, strong intra-mode and intermodal competition, and relatively low and stable fuel prices have facilitated better access for U.S. grains to foreign markets. Compared to some other competitors, such as Canada and Argentina, the U.S. enjoys a relative advantage in its inland transportation.

In conclusion, indications are that demand for food grains in world markets will continue to grow in a consistent manner. Further, it is safe to assume that the U.S. will be a strong competitor in international commodity markets and maintain its export market share. Louisiana's dominant market position in handling the nation's grain exports is linked to low cost barge transportation. If recent proposals aimed at full recovery of inland navigation operation and maintenance costs from the operators of vessels through a fuel tax are implemented, it will increase inland transportation costs of grain exports through the state. This remains a major challenge to the industry.

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[6]Op cit., p.14.

[7]Effects of Railroad Deregulation on Grain Transportation. James M. MacDonald, U.S. Department of Agriculture, Economic Research Service, Technical Bulletin Number 1759, June 1989, p.25.

IX.C STRATEGIC ISSUES IN CONTAINERIZED TRADE

IX.C.1 MAIN TRADE COMPONENTS

Louisiana's ports currently serve 3 primary trade routes: Puerto Rico, North Europe and South/Central America. In addition, they serve several secondary trade routes, including the Mediterranean, Middle East, Africa and others. This section focuses on the 3 primary trade routes (hereafter called *components)* since they encompass about 85-90% of the containerized trade. For each component the discussion will review the main characteristics of the trading partners, participating shipping lines, rival regional ports, and global trends that may affect future prospects.

IX.C.2 PUERTO RICO TRADE

The trade with Puerto Rico, with about 60-65% of the total Louisiana throughput, is by far the most important component of Louisiana's containerized trade. Puerto Rico is totally dependent on the mainland for receiving/shipping its raw materials and finished goods. Therefore, despite its small size, its ocean trade is large, with about 1.7 million TEUs/year. Recent forecasts for Puerto Rico suggest modest growth, although somewhat lower than that experienced in the past. This slowdown is mainly the result of the NAFTA agreement that is expected to hurt investments in the Island's industries. Long-term growth is expected to fluctuate in the range of 0 - 5% per year.

Louisiana is one of the three mainland gateways for Puerto Rico. The largest gateway is Florida, especially the ports of Jacksonville and Everglades/Miami. The second gateway is in the Northeast, mainly the ports of Philadelphia and New York. Puerto Rico's main carriers include American Transport (Crowley), Sea-Land Services, Navieras (Puerto Rico Marine Management), SeaBarge and Trailer Bridge. The first three are the largest, and all call at the three gateways. The rest call only in Florida. Recently, Trailer Bridge announced plans to construct two 1,068-trailer barges. These new buildings are expected to call at the Jacksonville terminal, increasing the line's present capacity five fold.

IX.C.2.a Sea-Land and Navieras

Sea-Land and Navieras have almost duplicate services; they operate the same vessels, the Lancer type, with about 1,100-TEU capacity, on a weekly basis, calling at the same mainland ports. In New Orleans, the two lines call at neighboring terminals in France Road. The lines' terminals seem to be adequate and the operations efficient with reported productivity at about 35 moves/hour.

The lines reportedly enjoy full vessels. However, since Puerto Rico is covered under the Jones Act, any fleet expansion of these two lines requires new building of U.S. flag vessels, a very costly undertaking. If, however, the lines decide to pursue new construction, the new vessel will probably be much larger than the present ones, in the 2,500 TEU range and with higher sailing speed, about 24 knots. It can be expected that the larger vessels will be deployed on the heavier trade route, calling at Florida ports. It is logical to assume that Louisiana will continue to be served by the smaller and older vessels. Assigning larger new buildings to New Orleans may face an obstacle if the new vessels draw more than 36 feet of water.

Altogether, it seems that Florida, Louisiana's main competitor for the Puerto Rican trade, will further enhance its advantage in the future. This may also lead to some changes in the market share allocation favoring Florida.

IX.C.2.b Crowley

Crowley serves the Puerto Rican trade from a specially designed terminal in Lake Charles. The line operates deck barges, with a capacity of 360 trailers (equivalent to 720 TEUs) with service frequency of about 7-8 days. The line's largest barges, with a capacity for 512 trailers, are deployed on the Jacksonville-to-Puerto Rico route.

Crowley services to Puerto Rico are different than that provided by Sea-Land and Navieras. Crowley barges carry only domestic trailers and have a low service speed of about 10 knots (vs. 22 knots for ships). Also, Lake Charles is much closer to the Texas cargo (143 miles to Houston) than to New Orleans's (210 miles). Presumably, Crowley has established its own niche in the trade, somewhat unaffected by competition from other lines and ports. Consequently, a likely future scenario for Crowley is to grow with the trade, retaining its market share. This may change, however, if a Texas service to Puerto Rico is established in the future. The growth in Lake Charles will probably take place by introducing larger barges, perhaps through jumboization of current equipment.

IX.C.2.c Cargo Base and Regional Competition

The cargo base for Puerto Rico can be divided into four categories of origin/destination: local Louisiana, Texas, West Coast, and Midwest. It is estimated that only about 20-30% of the cargo is local Louisiana, mainly forest products and chemicals. The rest of the cargo is equally divided between the other categories.

Texas trade with Puerto Rico is currently served by Louisiana ports since presently Texas, with its large port in Houston, does not have a Puerto Rico service. Texas local cargo is either equal to or even *larger* than Louisiana's local cargo (see above). There is a high probability that such a service will be established in the future. In this case it is logical to assume that a Texas service will also attract the West Coast cargo and perhaps some Mexican cargo as well. Any direct call in Texas may come at the expense of Louisiana.

A Texas service may be provided by a new line looking to create its own niche. But, it could also be provided by existing carriers looking to diversify and enhance their presence in the Gulf. More daunting is the possibility of a line substituting its current Louisiana call with a Texas one. There are, however, some powerful arguments against a Texas service: the Puerto Rico trade is very competitive with lines attempting to cut costs by load-centering. Louisiana's overall location vis-a-vis the trade is more advantageous: it has better land connections to the Midwest and it is closer (via sea) to Puerto Rico.

IX.C.2.d Summary: Stability or Small Growth

The *positive factors* affecting this trade component are:

- Puerto Rican trade is stable and will experience modest growth;
- trade is well-entrenched in Louisiana, with an efficient terminal system and land connections to a wide hinterland; and
- changes to services are difficult because of U.S.-flag requirements.

The *negative factors* are:

- introduction of a Texas service to cater to local cargos along with West Coast cargos; and
- possible line consolidation resulting in a new ship building program that will favor Florida's ports.

On the whole, it is reasonable to expect either a continuation of the present level of activity (stabilization) or even a modest growth.

IX.C.3 NORTH EUROPE TRADE

The trade with North Europe accounts for about 10% of Louisiana's containerized trade. The overall trans-Atlantic trade is considered the second largest in the world in terms of volume (TEUs/year). Though it is a well-developed trade, it is still showing signs of growth following the recent flurry of trade liberalization agreements. The Gulf segment of this trade is much smaller than the North and South Atlantic segments. The main services are provided by large, multi-line consortia, the most prominent headed by Sea-Land, with a fleet of 3,400 TEU vessels. Most lines are organized in a rate-setting cartel, the Trans-Atlantic Conference (TACA). In parallel to the conference lines there are several non-conference lines, the so-called independents. These lines usually operate smaller ships with lower service levels and rates.

IX.C.3.a European Consortia

Louisiana is presently served by three consortia: (1) Hapag Lloyd/Atlantic Container Line/Mexican Lines/Tecomer; (2) Mediterranean Shipping/Polish Ocean Lines; and (3) Lykes Lines/Deppe. The first two call at France Road and the third one at Jourdan Road. All carriers seem to enjoy uncontested terminals and highly productive operations. Sea-Land's consortium does not directly call New Orleans but limits its Gulf Coast calls to Houston, from which the lines barge their European boxes to New Orleans.

IX.C.3.b Cargo Base and Regional Competition

The cargo base for the European trade is very similar to that of Puerto Rico with, perhaps, more emphasis on local cargo and less on West Coast and Texas. Both are mainly served through Houston. The more important difference between the European and Puerto Rican trade relates to the Midwest and West Coast cargo that, in the case of the European trade can take advantage of the double-stack rail system and move through the North and South Atlantic ports. Louisiana ports face competition on the European cargo from two fronts: the Texas ports on the west and the North/South Atlantic ports on the east.

IX.C.3.c Lines Consolidation and Load Centering Trends

Louisiana's connections to Europe are somewhat limited relative to other Gulf and Atlantic ports. For example, a recent survey of the trans-Atlantic services from Gulf and South Atlantic ports indicate that while New Orleans has 3 weekly calls, Charleston has the equivalent of 7.5 weekly calls and Houston 4.[8] New Orleans's limited services are the result of a continuing trend of consolidation (or rationalization) among lines. The consolidated services operate larger and more cost-effective vessels that call at a smaller number of ports, called load-centers. Consolidation also allows the participating lines, through vessel sharing agreements, to provide more frequent services to a broader selection of ports that are beyond the capability of a single carrier. The selected load-center that serves the larger vessels require greater volumes of cargo. New Orleans has a limited local cargo base, which may not justify a direct call by the larger consortia in the future.

Charleston and Miami on the South Atlantic and Houston in the Gulf, together with their close hinterlands, generate enough cargo to sustain a consortium call. Houston, especially, constitutes a threat for New Orleans if a consortium decides to have only one direct call in the Gulf. This was demonstrated in the case of the Sea-Land consortium, which left New Orleans several years ago and now transfers its local boxes to New Orleans by barge from Houston.

IX.C.3.d MRGO Channel

A major obstacle for future development of New Orleans's European trade is the Mississippi River Gulf Outlet (MRGO) depth. The channel draft of 36 feet limits vessel capacity to about 2,000-2,500 TEUs, which is the size of the vessels presently calling there. In fact, the present vessels operated by the Hapag-Lloyd and Lykes-led consortiums are able to navigate the MRGO only because they come light-loaded. For example, the Lykes' Oceanus, with carrying capacity of 2,441 TEUs, has a nominal draft of 37'7", but because New Orleans is a "middle-of-way" port, the vessel has to draw only about 30 feet of water upon arrival. It is logical to assume that future new buildings will involve vessels in the 3,000 - 3,500 TEUs range, with a draft of about 40 feet.

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[8]See: Bonney, J., "Shared Vessels", *American Shippers*, December 1994, pp. 30 -31.

The present Sea-Land Atlantic-series ships, with 3,500 TEUs, are already too large to efficiently access New Orleans's France Road terminal via the MRGO.

IX.C.3.e France Road vs. River Terminal

A container terminal with sufficient channel depth to accumulate increasingly larger container ships is one of the major strategic issues facing Louisiana with regard to this trade. Such a terminal may be located at one of the present Mississippi River terminals in uptown, where the channel depth is 45 feet, sufficient to accommodate all known containerships.[9] However, the present (and future) River terminals are designed as multi-purpose with large transit sheds facing the docks that occupy much of the yard area. Also, the terminals in their current layout do not have gantry cranes and lack a multi-lane container gate with a queuing area as well as convenient access to I-10. But, even if gantry cranes and gates are constructed on the River, the overall configuration of the terminals is not suitable for high volume container operations. Moreover, the yard acreage available behind the dock is limited and expansion is difficult.

Another possible river site is at St. Bernard, south of New Orleans. This site was mentioned in the New Orleans Strategic Plan (1986) as a possibility for future expansion. It has the advantage of size and is closer to the ocean. It has the disadvantage of the levee and difficult rail access. Further investigation is required, however, before further evaluation can be made.

IX.C.3.f Summary: Stability or Decline

The only positive factor affecting Louisiana's situation regarding the European trade is an overall growth for the trans-Atlantic trade. The negative factors are: (1) a continuing trend toward consolidation and load-centering; and (2) limited availability of deep-water terminals.

It seems that the threats are stronger than the opportunities in this trade component. These threats, however, are not expected to come to fruition in the near future, allowing time to devise counter measures. Also, even if one of the consortiums decides to leave Louisiana, smaller lines may come in to fill the gap. These lines may operate smaller, low-cost vessels and offer independent (non-conference) service, geared mainly for local, non-intermodal cargo. Altogether, the prospects of this trade are for stability or decline. The latter is expected especially if actions are not undertaken in the near future to develop a deeper-draft container terminal.

IX.C.4 South and Central American Trade

Latin America is the third component of Louisiana's containerized trade. The trade as a whole is poised for accelerated growth following NAFTA and possible future free-trade agreements (e.g. Chile). Further growth is expected in the long-term future following the opening of Cuba for U.S. trade. However, since presently this trade only accounts for about 15% of Louisiana's

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[9] An alternative not discussed here is to use an expanded Industrial Canal lock.

containerized volume, the healthy growth prospects will not amount to large growth in absolute terms (e.g. number of containers).

The number of lines serving this trade is still limited and the level of service offered by them is lacking, especially with regard to Mexico where the competition is land transport. For example, the only present service from Louisiana to Mexico is by two consortiums, one headed by Lykes and the other by Hapag-Lloyd. The primary concern of both consortiums is the European trade to the U.S. Gulf and Mexico and not the U.S. Gulf/Mexican trade. As a result, the service offered between Louisiana and Mexico is only in one direction (inbound, from Mexico).

IX.C.4.a Direct Services and Regional Feeders

The lines serving the trade between South/Central America and Louisiana are divided into direct services and regional feeders. The direct services, the largest of them provided by Sea-Land and Pan American, call Louisiana (along with other Gulf ports) from which they directly proceed to their destination ports in South/Central America. The feeders proceed from Louisiana to their regional hubs, where they tranship the cargo to mainline vessels headed to the major South/Central American ports. This pattern is well illustrated in the case of Maersk and Zim feeders, with Maersk and Zim operation through regional hubs in Miami and Kingston, respectively. Both services employ small geared vessels, with capacity of about 500 TEUs.

Most of the regional and feeder services call at France Road/Jourdan Road complex. Since the vessels on these services are relatively small, the lines do not experience any terminal limitations. Crowley operates a barge service to Central America from Lake Charles. The service uses the same terminal as the barge service to Puerto Rico.

IX.C.4.b Cargo Base and Regional Competition

Most of the lines that call at New Orleans also call at Houston, as is the case with the European trade and unlike the Puerto Rican one. Local Texas and the West Coast cargos are handled in Houston.

The main competition is for Midwest cargo, especially for the portion that is generated/terminated at the northern tier of the Midwest (Chicago/St. Louis). For this cargo, Louisiana's ports compete mainly against the North Atlantic ports (New York/Baltimore/Norfolk), as was the case with the European trade. The North Atlantic ports have the advantage on the Brazil/Argentine trade, where they offer faster and more frequent services. Another source of competition is Florida's ports, mainly for the southern tier of the Midwest. Florida's advantage is in the wider variety of services available there; its disadvantage are the longer and less convenient land connections. Finally, since most of the services operate geared vessels and cater to local cargo, some of them prefer calling at smaller, non-Louisiana regional ports, closer to the sources of cargo (Gulfport). Altogether, Louisiana faces 4-pronged competition on the South/Central American trade by: Houston, smaller Gulf ports, North Atlantic and South Atlantic ports. The result is that Louisiana's cargo base is somewhat limited to the immediate vicinity and adjacent regions of the Gulf and Midwest (Memphis).

IX.C.4.c Summary: Growth

The primary positive factor affecting this trade component is overall, large growth in the South/Central trade. The negative factor is the possibility of establishing non-Louisiana regional ports.

The overall assessment is that continued growth will surpass any diversion of cargo to regional ports. Therefore, the prospect for this trade component is for significant growth. It should be remembered, however, that while the relative growth (in percentage) may be substantial, the absolute growth (in TEUs) may be moderate because of the current small base.

The trade will be characterized by small and mid-size containerships, some of which will be redeployed from the major trans-Atlantic and trans-Pacific trade routes where post-Panamax containerships have recently taken the lead. Another possibility is for some of the trade to be served by shallow-draft coasters and river/ocean vessels, especially on the shorter trade routes to Mexico. It is reasonable to expect that these vessels may call at Louisiana ports that are presently not involved in the trade, such as Lake Charles, Baton Rouge, and perhaps even at ports on the GIWW.

IX.C.5 Cross-Gulf Trailer Ferry

The trade with Mexico has the most promising growth potential. Currently, most of this trade is served by road and rail, through the land crossing in Texas, mainly at Laredo. A recent study by the LSU National Ports & Waterways Institute indicated that a fast (22-24 knots) trailer ferry has a good chance of *diverting* cargo from the land to the water mode. The ferry service should focus on serving hinterlands in the U.S. east of the Mississippi, and south of the Federal District in Mexico. New Orleans is located on the southeast "tip" of the U.S. hinterland and seems to be the most suitable port of call for such a service. Also, New Orleans has superior rail connections to the Midwest and Atlantic.

At this point, however, no line has announced its intentions to develop such a service. The only reported initiative is by CSX railroad, but it has been oriented mainly for moving railcars using deck barges.

IX.C.6 Summary

Louisiana's containerized trade has three main components: the Puerto Rico, European, and South/Central America. The Puerto Rican component is poised for stability with, perhaps, small growth. This may offset the expected decline that looms over the European components, since the Puerto Rican component is much larger. The "balance" between the first two components leaves Louisiana with the growth expected in the third component, South/Central America. Therefore, the overall, long-term prospects of Louisiana's containerized trade are for stability with modest growth. The containerized trade with South/Central America through Louisiana's ports, the main source of future growth, will be handled by mid-size containerships. The trade can be accommodated in the existing terminals on the Industrial Canal. Therefore, this trade does not require deep-draft and large terminals equipped with post-Panamax cranes and on-dock intermodal yards, like those currently contemplated for the major West and East Coast ports. A deep-draft River terminal is necessary only if Louisiana decides to retain its position with the European trade in the absence of efficient deployment of vessels through MRGO.

The modest prospects for growth in Louisiana's containerized trade, as presented above, may change dramatically upward if a high-volume trailer ferry to Mexico is successfully developed. A dramatic downturn may occur, however, if one (or more) of the consortiums serving the European trade decides to terminate direct calls at Louisiana because of lack of deeper-draft terminal availability.

IX.D STRATEGIC ISSUES IN INTERMODAL ACTIVITIES

IX.D.1 MAIN ACTIVITY COMPONENTS

The main activity of intermodal yards is the transfer of containers and trailers between trains and trucks. The yards link two *land* modes of transportation, rail and road, and have no direct connection to the water mode. Therefore, the categorization of activities and markets served by intermodal yards is quite different from the categorization employed for marine terminals in the previous sections. There are two criteria used here to categorize the intermodal activity in Louisiana: the primary is *cargo type* and the secondary is *hinterland region*.

IX.D.1.a Domestic and International Boxes

The primary categorization is according to the type of cargo stored *inside* the "boxes"[10] handled at yards. Accordingly, the intermodal activity can be divided into three segments (the activity is presented below in the *inbound* direction - outbound moves would follow similarly):

- **Domestic Trailers and Containers** -- trailers and domestic containers carrying *inter-city* cargo that originates/terminates in the vicinity of New Orleans.[11]

[10]The term "box" is used here to denote both trailers and containers.

[11]Since domestic containers are still only a small fraction, and for brevity of discussion, the following will refer to trailers and domestic containers as trailers.

- **Import Containers** -- containers carrying *international* cargo that is destined for consignees in the vicinity of New Orleans. The containers are discharged from ships at *non-Louisiana ports*, for example Long Beach.

- **Export, "Bridge" Containers** -- containers carrying *international* cargo that is originated by hinterland shippers, moved on rail to Louisiana's yard and loaded on ships at a *Louisiana port* (New Orleans).

The intermodal trains that are handled (loaded/unloaded) at the yards may have a mixture of the three types of boxes. Ideally, the various types of boxes should be blocked (grouped together) to allow for easy separation. In reality, however, the boxes may be scattered all along the train.

No statistics with regard to the relative importance of the three categories of boxes are currently available. A rough estimate, based on interview with operators, is that about 60% of the intermodal activity is in containers, of which 45% accounts for bridge containers and 15% for locally-destined containers; the rest, about 40%, accounts for trailers. Figure IX.8 presents a schematic flow chart of the three types of boxes. Figure IX.9 presents the schematic flow of the bridge and export containers with local cargo as related to both the intermodal yard and marine terminal. Note, again, that figures IX.8 and IX.9, as well as all discussions in this section, only refer to the inbound direction -- though it is equally relevant for the other direction.

IX.D.1.b Uniform Handling System

Domestic trailers, local containers, and bridge containers share in the *same yard* using the same handling systems. That is, the train may consist of TOFC, COFC and double-stack cars, and all will be switched on to the same working trackage (ramp) and off loaded by the same crane or packer. Most of the yards use an all-wheel system (chassis). Since most of containers are kept on chassis while in the yard, there is almost no distinction between them and trailers in terms of actual terminal facilities and the operating system. The only differences between international and domestic cargos may be in gate procedures in the case of *in-bond* containers.

IX.D.1.c Hinterlands and Railroads

The second criteria for categorization of the activities of Louisiana rail intermodal yards is according to the 3 general hinterland regions that they serve via rail routes: the Midwest, West Coast and East Coast. Currently, the hinterlands are each served by two Class I railroads: the Midwest by the IC and KCS; the West by SP and UP; and the East by CSX and NS. This division does not always hold since both the CSX and NS have Midwest connections, although their routing is circuitous.

Almost all of Louisiana's intermodal activity is concentrated in New Orleans. Shreveport yards have a limited level of activity presently and almost exclusively serve local cargo. Therefore, the following discussion will mainly focus on the New Orleans yards.

IX.D.2 COMPETITIVE SETTING

IX.D.2.a Domestic Trailers and Locally-Destined Containers

The number of trailers that use rail for inter-city transport to/from New Orleans along with the local intermodal yards is directly related to the local economic activity. The prospects for further developments of the trailer component in New Orleans's intermodal yards are therefore linked to the future prospects for the area's economic growth. This intermodal activity component, for obvious reasons, is not threatened by diversion to other, non-Louisiana yards.

The same also holds for the containers with local cargo. These containers are discharged from ships at non-Louisiana ports, but contain cargo that originates/terminates in Louisiana. For example, a container with Far East imported cargo is discharged in Long Beach and comes to New Orleans via rail. The train is "stripped" at a New Orleans yard, and the container is trucked to a local receiver. Louisiana's businesses are impartial with regard to the port that serves as a "bridge" point for New Orleans's containers. The exception here is that some of this cargo may come on ships *directly* to New Orleans, substituting the rail routing with an all-water one. This option is relevant mainly for containers using the South Atlantic ports and, especially, Houston. Regaining these containers may require re-deployment of ships and changing lines' itineraries, however. This is in contrast to the overall trend that favors intermodal bridging and feedering over direct calls and all-water routings (see discussion in Section IX.C on North Europe Trade).

IX.D.2.b Bridge Containers

The situation with bridge containers is different than that for local trailers and containers. While local trailers and containers are not threatened by external competition, bridge containers are at the center of competition between Louisiana and non-Louisiana operators. Bridge containers currently using New Orleans yards and marine terminals have several alternative routings. For example, a Midwest container with export cargo to South America currently routed via the IC railroad through a New Orleans yard and marine terminal may be routed via the NS to an East Coast port, at Norfolk, VA (see a parallel analysis in Section IX.C). The competition can be in both directions. That is, a South-America box currently using NS through Norfolk may be shifted to New Orleans. Consequently, this intermodal activity component is very volatile; it is under threat but also has opportunities. Bridge containers are the main subject of the following analysis of possible improvements to the intermodal setting in New Orleans.

It should be noted that the significance of bridge containers to New Orleans is because of the yard activity and more importantly the port activity they generate. Since most of Louisiana's international cargo is in effect bridge containers, they are the primary consideration for a line's decision to call at a Louisiana port. Therefore, bridge containers are critical for the future of the intermodal yards and the container terminals of New Orleans; both are part of the same *intermodal chain of transportation*.

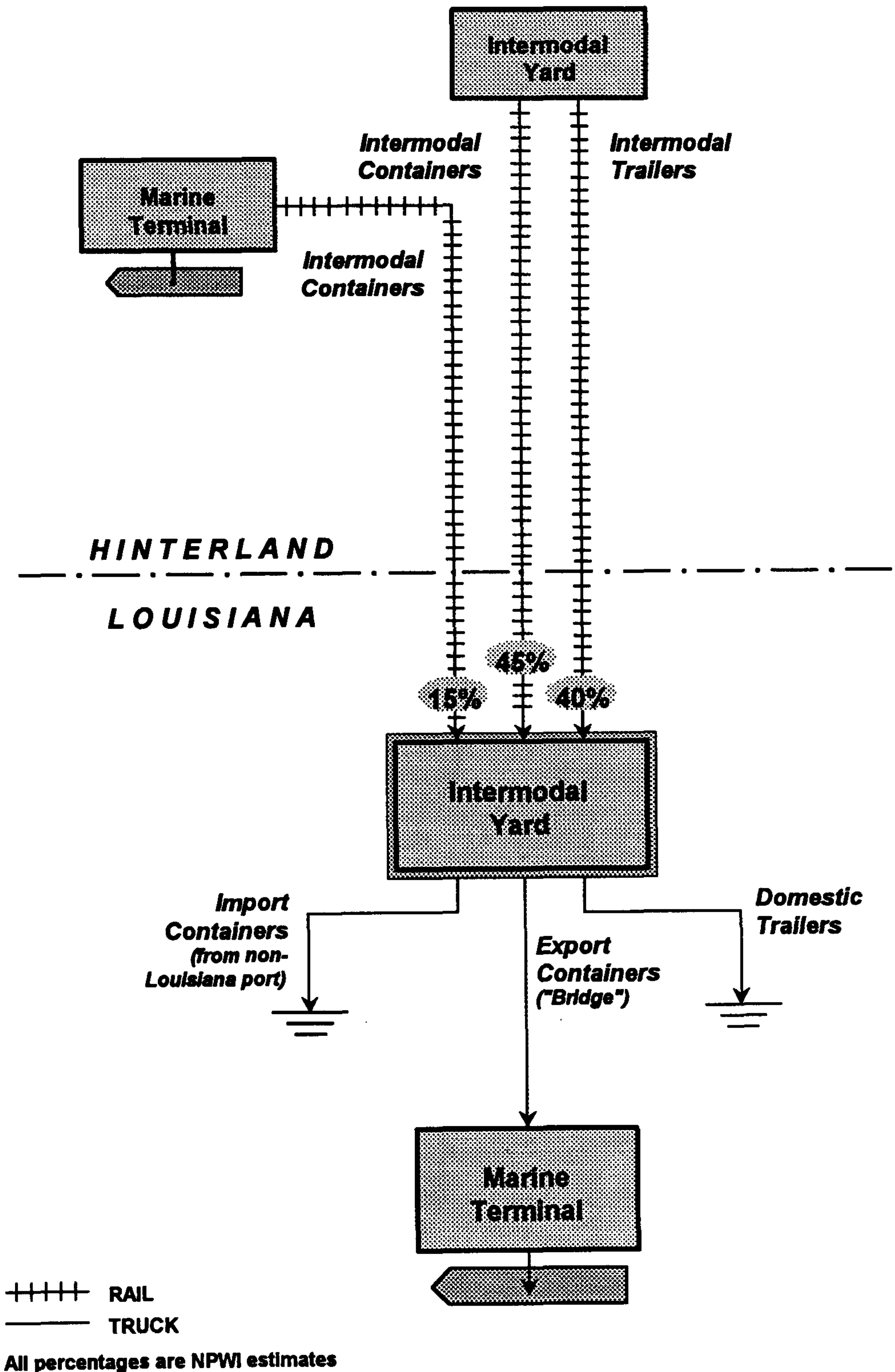

Figure IX.8
Intermodal Yard Flow Composition (Inbound Direction)

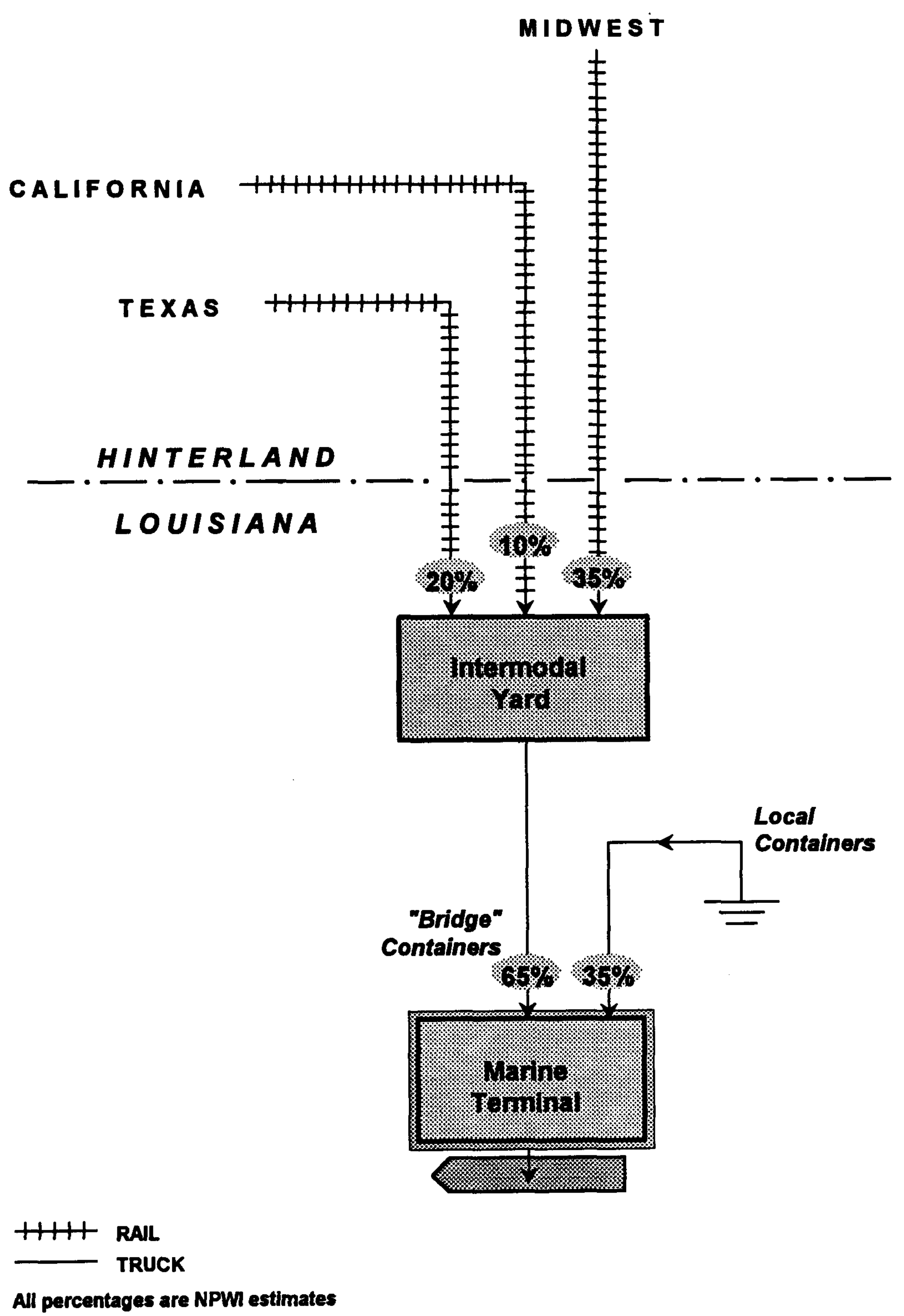

Figure IX.9
Container Terminal Flow Composition (Inbound Direction)

IX.D.2.c Intermodal Transport Chain

The elements that constitute the intermodal chain and are critical for selecting New Orleans for bridge containers are: (a) the rail route itself; (b) the local intermodal yards; (c) the connection between the yards and the marine terminals; (d) the marine terminals; and (e) the water routes. The above listing is in the outbound direction, which will be used in the following for convenience of discussion.

The intermodal rail routes to Louisiana, the first link, are generally considered as superior. New Orleans is the only port in the country which has direct service by six Class I railroads. Especially important is the fact that New Orleans is the only intermodal port for the two Midwest railroads. The State role here in terms of improvements is limited since most of the rail routings are outside Louisiana. Still the state can assist in solving East Bridge Junction bottleneck (see section VII.A.3). Likewise, the State has a limited influence on the water routes available at New Orleans, the last link. The marine terminals were discussed in the previous section. Consequently, the remainder of this section is devoted to discussion of possible improvements of the two other links, the yards and their connections to the marine terminals. The focus of these improvements, as stated in the previous section, is on bridge containers.

IX.D.3 CAPACITY AND LOCATION OF YARDS

IX.D.3.a Long-Term Capacity

The comparisons of demand vs. capacity of Louisiana yards are included in Chapter V. The results there indicate that except for the CSX yard in New Orleans, all other New Orleans and Shreveport yards are operating far below their estimated capacities. The CSX yard is currently under an expansion program to increase capacity by about 50%. Once CSX plans are implemented, New Orleans will have sufficient intermodal yard capacity for at least the next 10-15 years. Yard capacity, therefore, is *not* an area that is in need of improvement at this stage.

IX.D.3.b Location of Yards Relative to Marine Terminals

The connection between intermodal yards and marine terminals, the remaining link, is the primary area to be considered for improvements. The overall thrust here is to *close the "gap" between ship and rail*, or simply to bring the intermodal train, with bridge containers, as close as possible to the ship for the continuing water leg.

The 6 intermodal yards in the New Orleans area are concentrated in 3 different locations. UP and SP are on the west side of the River, IC and KCS in uptown, and NS and CSX are near the Industrial Canal. This wide distribution of yards is not a deficiency for trailers and containers with local cargo, since shippers and receivers are in various parts of the surrounding area. However, bridge containers, which constitute 45% of the yards' throughput, are almost all destined or originated to/from the France Road and Jourdan Road container terminals. The CSX and NS yards are within close drayage distance from the marine terminals; drayage to other yards, especially those on the west side, is expensive and time consuming. Frequently-quoted figures for drayage are $50 for the CSX/NS, $70 for the IC/KCS, and $90 for the UP/SP. The thrust of possible improvements is to reduce the drayage or even eliminate it entirely.

IX.D.3.c Improvement Options

Since the location of New Orleans marine container terminals is fixed, the improvement options are basically to relocate the intermodal yards closer to them. There are two generic options, called *intermodal configurations*, to achieve a closer interaction:

- On-Dock Yards
- Near-Dock Yards

The following is a brief discussion of the general considerations involved in the above options and their application to the New Orleans area.

IX.D.3.d On-Dock Yard Arrangements

The drayage can be eliminated entirely if the rail-to-ship transfer is performed in the port area or "on-dock". The intermodal yard in an on-dock arrangement may have two general locations relative to the marine terminal:

- **On-Terminal** -- the yard is located within the marine terminal boundaries, or *inside* the terminal gate.
- **Off-Terminal** -- the yard is located *outside* the gate, but adjacent to it and within the general area of the port.

There could also be many in-between variations. For example, in some options the gate functions are divided into two (or more) stages, an outer one serving only for security and an inner one for equipment interchange. In this case the yard can be inside the security gate but outside the equipment gate. Usually, on-dock yards handle only bridge containers with some also handling containers with local cargo, but not trailers. Therefore, in addition to these on-dock yards, the local railroads continue to operate their own intermodal yards.

There is a growing trend among U.S. ports to construct on-dock yards. The trend is notable especially on the West Coast, where between 40 and 70% of the activity is for bridge containers. For example, Long Beach has 4 on-dock yards, Los Angeles 2, Tacoma 2, Seattle 2, and Portland 1.[12] The larger on-dock yards of these ports have working tracks for 3 unit-trains along with run-

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[12]Portland, OR was the first port in the country to introduce in 1982 a "true" on-terminal yard with tracks integrated with the yard storage stack. Currently, the Portland yard has 44 car spots (for double-stack) with 1994 lifting volumes at 55,000 moves.

around and storage tracks. The Atlantic Coast ports are not far behind, including Miami, a New Orleans competitor for Central and South American trades. More important though is the fact that Houston, New Orleans's chief competitor, has an on-dock yard adjacent to its main container terminal at Barbours Cut.

IX.D.3.e Advantages of On Dock Yards

The main advantage of having the marine terminal and intermodal yards in close proximity is the elimination, or at least drastic shortening of drayage (for bridge containers). Other commonly quoted advantages are the use of marine terminal equipment for drayage (yard tractors and chassis) and, most importantly, the reduction or even elimination of gate processing (in on-terminal).

IX.D.3.f Pre-Conditions for On-Dock Yards

There are three necessary conditions to ensure an efficient on dock arrangement:

(a) The yard should have convenient access to major trunkline railroads.
(b) The port should have a sufficient volume of bridge containers to justify investments in facilities and provide for efficient operations.
(c) The port should have sufficient reserves of waterfront land so that the yard will not obstruct future marine terminal expansion.

The first condition, convenient multi-rail access, may be difficult to fulfill in New Orleans with its 6 railroads scattered over the two sides of the River (see more in the following section on Joint Intermodal Corridor). It may be achievable, though, in France Road using the NS tracks through Alvar Street. The second is a direct function of the first, since volume customarily depends on the number of participating railroads. The third condition depends on the overall layout arrangement of the waterfront land. The site that seems most appropriate for such a yard in New Orleans is the Public Belt yard at France Road. However, this area is also the main back-up area for the France Road marine terminals. Short of a careful analysis of future needs of the marine terminals, including a master plan of the entire France Road area, no observation could be made here.

Another, long-range factor to be considered with regard to an on-dock yard in France Road is the possible construction of a major container terminal on the River (see Chapter IX.C on North Europe Trade). Such a terminal may take away considerable volume from France Road, including bridge containers. This may leave France Road with insufficient volume to justify an on-dock yard.

Altogether, the prospect of an on-dock yard program in France Road seems remote at this time. There are still major uncertainties regarding rail connections, volumes, land reserves, and marine terminal layout that need to be resolved first.

IX.D.4 JOINT, NEAR-DOCK YARD

IX.D.4.a Near-Dock Yard in Almonaster

The CSX yard in Almonaster is outside the France Road area -- but it is sufficiently close to it to be considered as *near-dock*. It is already the largest yard in New Orleans both in terms of facilities and throughput. The yard is also undergoing a large expansion program. Even after completion of the expansion, the Almonaster area will have enough room for additional expansions.

To take advantage of the existing asset, and instead of constructing an additional on-dock yard, New Orleans may be better off using an existing yard, located about 1 mile away from France Road.[13] While yard facilities should be based on the present CSX yard in Almonaster, its operations should be managed by a third party on the basis of a common-use facility. The yard should offer equal access and services to all regional railroads. This is not difficult to achieve since already many intermodal yards are operated by independent contractors. To enhance efficiency, the yard operator should also control the rail access to the yard.

Near-dock yards are considered by some ports as an intermediate stage on the way to on-dock; others see them as a permanent substitute for on-dock yards, especially where there is a shortage in waterfront area or when the rail access to it is difficult. The best known example is the ICTF in Los Angeles, the largest container port in the U.S. This near-dock, 250-acre intermodal yard is located 4 miles away from the port. The yard was originally planned to serve all three regional railroads, including SP, UP and SF. But, because of railroad competition, SP is its only user. Another more recent example is the initiative toward a "Joint Intermodal Rail Terminal" in Oakland. Oakland's yard will serve three railroads at a location about 2 miles away from the port that used to be a Navy base. The consolidated yard will be managed by a third party. A third, non-port but relevant example is the new IC yard in Memphis that also handles CSX's intermodal trains. It should be mentioned, however, that in most cases the joint yards are constructed to overcome problems of inadequate or unavailable yards. This is *not* the case in New Orleans, however, where existing yards are only partially utilized. The objective here is to provide all railroads a yard in proximity to the marine terminals.

IX.D.4.b Dedicated or General Yard

There are two operational options for a joint yard in New Orleans:

- A yard dedicated to port-related, *bridge* containers;
- A yard for *all* intermodal boxes, including trailers and containers with local cargo.

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[13] A third possibility to construct an additional port-owned, near-dock yard in Almonaster, on port-owned land.

In the first option, some or all of the existing yards will continue to serve non-port containers and trailers. In this case, the activity of these yards will decline substantially. The bridge containers would be arranged in dedicated blocks, switched to the joint yard, de-ramped, and drayed to the port. In the second option, some or all of the local intermodal yards will be closed and all the intermodal activity will be shifted to the joint yard in Almonaster. The volume handled at Almonaster in the first option would increase by about 50%; in the second by about 100%.

An in-depth discussion of each main near-dock option, and the many more sub-options that may be defined, is beyond the scope of the analysis in this section. However, there are certain advantages and disadvantages for the general joint yard configuration, regardless of cargo composition; these are addressed below.

IX.D.4.c Advantages and Disadvantages

The advantages of a joint (multi-use) yard located close to the port are:

(a) Scale economies of operation and higher utilization of facilities (space, cranes, trackage);
(b) Shorter drayage for port-destined containers; and
(c) A better marketing "appeal" for New Orleans, having unified and efficient rail connections for 6 railroads covering almost the entire U.S.

The disadvantages of a joint (multi-use) yard located close to the port are:

(a) Extra switching for the non-CSX trains and the associated longer time and higher cost;
(b) Additional drayage cost for trailers and containers with local cargo originated/terminated in proximity to the present yards; and
(c) Defused competition between railroads due to the lack of "product differentiation".

Other problems that may arise in any joint operation are: service priority (whose train is served first), labor conflicts (mainly unionized, administrative labor), and different operational procedures.

IX.D.4.d Steel vs. Rubber Connection

The critical trade off in the decision to have a joint intermodal yard is between switching and drayage ("steel" or "rubber" connection). This trade-off is especially difficult to assess in the New Orleans situation because the present rail connection between the east and west bank trunklines is through the so-called *Back Belt*. The Back Belt is a short stretch (about seven miles) of railroad owned by NS that serves as the main connection between Western, Midwestern and Eastern railroads. The Belt is grade separated and double tracked except for about a one mile segment, where it is single track and burdened with several roadway grade crossings. The Back Belt is already heavily utilized, and, because of the impacts on users of the roadway grade crossings, any significant increase in traffic following a joint CSX intermodal yard may generate resistance by local residents and businesses. Consequently, improvements to the Back Belt will mandate considerable investments in both the facilities themselves and mitigation. Another problem in using the Back Belt relates to its west-side entry trackage through a busy intersection known as East Bridge Junction (see discussion, pp. VII-4 - 5).

Presently, because of the difficulty in access, it may take up to a full day for a Western railroad to come over the Huey P. Long Bridge, cross the Back Belt, and reach Almonaster.[14] This journey is almost as difficult for the Midwestern railroads because of its trackage layout. The assessment of switch vs. dray is therefore heavily dependent on the situation of the Back Belt. A preliminary assessment is that setting a separate train and running it to Almonaster would make sense only for blocks of about 20 cars (40 FEUs) and longer. Currently, such blocks are only available on the Western railroads, mainly the SP.

Until now the discussion did not relate to the other major Eastern railroad, the NS. The NS yard is also close to the port. Also, the yard itself was recently rehabilitated. Therefore, there is no apparent advantage for the NS to use the joint yard into Almonaster.

IX.D.4.e Limited Consolidation at CSX Yard

It appears that any form of joint yard operation in Almonaster may be viable only in the long term when (and if) the volumes of bridge containers on the Midwestern railroads are significantly greater. Meanwhile, a less comprehensive consolidation can take place in the existing CSX yard, along the same lines as is presently performed. The yard is reportedly handling most of the SP and UP containerized cargo, especially the portion that belongs to its sister company Sea-Land and Sea-Land's partners in the various consortiums calling New Orleans. Similar arrangements can be worked out for other railroads for their blocks of bridge containers. If such an arrangement is considered advantageous, it should be discussed with CSX so that they can consider it while planning for yard expansion. Table IX.20 summarizes the intermodal options for New Orleans.

[14] The Western railroads have the option to tie the port-blocks to the run-through trains of the SP/UP, which interchange with the CSX in Almonaster.

Table IX.20
Intermodal Options for New Orleans

Configuration	Type of Cargo	Yard Location
On Dock	Bridge Containers	France Road
Near-Dock All	All Intermodal Cargo Trailers, Local & Bridge Containers	Almonaster
Near-Dock Port	Bridge Containers	Almonaster
Near-Dock Existing	Bridge Containers (Only Large Blocks)	Almonaster

AIX.D.4.f Joint Intermodal Corridor

The Back Belt was already mentioned as a constraint for consolidation of intermodal activity in Almonaster. In fact, the Back Belt and its west side access through East Bridge Junction is already a bottleneck for the present rail traffic (intermodal and non-intermodal), resulting in frequent delays. It seems that major improvements of the East Bridge Junction and the Metairie segment of the Back Belt are required to improve east-west access between NS/CSX (and the France Rd./Jourdan Rd. port facilities) and IC/KCS/SP/UP, respectively. A program to improve the Back Belt is beyond the ability of any single railroad. It would require active involvement by all railroads, the Port, the City, and the State.

Several other U.S. ports are currently involved in developing similar joint corridors, most notable of which is the Alameda Corridor serving the Los Angeles/Long Beach complex. This 20-mile corridor is being developed by a special Joint Power Authority representing 15 regional municipalities and agencies with the two regional ports at its center. About 40% of the traffic of the two regional ports consists of bridge containers. This traffic is presently served by 15 trains/day, but is expected to reach 95 trains/day in the year 2020. The investment is $1.8 billion, including $600 million generated by user fees of $15 per TEU, $650 million expected from Federal and State contributions, and the rest by the local ports.

IX.D.5 SUMMARY: THREATS AND OPPORTUNITIES

The major strategic asset of Louisiana is its rail connection to six Class I railroads, providing the State and its major port in New Orleans with direct rail access to almost the entire U.S. The main strategic deficiency is the connection between these six railroads and the marine terminals. While this connection is irrelevant to the containers and trailers with local cargo, it is essential for bridge containers. These containers are responsible for about 60% of the Port's present throughput. Moreover, they are critical for the Port's long-term prospects in a marketplace dominated by consortiums that prefer load-center ports with close ship-to-rail linkage to handle massive movement of bridge containers.

At this time, the areas for State intervention to improve intermodal connections in New Orleans are limited. The State may take immediate initiatives to stimulate improvements to the Back Belt corridor and enhance the joint usage of the CSX intermodal yard in Almonaster. More initiatives will be needed in the future, as the intermodal activity grows, including the development of a near-dock or even an on-dock intermodal yard.

In summary, the intermodal setting in Louisiana holds both opportunity and threats. The opportunities stem from the generally favorable rail situation. The threats arise because of the unfavorable ship-to-rail connection and because of global, adverse market trends. The State's commitment to facilitate improvements in the ship-to-rail connection is a necessary input for the opportunities to be realized and threats to be thwarted.

IX.E STRATEGIC ISSUES IN NON-CONTAINERIZED GENERAL CARGO TRADE

IX.E.1 MAIN TRADE COMPONENTS

The general cargo handled by Louisiana's ports consists mainly of raw and semi-finish materials. The trade patterns of these cargos change occasionally according to availability and world markets. Therefore, the trade is mainly served by tramp or semi-liner services. This is in contrast to containerized cargo which is almost solely served by liner shipping operating on a well-defined trade route.

Therefore, the division of the trade into components in this section is *not* according to trade routes as was done in containerized cargo, but primarily according to cargo types. Then, for each cargo type the discussion will be organized by trade direction (import/export) and, finally, when relevant, by trade route (countries of origin and destination).

Louisiana's top five primary general cargos (in terms of volumes) are: steel products, forest products, bagged grain and products, coffee, and rubber. The following is a brief review of these cargos.

IX.E.2 STEEL PRODUCTS

Steel is the most important general cargo handled in Louisiana, representing over 50% of the total state-wide general cargo tonnage. Recently, Louisiana has been experiencing a surge in this cargo, especially in the vicinity New Orleans, where most of it is handled. Baton Rouge and Lake Charles also handle small volumes of steel.

Steel products can be roughly divided into finished and semi-finished. Finished steel mainly includes plates, coils, bars and pipes. Semi-finished (or raw) steel primarily includes slabs. The steel trade is almost 100% inbound (imported).

Steel is brought in by charter ships, with full shiploads of about 30,000 tons. Semi-finished steel is mostly transferred direct from ship to barges. The transfer is performed either by midstream terminals, or overboard while the ship is berthed at a shore terminal. Finished steel moves in roughly the same proportion to barges overboard ship and to the terminal. The on-terminal storage is either in the storage shed or in an open area. The stored steel is ship to domestic destinations by rail, trucks, and sometimes by barges.

IX.E.2.a Advantages of Direct Transfer

As mentioned above, the direct, ship-to-barge loading is the salient characteristic of steel handling. Direct transfer to barges is very cost effective compared to indirect transfer (through a shore terminal). It saves: (a) one out of the two moves needed in indirect handling (ship-to-barge vs. ship-to-shore and shore-to-rail); (b) the use of a shore terminal and the related investments; and (c) most of the transfer time. The combination of direct transfer and barge transportation creates an efficient transportation chain that is only available on the Mississippi River. Barge transportation is generally less expensive than rail transportation. In the case of inbound steel, it has a further advantage since the northbound direction is the *backhaul* direction (most of the barge cargos are in the southbound, export direction).

In addition to being low cost, direct transfer also allows for greater operational flexibility. This is because the direct ship-to-barge discharge does not require shore terminals and therefore is not limited by their availability and capacity. In contrast, the number of floating cranes that can be deployed on the River is practically unlimited. Some of the cranes can be diverted from floating terminals that are involved in handling non-steel cargos if justified by demand. Other floating cranes can be assembled simply by taking shore-based cranes and mounting them on barges.

The potential capacity for mid-stream is very large and, most importantly, responsive to surges in demand. This flexibility is not available at any other Gulf port since all operate only shore terminals. The advantage of this flexibility was demonstrated in the first part of 1994, when steel handling almost doubled relative to the volume in the same period during 1993. Most of this cargo was semi-finished steel transferred from vessels directly to barges.

IX.E.2.b Cargo Base and Regional Competition

The semi-finished steel is destined mainly to mills, many of them located on the inland waterway system in the upper Midwest (Chicago area). The recent surge in steel imports is in response to increased demand of domestic mills for plates that cannot be locally supplied. Finished steel is distributed to smaller consignees with a wide distribution, using rail and truck (for short distances).

Steel is considered as the most lucrative cargo in the general cargo trade because of its large tonnage and because charges in the industry are mainly based on tonnage. Steel is therefore a very competitive cargo with almost all Gulf ports involved in handling it. Semi-finished steel, as indicated above, is destined mainly to waterfront steel mills. Louisiana, with its unique mid-streaming capacity and related barge transport, seems to enjoy a substantial edge over its regional competitors in this cargo segment.

The main competition to Louisiana's ports are from the Texas ports, especially Houston, Port Arthur, and Beaumont, for finished steel. Finished steel has two sub-components, the first is destined to regional consumption and the second to non-regional (sometimes called intermodal) consumption. Regional steel is usually handled at regional ports (e.g. the steel for Texas consumption is handled at Texan ports). This is because land transportation of steel, with its large and heavy cargo units, is expensive. The non-regional steel can be handled in many ports, especially where rail transport is available. Since Louisiana has a relatively (to Texas) small regional cargo market, its volume of local steel is much smaller than non-regional steel. Shipments of non-regional steel benefits from New Orleans's good rail connection, especially to the Midwest. Another advantage for Louisiana is where ships carry a mixture of barge-bound steel with rail-bound cargo; because of the barge-bound portion, these ships tend to discharge *all* their cargos in Louisiana.

IX.E.2.c Summary: Growth

Louisiana has two natural advantages: (a) the availability of deep and protected water that allows direct transfer; (b) the availability of barge transportation in the backhaul direction. Consequently, Louisiana specializes in handling semi-finished steel that is directly transferred to barges. In this trade component, Louisiana is unchallenged by any other Gulf ports. Louisiana faces competition on non-local finished steel that moves inland by rail, mainly by other Gulf ports. Altogether, steel seems to be a "natural" cargo for Louisiana and a main source for future growth. In this respect, it should be mentioned that the impact of future growth in steel handling on terminal requirements and related investments is limited, since most of the steel is expected to be directly transferred to barge.

IX.E.3 FOREST PRODUCTS

Forest products, including logs, lumber, plywood, linerboard, woodpulp and paper, is second in importance to steel. It is much smaller, however, with about 10% of total volume of general cargo, or 1/5 of steel. About 70% of the cargo is export (primarily woodpulp). The rest is import and includes mainly plywood and veneer. A recent trend is the import of construction materials unavailable locally, following the surge in new construction.

Forest products are handled at all the three deep-water ports of Louisiana, with the largest concentration in Baton Rouge and New Orleans. The facilities handling these cargos are generally in good condition and, as shown in Chapter V, have sufficient capacity.

IX.E.3.a Cargo Base and Regional Competition

The export cargo originates mostly from regional mills. The cargo is mostly trucked to the ports of export, with some being railed from more remote sources. The competition between ports is thus limited to the non-regional cargos. For example, most Baton Rouge pulp is generated by a mill in Port Hudson, a short distance away from the port. The competition for this cargo from non-Louisiana ports is limited because it requires substantially longer land transport.[15] Baton Rouge also serves non-regional pulp markets, for which it faces competition from other ports. For example, the woodpulp brought in by rail from Vicksburg, MS may be railed to other Gulf ports such as Mobile, AL. The situation is different in Lake Charles, which is only 60 miles away from Beaumont, TX and therefore competes with it for local exports. The situation for imports is somewhat similar with most of the cargo being consumed locally.

IX.E.3.b Summary: Modest Growth

Louisiana's forest product cargos seem to be immune from competitive threats largely due to fact that this cargo is mostly locally oriented (non-intermodal). The prospects of Louisiana's terminals in this trade component coincide with the prospects of locally-originated exports. While there was some decline in U.S. forest products exports in recent years it seems that the trend has bottomed out in 1994, suggesting likely growth in the coming years. It is logically to expect that Louisiana's ports will retain their market share in this trade and experience, therefore, a growth rate similar to the overall market growth.

On the import side the picture of the trade is unclear. Most of the imports are for high-grade plywood and veneer. Both are expected to continue growing, especially following future trade agreements with more South American nations, the primary sources of this cargo. However, the recent swell in import of construction material may subside following a slow down in the economy. Altogether, forest product imports are not expected to experience large changes in the future and can be assumed stable with small growth.

IX.E.4 BAGGED GRAINS/PRODUCTS

Bagged grains mainly include exports of rice, flour, milk powder and other foods in loose bags. The cargo is the result of several federal government programs with about 1/3 under the PL 480 Title I & II programs and 2/3 handled through the Export Enhancement Program. Currently, this cargo, which amounts to about 5% of total general cargo, is handled in Louisiana primarily at

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[15] Ocean freight is usually quoted for a region that includes a range of ports.

Lake Charles. however, both New Orleans and Baton Rouge have handled these cargos in the past.

This cargo group has two dominant commodities: rice and flour. Most of the rice originates in Louisiana; the flour originates in the Midwest. Louisiana thus enjoys an advantage with regard to rice, but is exposed to competition for flour. Another advantage is the specialization of Lake Charles in this labor intensive work.

IX.E.4.a Cargo Base and Regional Competition

Louisiana's main competitors are other east Gulf ports including Beaumont, Houston and Galveston. Of particular concern are the automated terminals: (a) the reactivated and modified Omniport in Houston, with its automated loader and non-union labor; and (b) a similarly-designed terminal planned for Galveston. A more general concern is for an overall decline in this cargo following a future reduction in export enhancement and foreign aid programs. A third concern is that of future containerization of some of the bagged cargos, especially Title II.

IX.E.4.b Summary: Decline

Despite stiff regional competition, Louisiana ports are expected to maintain their market share in this cargo. However, the overall long-term trend in this cargo is for decline. Threfore, it is reasonable to assume that Louisiana ports also will see somewhat lower demand.

IX.E.5 COFFEE

Coffee accounts for less than 5% of Louisiana's general cargo. Coffee is an import cargo, brought in from South/Central America and East Africa. Some of the coffee is packaged in bags and thus is considered general cargo. The rest is brought in bags inside containers or in lined containers.

IX.E.5.a Summary: Growth

New Orleans is the largest coffee handling port in the U.S. Its main advantage is the large, local roaster that is the destination of a large portion of this cargo. New Orleans market position has been recently further enhanced following the inauguration of a unique on-dock bulk storage and blending facility. New Orleans is also an approved "Exchange" port where the coffee is kept for the purpose of future trade. Therefore, currently, Louisiana does not face any strong regional competition for coffee.

It seems logical to assume that Louisiana will retain its market share in the future. However, the future prospects of the growth of coffee trade are unclear due to both demand and suplly factors. Nevertheless, the longer term prospects are for stability with small growth.

IX.E.6 RUBBER

Rubber, like coffee, is a traditional New Orleans cargo, though for a while it was handled in other regional ports. The rubber, in bales, is imported from Malaysia and Indonesia, and destined to tire manufacturers that are not in the vicinity of New Orleans. Therefore, the rubber can be served by other, non-Louisiana ports, such as Mobile. The cargo is attracted to Louisiana mainly because of the availability of cost-effective storage facilities and productive labor. Also, New Orleans offers specialized sampling, weighing, and packaging services.

IX.E.6.a Summary: Growth

In absence of any specific known competitive threats, it can be assumed that the future prospects are for stability with small growth, following the growth in the auto industry.

IX.E.7 SUMMARY

The overall prospects of Louisiana ports in the general cargo trade is for growth. This is mainly due to expected growth in the largest cargo (steel), especially the midstream portion of it. The general trend in the rest of the cargos, with the exception of bagged food, is for stability with small growth. These cargos, for most cases, are regional and not subject to diversion threats from non-Louisiana ports. An interesting future possibility is for handling fresh produce imports, especially bananas and grapes. The prospects of such cargos, however, are unclear at this stage.

X. CONCLUSIONS

X.A MARKET DEMAND

Relatively modest growth rates used for projections of major cargoes handled at Louisiana marine and rail-highway intermodal terminals indicate substantial increases in volume can be expected to occur. The forecasts indicate that tonnages of major commodity groups handled through Louisiana ports will increase as follows:

Commodity	1990 tons (000,000)	2000 tons (000,000)	2010 tons (000,000)	2020 tons (000,000)
Coal	21.2	28.2	33.7	40.4
Grain	70.1	84.8	98.7	114.9
Gen Cargo	5.7	7.2	8.6	10.3

Containers, measured in twenty-foot equivalent units (TEU), will increase from 458,000 in 1990 to 583,000 in 2000 to 697,000 in 2010 and 833,000 by 2030.

X.B CAPACITY

The commodity projections when compared with the throughput capacities of major marine terminals indicate that expansion will be necessary. The grain sector, which is already operating at high levels of capacity utilization, will require expansion near 2000. Expanded capacity in grain terminals will probably take the form of improvements to existing facilities, particularly in vessel unloading and loading. The coal transshipment sector appears to have sufficient capacity until the very latter part of the forecast near 2020. Again, it appears that if new capacity is warranted that it will take place at existing terminals.

General cargo facilities overall have sufficient capacity throughout the thirty year forecast. However, some bottlenecks develop at smaller facilities at Baton Rouge and Lake Charles as early as 2000. The state has ample marine container handling capacity through 2000. Expansion will be required about 2010.

Rail-highway intermodal terminals, primarily in New Orleans, operate at relatively low levels of utilization. Expansion may vary based on individual carriers and markets served. Overall, total capacity is sufficient until nearly 2010.

X.C ACCESSIBILITY

Highway access to the state's major public marine and rail-highway transfer terminals suffers from congestion in major metropolitan areas (New Orleans) and incomplete or insufficiently maintained local roads at more rural or smaller urban locations. Unless new road capacity is forthcoming, access to the Port of New Orleans facilities via I-10, particularly to the Mississippi River Terminal Complex, will deteriorate as traffic congestion worsens. A program for prioritization and shared funding for access improvements, particularly maintenance, is needed.

Rail access to public marine facilities is normally limited to one carrier with attendant concerns about service quality and efficiency. The smaller deep draft ports, Lake Charles and Baton Rouge, have experienced rail access problems that reflect local markets and institutional changes. In both cases the quality of rail access appears to have diminished, primarily due to factors beyond the control of the ports.

Rail access in New Orleans for containers is via drayage from several "near dock" rail intermodal terminals. Sufficient volume and operational incentives do not exist for consolidation of seemingly redundant facilities. Until sufficient intermodal interchange between individual railroads and port facilities occurs to facilitate "run through" inter-terminal services, no major changes will occur. Breakbulk rail access will continue to be provided by the city owned New Orleans Public Belt Railroad which will encounter increased cash flow difficulties without major organizational changes tantamount to restructuring of the public belt railroad access concept.

X.D INFRASTRUCTURE, INSTITUTIONAL AND POLICY ISSUES

X.D.1 RAIL

The private rail sector requires relatively minor assistance with regard to public investment requirements. However, significantly increased state funding is recommended to facilitate improved grade crossing safety. Other minor rail funding is recommended for intermodal demonstration programs and light density line rehabilitation. Concerns about efficient east-west bank rail access via East Bridge Junction (New Orleans) and perceived inefficiencies in rail access that may have detrimental impacts on economic development are issues recommended for further study.

X.D.2 MARINE - INFRASTRUCTURE

The marine sector (ports) will continue to require state investment to rehabilitate, expand and capture new market opportunities. The mixture of investment priorities varies by port, commodity and forecast scenario (low, trend and high) and the magnitude and timing of market threats and opportunities. Under all scenarios the existing port priority program, currently funded at $15 million annually, should be maintained with an emphasis on maintenance and rehabilitation of existing facilities. The trend level of projections will require an increase in the port priority program to $16.5 million per year and $8 million annually for the Port of New Orleans. The high growth scenario together with realization of new market opportunities will require annual funding of $25 million for the port priority program and $20 million for the Port of New Orleans. Total annual investments from all sources in public ports will average approximately between $40 million for a low growth scenario (current level of investments without the $20 million for the

Port of New Orleans from the TIME Program), to $50 million for the trend scenario to $72 million for the high growth scenario.

X.D.3 MARINE - INSTITUTIONAL AND POLICY

State assistance for enhanced port marketing is recommended by funding several programs designed to attract more cargoes through Louisiana. Programs recommended to improve the utilization of Louisiana ports include: (1) development of north/south trade opportunities; (2) regional public port marketing programs; (3) port intermodal services directory; (4) "ship Louisiana" campaign follow up; (5) establishment of port/intermodal transportation specialist position in one of the state agencies; (6) joint marketing mission trips; and (7) cargo pooling.

State participation will also be required in several important federal studies that may significantly impact the marine sector relative to the Mississippi River Gulf Outlet (MRGO), possible replacement of the deep draft ship lock at the Inner Harbor Navigation Canal, and potential for deepening the Lower Mississippi River to 55 feet. It is also recommended that the state develop a methodology and criteria to provide for shared funding of "intermodal" projects pertaining to access. The criteria would allow for intermodal projects that relate to different funding sources to be evaluated and financed jointly according to multiple categories of beneficiaries and existing investment mechanisms. This is particularly important for maintenance and rehabilitation of existing port access road infrastructure which otherwise might not receive sufficient attention relative to scarcity of resources.

X.E PRODUCTIVITY AND COST ANALYSIS

Analyses of Louisiana port costs and cargo handling productivities indicate that the terminals are generally competitive for similarly sized facilities. The major disadvantages compared to other ports are relative to location with respect to port access time and associated vessel costs between the sea buoy and berths and weather interference.

X.F COMPETITIVE AND STRATEGIC OUTLOOK FOR MARKET SHARE

Competitive analyses and strategic assessments of opportunities and threats for the state's marine sector were performed for major commodity groups of coal, grain, containers and general cargo. The findings are as follows:

X.F.1 COAL

Coal exports via the Lower Mississippi River will continue to reflect cyclical growth largely unaffected by opportunities (deepening) and threats (increased barge user fees). Emerging new import markets may provide significant new opportunities to blend and/or backhaul coal via barge.

X.F.2 GRAIN

Grain exports via the Lower Mississippi will exhibit continued relatively steady growth with no major threats. The U.S. major world competitive position is expected to be maintained, possibly enhanced, with the result that Louisiana will be favorably impacted.

X.F.3 CONTAINERS

Containers via the Lower Mississippi and Lake Charles will reflect overall modest growth but possible decreases or increases occurring in particular years or periods of the forecast based on interaction of different developments on major trade routes: (1) Northern Europe - threats of diversion of vessels and/or cargoes to load center ports; (2) Puerto Rico - slow growth of trade with threat of diversion if new larger vessels are deployed in this trade that exceed MRGO capabilities or if new port services arise that can more efficiently accommodate mini-bridge and macro-bridge cargoes that dominate this trade relative to small Louisiana hinterland; (3) Central/South America - smallest and fastest growing market with significant expansion but small absolute overall impact unless new services are demanded relative to niche cargoes and vessels ideally suited for Louisiana ports such as river/ocean vessels, cross Gulf ferries and mini-container/combination ships serving shallow draft ports.

X.F.4 GENERAL CARGO

General cargo imports and exports through the Louisiana ports will reflect continued steady growth characterized by cyclical increases and decreases in steel and key cargoes that are niches at particular ports such as bagged goods at Lake Charles and paper products at Baton Rouge. The Lower Mississippi River will continue to dominate U.S. steel imports to augment domestic production shortages via low cost direct transfer (mid-streaming) between vessels and barges. The Lower River will remain an important transshipment point for lumber product exports, rubber imports and coffee.

APPENDICES

APPENDIX 1

LOUISIANA CLASS I RAILROAD OPERATIONS IN NEW ORLEANS AND SHREVEPORT

CSX (see Table 1.1) runs six long distance trains each way each day, plus a local turn to Bay St. Louis, Mississippi, and Amtrak's tri-weekly *Sunset Limited.* Only two of the inbound road trains terminate at Gentilly Yard. Road crews deliver two trains to the SP and two to the UP; however, none of these are true run-through trains. At least six foreign line trains are delivered to the CSX each day: SP's LBCXT, HOCXF, and HOCXM; UP's AVNOCX and FWNOCX; and KCS #53. On Thursday and Saturday, SP also delivers a BCNOT. Of these, only UP FWNOCX is a true run-through train, continuing on to Florida as CSX Q-606.

Illinois Central (see Table 1.2) has two routes into New Orleans: the mainline from Chicago and the riverfront (Y&MV) line from Baton Rouge. The main line sees four scheduled freight trains each way and Amtrak's *City of New Orleans.* Service on the Baton Rouge line is provided by three turns. IC also operates a large number of grain trains, which come down the mainline and head up the Y&MV line to elevators along the River.

Kansas City Southern (see Table 1.3) has three pairs of daily road trains, plus a Monday-Saturday turn to Baton Rouge. Inbound, trains #9 and #139 terminate at West Yard, while #53 goes to the CSX (via the NS) and #55 goes to the NS.

Norfolk Southern (see Table 1.4) runs five trains each way each day, plus Amtrak's *Crescent.* Two inbound trains are delivered to the UP, and one to the SP. In addition to these, stack cars arriving on #221 are delivered to the SP. Number 369 terminates in Oliver Yard, but it includes a KCS block which is delivered to the KCS as their train #56. Five foreign line trains are delivered to the NS: KCS #55, SP HOSOM and LBAVT, and UP HONOSZ and HONONS. SP HOSOM and UP HONONS are true run-through trains; they depart on the NS as #394 and #314 respectively. SP LBAVT usually runs right through, but it always changes locomotives at Oliver Yard. The NS runs the LBAVT connection, a dedicated stack train, as #294, #296 or #298, depending on its destination. UP HONOSZ becomes NS #238, but it does not run right through. At Oliver Yard, it sets out its non-intermodal cars and picks up all of the local NS intermodal traffic. Most of the cars that come in on KCS #55 go out on #368.

Southern Pacific (see Table 1.5) usually runs six trains each way each day, plus Amtrak's tri-weekly *Sunset Limited.* An additional eastbound train, BCNOT, runs on Thursday and Saturday. Only the HOAVM (sometimes run as an LFAVM) terminates at Avondale Yard. Two trains go to the NS; four go to the CSX. Only the HOSOM functions as a true run-through train, becoming NS #394. LBAVT usually runs through onto the NS except for its motive power. None of the trains to the CSX run through. SP receives three trains from connecting lines: CSX R-101, CSX Q-601, and NS #393, plus the stack cars off of NS #221; but none of these run through.

Union Pacific (see Table 1.6) runs six inbound and five outbound, plus two local turns, daily. Road crews deliver three trains to other railroads: HONOSZ, HONONS and FWNOCX become NS #238, NS #314 and CSX Q-606, respectively. HONOCX terminates at Avondale Yard and its CSX cars go to the CSX on the AVNOCX transfer run. Four foreign line trains go to the UP: CSX Q-579 and Q-605, and NS #237 and #315. None of these function as true run-through trains, although most of NS #237 goes out on NOHONS after a few hours at Avondale.

Available information on train movements at Shreveport, for Southern Pacific and Kansas City Southern, is presented in Tables 1.7 and 1.8, respectively. These two lines represent the majority of train movements through Shreveport; Union Pacific movements here are limited.

Table 1.1
CSX Train Movements In/Out of New Orleans

Train Designation	Approx. Arrival Time	Origin	Comment	Train Designation	Approx. Departure Time	Destination	Comment
Q-601	E/AM	Winston,FL	to SP	R-102	E/AM	Charleston,SC	Intermodal
R-145	E/AM	Atlanta,GA	Intermodal	R-144	E/AM	Atlanta,GA	Intermodal
R-101	M/AM	Charleston,SC	Int. to SP	Q-606	M/AM	Waycross,GA	from UP
Q-615	M-L/AM	Hamlet,NC	-	M-720	L/AM	Local	Bay Turn
Q-605	L/AM	Waycross,GA	to UP	Q-602	E/PM	Winston,FL	-
AMT 1	MIDDAY	Miami,FL	*Sunset Limited*	Q-614	M/PM	Hamlet,NC	-
Q-579	MIDDAY	Nashville,TN	to UP	Q-572	L/PM	Nashville,TN	-
M-720	M/PM	Local	Bay Turn	AMT 2	23:00	Miami,FL	*Sunset Limited*

For timekeeping purposes, the day has been divided into six 4-hour segments; midnight-04:00 = early/AM(E/AM), 04:00-08:00 = mid/AM, 08:00-12:00 = late/AM, etc. All times are approximate.

Source: Louisiana Railroad Quarterly

Table 1.2
Illinois Central Train Movements In/Out of New Orleans, March, 1994

Train Designation	Approx. Arrival Time	Origin	Comment	Train Designation	Approx. Departure Time	Destination	Comment
RNO	E-M/AM	Local	Reserve Turn	LNOGE-2	E/AM	Local	Geismar Turn
I-03	M/AM	Chicago,IL	Intermodal	I-02	E/AM	Chicago,IL	Intermodal
LNOGE-2	L/AM	Local	Geismar Turn	NOME	E-M/AM	Memphis,TN	-
GLNO	MIDDAY	Chicago,IL	-	LNOGE-1	E/PM	Local	Geismar Turn
AMT 59	E/PM	Chicago,IL	*City of N.O.*	AMT 58	14:35	Chicago,IL	*City of N.O.*
I-01	M/PM	Chicago,IL	Intermodal	NOCH	E-M/PM	Chicago,IL	-
LNOGE-1	L/PM	Local	Geismar Turn	I-04	M/PM	Chicago,IL	Intermodal
MENL	Midnight	Memphis,TN	-	RNO	M/PM	Local	Reserve Turn

For timekeeping purposes, the day has been divided into six 4-hour segments; midnight-04:00 = early/AM(E/AM), 04:00-08:00 = mid/AM, 08:00-12:00 = late/AM, etc. All times are approximate.
Source: Louisiana Railroad Quarterly

Table 1.3
Kansas City Southern Train Movements In/Out of New Orleans, March, 1994

Train Designation	Approx. Arrival Time	Origin	Comment	Train Designation	Approx. Departure Time	Destination	Comment
139	M/AM	Local	Baton Rouge Turn	140	M/PM	Local	Baton Rouge Turn
9	M-L/AM	Kansas City, MO	Intermodal	10	M/PM	Kansas City, MO	Intermodal
53	L/AM	Dallas,TX	to CSX	54	L/PM	Dallas,TX	from CSX
55	MIDDAY	Dallas,TX	to NS	56	L/PM	Dallas,TX	from NS

For timekeeping purposes, the day has been divided into six 4-hour segments; midnight-04:00 = early/AM(E/AM), 04:00-08:00 = mid/AM, 08:00-12:00 = late/AM, etc. All times are approximate.

Source: Louisiana Railroad Quarterly

Table 1.4
Norfolk Southern Train Movements In/Out of New Orleans, March, 1994

Train Designation	Approx. Arrival Time	Origin	Comment	Train Designation	Approx. Departure Time	Destination	Comment
237	E/AM	Charleston,SC	to UP	AMT 20	07:05	New York City	*Crescent*
369	L/AM	Birmingham,AL	-	368	E/PM	Birmingham,AL	-
393	M/PM	Birmingham,AL	to SP	238	M/PM	Charleston,SC	Intermodal
221	M/PM	Linwood,NC	Intermodal	314	L/PM	Birmingham,AL	from UP
AMT 19	M-L/PM	New York City	*Crescent*	394	ANYTIME	Birmingham,AL	from SP
315	Midnight	Birmingham,AL	to UP	294	ANYTIME	Varies	Int. from SP

For timekeeping purposes, the day has been divided into six 4-hour segments; midnight-04:00 = early/AM(E/AM), 04:00-08:00 = mid/AM, 08:00-12:00 = late/AM, etc. All times are approximate.

Source: Louisiana Railroad Quarterly

Table 1.5
Union Pacific Train Movements In/Out of New Orleans, March, 1994

Train Designation	Approx. Arrival Time	Origin	Comment	Train Designation	Approx. Departure Time	Destination	Comment
FWNOCX	E/AM	Fort Worth,TX	to CSX	AVNL	M/AM	North Little Rock,AR	-
LRA-81	E-M/AM	Alexandria,LA	Local	NOHONS	M/AM	Houston,TX	from NS
LRA-04	L/AM	Local Turn	Ama Dodger	LRA-07	L/AM	Local Turn	Ama Dodger
ALAV	MIDDAY	Alexandria,LA	-	NOFWCX	E/PM	Fort Worth,TX	-
HONOCX	M/PM	Houston,TX	to CSX	NOHO	E/PM	Houston,TX	-
HONOSZ	M/PM	Houston,TX	to NS	LRA-06	M/PM	Local Turn	Johnson Dodger
HONONS	L/PM	Houston,TX	to NS	LRA-82	L/PM	Alexandria,LA	Local
LRA-06	Midnight	Local Turn	Johnson Dodger	-	-	-	-

For timekeeping purposes, the day has been divided into six 4-hour segments; midnight-04:00 = early/AM(E/AM), 04:00-08:00 = mid/AM, 08:00-12:00 = late/AM, etc. All times are approximate.

Source: Louisiana Railroad Quarterly

Table 1.6
Southern Pacific Train Movements In/Out of New Orleans, March, 1994

Train Designation	Approx. Arrival Time	Origin	Comment	Train Designation	Approx. Departure Time	Destination	Comment
HOAVM	E-M/AM	Houston,TX	-	AVSRQ	E/AM	Houston,TX	-
BCNOT	MIDDAY	Houston (ThSa)	Int. to CSX	AVLFM	M/AM	Lafayette,LA	-
HOCXF	E-M/PM	Houston,TX	Int. to CSX	CXCIT	MIDDAY	Los Angeles	Int. from CSX
LBCXT	M-L/PM	Los Angeles	Int. to CSX	AMT-1	14:15	Los Angeles (MWSa)	*Sunset Limited*
AMT 2	11:00	Los Angeles (SuTuTh)	*Sunset Limited*	NOHO	E/PM	Houston,TX	-
HOCXM	Midnight	Houston,TX	to CSX	LRA-06	M/PM	Los Angeles	Int. from NS
LBAVT	Anytime	Los Angeles	Int. to NS	LRA-82	Midnight	Houston,TX	-
HOSOM	Anytime	Houston,TX	to NS	-	-	-	-

For timekeeping purposes, the day has been divided into six 4-hour segments; midnight-04:00 = early/AM(E/AM), 04:00-08:00 = mid/AM, 08:00-12:00 = late/AM, etc. All times are approximate.

Source: Louisiana Railroad Quarterly

Table 1.7
Southern Pacific Train Movements Departing Shreveport, June, 1993

Train/ Designation	Approx. Departure Time	Origin/Destination	Comment
Southbound Trains			
ASBTQ	00:45	East St. Louis/Beaumont,TX	-
ASHOQ	05:00	East St. Louis/Houston,TX	-
ASSRQ	12:30	East St. Louis/Strang,TX	-
SPTXM	18:30	Shreveport,LA/Tenaha,TX	Interchange/ATSF
Northbound Trains			
TXESQ	01:00	Tenaha,TX/East St. Louis	SPTXM Turn
LFASQ	20:15	Lafayette,LA/East St. Louis	-
HOCHF	20:35	Houston,TX/Chicago,IL	-
SRASQ	21:00	Strang,TX/East St. Louis & Chicago	-
DYASQ	21:30	Dayton,TX/East St. Louis & Chicago	-
HOPBM	nonscheduled "M"	Houston,TX/Pine Bluff,LA	-
0414L2	01:00-08:00	Shreveport,LA/Lufkin,TX	218 Local
R349L2	13:00	Millville,AR	"Millville turn"

Source: Louisiana Railroad Quarterly

Table 1.8
Kansas City Southern Traffic at Shreveport, January, 1995

Southbound Trains			
Train/ Designation	**Approx. Departure Time**	**Origin/Destination**	**Comment**
5	Anytime (Multiple Section)	Kansas City/Shreveport	-
7	08:00-09:00	Dallas/Shreveport/Meridian/ Atlanta	Intermodal:conne cts with NS #220-
9	15:00-20:00	Kansas City/Shreveport/New Orleans	Intermodal plus mixed freight
21	Varies	Shreveport/Pt. Arthur	
27	Night	Shreveport/Meridian	
29	Morning	Shreveport/Meridian	
41	03:00	Shreveport/Beaumont	
53	16:00 (Arrives about 10:00)	Dallas/Shreveport/New Orleans	to CSX
55	17:00 (Arrives about 11:00	Dallas/Shreveport/New Orleans	to NS
73		Shreveport/Mossville(Lake Charles)	
81	Not Every Day	Kansas City/Shreveport	
91	Anytime	Kansas City/Blanchard/ Welch,TX	SWEPCO coal train
97	Anytime	Kansas City/Shreveport/ Mossville(Lake Charles)	GSU coal train

Source: Louisiana Railroad Quarterly

Table 1.8
Kansas City Southern Traffic at Shreveport, January, 1995

Northbound Trains			
Train/ Designation	**Approx. Departure Time**	**Origin/Destination**	**Comment**
2	03:00 (Arrives about 14:00)	Beaumont/Shreveport/Kansas City	-
6	06:00	Shrevport/Kansas City	
8	Night	Atlanta/Meridian/Shreveport/ Dallas	Intermodal: connects w/ NS #219
10	10:00 (Arrives about 06:00)	New Orleans/Shreveport/ Kansas City	Intermodal plus mixed freight
22		Beaumont/Shreveport	
28	Night	Meridian/Shreveport	
30	Morning	Meridian/Shreveport	
54	17:00 (Arrives about 10:00)	New Orleans/Shreveport/ Dallas	from CSX
56	Night (Arrives about 17:00)	New Orleans/Shreveport/ Dallas	from NS
72	Night (Arrives about 15:00)	Mossville(Lake Charles)/ Shreveport	-
82	Anytime	Shreveport/Kansas City	-
92	Anytime	Welch,TX/Blanchard/Kansas City	SWEPCO coal train
98	Anytime	Mossville(Lake Charles)/ Shreveport/Kansas City	GSU coal train

Source: Louisiana Railroad Quarterly

APPENDIX 2

LOUISIANA WATERWAY CARGO VOLUMES (1984 - 1993) AND MAJOR PORT FACILITIES

Table 2.1
Mississippi River Comparative Statement of Traffic (000 tons)

Year	Seg. 1	Seg. 2	Seg. 3	Seg. 4	Seg. 5	Seg. 6	Seg. 7
1984	158123	233736	269697	0	156582	386568	397346
1985	150806	223880	256963	0	149874	378852	383964
1986	155399	234372	272475	0	156194	402802	399944
1987	170108	255973	289381	0	167759	414176	425005
1988	179647	266707	305874	0	169016	423025	441546
1989	195049	281225	331655	0	181802	431463	462736
1990	201694	288829	337241	412648	188544	457497	475276
1991	201644	289672	341284	411396	188981	445149	471741
1992	208246	301955	351567	426342	198687	467296	491004
1993	208934	296487	340785	416149	183843	451731	475112

Segment 1 : Passes of the Mississippi River (South Pass, 14.2 miles; Southwest Pass, 21.2 miles; Controlling Depth: South Pass 13 feet; Southwest Pass, 45 feet. Project Depth: Southwest Pass, 45 feet. South Pass not currently being maintained.).

Segment 2 : New Orleans to Mouth of Passes (New Orleans, LA, to Mouth of Passes; Lower Mississippi River from mile 106 to mile 0 AHP; South Pass 14.2 miles; Southwest Pass, 21.2 miles. Controlling Depth: 45 feet.).

Segment 3 : Baton Rouge to New Orleans (Baton Rouge, LA to New Orleans, LA; Lower Mississippi River from mile 236 to mile 106. Controlling depth: 40 feet from mile 236 to mile 181; 45 feet from mile 181 to 106. Project Depth: 40 feet from mile 236 to mile 181; 45 feet from mile 181 to mile 106.). Note: 45 Foot Channel Complete to Baton Rouge in December 1994.

Segment 4 : Baton Rouge to Mouth of Passes (Baton Rouge, LA to the mouth of passes; lower Mississippi River from mile 236 to mile 0 AHP; South Pass, 14.2 miles; Southwest Pass, 21.2 miles. Controlling Depth: 45 feet.). Note: Not Compiled Prior to 1990.

Segment 5: Mouth of Ohio River to Baton Rouge (Mouth of Ohio River to Baton Rouge, LA, Lower Mississippi River from mile 954 to mile 236. Controlling Depth: not less than 9 feet maintained during low water and commensurably greater depths available during high water season. Project depth: 12 feet.).

Segment 6 : Mississippi River System (Main Channels and all Tributaries of the Mississippi, Illinois, Missouri, and Ohio Rivers.).

Segment 7: Minneapolis to Mouth of Passes (Minneapolis, MN, to Mouth of Passes.).
Source: Waterborne Commerce of the United States, Part 2

Table 2.2
Gulf Intracoastal Waterway and Tributaries Comparative Statement of Traffic (000 tons)

Year	Seg. 1	Seg. 2	Seg. 3	Seg. 4	Seg. 5
1984	55840	20413	93439	5043	21325
1985	63093	21578	102464	6851	23150
1986	64472	23589	106961	7263	25181
1987	63968	24070	107032	12600	19683
1988	69292	27268	117712	8496	27073
1989	66416	25973	112739	11052	27264
1990	67801	25707	115386	10230	29292
1991	65981	23441	110988	9725	24533
1992	66220	23756	112188	12141	23688
1993	65346	25734	114944	10279	27097

Segment 1 : Gulf Intracoastal Waterway, Mississippi River to Sabine River (From Harvey and Algiers Locks at New Orleans to Sabine River, TX, 266 miles. Controlling Depth (mean low Gulf): Harvey and Algiers Locks to Sabine River, TX, 12 feet, except 10 feet intermittently between New Orleans and Sabine River, TX.

Segment 2 : Gulf Intracoastal Waterway, Mobile to New Orleans (Mobile Bay, Al, via the Mississippi Sound and New Orleans-Rigolets Cut to the Innerharbor Navigation Canal at New Orleans, LA, 134 miles. Project depth: Mobile Bay, Al, to New Orleans, LA, 12 feet.

Segment 3 : Gulf Intracoastal Waterway, Apalachee Bay, Florida to the Mexican Border (Consolidated Report) (St. Marks River, Fl, to Brownsville, TX, 1108.9 miles.

Segment 4 : Atchafalaya River (Old River lock at Mississippi River through Old River to Three Rivers then via Atchafalaya River to Morgan City, LA, 121 miles. Controlling Depth (NGVD): 14 feet. Project Depth: 12 feet.

Segment 5: Gulf Intracoastal Waterway, Morgan City-Port Allen Route (64.1 miles; Morgan City, LA, to Port Allen, LA, via the East Atchafalaya Basin Protection Levee Borrow Pit, Bayou Sorrel Lock, Lower Grand River and Bayou Plaquemine to Indian Village, thence via Bayou Grosse Tete and Land Cut to the Mississippi River through lock in levee at Port Allen opposite Baton Rouge, LA. Controlling Depth (mean low gulf): 10 feet. Project Depth: 12 feet.

Source: Waterborne Commerce of the United States, Part 2

Table 2.3
Mississippi River Gulf Outlet and Inner Harbor Navigation Canal Comparative Statement of Traffic (000 tons)

Year	MRGO	IHNC
1984	8035	24159
1985	6916	23630
1986	8145	27600
1987	7703	27869
1988	7687	29576
1989	7289	29319
1990	6960	26063
1991	6095	23810
1992	5937	24068
1993	7160	24785

MRGO : Mississippi River Gulf Outlet (From New Orleans to the Gulf of Mexico via Land Cut 36 feet by 500 feet to the 38-foot contour in the Gulf of Mexico, 75.4 miles. Controlling Depth (mean low gulf): Mile 66 to mile 0, 35 feet; to mile -9.38, 38 feet. Project Depth: 36 feet and 38 feet.

IHNC : Inner Harbor Navigation Canal (From Mississippi River to Lake Pontchartrain, 5.5 miles. Controlling Depth (mean low gulf): Lock to mile 2.1, 30 feet; to Seabrook Bridge, 30 feet; to Seabrook Light, 15 feet. Project depth 32 feet to mile 2.1.

Source: Waterborne Commerce of the United States, Part 2

Table 2.4
Lower Mississippi River Deep Draft Ports - Baton Rouge; South Louisiana; New Orleans; Plaquemine: Comparative Statement of Traffic (000 tons)

Year	Baton Rouge	South Louisiana	New Orleans	Plaquemine	TOTAL
1984	66199	0	154220	0	220419
1985	70716	0	146678	0	217394
1986	77184	0	149082	0	226266
1987	73401	0	167918	0	241319
1988	78857	0	175501	0	254358
1989	82400	0	177523	0	259923
1990	78132	194190	62740	56598	391660
1991	87630	198654	60898	53782	400964
1992	84699	199665	66441	58473	409278
1993	85079	193796	67037	53110	399022

*port definition for the ports along the deep draft stretch of the Mississippi River were changed in 1990 to conform with the Louisiana State Constitution.

Port of Baton Rouge: (Both banks of Mississippi River from mile 168.5 A.H.P. through mile 253 A.H.P.; including the Baton Rouge Barge Canal from a point on the Mississippi River at mile 234.5 A.H.P., for a distance of 5 miles.)

Port of South Louisiana: (Both banks of Mississippi River from mile 114.9 A.H.P. through mile 168.5 A.H.P.)

Port of New Orleans: (Both banks of the Mississippi River from mile 81.2 A.H.P. through mile 114.9 A.H.P.; Innerharbor Navigation Canal, 5.5 miles; Mississippi River-Gulf Outlet from its junction with the Innerharbor Navigation Canal toBayou Bienvenue, 7 miles; and Harvey Canal, 5.5 miles.)

Port of Plaquemine: (Both banks of Mississippi River from mile 0 A.H.P. through mile 81.2 A.H.P.)

Source: Waterborne Commerce of the United States, Part 2

Table 2.5
Lake Charles and Calcasieu River Comparative Statement of Traffic(000 tons)

Year	Lake Charles	Calcasieu River
1984	36074	27239
1985	35359	25494
1986	39813	30921
1987	38844	31731
1988	43110	37312
1989	43066	40814
1990	42852	40883
1991	40184	41237
1992	39815	44039
1993	39071	45436

Lake Charles Deep Water Channel : (Calcasieu River to Sabine River, following the Calcasieu-Sabine section of the Gulf Intracoastal Waterway, 24.9 miles. Controlling Depth (mean low gulf): 12 feet. Project Depth: 30 feet (maintained to Gulf Intracoastal Waterway depth of 12 feet.)

Calcasieu River : (Phillips Bluff, LA, to the 42-foot contour in Gulf of Mexico, 109.5 miles. Controlling Depth (mean low gulf): Bar channel, 39 feet; jetty channel, 42 feet; to Lake Charles, 41 feet; to mile 50, 10 feet; to mile 60, 9 feet. Project Depth: Phillips Bluff to mile 36.2, none specified; 35 feet between miles 36 and 34.1 above Lake Charles wharves; 40 feet from Lake Charles wharves to Gulf of Mexico, with 40 feet in Clooney Loop; 12 feet in Cameron Loop; 40 feet in Devil's Elbow Industrial Canal; and 42 feet in bar channel.)

Source: Waterborne Commerce of the United States, Part 2

Table 2.6
Major Port Facilities

I. Port of New Orleans

I.1 Mississippi River

Henry Clay Avenue Wharf - 842 feet water frontage, 62-foot wide front apron, 95,020 square foot transit shed, 170,858 square foot open wharf area, and 154,125 square foot open area on land side;
Nashville Avenue Wharf - 2,759 feet water frontage, 62-foot wide apron, 756,000 square foot transit shed, 110,000 square foot open wharf area, and 463,000 square foot open area on land side;
Nashville Avenue "B" Terminal - 1,786 feet water frontage, 100-foot wide front apron, 141,000 square foot transit shed, 360,000 square foot open wharf area, and 487,243 square foot open area on land side;
Napoleon Avenue "A" & Napoleon "A" Open Wharves - 1,099 feet water frontage, 48-foot wide apron, 144,867 square foot transit shed, 129,766 foot open wharf area, and 97,844 square foot open area on land side;
Napoleon Avenue "B" Wharf - 762 feet water frontage, 108-foot wide front apron, 100,381 square foot transit shed, 36,521 foot open wharf area, and 57,991 square foot open area on land side;
Napoleon Avenue "C" Wharf - 1,000 feet water frontage, 48-foot wide front apron, 199,859 square foot transit shed, 28,313 square foot open wharf area, and 22,903 foot open area on land side;
Napoleon Avenue "C" Lower Open Wharf - 375 feet water frontage, 118,420 square foot open area, and 36,300 square foot paved area on land side;
Milan Street Wharf - 1,263 feet water frontage, 31.5-foot wide front apron, 107,081 square foot transit shed, and 65,000 square foot paved open area on land side (NOTE: draft limited to 12 feet);
Louisiana Avenue E & F Wharves - 1,590 feet water frontage, 150-foot wide open wharf area (for E), 178,360 square foot open area (E & F), 138,240 square foot transit shed and 1,221,243 square feet open area on land side;
Harmony Street Wharf - 1,289 feet water frontage, 49-foot wide front apron, 135,653 square foot transit shed, and 114,380 square foot open area;
Seventh Street Wharf - 1,196 feet water frontage, 50-foot wide front apron, 119,280 square foot transit shed, and 134,911 square foot open area;
First Street Wharf - 1,275 feet water frontage, 50-foot wide front apron, 140,655 square foot transit
Gov. Nicholls Street Wharf -1,210 feet water frontage, 30-foot wide apron, 156,617 square foot transit shed, and 37,694 foot open wharf area;
Poland Avenue Wharf Berths 4 & 5 - 932 feet water frontage, 35-foot wide front apron, 84,328 square foot transit shed, and 96,257 foot open area;

Alabo Street Wharf - 1,313 feet water frontage, 81-foot wide front apron, and 182,821 square foot open area.

I.2 Industrial Canal

France Road Container Terminal Berth 1 - 830 feet water frontage, 147-foot wide wharf, 67,019 square foot transit shed, 2.6 million square foot marshaling area, 160 reefer jacks, and two container cranes: one 30-ton and one 33.5-ton (owned by Sea-Land);
France Road Container Terminal Berth 4 - 700 feet water frontage, 120-foot wide wharf, 1.3 million square foot marshaling area, 84 reefer jacks, and three container cranes: one 30-ton and two 40-ton;
France Road Container Terminal - Berths 5 & 6 - Public Container Terminal - 1,700 feet water frontage, 131,200 square feet in two consolidation sheds, 2.1 million square foot marshaling area, 60 reefer jacks, RO/RO (roll on, roll off) ramp at Berth 6 for Class A & B ships, and three container cranes: one 30-ton and two 40-ton.

I.3 Mississippi River-Gulf Outlet:

Jourdan Road Terminal - 1,400 feet water frontage, 70-foot wide front apron, 142,400 square foot transit shed, 157,413 square foot open areas, 435,600 square foot marshaling yard, RO/RO ramp for stern-loading vessels, and a 30-ton container crane (owned by Ceres Gulf);
New Orleans Public Bulk Terminal (closed as of 6/30/94) - 1,800 feet water frontage, 750,000-ton open storage pad and 30,000-ton covered storage facility..

II. Port of Baton Rouge

General Cargo Docks No. 1 and No. 2 - 3,000 feet water frontage, 40 to 60-foot wide aprons, 462,000 square feet of covered transit sheds, 50,000 square feet of open shipside storage on the wharf,
Grain Elevator and Dock (currently leased to Cargill, Inc.) - 7.5 million bushel grain storage capacity, handling capacity in excess of three million tons annually, flour mill (operated by Cargill);
Liquid Bulk Terminals - molasses terminal (leased to Westway Trading Company) with storage capacity in excess of 15 million gallons, petroleum terminal (leased to Petroleum Fuel and Chemical Company) with a capacity of 1.215 million barrels (handles No. 2 through No. 6 fuel oils) and steam boilers for heating products operated at dockside;
Barge Terminal - finger-pier wharf 985 feet long and 90 feet wide, 250,000 square foot public warehouse adjacent, three storage tanks for liquid bulk commodities with a total capacity of 945,000 gallons, packaging operation (for bags, boxes, and supersacks), large paved area for outside storage, terminal handles as much as 200,000 tons of cargo each year;
Burnside Terminal (currently leased to Ormet, Inc.) - 877 feet water frontage, over 12,000 feet of barge fleeting area, two rail-mounted gantry cranes (each with a 12-ton lifting capacity and rated at 1,000 tons per hour), a traveling ship/barge loader (1,500 tons per hour capacity), over 5 million tons.

Midstream Facilities - Port-owned mooring buoys (only port authority on lower Mississippi to have such a facility), load bagged goods (pre-slung in barges at inland terminals) at upwards of 200 tons per gang hour, Coal Monitor One (a blending, sampling and transferring facility for handling export coal directly between barges and ships with a peak capacity of 1,800 tons per hour) is the only facility in the world that can provide midstream direct transfer and continuous mechanical sampling of coal.

APPENDIX 3

PORT, WATERWAY AND RAILROAD WEAK LINKS OR BOTTLENECKS

While the intercity linehaul (or "long link") elements of Louisiana's network of navigable waterways and railroads have practically no capacity limitations in the context of existing and foreseeable levels of utilization for freight movements, industry sources report a few weak links or bottlenecks that may require attention by state and local agencies and private carriers in the future. (Waterway weak links or bottlenecks in Louisiana which are solely a federal responsibility are not included in the listing below.) These are described below (and keyed for location on the map which follows), along with some of the port access "short links" discussed fully in Chapter VI and Appendix 7.

PORT ROADWAY ACCESS

P.1 Port Roadway Access 1: Highway access to Port Fourchon is said to be deficient because it is located approximately 50 miles from the nearest four lane federal highway. The connecting route is a predominately two lane state highway.

P.2 Port Roadway Access 2: At New Orleans, the Tchoupitoulas Corridor roadway (under construction) will provide adequate capacity connecting the Port's Uptown Terminal with the Interstate Highway system in downtown New Orleans. However, the benefits of this new roadway may be negated by congestion on the urban segments of the Interstate system.

P.3 Port Roadway Access 3: Improved roadway access linking the eastern (tidewater) terminals of the Port of New Orleans [on both sides of the Inner Harbor Navigation Canal (IHNC)] with Interstate 10 or U.S. Highway 90 will be needed in the future.

WATERWAY

NOTE: Relief of waterway bottlenecks is a federal responsibility. Accordingly, only those waterway bottlenecks that may require a state role are identified below.

W.1 The IHNC Lock at New Orleans, which links the IHNC and the Gulf Intracoastal Waterway (GIWW) with the Mississippi River, is proposed to be replaced to reduce transit time for commercial navigation and to improve roadway crossings of the waterway. A state contribution may be required if the new lock is built to accommodate oceangoing (deep draft) vessels.

W.2 Barge operators have indicated that railroad and highway bridges of the Atchafalaya River at Krotz Springs, Melville and Simmesport represent impediments to expanded commercial navigation on the River. The opening of the Red River from Simmesport to Shreveport in 1995 may induce new waterborne traffic on this river segment. The alternate waterway route requires transiting at least two locks and a segment of the Mississippi River, adding up to 24 hours.

RAILROAD

R.1 Mainline tracks of IC, NOPB (which accommodate UP and SP), KCS and Amtrak (NOUPT) converge at the East Bridge Junction (the eastern foot of the Huey P. Long Bridge in New Orleans). The current physical configuration and age of track, signal and communications infrastructure at the junction handicaps operations, given the volume and of train movements. In addition, the control of train movements across the junction involve decisions by several railroads. Amtrack passenger trains are also affected, as well as several high volume roadway grade crossings located nearby.

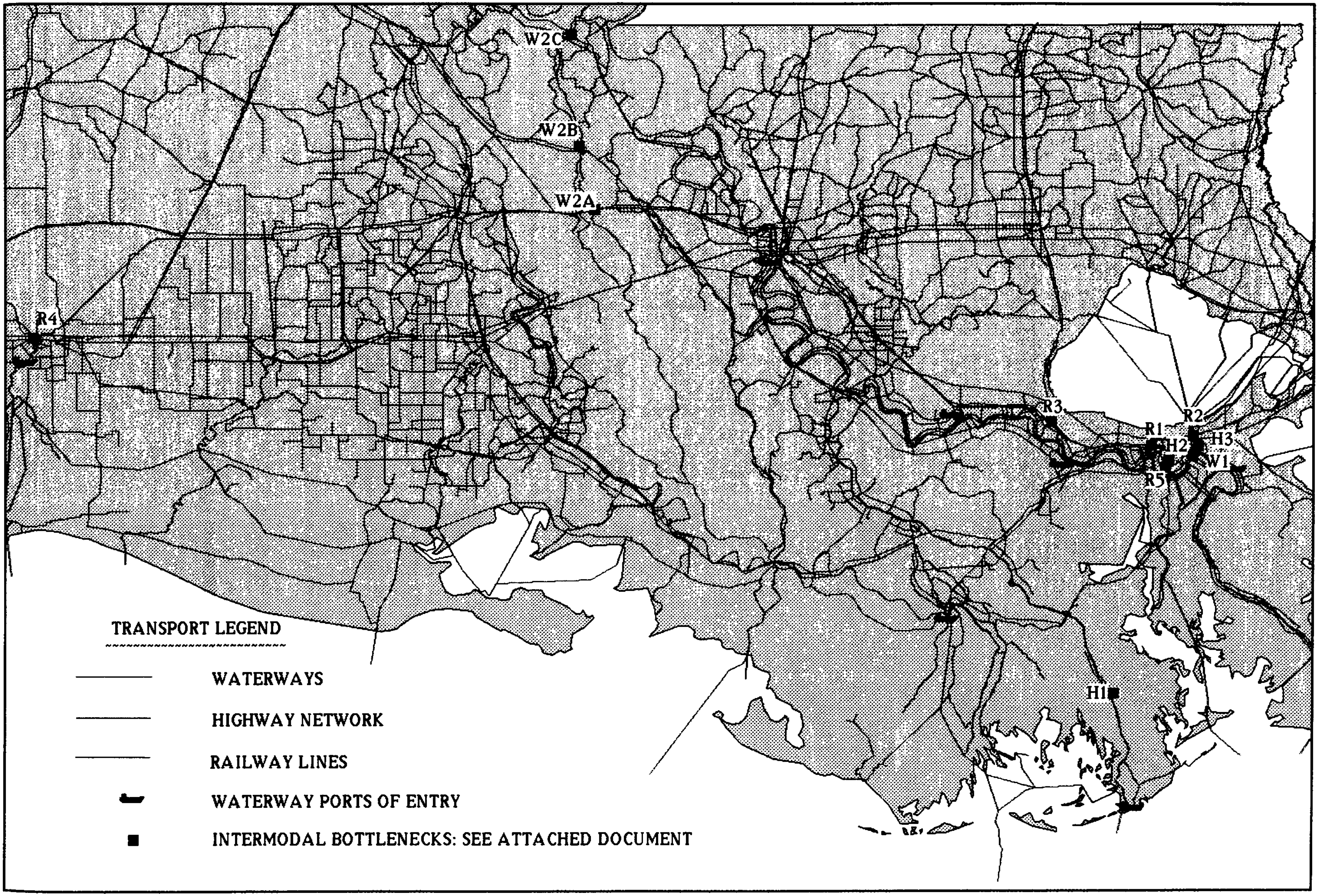
R.2 The L&N Railroad Bridge, owned by the Port of New Orleans, is a 75-year-old structure and requires continued renewal or replacement. The bridge also experiences a high level of train congestion resulting from an increase in both through train movements and nearby yard operations. The Port and the Regional Planning Commission(the local MPO) will jointly study the feasibility of alternative replacement structures, including and increase in the number of tracks and roadway lanes provided.

R.3 The three 2-mile timber railroad trestles crossing the Bonnet Carre Spillway (owned by IC and KCS) are about 60 years old. Continued renewal or replacement is required to extend their useful lives.

R.4 Port Railroad Access 1: Commercial and physical access to/from its principal North-South trunkline railroad (the KCS) is handicapped at the Port of Lake Charles' City Docks. KCS' loss of a bridge several years ago now requires that its traffic with the Port transit the lines of two other railroads.

R.5 Port Railroad Access 2: Because of a continued decline of online business, long term financial viability of the New Orleans Public Belt Railroad is uncertain, absent significant changes in network and operations.

Port, Waterway and Railroad Weak Links or Bottlenecks Having Non-Federal Responsibility



APPENDIX 4

COMMODITY GROUPS

Commodity 2 Digit Code	Group name	Std. Transportation Commodity Code	Name
1	Farm Products	112	Cotton crops
		115	Non-oil field seeds
		119	Sugar,potatoes, misc.
		121	Citrus fruits
		122	Deciduous fruits
		129	Berries,cofee,nuts, misc.
		131	Bulbs,roots or tubers
		134	Field dry ripe veg.seeds
		842	Barks or gums, crude
2	Grain, corn, rice, etc	113	Grain,corn,rice,etc
3	Oil kernels & seeds	114	Oil kernels & seeds
10	Mineral Ores	1011	Iron ores
		1031	Lead ores
		1051	Bauxite & aluminium ores
		1061	Manganese ores
		1081	Chronium ores
		1092	Miscellaneous metal ores
11	Coal	1121	All types of Coal & Coke
13	Crude Oil	1311	Crude petroleum
14	Nonmetal Ores	1421	Broken or crushed stone or riprap
		1441	Gravel or sand
		1451	Ceramic,clay or refractory minerals
		1471	Chemical or fertilizer minerals, crude
		1491	Miscellaneous nonmetallic minerals
		1492	Water exc. carbonated or mineral
20	Food products	912	Fresh fish/whale prods
		2012	Meat fresh-frozen
		2013	Meat products
		2014	Animal by-products, inedible
		2016	Dressed poultry or small game
		2021	Creamery butter
		2023	Condensed,evaporated or dry milk
		2024	Ice cream or related frozen desserts
		2025	Cheese or special dairy products
		2031	Canned or cured sea food
		2032	Canned specialties
		2033	Canned fruits, jams, preserves, or veg.
		2034	Dehydrated fruits or veg. or soup mix
		2035	Pickled fruits,veg., salad dressings
		2036	Fresh or frozen fish
		2037	Frozen fruits,veg. or fruit juices
		2038	Frozen specialties
		2039	Mixed loads of canned fruits,seafood or veg.

Commodity 2 Digit Code and Group name | Std. Transportation Commodity Code & Name

Commodity 2 Digit Code	Group name	Std. Transportation Commodity Code	Name
20	Food products (continued)	2041	Grain mill products
		2042	Prepared animal feed
		2044	Milled rice, fluor or meal
		2045	Blended or prepared flour
		2046	Wet grains, syrup
		2047	Pet food
		2051	Bread or bakery products
		2052	Biscuits, crackers or pretzels
		2061	Sugar mill products
		2062	Sugar,refined,cane or beet
		2071	Candy or other confectionery products
		2082	Malt liquors
		2083	Malt
		2084	Wines, brandy or barndy spirits
		2085	Distilled, rectified or blended liquors
		2086	Soft drinks,carbonated or mineral waters
		2087	Misc.flavoring extracts, syrups, compounds
		2091	Cottonseed oil
		2092	Soybean oil
		2093	Nut or vegetable oils
		2094	Marine fats or oils
		2095	Roasted or instant coffee
		2096	Margarine, shortening or table oils
		2099	Misc. food preparations
22	Misc. Manufactured Products	1929	Ammunition or related parts
		1931	Full tracked combat vehicles/parts
		1961	Small arms ammunition<=30mm
		2111	Cigarettes
		2251	Knit fabrics
		2279	Carpets,mats or rugs
		2291	Felt goods
		2294	Textile waste
		2299	Textile goods
		2311	Men clothing or uniforms
		2352	Caps or hats
		2392	Textile housefurnishings
		2394	Canvas products
		2399	Fabricated textile prod.
		2511	Benches, chairs
		2512	Tables, desks
		2513	Davenports, sofas
		2516	Beds, dressers, chests of drawers
		2519	Housesold or office furniture
		2531	Public building or related furniture

Commodity 2 Digit Code and Group name		Std. Transportation Commodity Code & Name	
22	Misc. Manufactured Products (continued)	2542	Metal lockers, shelving or office fixtures
		2599	Furniture or fixtures
		3011	Rubber tires or inner tubes
		3041	Rubber hose or belting
		3061	Misc. rubber products
		3071	Misc. plastic products
		3072	Misc. plastic products
		3141	Footwear (leather)
		3161	Luggage, handbags (leather)
		3831	Optical instruments, lenses
		3841	Surgical or medical instruments
		3842	Orthopedic, prosthetic or surgical supplies
		3861	Photographic equip. or supplies
		3941	Games or toys
		3943	Children vehicles or parts
		3949	Sporting or athletic goods
		3991	Brooms or brushes for vacuum cleaners
		3992	Coverings, facing or flooring
		3993	Signs/advertising displays
		3999	Manufactured products
24	Forest & wood products	2411	Primary forest or wood raw materials
		2421	Lumber or dimension stock
		2429	Misc. sawmill or planing mill products
		2431	Millwork or cabinetwork
		2432	Plywood or veneer or built-up wood
		2439	Structural products
		2491	Treated wood products,creosoted
		2499	Wood products
26	Paper & cardboard products	2611	Pulp or pulp mill products
		2621	Paper
		2631	Fibrebord, paperbord or pulpbord
		2643	Paper bags
		2647	Sanitary paper products
		2649	Miscellaneous converted paper products
		2651	Containers or boxes
		2654	Sanitary food containers
		2655	Fibre cans, drums, or tubes
		2661	Building paper or board
		2741	Miscellaneous printed matter
		2781	Blankbooks, loose leaf binders
27	Agro- Chemicals	2871	Fertilizers
		2879	Miscellaneous agro-chemicals

Commodity 2 Digit Code and Group name		Std. Transportation Commodity Code & Name	
28	Industrial Chemicals & Plastics	2812	Potassium or sodium compunds
		2813	Industrial gases
		2814	Crude prodcust from coal, gas or petroleum
		2815	Organic pigments
		2816	Inorganic pigments
		2818	Industrial organic chemicals
		2819	Industrial inorganic chemicals
		2821	Plastic materials
		2831	Drugs
		2841	Soap or detergents
		2842	Specialty cleaning bleaches
		2843	Surface active agents
		2844	Cosmetics, perfums
		2851	Paints, enamels, lacquers
		2861	Gum or wood chemicals
		2891	Adhesives,cements,glues
		2892	Explosives
		2893	Printing ink
		2899	Chemicals
29	Misc petroleum products	2911	Petroleum refined products
		2912	Kerosene
		2951	Asphalt paving blocks
		2952	Asphalt coatings
		2991	Misc. coal or petro. products
32	Nonmetal, Clay & Glass products	3211	Flat glass
		3221	Glass containers
		3229	Glass, glassware
		3241	Hydraulic cement
		3251	Clay brick
		3255	Refractories, clay or non-clay
		3259	Misc. structural clay prod.
		3261	Vitreous china plumbing fixtures
		3271	Concrete products
		3274	Lime or lime plaster
		3275	Gypsum products
		3291	Abrasive products
		3292	Asbestos products
		3295	Nonmetallic earths or minerals
		3299	Misc. nonmetallic mineral prod.
33	Primary metalic products	3311	Blast furnace products
		3312	Primary iron/steel products
		3313	Electrometallurgical products
		3315	Steelwire, nails,spikes
		3321	Iron/steel castings
		3331	Primary copper smelter prod.
		3332	Primary lead smelter products

Commodity 2 Digit Code and Group name		Std. Transportation Commodity Code & Name	
33	Primary metalic 3334		Primary aluminium
	products (continued)		smelter prod.
		3339	Misc. primary nonferrous metal prod.
		3351	Brass, bronze or copper
		3352	Aluminium basic shapes

		3357	Nonferrous metal
		3399	Primary metal products
35	Tools, machinery, electric products, appliances	3423	Edge or hand tools
		3425	Hand saws, saw blades
		3428	Builders equipment
		3429	Misc. hardware
		3432	Plumbing fixtures fittings
		3433	Heating equipment
		3441	Fabricated structural metal prod.
		3443	Fabricated plate products
		3452	Bolts, nuts, screws, rivets, washers
		3461	Metal stampings
		3481	Misc. fabricated wire prod.
		3491	Metal shipping containers
		3493	Steel springs
		3494	Valves or pipe fittings
		3499	Fabricated metal products
		3519	Misc. internal combustion
		3524	Garden tractors, lawn equipment
		3531	Construction machinery
		3533	Oil field machinery
		3537	Industrial trucks, tractors, trailers
		3542	Machine tools
		3544	Special dies, tools, dies sets
		3548	Metalworking machinery
		3553	Woodworking machinery
		3559	Misc. special industry machinery
		3566	Mechanical power transmission
		3582	Commercial laundry equip.
		3585	Refrigerators
		3589	Misc. service industry machines
		3599	Misc. machinery or parts
		3611	Electrical measuring equip.
		3612	Power, distribution transformers
		3621	Motors or generators
		3631	Household cooking equip.
		3632	Houhold refrigerators
		3634	Electric fans
		3639	Misc. household appliances
		3642	Lighting fixtures
		3651	Radio or TV receiving sets

Commodity 2 Digit Code and Group name		Std. Transportation Commodity Code & Name	
35	Tools, machinery, electric products, appliances (continued)	3661	Telephone or telegraph equip.
		3671	Electronic tubes
		3679	Misc. electronic components
		3691	Storage batteries
		3692	Primary batteries (dry or wet)
37	Vehicles/parts/ trailers/motorcycles, RR/ street cars	3711	Motor vehicles
		3714	Motor vehicle parts
		3715	Truck trailers
		3722	Aircraft or missile engines
		3729	Misc. aircraft parts
		3741	Locomotives or parts
		3742	Railroad or streets cars
		3751	Motorcycles,bicycles or parts
40	Industrial scrap or wastes	4021	Metal scrap, wastes or tailings
		4022	Textile waste or scrap
		4024	Paper waste or scrap
		4025	Chemical or petroleum waste
		4026	Rubber or plastic scrap
		4029	Misc. waste or scrap
46	Containerized mixed cargo	4111	Misc. freight shipments
		4121	Special commodities
		4211	Nonrevenue movement of containers
		4221	Trailers, semi-trailers, returned empty
		4231	Revenue movement of container
		4311	Mail and express traffic
		4411	freight forwarder traffic
		4511	Shipper association traffic
		4611	Misc. mixed shipments
		4621	Mixed shipments
		4711	Small packaged freight shipments

BUSINESS ECONOMIC AREAS (BEAs)

"Super" BEA Code/Name		BEA Code/Name	
6	New Eng	1	Bangor, ME
		2	Portland-Lewiston, ME
		3	Burlington, VT
		4	Boston, MA
		5	Providence-Warwick-Pawtucket, RI
		6	Hartford-New Haven-Springfield, CT-MA
12	NY PA NJ	7	Albany-Schenectady- Troy, NY
		8	Syracuse-Utica, NY
		9	Rochester, NY
		10	Buffalo, NY
		11	Binghamton-Elmira, NY
		12	New York, NY
		13	Scranton-Wilkes-Barre, PA
		14	Williamsport, PA
		15	Erie, PA
		16	Pittsburgh, PA
		17	Harrisburg-York- Lancaster, PA
		18	Philadelphia, PA
23	MD DC VA	19	Baltimore, MD
		20	Washington, DC
		21	Roanoke-Lynchburg, VA
		22	Richmond, VA
		23	Norfolk-Virginia Beach-Newport News, VA
30	NC	24	Rocky Mount-Wilson- Greenville, NC
		25	Wilmington, NC
		26	Fayetteville, NC
		27	Raleigh-Durham, NC
		28	Greensboro-Winston-Salem- Highpoint, NC
		29	Charlotte, NC
		30	Asheville, NC
34	SC	31	Greenville-Spartanburg, SC
		32	Columbia, SC
		33	Florence, SC
		34	Charleston-North Charleston, SC
40	GA	35	Augusta, GA
		36	Atlanta, GA
		37	Columbus, GA
		38	Macon, GA
		39	Savannah, GA
		40	Albany, GA
42	FL	41	Jacksonville, FL
		42	Orlando-Melbourne-Daytona Beach, FL
		43	Miami-Fort Lauderdale, FL
		44	Tampa-St. Petersburg, FL
		45	Tallahassee, FL
		46	Pensacola-Panama City, FL
47	AL	47	Mobile, AL
		48	Montgomery, AL
		49	Birmingham, AL
		50	Huntsville-Florence, AL
54	TN	52	Johnson City-Kingsport Bristol, TN-VA
		53	Knoxville, TN
		51	Chattanooga, TN
		54	Nashville, TN
		55	Memphis, TN

"Super" BEA Code/Name		BEA Code/Name	
58	KY	56	Paducah, KY
		57	Louisville, KY
		58	Lexington, KY
63	WV	59	Huntington, WV
		60	Charleston, WV
		61	Morgantown-Fairmont, WV
		62	Parkersburg, WV
		63	Wheeling-Steubenville-Wierton, WV-OH
70	OH	64	Youngstown-Warren, OH
		65	Cleveland, OH
		66	Columbus, OH
		67	Cincinnati, OH
		68	Dayton, OH
		69	Lima, OH
		70	Toledo, OH
82	IN	75	South Bend, IN
		76	Fort Wayne, IN
		77	Kokomo-Marion, IN
		78	Anderson-Muncie, IN
		79	Indianapolis, IN
		80	Evansville, IN
		81	Terre Haute, IN
		82	Lafayette, IN
83	IL	83	Chicago, IL
		87	Peoria, IL
		88	Rockford, IL
		84	Champaign-Urbana, IL
		85	Springfield-Decatur, IL
		86	Quincy, IL
74	MN WI MI	71	Detroit, MI
		72	Saginaw-Bay City, MI
		73	Grand Rapids, MI
		74	Lansing-Kalamazoo, MI
		89	Milwaukee, WI
		90	Madison, WI
		91	La Crosse, WI
		92	Eau Claire, WI
		93	Wausau, WI
		94	Appleton-Green Bay-Oshkosh, WI
		95	Duluth, MN
		96	Minneapolis-St. Paul, MN
		97	Rochester, MN
101	IA	98	Dubuque, IA
		99	Davenport-Rock Island-Moline, IA-IL
		100	Cedar Rapids, IA
		101	Waterloo, IA
		102	Fort Dodge, IA
		103	Sioux City, IA
		104	Des Moines, IA
105	MO	105	Kansas City, MO
		106	Columbia, MO
		107	St. Louis, MO
		108	Springfield, MO
109	AR	109	Fayetteville, AR
		110	Fort Smith, AR
		111	Little Rock-North Little Rock, AR
112	MS	112	Jackson, MS
113	NOrleans	113	New Orleans, LA
114	BtnRouge	114	Baton Rouge, LA

"Super" BEA Code/Name	BEA Code/Name
115 Lafayette	115 Lafayette, LA
116 LkCharls	116 Lake Charles, LA
117 Shrevprt	117 Shreveport, LA
118 MonroeLA	118 Monroe, LA
119 TX N	119 Texarkana, TX
	120 Tyler-Longview, TX
	125 Dallas-Fort Worth, TX
	126 Wichita Falls, TX
	127 Abilene, TX
	132 Odessa-Midland, TX
	134 Lubbock, TX
	135 Amarillo, TX
121 TX S	121 Beaumont-Port Arthur, TX
	122 Houston, TX
	123 Austin, TX
	128 San Angelo, TX
	129 San Antonio, TX
	124 Waco-Killeen-Temple, TX
	130 Corpus Christi, TX
	131 Brownsville-McAllen-Harlingen, TX
	133 El Paso, TX
138 OK	136 Lawton, OK
	137 Oklahoma City, OK
	138 Tulsa, OK
141 KS	139 Wichita, KS
	140 Salina, KS
	141 Topeka, KS
145 ND SD NE	142 Lincoln, NE
	143 Omaha, NE
	144 Grand Island, NE
	145 Scotts Bluff, NE
	146 Rapid City, SD
	147 Sioux Falls, SD
	148 Aberdeen, SD
	149 Fargo-Moorhead, ND-MN
	150 Grand Forks, ND
	151 Bismark, ND
	152 Minot, ND
160 AZ NM	161 Tucson, AZ
	162 Phoenix, AZ
	160 Albuquerque, NM
165 NV UT CO	157 Denver, CO
	158 Colorado Springs-Pueblo, CO
	159 Grand Junction, CO
	163 Las Vegas, NV
	164 Reno, NV
	165 Salt Lake City-Ogden, UT
167 ID UT WY	153 Great Falls, MT
	154 Missoula, MT
	155 Billings, MT
	156 Cheyenne-Casper, WY
	166 Pocatello-Idaho Falls, ID
	167 Boise City, ID
173 WA OR	168 Spokane, WA
	169 Richland, WA
	170 Yakima, WA
	171 Seattle, WA
	172 Portland, OR
	173 Eugene, OR
177 CA N	174 Redding, CA
	175 Eureka, CA
	176 San Francisco-Oakland-San Jose, CA
	177 Sacramento, CA
181 CA S	178 Stockton-Modesto, CA
	179 Fresno-Bakersfield, CA
	180 Los Angeles, CA
	181 San Diego, CA
187 QB ON	186 Quebec
	187 Ontario
189 MB SK	188 Manitoba
	189 Saskatchewan
191 BC AB	190 Alberta
	191 British Columbia
Off-shore	Hawai, other US off-shore territories & Off-shore Foreign Countries

"Super" BEA Code/Name   BEA Code/Name

APPENDIX 5

FREIGHT VOLUME FORECASTS - Medium

Summary of Cargo Flow and Medium Forecasts for Group 1

		Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
	Water-offshore	74,468,020	25,824,402	20	516,602	0	48,126,996	0
1990	Water-continental	65,771,132	19,667,326	167,858	158,949	955,888	44,807,490	13,621
	Rail	6,283,091	307,930	280	84,164	178,158	5,614,303	98,256
	Truck	678,532	84,055	112,692	8,540	56,906	351,626	64,713
	Air	5	0	0	0	0	5	0
	Total	147,200,780	45,883,713	280,850	768,255	1,190,952	98,900,420	176,590
	Water-offshore	89,011,801	30,867,969	24	617,496	0	57,526,312	0
2000	Water-continental	78,616,390	23,508,401	200,641	189,992	1,142,575	53,558,499	16,281
	Rail	7,510,194	368,069	335	100,601	212,953	6,710,790	117,446
	Truck	811,051	100,471	134,701	10,208	68,020	420,299	77,352
	Air	6	0	0	0	0	6	0
	Total	175,949,441	54,844,911	335,701	918,297	1,423,548	118,215,906	211,078
	Water-offshore	103,607,561	35,929,561	28	718,750	0	66,959,222	0
2010	Water-continental	91,507,556	27,363,205	233,541	221,146	1,329,930	62,340,784	18,951
	Rail	8,741,682	428,424	390	117,098	247,872	7,811,195	136,704
	Truck	944,043	116,946	156,789	11,882	79,173	489,218	90,035
	Air	7	0	0	0	0	7	0
	Total	204,800,849	63,838,136	390,747	1,068,875	1,656,975	137,600,426	245,690
	Water-offshore	120,596,668	41,821,131	32	836,607	0	77,938,898	0
2020	Water-continental	106,512,559	31,850,101	271,836	257,409	1,548,006	72,563,149	22,058
	Rail	10,175,104	498,675	453	136,299	288,517	9,092,040	159,120
	Truck	1,098,843	136,122	182,498	13,830	92,156	569,438	104,799
	Air	8	0	0	0	0	8	0
	Total	238,383,183	74,306,030	454,820	1,244,145	1,928,678	160,163,533	285,977

Summary of Cargo Flow and Medium Forecasts for Group 2

		Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
	Water-offshore	13,915,793	5,729,054	2,966	92,160	0	8,091,613	0
1990	Water-continental	12,869,521	3,682,019	1,099,631	451,101	12,181	7,365,946	258,643
	Rail	3,629,448	491,390	165,639	117,174	184,498	1,892,435	778,312
	Truck	8,655,091	866,411	729,993	239,504	475,897	5,161,190	1,182,096
	Air	35,421	3,020	0	0	0	23,329	9,072
	Total	39,105,274	10,771,894	1,998,229	899,939	672,576	22,534,513	2,228,123
	Water-offshore	15,371,693	6,328,440	3,276	101,802	0	8,938,175	0
2000	Water-continental	14,215,958	4,067,240	1,214,677	498,296	13,455	8,136,587	285,703
	Rail	4,009,169	542,800	182,969	129,433	203,801	2,090,426	859,741
	Truck	9,560,605	957,057	806,366	264,561	525,686	5,701,165	1,305,769
	Air	39,127	3,336	0	0	0	25,770	10,021
	Total	43,196,551	11,898,872	2,207,288	994,093	742,942	24,892,122	2,461,234
	Water-offshore	16,729,414	6,887,406	3,566	110,794	0	9,727,648	0
2010	Water-continental	15,471,597	4,426,483	1,321,964	542,309	14,644	8,855,260	310,938
	Rail	4,363,283	590,744	199,129	140,865	221,801	2,275,065	935,678
	Truck	10,405,056	1,041,590	877,590	287,929	572,118	6,204,726	1,421,103
	Air	42,583	3,631	0	0	0	28,046	10,906
	Total	47,011,932	12,949,853	2,402,249	1,081,897	808,563	27,090,744	2,678,625
	Water-offshore	18,207,057	7,495,743	3,881	120,580	0	10,586,853	0
2020	Water-continental	16,838,142	4,817,457	1,438,728	590,209	15,937	9,637,410	338,402
	Rail	4,748,674	642,922	216,718	153,307	241,392	2,476,012	1,018,323
	Truck	11,324,093	1,133,589	955,104	313,361	622,651	6,752,765	1,546,623
	Air	46,344	3,951	0	0	0	30,523	11,870
	Total	51,164,310	14,093,662	2,614,430	1,177,456	879,981	29,483,563	2,915,217

*Water-offshore cargoes include all cargo exported to (outbound) or imported from (inbound) foreign countries, Alaska & Puerto Rico

Summary of Cargo Flow and Medium Forecasts for Group 3

Year	Mode	Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	13,180,653	3,366,847	0	1,773	0	9,812,033	0
	Water-continental	37,371,184	11,941,379	350	413	0	25,427,636	1,406
	Rail	4,147,517	0	0	2,050,299	0	425,186	1,672,032
	Truck	887,847	1,032	0	0	0	6,815	880,000
	Air	0	0	0	0	0	0	0
	Total	55,587,201	15,309,258	350	2,052,485	0	35,671,670	2,553,438
2000	Water-offshore	17,854,340	4,547,865	0	2,406	0	13,304,069	0
	Water-continental	48,307,044	15,435,763	452	534	0	32,868,478	1,817
	Rail	5,361,197	0	0	2,650,274	0	549,607	2,161,316
	Truck	1,147,656	1,334	0	0	0	8,809	1,137,513
	Air	0	0	0	0	0	0	0
	Total	72,670,237	19,984,962	452	2,653,214	0	46,730,964	3,300,646
2010	Water-offshore	20,817,076	5,300,167	0	2,806	0	15,514,103	0
	Water-continental	60,109,671	19,207,108	563	664	0	40,899,074	2,261
	Rail	6,671,073	0	0	3,297,803	0	683,890	2,689,379
	Truck	1,428,057	1,660	0	0	0	10,962	1,415,436
	Air	0	0	0	0	0	0	0
	Total	89,025,877	24,508,935	563	3,301,273	0	57,108,029	4,107,077
2020	Water-offshore	24,271,629	6,177,032	0	3,272	0	18,091,325	0
	Water-continental	74,795,976	23,899,887	701	827	0	50,891,747	2,814
	Rail	8,300,983	0	0	4,103,539	0	850,982	3,346,462
	Truck	1,776,968	2,065	0	0	0	13,640	1,761,262
	Air	0	0	0	0	0	0	0
	Total	109,145,556	30,078,985	701	4,107,638	0	69,847,693	5,110,539

Summary of Cargo Flow and Medium Forecasts for Group 4

Year	Mode	Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	118,756,894	34,575,813	0	18,743,593	0	65,437,488	0
	Water-continental	30,834,293	3,802,000	4,782,841	6,116,449	21,231	15,607,994	503,778
	Rail	61,567	34,685	4,332	672	0	21,786	92
	Truck	42,748	11,858	1,460	5,677	1,589	18,195	3,969
	Air	0	0	0	0	0	0	0
	Total	149,695,502	38,424,356	4,788,633	24,866,391	22,820	81,085,463	507,839
2000	Water-offshore	143,349,959	41,736,328	0	22,625,313	0	78,988,317	0
	Water-continental	28,454,484	3,508,559	4,413,699	5,644,378	19,592	14,403,360	464,896
	Rail	56,815	32,008	3,998	620	0	20,105	85
	Truck	39,449	10,943	1,347	5,239	1,466	16,791	3,663
	Air	0	0	0	0	0	0	0
	Total	171,900,707	45,287,839	4,419,043	28,275,550	21,059	93,428,572	468,644
2010	Water-offshore	168,257,230	48,988,310	0	26,556,618	0	92,712,302	0
	Water-continental	26,577,726	3,277,147	4,122,586	5,272,095	18,300	13,453,365	434,233
	Rail	53,068	29,897	3,734	579	0	18,779	79
	Truck	36,847	10,221	1,258	4,893	1,370	15,683	3,421
	Air	0	0	0	0	0	0	0
	Total	194,924,871	52,305,575	4,127,579	31,834,185	19,670	106,200,129	437,734
2020	Water-offshore	197,492,368	57,500,374	0	31,171,014	0	108,820,979	0
	Water-continental	24,824,753	3,060,998	3,850,675	4,924,366	17,093	12,566,028	405,593
	Rail	49,568	27,925	3,488	541	0	17,540	74
	Truck	34,417	9,547	1,175	4,571	1,279	14,649	3,195
	Air	0	0	0	0	0	0	0
	Total	222,401,105	60,598,844	3,855,338	36,100,492	18,372	121,419,196	408,862

*Water-offshore cargoes include all cargo exported to (outbound) or imported from (inbound) foreign countries, Alaska & Puerto Rico

Summary of Cargo Flow and Medium Forecasts for Group 5

		Louisiana Statewide	Baton Rouge	Lafayette	Lake Charles	Monroe	New Orleans	Shreveport
		Total	Total	Total	Total	Total	Total	Total
1990	Water-offshore	3,233,547	951,788	3,593	594,326	0	1,683,840	0
	Water-continental	22,370,110	5,742,172	4,583,587	1,040,641	0	10,714,668	289,042
	Rail	4,545,198	379,009	54,016	325,543	177,687	1,446,192	2,162,751
	Truck	21,242,319	2,966,138	2,811,435	2,014,926	2,129,189	7,368,949	3,951,682
	Air	1,061	0	0	0	0	1,061	0
	Total	51,392,235	10,039,107	7,452,631	3,975,436	2,306,876	21,214,710	6,403,475
2000	Water-offshore	3,398,911	1,000,463	3,777	624,720	0	1,769,952	0
	Water-continental	23,514,120	6,035,827	4,817,992	1,093,860	0	11,262,618	303,824
	Rail	4,777,640	398,392	56,778	342,191	186,774	1,520,150	2,273,354
	Truck	22,328,654	3,117,827	2,955,212	2,117,970	2,238,076	7,745,798	4,153,772
	Air	1,115	0	0	0	0	1,115	0
	Total	54,020,441	10,552,508	7,833,760	4,178,740	2,424,850	22,299,633	6,730,950
2010	Water-offshore	3,546,159	1,043,805	3,940	651,784	0	1,846,630	0
	Water-continental	24,532,801	6,297,312	5,026,718	1,141,248	0	11,750,538	316,986
	Rail	4,984,617	415,651	59,238	357,016	194,865	1,586,007	2,371,841
	Truck	23,295,978	3,252,897	3,083,238	2,209,724	2,335,034	8,081,362	4,333,722
	Air	1,164	0	0	0	0	1,164	0
	Total	56,360,719	11,009,665	8,173,134	4,359,772	2,529,900	23,265,700	7,022,548
2020	Water-offshore	3,699,786	1,089,025	4,111	680,021	0	1,926,630	0
	Water-continental	25,595,614	6,570,125	5,244,486	1,190,689	0	12,259,596	330,718
	Rail	5,200,561	433,658	61,804	372,482	203,307	1,654,716	2,474,594
	Truck	24,305,209	3,393,820	3,216,810	2,305,454	2,436,193	8,431,464	4,521,468
	Air	1,214	0	0	0	0	1,214	0
	Total	58,802,384	11,486,627	8,527,212	4,548,647	2,639,500	24,273,619	7,326,780

Summary of Cargo Flow and Medium Forecasts for Group 6

		Louisiana Statewide	Baton Rouge	Lafayette	Lake Charles	Monroe	New Orleans	Shreveport
		Total	Total	Total	Total	Total	Total	Total
1990	Water-offshore	9,806,380	2,757,207	7,163	363,686	0	6,678,324	0
	Water-continental	20,606,881	11,571,030	2,259,979	1,175,804	19,639	5,574,746	5,683
	Rail	9,303,059	896,427	467,359	858,862	1,268,459	3,915,732	1,896,220
	Truck	24,562,707	2,224,690	2,409,873	1,155,732	3,881,138	11,592,618	3,298,656
	Air	20,959	499	0	0	0	19,094	1,366
	Total	64,299,986	17,449,853	5,144,374	3,554,084	5,169,236	27,780,514	5,201,925
2000	Water-offshore	11,380,704	3,199,851	8,313	422,072	0	7,750,468	0
	Water-continental	23,915,127	13,428,653	2,622,798	1,364,569	22,792	6,469,720	6,595
	Rail	10,796,580	1,040,340	542,389	996,744	1,472,098	4,544,367	2,200,641
	Truck	28,506,024	2,581,844	2,796,756	1,341,274	4,504,219	13,453,706	3,828,225
	Air	24,324	579	0	0	0	22,159	1,585
	Total	74,622,759	20,251,267	5,970,256	4,124,660	5,999,109	32,240,421	6,037,046
2010	Water-offshore	12,917,892	3,632,054	9,436	479,082	0	8,797,321	0
	Water-continental	27,145,335	15,242,456	2,977,058	1,548,880	25,870	7,343,583	7,486
	Rail	12,254,870	1,180,859	615,650	1,131,374	1,670,934	5,158,173	2,497,881
	Truck	32,356,323	2,930,572	3,174,513	1,522,440	5,112,602	15,270,894	4,345,302
	Air	27,609	657	0	0	0	25,152	1,799
	Total	84,702,030	22,986,599	6,776,657	4,681,776	6,809,407	36,595,124	6,852,468
2020	Water-offshore	14,662,708	4,122,634	10,710	543,791	0	9,985,572	0
	Water-continental	30,811,846	17,301,250	3,379,169	1,758,087	29,365	8,335,479	8,497
	Rail	13,910,131	1,340,357	698,805	1,284,189	1,896,627	5,854,886	2,835,268
	Truck	36,726,681	3,326,404	3,603,293	1,728,075	5,803,160	17,333,529	4,932,221
	Air	31,338	746	0	0	0	28,550	2,042
	Total	96,142,705	26,091,391	7,691,977	5,314,142	7,729,151	41,538,015	7,778,029

*Water-offshore cargoes include all cargo exported to (outbound) or imported from (inbound) foreign countries, Alaska & Puerto Rico

Summary of Cargo Flow and Medium Forecasts for Group 7

Year	Mode	Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	835,527	64,027	0	369,302	0	402,198	0
	Water-continental	1,996,282	156,703	43	323	1,411,392	427,819	2
	Rail	6,333,578	1,780,875	88,607	347,223	1,129,070	962,241	2,025,562
	Truck	27,591,849	6,166,320	662,481	1,400,914	4,894,660	5,830,838	8,636,636
	Air	59	0	0	0	0	59	0
	Total	36,757,295	8,167,925	751,131	2,117,762	7,435,122	7,623,155	10,662,200
2000	Water-offshore	950,725	72,855	0	420,219	0	457,651	0
	Water-continental	2,271,519	178,308	49	368	1,605,987	486,804	2
	Rail	7,206,818	2,026,413	100,824	395,096	1,284,740	1,094,910	2,304,836
	Truck	31,396,068	7,016,500	753,820	1,594,065	5,569,510	6,634,763	9,827,410
	Air	67	0	0	0	0	67	0
	Total	41,825,197	9,294,075	854,693	2,409,748	8,460,237	8,674,195	12,132,248
2010	Water-offshore	1,061,161	81,317	0	469,032	0	510,812	0
	Water-continental	2,535,378	199,021	55	410	1,792,538	543,351	3
	Rail	8,043,960	2,261,800	112,535	440,991	1,433,975	1,222,094	2,572,565
	Truck	35,043,025	7,831,534	841,384	1,779,231	6,216,463	7,405,455	10,968,959
	Air	75	0	0	0	0	75	0
	Total	46,683,599	10,373,672	953,974	2,689,663	9,442,976	9,681,787	13,541,526
2020	Water-offshore	1,184,425	90,763	0	523,515	0	570,147	0
	Water-continental	2,829,886	222,139	61	458	2,000,759	606,467	3
	Rail	8,978,344	2,524,530	125,607	492,216	1,600,545	1,364,052	2,871,393
	Truck	39,113,612	8,741,243	939,119	1,985,906	6,938,565	8,265,671	12,243,110
	Air	84	0	0	0	0	84	0
	Total	52,106,352	11,578,675	1,064,787	3,002,094	10,539,869	10,806,421	15,114,506

Summary of Cargo Flow and Medium Forecasts for Group 8

Year	Mode	Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	2,964,690	2,211,323	0	9,391	0	743,976	0
	Water-continental	6,809,386	3,548,596	4,552	27,269	0	3,227,998	971
	Rail	976,890	390,002	26,969	260,067	47,228	165,014	87,610
	Truck	2,986,564	1,314,119	142,216	288,807	198,803	824,304	218,315
	Air	880	137	0	0	0	595	148
	Total	13,738,410	7,464,177	173,737	585,534	246,031	4,961,887	307,044
2000	Water-offshore	3,721,651	2,775,930	0	11,789	0	933,932	0
	Water-continental	8,547,996	4,454,643	5,714	34,231	0	4,052,188	1,219
	Rail	1,226,315	489,579	33,855	326,469	59,287	207,146	109,979
	Truck	3,749,110	1,649,647	178,527	362,547	249,562	1,034,770	274,056
	Air	1,105	172	0	0	0	747	186
	Total	17,246,176	9,369,971	218,096	735,036	308,849	6,228,783	385,440
2010	Water-offshore	4,516,697	3,368,944	0	14,307	0	1,133,445	0
	Water-continental	10,374,080	5,406,276	6,935	41,544	0	4,917,846	1,479
	Rail	1,488,289	594,167	41,087	396,211	71,952	251,398	133,474
	Truck	4,550,022	2,002,056	216,666	439,997	302,876	1,255,825	332,602
	Air	1,341	209	0	0	0	906	225
	Total	20,930,428	11,371,652	264,688	892,059	374,828	7,559,420	467,781
2020	Water-offshore	5,481,586	4,088,642	0	17,364	0	1,375,580	0
	Water-continental	12,590,265	6,561,203	8,416	50,419	0	5,968,431	1,795
	Rail	1,806,228	721,097	49,865	480,853	87,323	305,104	161,987
	Truck	5,522,030	2,429,750	262,951	533,992	367,578	1,524,103	403,655
	Air	1,627	253	0	0	0	1,100	274
	Total	25,401,736	13,800,946	321,232	1,082,627	454,901	9,174,318	567,711

*Water-offshore cargoes include all cargo exported to (outbound) or imported from (inbound) foreign countries, Alaska & Puerto Rico

Summary of Cargo Flow and Medium Forecasts for Group 9

		Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	4,508,493	1,783,759	663	612,771	0	2,111,300	0
	Water-continental	19,577,047	9,082,560	548,707	1,344,675	19,927	8,546,028	35,150
	Rail	22,076,911	10,487,243	539,985	4,544,654	579,604	4,912,286	1,013,139
	Truck	13,643,014	4,040,550	689,785	2,065,595	495,249	5,362,478	989,357
	Air	6,840	2,079	219	0	0	3,582	960
	Total	59,812,305	25,396,191	1,779,359	8,567,695	1,094,780	20,935,674	2,038,606
2000	Water-offshore	5,284,069	2,090,611	777	718,183	0	2,474,498	0
	Water-continental	22,944,799	10,644,992	643,099	1,575,993	23,355	10,016,163	41,197
	Rail	25,874,704	12,291,317	632,876	5,326,451	679,311	5,757,325	1,187,425
	Truck	15,989,961	4,735,628	808,446	2,420,930	580,444	6,284,961	1,159,552
	Air	8,017	2,437	257	0	0	4,198	1,125
	Total	70,101,550	29,764,985	2,085,454	10,041,557	1,283,110	24,537,145	2,389,298
2010	Water-offshore	6,048,316	2,392,981	889	822,056	0	2,832,390	0
	Water-continental	26,263,360	12,184,603	736,111	1,803,933	26,733	11,464,824	47,155
	Rail	29,617,023	14,069,039	724,411	6,096,828	777,561	6,590,020	1,359,165
	Truck	18,302,627	5,420,553	925,373	2,771,075	664,396	7,193,970	1,327,260
	Air	9,176	2,789	294	0	0	4,805	1,288
	Total	80,240,502	34,069,965	2,387,078	11,493,892	1,468,689	28,086,010	2,734,868
2020	Water-offshore	6,923,099	2,739,084	1,018	940,952	0	3,242,045	0
	Water-continental	30,061,891	13,946,891	842,577	2,064,840	30,599	13,123,009	53,975
	Rail	33,900,603	16,103,877	829,184	6,978,626	890,021	7,543,150	1,555,744
	Truck	20,949,779	6,204,540	1,059,212	3,171,862	760,489	8,234,451	1,519,225
	Air	10,503	3,192	336	0	0	5,500	1,474
	Total	91,845,875	38,997,584	2,732,327	13,156,280	1,681,109	32,148,156	3,130,419

Summary of Cargo Flow and Medium Forecasts for Group 10

		Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	16,701,958	4,963,453	0	4,603,295	0	7,135,210	0
	Water-continental	78,542,858	16,085,425	5,523,974	4,094,126	448,840	52,105,961	284,532
	Rail	4,388,018	1,263,837	58,519	685,468	18,941	1,674,143	687,110
	Truck	6,907,898	1,438,067	504,887	1,842,600	110,271	2,484,114	527,959
	Air	0	0	0	0	0	0	0
	Total	106,540,732	23,750,782	6,087,380	11,225,489	578,052	63,399,428	1,499,601
2000	Water-offshore	18,724,338	6,117,535	0	4,960,022	0	7,646,781	0
	Water-continental	72,480,874	14,843,942	5,097,630	3,778,139	414,198	48,084,392	262,572
	Rail	4,049,348	1,166,293	54,002	632,563	17,479	1,544,932	634,078
	Truck	6,374,742	1,327,076	465,920	1,700,387	101,760	2,292,389	487,211
	Air	0	0	0	0	0	0	0
	Total	101,629,303	23,454,847	5,617,552	11,071,112	533,438	59,568,494	1,383,861
2010	Water-offshore	21,179,241	7,426,881	0	5,426,261	0	8,326,098	0
	Water-continental	67,700,290	13,864,888	4,761,409	3,528,946	386,879	44,912,915	245,253
	Rail	3,782,267	1,089,369	50,441	590,842	16,326	1,443,033	592,257
	Truck	5,954,287	1,239,547	435,189	1,588,235	95,048	2,141,191	455,076
	Air	0	0	0	0	0	0	0
	Total	98,616,085	23,620,685	5,247,038	11,134,284	498,254	56,823,237	1,292,586
2020	Water-offshore	24,489,605	9,122,132	0	6,080,501	0	9,286,972	0
	Water-continental	63,235,017	12,950,409	4,447,363	3,296,189	361,362	41,950,617	229,077
	Rail	3,532,802	1,017,518	47,114	551,872	15,249	1,347,856	553,194
	Truck	5,561,563	1,157,791	406,486	1,483,481	88,779	1,999,965	425,061
	Air	0	0	0	0	0	0	0
	Total	96,818,987	24,247,849	4,900,962	11,412,043	465,391	54,585,410	1,207,332

*Water-offshore cargoes include all cargo exported to (outbound) or imported from (inbound) foreign countries, Alaska & Puerto Rico

Summary of Cargo Flow and Medium Forecasts for Group 11

Year	Mode	Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	0	0	0	0	0	0	0
	Water-continental	4,412,524	0	1,300,696	378,983	0	2,732,845	0
	Rail	5,354,441	21,729	199	32,042	190	5,237,564	62,717
	Truck	0	0	0	0	0	0	0
	Air	0	0	0	0	0	0	0
	Total	9,766,965	21,729	1,300,895	411,025	190	7,970,409	62,717
2000	Water-offshore	0	0	0	0	0	0	0
	Water-continental	6,239,352	0	1,839,197	535,886	0	3,864,269	0
	Rail	7,571,232	30,725	281	45,308	269	7,405,966	88,682
	Truck	0	0	0	0	0	0	0
	Air	0	0	0	0	0	0	0
	Total	13,810,583	30,725	1,839,478	581,193	269	11,270,236	88,682
2010	Water-offshore	0	0	0	0	0	0	0
	Water-continental	7,430,485	0	2,190,311	638,190	0	4,601,984	0
	Rail	9,016,629	36,591	335	53,957	320	8,819,814	105,613
	Truck	0	0	0	0	0	0	0
	Air	0	0	0	0	0	0	0
	Total	16,447,114	36,591	2,190,647	692,147	320	13,421,797	105,613
2020	Water-offshore	0	0	0	0	0	0	0
	Water-continental	8,849,013	0	2,608,456	760,024	0	5,480,532	0
	Rail	10,737,963	43,576	399	64,258	381	10,503,574	125,775
	Truck	0	0	0	0	0	0	0
	Air	0	0	0	0	0	0	0
	Total	19,586,975	43,576	2,608,855	824,282	381	15,984,106	125,775

FREIGHT VOLUME FORECASTS- Low

Summary of Cargo Flow and Low Forecasts for Group 1

		Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	74,468,020	25,824,402	20	516,602	0	48,126,996	0
	Water-continental	65,771,132	19,667,326	167,858	158,949	955,888	44,807,490	13,621
	Rail	6,283,091	307,930	280	84,164	178,158	5,614,303	98,256
	Truck	678,532	84,055	112,692	8,540	56,906	351,626	64,713
	Air	5	0	0	0	0	5	0
	Total	147,200,780	45,883,713	280,850	768,255	1,190,952	98,900,420	176,590
2000	Water-offshore	84,735,278	29,384,935	23	587,828	0	54,762,493	0
	Water-continental	74,839,309	22,378,953	191,001	180,864	1,087,681	50,985,311	15,499
	Rail	7,149,370	350,386	319	95,768	202,721	6,388,374	111,803
	Truck	772,084	95,644	128,229	9,717	64,752	400,106	73,635
	Air	6	0	0	0	0	6	0
	Total	167,496,048	52,209,918	319,572	874,178	1,355,154	112,536,289	200,937
2010	Water-offshore	94,578,102	32,798,279	25	656,110	0	61,123,687	0
	Water-continental	83,532,620	24,978,486	213,188	201,873	1,214,025	56,907,749	17,299
	Rail	7,979,839	391,086	356	106,892	226,270	7,130,445	124,790
	Truck	861,770	106,754	143,124	10,846	72,273	446,583	82,189
	Air	6	0	0	0	0	6	0
	Total	186,952,338	58,274,606	356,694	975,722	1,512,568	125,608,470	224,278
2020	Water-offshore	105,564,266	36,608,118	28	732,324	0	68,223,796	0
	Water-continental	93,235,744	27,879,979	237,952	225,323	1,355,046	63,518,135	19,309
	Rail	8,906,775	436,515	397	119,309	252,553	7,958,715	139,286
	Truck	961,872	119,155	159,750	12,106	80,669	498,457	91,736
	Air	7	0	0	0	0	7	0
	Total	208,668,664	65,043,766	398,127	1,089,062	1,688,268	140,199,111	250,330

Summary of Cargo Flow and Low Forecasts for Group 2

		Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	13,915,793	5,729,054	2,966	92,160	0	8,091,613	0
	Water-continental	12,869,521	3,682,019	1,099,631	451,101	12,181	7,365,946	258,643
	Rail	3,629,448	491,390	165,639	117,174	184,498	1,892,435	778,312
	Truck	8,655,091	866,411	729,993	239,504	475,897	5,161,190	1,182,096
	Air	35,421	3,020	0	0	0	23,329	9,072
	Total	39,105,274	10,771,894	1,998,229	899,939	672,576	22,534,513	2,228,123
2000	Water-offshore	14,338,948	5,903,265	3,056	94,962	0	8,337,665	0
	Water-continental	13,260,861	3,793,983	1,133,069	464,818	12,551	7,589,932	266,508
	Rail	3,739,813	506,332	170,676	120,737	190,108	1,949,981	801,979
	Truck	8,918,277	892,757	752,191	246,787	490,368	5,318,133	1,218,041
	Air	36,498	3,112	0	0	0	24,038	9,348
	Total	40,294,397	11,099,449	2,058,992	927,305	693,028	23,219,748	2,295,876
2010	Water-offshore	14,708,816	6,055,537	3,135	97,412	0	8,552,732	0
	Water-continental	13,602,919	3,891,847	1,162,296	476,808	12,875	7,785,711	273,382
	Rail	3,836,280	519,393	175,078	123,851	195,012	2,000,280	822,666
	Truck	9,148,321	915,785	771,593	253,153	503,017	5,455,312	1,249,460
	Air	37,440	3,192	0	0	0	24,658	9,589
	Total	41,333,776	11,385,754	2,112,103	951,224	710,904	23,818,693	2,355,098
2020	Water-offshore	15,088,224	6,211,737	3,216	99,925	0	8,773,346	0
	Water-continental	13,953,801	3,992,236	1,192,277	489,107	13,207	7,986,540	280,434
	Rail	3,935,236	532,790	179,594	127,046	200,042	2,051,876	843,886
	Truck	9,384,298	939,408	791,496	259,683	515,992	5,596,030	1,281,690
	Air	38,405	3,274	0	0	0	25,295	9,836
	Total	42,399,964	11,679,446	2,166,583	975,760	729,242	24,433,087	2,415,846

*Water-offshore cargoes include all cargo exported to (outbound) or imported from (inbound) foreign countries, Alaska & Puerto Rico

Summary of Cargo Flow and Low Forecasts for Group 3

Year	Mode	Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	13,180,653	3,366,847	0	1,773	0	9,812,033	0
	Water-continental	37,371,184	11,941,379	350	413	0	25,427,636	1,406
	Rail	4,147,517	0	0	2,050,299	0	425,186	1,672,032
	Truck	887,847	1,032	0	0	0	6,815	880,000
	Air	0	0	0	0	0	0	0
	Total	55,587,201	15,309,258	350	2,052,485	0	35,671,670	2,553,438
2000	Water-offshore	16,208,326	4,133,425	0	2,182	0	12,072,719	0
	Water-continental	45,110,610	14,414,392	422	499	0	30,693,600	1,697
	Rail	5,006,452	0	0	2,474,908	0	513,240	2,018,303
	Truck	1,071,717	1,246	0	0	0	8,226	1,062,245
	Air	0	0	0	0	0	0	0
	Total	67,397,104	18,549,062	422	2,477,589	0	43,287,786	3,082,245
2010	Water-offshore	17,992,302	4,588,130	0	2,423	0	13,401,750	0
	Water-continental	52,948,896	16,918,994	496	585	0	36,026,829	1,992
	Rail	5,876,358	0	0	2,904,941	0	602,419	2,368,998
	Truck	1,257,935	1,462	0	0	0	9,656	1,246,817
	Air	0	0	0	0	0	0	0
	Total	78,075,491	21,508,586	496	2,907,948	0	50,040,654	3,617,807
2020	Water-offshore	19,972,634	5,092,856	0	2,689	0	14,877,088	0
	Water-continental	62,149,141	19,858,789	582	687	0	42,286,745	2,338
	Rail	6,897,416	0	0	3,409,695	0	707,094	2,780,628
	Truck	1,476,510	1,716	0	0	0	11,334	1,463,460
	Air	0	0	0	0	0	0	0
	Total	90,495,701	24,953,361	582	3,413,071	0	57,882,261	4,246,426

Summary of Cargo Flow and Low Forecasts for Group 4

Year	Mode	Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	118,756,894	34,575,813	0	18,743,593	0	65,437,488	0
	Water-continental	30,834,293	3,802,000	4,782,841	6,116,449	21,231	15,607,994	503,778
	Rail	61,567	34,685	4,332	672	0	21,786	92
	Truck	42,748	11,858	1,460	5,677	1,589	18,195	3,969
	Air	0	0	0	0	0	0	0
	Total	149,695,502	38,424,356	4,788,633	24,866,391	22,820	81,085,463	507,839
2000	Water-offshore	143,349,959	41,736,328	0	22,625,313	0	78,988,317	0
	Water-continental	28,454,484	3,508,559	4,413,699	5,644,378	19,592	14,403,360	464,896
	Rail	56,815	32,008	3,998	620	0	20,105	85
	Truck	39,449	10,943	1,347	5,239	1,466	16,791	3,663
	Air	0	0	0	0	0	0	0
	Total	171,900,707	45,287,839	4,419,043	28,275,550	21,059	93,428,572	468,644
2010	Water-offshore	168,257,230	48,988,310	0	26,556,618	0	92,712,302	0
	Water-continental	26,577,726	3,277,147	4,122,586	5,272,095	18,300	13,453,365	434,233
	Rail	53,068	29,897	3,734	579	0	18,779	79
	Truck	36,847	10,221	1,258	4,893	1,370	15,683	3,421
	Air	0	0	0	0	0	0	0
	Total	194,924,871	52,305,575	4,127,579	31,834,185	19,670	106,200,129	437,734
2020	Water-offshore	197,492,368	57,500,374	0	31,171,014	0	108,820,979	0
	Water-continental	24,824,753	3,060,998	3,850,675	4,924,366	17,093	12,566,028	405,593
	Rail	49,568	27,925	3,488	541	0	17,540	74
	Truck	34,417	9,547	1,175	4,571	1,279	14,649	3,195
	Air	0	0	0	0	0	0	0
	Total	222,401,105	60,598,844	3,855,338	36,100,492	18,372	121,419,196	408,862

*Water-offshore cargoes include all cargo exported to (outbound) or imported from (inbound) foreign countries, Alaska & Puerto Rico

Summary of Cargo Flow and Low Forecasts for Group 5

		Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
	Water-offshore	3,233,547	951,788	3,593	594,326	0	1,683,840	0
1990	Water-continental	22,370,110	5,742,172	4,583,587	1,040,641	0	10,714,668	289,042
	Rail	4,545,198	379,009	54,016	325,543	177,687	1,446,192	2,162,751
	Truck	21,242,319	2,966,138	2,811,435	2,014,926	2,129,189	7,368,949	3,951,682
	Air	1,061	0	0	0	0	1,061	0
	Total	51,392,235	10,039,107	7,452,631	3,975,436	2,306,876	21,214,710	6,403,475
	Water-offshore	3,137,840	923,617	3,487	576,735	0	1,634,001	0
2000	Water-continental	21,707,994	5,572,214	4,447,921	1,009,840	0	10,397,533	280,487
	Rail	4,410,668	367,791	52,417	315,908	172,428	1,403,387	2,098,737
	Truck	20,613,584	2,878,346	2,728,222	1,955,288	2,066,169	7,150,841	3,834,719
	Air	1,030	0	0	0	0	1,030	0
	Total	49,871,116	9,741,967	7,232,046	3,857,770	2,238,597	20,586,792	6,213,944
	Water-offshore	3,058,737	900,333	3,399	562,196	0	1,592,809	0
2010	Water-continental	21,160,750	5,431,742	4,335,792	984,382	0	10,135,418	273,416
	Rail	4,299,478	358,519	51,096	307,944	168,081	1,368,009	2,045,830
	Truck	20,093,929	2,805,784	2,659,445	1,905,996	2,014,082	6,970,573	3,738,048
	Air	1,004	0	0	0	0	1,004	0
	Total	48,613,897	9,496,378	7,049,731	3,760,518	2,182,163	20,067,812	6,057,294
	Water-offshore	2,981,628	877,636	3,313	548,023	0	1,552,655	0
2020	Water-continental	20,627,301	5,294,811	4,226,489	959,567	0	9,879,910	266,523
	Rail	4,191,091	349,481	49,808	300,181	163,844	1,333,522	1,994,255
	Truck	19,587,373	2,735,052	2,592,402	1,857,947	1,963,308	6,794,849	3,643,815
	Air	978	0	0	0	0	978	0
	Total	47,388,371	9,256,981	6,872,012	3,665,718	2,127,152	19,561,915	5,904,593

Summary of Cargo Flow and Low Forecasts for Group 6

		Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
	Water-offshore	9,806,380	2,757,207	7,163	363,686	0	6,678,324	0
1990	Water-continental	20,606,881	11,571,030	2,259,979	1,175,804	19,639	5,574,746	5,683
	Rail	9,303,059	896,427	467,359	858,862	1,268,459	3,915,732	1,896,220
	Truck	24,562,707	2,224,690	2,409,873	1,155,732	3,881,138	11,592,618	3,298,656
	Air	20,959	499	0	0	0	19,094	1,366
	Total	64,299,986	17,449,853	5,144,374	3,554,084	5,169,236	27,780,514	5,201,925
	Water-offshore	10,832,344	3,045,672	7,912	401,736	0	7,377,024	0
2000	Water-continental	22,762,817	12,781,616	2,496,423	1,298,819	21,694	6,157,988	6,278
	Rail	10,276,365	990,213	516,255	948,718	1,401,168	4,325,404	2,094,607
	Truck	27,132,510	2,457,442	2,661,999	1,276,647	4,287,191	12,805,462	3,643,768
	Air	23,152	551	0	0	0	21,092	1,509
	Total	71,027,187	19,275,494	5,682,589	3,925,920	5,710,052	30,686,970	5,746,161
	Water-offshore	11,789,123	3,314,684	8,611	437,219	0	8,028,608	0
2010	Water-continental	24,773,366	13,910,565	2,716,922	1,413,539	23,610	6,701,899	6,832
	Rail	11,184,036	1,077,675	561,854	1,032,514	1,524,928	4,707,450	2,279,615
	Truck	29,529,017	2,674,498	2,897,123	1,389,408	4,665,862	13,936,518	3,965,608
	Air	25,197	600	0	0	0	22,955	1,642
	Total	77,300,738	20,978,022	6,184,510	4,272,681	6,214,399	33,397,429	6,253,697
	Water-offshore	12,830,409	3,607,457	9,372	475,837	0	8,737,743	0
2020	Water-continental	26,961,500	15,139,231	2,956,897	1,538,391	25,695	7,293,851	7,435
	Rail	12,171,877	1,172,861	611,480	1,123,712	1,659,618	5,123,241	2,480,964
	Truck	32,137,199	2,910,726	3,153,014	1,512,129	5,077,979	15,167,476	4,315,875
	Air	27,422	653	0	0	0	24,982	1,787
	Total	84,128,407	22,830,928	6,730,763	4,650,070	6,763,292	36,347,292	6,806,062

*Water-offshore cargoes include all cargo exported to (outbound) or imported from (inbound) foreign countries, Alaska & Puerto Rico

Summary of Cargo Flow and Low Forecasts for Group 7

Year	Mode	Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	835,527	64,027	0	369,302	0	402,198	0
	Water-continental	1,996,282	156,703	43	323	1,411,392	427,819	2
	Rail	6,333,578	1,780,875	88,607	347,223	1,129,070	962,241	2,025,562
	Truck	27,591,849	6,166,320	662,481	1,400,914	4,894,660	5,830,838	8,636,636
	Air	59	0	0	0	0	59	0
	Total	36,757,295	8,167,925	751,131	2,117,762	7,435,122	7,623,155	10,662,200
2000	Water-offshore	922,942	70,726	0	407,939	0	444,277	0
	Water-continental	2,205,137	173,098	47	357	1,559,055	472,578	2
	Rail	6,996,210	1,967,194	97,877	383,550	1,247,196	1,062,913	2,237,481
	Truck	30,478,567	6,811,454	731,791	1,547,481	5,406,750	6,440,873	9,540,219
	Air	65	0	0	0	0	65	0
	Total	40,602,921	9,022,471	829,716	2,339,327	8,213,000	8,420,706	11,777,702
2010	Water-offshore	1,004,461	76,973	0	443,971	0	483,518	0
	Water-continental	2,399,908	188,387	52	388	1,696,760	514,319	2
	Rail	7,614,158	2,140,948	106,522	417,428	1,357,356	1,156,796	2,435,108
	Truck	33,170,618	7,413,082	796,427	1,684,163	5,884,307	7,009,770	10,382,869
	Air	71	0	0	0	0	71	0
	Total	44,189,217	9,819,390	903,001	2,545,950	8,938,422	9,164,473	12,817,980
2020	Water-offshore	1,093,182	83,771	0	483,185	0	526,225	0
	Water-continental	2,611,883	205,026	56	423	1,846,628	559,747	3
	Rail	8,286,687	2,330,050	115,931	454,297	1,477,245	1,258,971	2,650,192
	Truck	36,100,448	8,067,851	866,773	1,832,919	6,404,044	7,628,915	11,299,947
	Air	77	0	0	0	0	77	0
	Total	48,092,276	10,686,698	982,760	2,770,824	9,727,918	9,973,935	13,950,142

Summary of Cargo Flow and Low Forecasts for Group 8

Year	Mode	Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	2,964,690	2,211,323	0	9,391	0	743,976	0
	Water-continental	6,809,386	3,548,596	4,552	27,269	0	3,227,998	971
	Rail	976,890	390,002	26,969	260,067	47,228	165,014	87,610
	Truck	2,986,564	1,314,119	142,216	288,807	198,803	824,304	218,315
	Air	880	137	0	0	0	595	148
	Total	13,738,410	7,464,177	173,737	585,534	246,031	4,961,887	307,044
2000	Water-offshore	3,373,446	2,516,209	0	10,686	0	846,551	0
	Water-continental	7,748,228	4,037,858	5,180	31,029	0	3,673,057	1,105
	Rail	1,111,578	443,773	30,687	295,924	53,740	187,765	99,689
	Truck	3,398,336	1,495,303	161,824	328,626	226,213	937,955	248,415
	Air	1,001	156	0	0	0	677	168
	Total	15,632,590	8,493,298	197,691	666,264	279,952	5,646,006	349,378
2010	Water-offshore	3,765,304	2,808,491	0	11,927	0	944,887	0
	Water-continental	8,648,260	4,506,894	5,781	34,633	0	4,099,719	1,233
	Rail	1,240,699	495,322	34,252	330,298	59,982	209,576	111,269
	Truck	3,793,085	1,668,997	180,621	366,799	252,490	1,046,907	277,271
	Air	1,118	174	0	0	0	756	188
	Total	17,448,466	9,479,877	220,655	743,657	312,472	6,301,844	389,961
2020	Water-offshore	4,202,681	3,134,724	0	13,312	0	1,054,644	0
	Water-continental	9,652,839	5,030,413	6,453	38,656	0	4,575,941	1,376
	Rail	1,384,818	552,858	38,231	368,665	66,949	233,920	124,194
	Truck	4,233,689	1,862,867	201,602	409,407	281,819	1,168,516	309,479
	Air	1,247	194	0	0	0	843	210
	Total	19,475,275	10,581,057	246,286	830,040	348,768	7,033,864	435,259

*Water-offshore cargoes include all cargo exported to (outbound) or imported from (inbound) foreign countries, Alaska & Puerto Rico

Summary of Cargo Flow and Low Forecasts for Group 9

		Louisiana Statewide	Baton Rouge	Lafayette	Lake Charles	Monroe	New Orleans	Shreveport
		Total	Total	Total	Total	Total	Total	Total
1990	Water-offshore	4,508,493	1,783,759	663	612,771	0	2,111,300	0
	Water-continental	19,577,047	9,082,560	548,707	1,344,675	19,927	8,546,028	35,150
	Rail	22,076,911	10,487,243	539,985	4,544,654	579,604	4,912,286	1,013,139
	Truck	13,643,014	4,040,550	689,785	2,065,595	495,249	5,362,478	989,357
	Air	6,840	2,079	219	0	0	3,582	960
	Total	59,812,305	25,396,191	1,779,359	8,567,695	1,094,780	20,935,674	2,038,606
2000	Water-offshore	4,834,217	1,912,630	711	657,042	0	2,263,834	0
	Water-continental	20,991,423	9,738,745	588,349	1,441,823	21,367	9,163,450	37,689
	Rail	23,671,894	11,244,911	578,997	4,872,990	621,478	5,267,182	1,086,335
	Truck	14,628,676	4,332,466	739,620	2,214,827	531,029	5,749,899	1,060,835
	Air	7,334	2,229	235	0	0	3,841	1,029
	Total	64,133,545	27,230,981	1,907,912	9,186,682	1,173,874	22,448,207	2,185,888
2010	Water-offshore	5,129,677	2,029,527	754	697,199	0	2,402,197	0
	Water-continental	22,274,391	10,333,964	624,308	1,529,946	22,673	9,723,508	39,993
	Rail	25,118,689	11,932,185	614,385	5,170,821	659,462	5,589,105	1,152,730
	Truck	15,522,761	4,597,261	784,824	2,350,195	563,485	6,101,325	1,125,672
	Air	7,782	2,365	249	0	0	4,076	1,092
	Total	68,053,301	28,895,302	2,024,521	9,748,160	1,245,620	23,820,211	2,319,487
2020	Water-offshore	5,443,196	2,153,569	800	739,811	0	2,549,016	0
	Water-continental	23,635,772	10,965,562	662,465	1,623,454	24,058	10,317,796	42,437
	Rail	26,653,909	12,661,464	651,935	5,486,854	699,768	5,930,704	1,223,184
	Truck	16,471,492	4,878,239	832,792	2,493,835	597,924	6,474,230	1,194,471
	Air	8,258	2,510	264	0	0	4,325	1,159
	Total	72,212,627	30,661,344	2,148,257	10,343,955	1,321,750	25,276,070	2,461,251

Summary of Cargo Flow and Low Forecasts for Group 10

		Louisiana Statewide	Baton Rouge	Lafayette	Lake Charles	Monroe	New Orleans	Shreveport
		Total	Total	Total	Total	Total	Total	Total
1990	Water-offshore	16,701,958	4,963,453	0	4,603,295	0	7,135,210	0
	Water-continental	78,542,858	16,085,425	5,523,974	4,094,126	448,840	52,105,961	284,532
	Rail	4,388,018	1,263,837	58,519	685,468	18,941	1,674,143	687,110
	Truck	6,907,898	1,438,067	504,887	1,842,600	110,271	2,484,114	527,959
	Air	0	0	0	0	0	0	0
	Total	106,540,732	23,750,782	6,087,380	11,225,489	578,052	63,399,428	1,499,601
2000	Water-offshore	17,529,013	5,562,668	0	4,703,009	0	7,263,336	0
	Water-continental	72,480,874	14,843,942	5,097,630	3,778,139	414,198	48,084,392	262,572
	Rail	4,049,348	1,166,293	54,002	632,563	17,479	1,544,932	634,078
	Truck	6,374,742	1,327,076	465,920	1,700,387	101,760	2,292,389	487,211
	Air	0	0	0	0	0	0	0
	Total	100,433,978	22,899,980	5,617,552	10,814,098	533,438	59,185,048	1,383,861
2010	Water-offshore	18,487,903	6,177,570	0	4,847,582	0	7,462,751	0
	Water-continental	67,700,290	13,864,888	4,761,409	3,528,946	386,879	44,912,915	245,253
	Rail	3,782,267	1,089,369	50,441	590,842	16,326	1,443,033	592,257
	Truck	5,954,287	1,239,547	435,189	1,588,235	95,048	2,141,191	455,076
	Air	0	0	0	0	0	0	0
	Total	95,924,747	22,371,374	5,247,038	10,555,605	498,254	55,959,889	1,292,586
2020	Water-offshore	19,709,829	6,903,375	0	5,052,775	0	7,753,680	0
	Water-continental	63,235,017	12,950,409	4,447,363	3,296,189	361,362	41,950,617	229,077
	Rail	3,532,802	1,017,518	47,114	551,872	15,249	1,347,856	553,194
	Truck	5,561,563	1,157,791	406,486	1,483,481	88,779	1,999,965	425,061
	Air	0	0	0	0	0	0	0
	Total	92,039,211	22,029,092	4,900,962	10,384,317	465,391	53,052,118	1,207,332

*Water-offshore cargoes include all cargo exported to (outbound) or imported from (inbound) foreign countries, Alaska & Puerto Rico

Summary of Cargo Flow and Low Forecasts for Group 11

Year	Mode	Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	0	0	0	0	0	0	0
	Water-continental	4,412,524	0	1,300,696	378,983	0	2,732,845	0
	Rail	5,354,441	21,729	199	32,042	190	5,237,564	62,717
	Truck	0	0	0	0	0	0	0
	Air	0	0	0	0	0	0	0
	Total	9,766,965	21,729	1,300,895	411,025	190	7,970,409	62,717
2000	Water-offshore	0	0	0	0	0	0	0
	Water-continental	5,593,539	0	1,648,828	480,418	0	3,464,293	0
	Rail	6,787,560	27,545	252	40,618	241	6,639,401	79,503
	Truck	0	0	0	0	0	0	0
	Air	0	0	0	0	0	0	0
	Total	12,381,099	27,545	1,649,080	521,036	241	10,103,694	79,503
2010	Water-offshore	0	0	0	0	0	0	0
	Water-continental	6,302,194	0	1,857,721	541,283	0	3,903,190	0
	Rail	7,647,488	31,034	284	45,764	271	7,480,559	89,576
	Truck	0	0	0	0	0	0	0
	Air	0	0	0	0	0	0	0
	Total	13,949,682	31,034	1,858,005	587,047	271	11,383,749	89,576
2020	Water-offshore	0	0	0	0	0	0	0
	Water-continental	7,100,630	0	2,093,079	609,859	0	4,397,692	0
	Rail	8,616,362	34,966	320	51,562	306	8,428,284	100,924
	Truck	0	0	0	0	0	0	0
	Air	0	0	0	0	0	0	0
	Total	15,716,993	34,966	2,093,399	661,421	306	12,825,976	100,924

FREIGHT VOLUME FORECASTS - High

Summary of Cargo Flow and High Forecasts for Group 1

		Louisiana Statewide	Baton Rouge	Lafayette	Lake Charles	Monroe	New Orleans	Shreveport
		Total	Total	Total	Total	Total	Total	Total
	Water-offshore	74,468,020	25,824,402	20	516,602	0	48,126,996	0
1990	Water-continental	65,771,132	19,667,326	167,858	158,949	955,888	44,807,490	13,621
	Rail	6,283,091	307,930	280	84,164	178,158	5,614,303	98,256
	Truck	678,532	84,055	112,692	8,540	56,906	351,626	64,713
	Air	5	0	0	0	0	5	0
	Total	147,200,780	45,883,713	280,850	768,255	1,190,952	98,900,420	176,590
	Water-offshore	92,571,812	32,102,528	25	642,192	0	59,827,067	0
2000	Water-continental	81,760,639	24,448,616	208,666	197,591	1,188,272	55,700,562	16,932
	Rail	7,810,562	382,790	348	104,625	221,470	6,979,187	122,143
	Truck	843,489	104,489	140,088	10,616	70,740	437,109	80,445
	Air	6	0	0	0	0	6	0
	Total	182,986,508	57,038,423	349,127	955,024	1,480,482	122,943,931	219,520
	Water-offshore	111,414,528	38,636,902	30	772,909	0	72,004,688	0
2010	Water-continental	98,402,773	29,425,059	251,139	237,810	1,430,142	67,038,245	20,379
	Rail	9,400,379	460,706	419	125,921	266,549	8,399,779	147,005
	Truck	1,015,178	125,758	168,603	12,777	85,139	526,081	96,820
	Air	7	0	0	0	0	7	0
	Total	220,232,866	68,648,424	420,191	1,149,416	1,781,830	147,968,801	264,203
	Water-offshore	134,092,624	46,501,328	36	930,232	0	86,661,028	0
2020	Water-continental	118,432,364	35,414,442	302,258	286,215	1,721,243	80,683,680	24,527
	Rail	11,313,798	554,482	504	151,552	320,804	10,109,529	176,927
	Truck	1,221,815	151,356	202,922	15,378	102,469	633,164	116,527
	Air	9	0	0	0	0	9	0
	Total	265,060,610	82,621,607	505,719	1,383,377	2,144,516	178,087,410	317,981

Summary of Cargo Flow and High Forecasts for Group 2

		Louisiana Statewide	Baton Rouge	Lafayette	Lake Charles	Monroe	New Orleans	Shreveport
		Total	Total	Total	Total	Total	Total	Total
	Water-offshore	13,915,793	5,729,054	2,966	92,160	0	8,091,613	0
1990	Water-continental	12,869,521	3,682,019	1,099,631	451,101	12,181	7,365,946	258,643
	Rail	3,629,448	491,390	165,639	117,174	184,498	1,892,435	778,312
	Truck	8,655,091	866,411	729,993	239,504	475,897	5,161,190	1,182,096
	Air	35,421	3,020	0	0	0	23,329	9,072
	Total	39,105,274	10,771,894	1,998,229	899,939	672,576	22,534,513	2,228,123
	Water-offshore	16,149,846	6,648,801	3,442	106,955	0	9,390,647	0
2000	Water-continental	14,935,605	4,273,133	1,276,167	523,521	14,137	8,548,481	300,166
	Rail	4,212,123	570,278	192,231	135,985	214,117	2,196,248	903,263
	Truck	10,044,586	1,005,505	847,187	277,954	552,298	5,989,772	1,371,871
	Air	41,108	3,505	0	0	0	27,074	10,528
	Total	45,383,267	12,501,223	2,319,026	1,044,416	780,552	26,152,222	2,585,828
	Water-offshore	18,331,200	7,546,852	3,907	121,402	0	10,659,039	0
2010	Water-continental	16,952,952	4,850,304	1,448,538	594,233	16,046	9,703,122	340,709
	Rail	4,781,053	647,305	218,195	154,353	243,038	2,492,895	1,025,266
	Truck	11,401,305	1,141,319	961,616	315,497	626,897	6,798,808	1,557,169
	Air	46,660	3,978	0	0	0	30,731	11,950
	Total	51,513,170	14,189,759	2,632,256	1,185,485	885,981	29,684,594	2,935,095
	Water-offshore	20,807,189	8,566,203	4,435	137,800	0	12,098,752	0
2020	Water-continental	19,242,781	5,505,433	1,644,192	674,496	18,213	11,013,719	386,729
	Rail	5,426,828	734,737	247,667	175,201	275,865	2,829,609	1,163,749
	Truck	12,941,276	1,295,476	1,091,501	358,111	711,571	7,717,121	1,767,495
	Air	52,962	4,516	0	0	0	34,882	13,565
	Total	58,471,037	16,106,365	2,987,794	1,345,608	1,005,650	33,694,083	3,331,537

*Water-offshore cargoes include all cargo exported to (outbound) or imported from (inbound) foreign countries, Alaska & Puerto Rico

Summary of Cargo Flow and High Forecasts for Group 3

		Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	13,180,653	3,366,847	0	1,773	0	9,812,033	0
	Water-continental	37,371,184	11,941,379	350	413	0	25,427,636	1,406
	Rail	4,147,517	0	0	2,050,299	0	425,186	1,672,032
	Truck	887,847	1,032	0	0	0	6,815	880,000
	Air	0	0	0	0	0	0	0
	Total	55,587,201	15,309,258	350	2,052,485	0	35,671,670	2,553,438
2000	Water-offshore	19,096,689	4,861,278	0	2,574	0	14,232,837	0
	Water-continental	51,207,530	16,362,568	480	566	0	34,841,991	1,927
	Rail	5,683,098	0	0	2,809,404	0	582,607	2,291,087
	Truck	1,216,564	1,414	0	0	0	9,338	1,205,812
	Air	0	0	0	0	0	0	0
	Total	77,203,882	21,225,260	480	2,812,544	0	49,666,773	3,498,826
2010	Water-offshore	23,043,121	5,862,516	0	3,107	0	17,177,498	0
	Water-continental	66,970,561	21,399,398	627	740	0	45,567,276	2,520
	Rail	7,432,506	0	0	3,674,213	0	761,949	2,996,344
	Truck	1,591,055	1,849	0	0	0	12,213	1,576,993
	Air	0	0	0	0	0	0	0
	Total	99,037,243	27,263,764	627	3,678,060	0	63,518,936	4,575,857
2020	Water-offshore	27,805,464	7,070,202	0	3,751	0	20,731,511	0
	Water-continental	87,585,869	27,986,699	820	968	0	59,594,087	3,295
	Rail	9,720,427	0	0	4,805,232	0	996,497	3,918,698
	Truck	2,080,824	2,419	0	0	0	15,972	2,062,433
	Air	0	0	0	0	0	0	0
	Total	127,192,585	35,059,319	820	4,809,951	0	81,338,068	5,984,426

Summary of Cargo Flow and High Forecasts for Group 4

		Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
1990	Water-offshore	118,756,894	34,575,813	0	18,743,593	0	65,437,488	0
	Water-continental	30,834,293	3,802,000	4,782,841	6,116,449	21,231	15,607,994	503,778
	Rail	61,567	34,685	4,332	672	0	21,786	92
	Truck	42,748	11,858	1,460	5,677	1,589	18,195	3,969
	Air	0	0	0	0	0	0	0
	Total	149,695,502	38,424,356	4,788,633	24,866,391	22,820	81,085,463	507,839
2000	Water-offshore	143,349,959	41,736,328	0	22,625,313	0	78,988,317	0
	Water-continental	28,454,484	3,508,559	4,413,699	5,644,378	19,592	14,403,360	464,896
	Rail	56,815	32,008	3,998	620	0	20,105	85
	Truck	39,449	10,943	1,347	5,239	1,466	16,791	3,663
	Air	0	0	0	0	0	0	0
	Total	171,900,707	45,287,839	4,419,043	28,275,550	21,059	93,428,572	468,644
2010	Water-offshore	168,257,230	48,988,310	0	26,556,618	0	92,712,302	0
	Water-continental	26,577,726	3,277,147	4,122,586	5,272,095	18,300	13,453,365	434,233
	Rail	53,068	29,897	3,734	579	0	18,779	79
	Truck	36,847	10,221	1,258	4,893	1,370	15,683	3,421
	Air	0	0	0	0	0	0	0
	Total	194,924,871	52,305,575	4,127,579	31,834,185	19,670	106,200,129	437,734
2020	Water-offshore	197,492,368	57,500,374	0	31,171,014	0	108,820,979	0
	Water-continental	24,824,753	3,060,998	3,850,675	4,924,366	17,093	12,566,028	405,593
	Rail	49,568	27,925	3,488	541	0	17,540	74
	Truck	34,417	9,547	1,175	4,571	1,279	14,649	3,195
	Air	0	0	0	0	0	0	0
	Total	222,401,105	60,598,844	3,855,338	36,100,492	18,372	121,419,196	408,862

*Water-offshore cargoes include all cargo exported to (outbound) or imported from (inbound) foreign countries, Alaska & Puerto Rico

Summary of Cargo Flow and High Forecasts for Group 5

		Louisiana Statewide	Baton Rouge	Lafayette	Lake Charles	Monroe	New Orleans	Shreveport
		Total	Total	Total	Total	Total	Total	Total
	Water-offshore	3,233,547	951,788	3,593	594,326	0	1,683,840	0
1990	Water-continental	22,370,110	5,742,172	4,583,587	1,040,641	0	10,714,668	289,042
	Rail	4,545,198	379,009	54,016	325,543	177,687	1,446,192	2,162,751
	Truck	21,242,319	2,966,138	2,811,435	2,014,926	2,129,189	7,368,949	3,951,682
	Air	1,061	0	0	0	0	1,061	0
	Total	51,392,235	10,039,107	7,452,631	3,975,436	2,306,876	21,214,710	6,403,475
	Water-offshore	3,432,883	1,010,462	3,814	630,964	0	1,787,642	0
2000	Water-continental	23,749,142	6,096,155	4,866,148	1,104,793	0	11,375,187	306,860
	Rail	4,825,392	402,373	57,346	345,611	188,641	1,535,344	2,296,076
	Truck	22,551,827	3,148,989	2,984,749	2,139,139	2,260,445	7,823,217	4,195,288
	Air	1,126	0	0	0	0	1,126	0
	Total	54,560,371	10,657,980	7,912,057	4,220,506	2,449,086	22,522,516	6,798,225
	Water-offshore	3,612,033	1,063,195	4,014	663,892	0	1,880,933	0
2010	Water-continental	24,988,527	6,414,292	5,120,095	1,162,448	0	11,968,818	322,874
	Rail	5,077,213	423,372	60,339	363,648	198,485	1,615,468	2,415,901
	Truck	23,728,728	3,313,324	3,140,513	2,250,773	2,378,410	8,231,483	4,414,226
	Air	1,185	0	0	0	0	1,185	0
	Total	57,407,686	11,214,183	8,324,960	4,440,760	2,576,895	23,697,888	7,153,000
	Water-offshore	3,800,532	1,118,679	4,223	698,538	0	1,979,092	0
2020	Water-continental	26,292,591	6,749,032	5,387,295	1,223,112	0	12,593,429	339,724
	Rail	5,342,175	445,466	63,487	382,625	208,843	1,699,774	2,541,978
	Truck	24,967,048	3,486,235	3,304,405	2,368,233	2,502,531	8,661,055	4,644,589
	Air	1,247	0	0	0	0	1,247	0
	Total	60,403,593	11,799,412	8,759,411	4,672,508	2,711,375	24,934,598	7,526,291

Summary of Cargo Flow and High Forecasts for Group 6

		Louisiana Statewide	Baton Rouge	Lafayette	Lake Charles	Monroe	New Orleans	Shreveport
		Total	Total	Total	Total	Total	Total	Total
	Water-offshore	9,806,380	2,757,207	7,163	363,686	0	6,678,324	0
1990	Water-continental	20,606,881	11,571,030	2,259,979	1,175,804	19,639	5,574,746	5,683
	Rail	9,303,059	896,427	467,359	858,862	1,268,459	3,915,732	1,896,220
	Truck	24,562,707	2,224,690	2,409,873	1,155,732	3,881,138	11,592,618	3,298,656
	Air	20,959	499	0	0	0	19,094	1,366
	Total	64,299,986	17,449,853	5,144,374	3,554,084	5,169,236	27,780,514	5,201,925
	Water-offshore	11,953,923	3,361,020	8,732	443,331	0	8,140,840	0
2000	Water-continental	25,119,673	14,105,021	2,754,902	1,433,299	23,940	6,795,584	6,928
	Rail	11,340,377	1,092,740	569,708	1,046,948	1,546,244	4,773,255	2,311,482
	Truck	29,941,803	2,711,885	2,937,622	1,408,831	4,731,086	14,131,337	4,021,043
	Air	25,549	608	0	0	0	23,275	1,665
	Total	78,381,324	21,271,273	6,270,963	4,332,409	6,301,270	33,864,292	6,341,118
	Water-offshore	14,148,812	3,978,145	10,335	524,732	0	9,635,599	0
2010	Water-continental	29,731,958	16,694,879	3,260,736	1,696,470	28,335	8,043,338	8,200
	Rail	13,422,612	1,293,380	674,314	1,239,181	1,830,154	5,649,685	2,735,898
	Truck	35,439,491	3,209,821	3,477,006	1,667,510	5,599,772	16,726,026	4,759,357
	Air	30,240	720	0	0	0	27,549	1,971
	Total	92,773,112	25,176,944	7,422,390	5,127,893	7,458,262	40,082,198	7,505,426
	Water-offshore	16,746,710	4,708,582	12,233	621,080	0	11,404,815	0
2020	Water-continental	35,191,116	19,760,266	3,859,448	2,007,963	33,538	9,520,195	9,705
	Rail	15,887,170	1,530,861	798,126	1,466,710	2,166,193	6,687,037	3,238,243
	Truck	41,946,623	3,799,184	4,115,427	1,973,685	6,627,960	19,797,133	5,633,234
	Air	35,792	852	0	0	0	32,608	2,333
	Total	109,807,412	29,799,745	8,785,234	6,069,438	8,827,691	47,441,788	8,883,515

*Water-offshore cargoes include all cargo exported to (outbound) or imported from (inbound) foreign countries, Alaska & Puerto Rico

Summary of Cargo Flow and High Forecasts for Group 7

		Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
	Water-offshore	835,527	64,027	0	369,302	0	402,198	0
1990	Water-continental	1,996,282	156,703	43	323	1,411,392	427,819	2
	Rail	6,333,578	1,780,875	88,607	347,223	1,129,070	962,241	2,025,562
	Truck	27,591,849	6,166,320	662,481	1,400,914	4,894,660	5,830,838	8,636,636
	Air	59	0	0	0	0	59	0
	Total	36,757,295	8,167,925	751,131	2,117,762	7,435,122	7,623,155	10,662,200
	Water-offshore	969,663	74,306	0	428,590	0	466,767	0
2000	Water-continental	2,316,767	181,860	50	375	1,637,978	496,501	2
	Rail	7,350,376	2,066,778	102,832	402,966	1,310,332	1,116,720	2,350,747
	Truck	32,021,467	7,156,266	768,836	1,625,818	5,680,453	6,766,926	10,023,169
	Air	68	0	0	0	0	68	0
	Total	42,658,341	9,479,210	871,718	2,457,749	8,628,763	8,846,983	12,373,918
	Water-offshore	1,100,635	84,342	0	486,480	0	529,813	0
2010	Water-continental	2,629,692	206,424	57	425	1,859,219	563,564	3
	Rail	8,343,189	2,345,937	116,722	457,395	1,487,318	1,267,555	2,668,262
	Truck	36,346,596	8,122,861	872,683	1,845,417	6,447,710	7,680,932	11,376,995
	Air	78	0	0	0	0	78	0
	Total	48,420,190	10,759,564	989,461	2,789,717	9,794,247	10,041,942	14,045,259
	Water-offshore	1,249,298	95,735	0	552,188	0	601,375	0
2020	Water-continental	2,984,883	234,306	64	483	2,110,343	639,684	3
	Rail	9,470,100	2,662,802	132,487	519,175	1,688,209	1,438,763	3,028,663
	Truck	41,255,919	9,220,013	990,556	2,094,676	7,318,600	8,718,393	12,913,682
	Air	88	0	0	0	0	88	0
	Total	54,960,288	12,212,855	1,123,107	3,166,523	11,117,152	11,398,303	15,942,348

Summary of Cargo Flow and High Forecasts for Group 8

		Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
	Water-offshore	2,964,690	2,211,323	0	9,391	0	743,976	0
1990	Water-continental	6,809,386	3,548,596	4,552	27,269	0	3,227,998	971
	Rail	976,890	390,002	26,969	260,067	47,228	165,014	87,610
	Truck	2,986,564	1,314,119	142,216	288,807	198,803	824,304	218,315
	Air	880	137	0	0	0	595	148
	Total	13,738,410	7,464,177	173,737	585,534	246,031	4,961,887	307,044
	Water-offshore	3,984,295	2,971,833	0	12,621	0	999,842	0
2000	Water-continental	9,151,245	4,769,016	6,118	36,647	0	4,338,159	1,305
	Rail	1,312,858	524,130	36,244	349,508	63,470	221,765	117,741
	Truck	4,013,692	1,766,066	191,126	388,132	267,175	1,107,796	293,397
	Air	1,183	184	0	0	0	800	199
	Total	18,463,274	10,031,230	233,488	786,909	330,645	6,668,361	412,641
	Water-offshore	5,125,169	3,822,796	0	16,235	0	1,286,139	0
2010	Water-continental	11,771,637	6,134,589	7,869	47,141	0	5,580,359	1,679
	Rail	1,688,786	674,211	46,622	449,587	81,645	285,266	151,455
	Truck	5,162,983	2,271,766	245,854	499,271	343,678	1,425,005	377,409
	Air	1,521	237	0	0	0	1,029	256
	Total	23,750,096	12,903,598	300,346	1,012,234	425,323	8,577,797	530,798
	Water-offshore	6,592,723	4,917,425	0	20,883	0	1,654,415	0
2020	Water-continental	15,142,357	7,891,183	10,123	60,639	0	7,178,254	2,159
	Rail	2,172,357	867,266	59,972	578,323	105,023	366,950	194,823
	Truck	6,641,365	2,922,269	316,253	642,234	442,088	1,833,044	485,478
	Air	1,957	305	0	0	0	1,323	329
	Total	30,550,760	16,598,448	386,347	1,302,080	547,111	11,033,986	682,788

*Water-offshore cargoes include all cargo exported to (outbound) or imported from (inbound) foreign countries, Alaska & Puerto Rico

Summary of Cargo Flow and High Forecasts for Group 9

		Louisiana Statewide	Baton Rouge	Lafayette	Lake Charles	Monroe	New Orleans	Shreveport
		Total	Total	Total	Total	Total	Total	Total
	Water-offshore	4,508,493	1,783,759	663	612,771	0	2,111,300	0
1990	Water-continental	19,577,047	9,082,560	548,707	1,344,675	19,927	8,546,028	35,150
	Rail	22,076,911	10,487,243	539,985	4,544,654	579,604	4,912,286	1,013,139
	Truck	13,643,014	4,040,550	689,785	2,065,595	495,249	5,362,478	989,357
	Air	6,840	2,079	219	0	0	3,582	960
	Total	59,812,305	25,396,191	1,779,359	8,567,695	1,094,780	20,935,674	2,038,606
	Water-offshore	5,827,805	2,305,737	857	792,085	0	2,729,126	0
2000	Water-continental	25,305,842	11,740,373	709,274	1,738,165	25,758	11,046,836	45,436
	Rail	28,537,237	13,556,105	698,000	5,874,548	749,212	6,349,759	1,309,612
	Truck	17,635,344	5,222,929	891,636	2,670,046	640,173	6,931,690	1,278,871
	Air	8,842	2,687	283	0	0	4,630	1,241
	Total	77,315,069	32,827,831	2,300,050	11,074,844	1,415,143	27,062,041	2,635,159
	Water-offshore	7,251,684	2,869,087	1,066	985,611	0	3,395,920	0
2010	Water-continental	31,488,696	14,608,841	882,568	2,162,842	32,052	13,745,856	56,537
	Rail	35,509,601	16,868,203	868,539	7,309,847	932,264	7,901,165	1,629,583
	Truck	21,944,102	6,499,022	1,109,484	3,322,406	796,583	8,625,276	1,591,331
	Air	11,002	3,344	352	0	0	5,761	1,544
	Total	96,205,085	40,848,496	2,862,009	13,780,707	1,760,899	33,673,979	3,278,995
	Water-offshore	9,023,453	3,570,077	1,327	1,226,421	0	4,225,629	0
2020	Water-continental	39,182,177	18,178,149	1,098,201	2,691,279	39,883	17,104,315	70,350
	Rail	44,185,490	20,989,530	1,080,745	9,095,827	1,160,039	9,831,618	2,027,731
	Truck	27,305,598	8,086,896	1,380,559	4,134,153	991,208	10,732,648	1,980,133
	Air	13,690	4,161	438	0	0	7,169	1,921
	Total	119,710,408	50,828,812	3,561,270	17,147,680	2,191,130	41,901,379	4,080,136

Summary of Cargo Flow and High Forecasts for Group 10

		Louisiana Statewide	Baton Rouge	Lafayette	Lake Charles	Monroe	New Orleans	Shreveport
		Total	Total	Total	Total	Total	Total	Total
	Water-offshore	16,701,958	4,963,453	0	4,603,295	0	7,135,210	0
1990	Water-continental	78,542,858	16,085,425	5,523,974	4,094,126	448,840	52,105,961	284,532
	Rail	4,388,018	1,263,837	58,519	685,468	18,941	1,674,143	687,110
	Truck	6,907,898	1,438,067	504,887	1,842,600	110,271	2,484,114	527,959
	Air	0	0	0	0	0	0	0
	Total	106,540,732	23,750,782	6,087,380	11,225,489	578,052	63,399,428	1,499,601
	Water-offshore	20,526,043	6,953,881	0	5,347,417	0	8,224,745	0
2000	Water-continental	72,480,874	14,843,942	5,097,630	3,778,139	414,198	48,084,392	262,572
	Rail	4,049,348	1,166,293	54,002	632,563	17,479	1,544,932	634,078
	Truck	6,374,742	1,327,076	465,920	1,700,387	101,760	2,292,389	487,211
	Air	0	0	0	0	0	0	0
	Total	103,431,008	24,291,192	5,617,552	11,458,506	533,438	60,146,458	1,383,861
	Water-offshore	25,743,434	9,545,566	0	6,407,634	0	9,790,234	0
2010	Water-continental	67,700,290	13,864,888	4,761,409	3,528,946	386,879	44,912,915	245,253
	Rail	3,782,267	1,089,369	50,441	590,842	16,326	1,443,033	592,257
	Truck	5,954,287	1,239,547	435,189	1,588,235	95,048	2,141,191	455,076
	Air	0	0	0	0	0	0	0
	Total	103,180,278	25,739,370	5,247,038	12,115,657	498,254	58,287,373	1,292,586
	Water-offshore	33,610,052	13,355,816	0	8,041,538	0	12,212,697	0
2020	Water-continental	63,235,017	12,950,409	4,447,363	3,296,189	361,362	41,950,617	229,077
	Rail	3,532,802	1,017,518	47,114	551,872	15,249	1,347,856	553,194
	Truck	5,561,563	1,157,791	406,486	1,483,481	88,779	1,999,965	425,061
	Air	0	0	0	0	0	0	0
	Total	105,939,434	28,481,534	4,900,962	13,373,080	465,391	57,511,135	1,207,332

*Water-offshore cargoes include all cargo exported to (outbound) or imported from (inbound) foreign countries, Alaska & Puerto Rico

Summary of Cargo Flow and High Forecasts for Group 11

		Louisiana Statewide Total	Baton Rouge Total	Lafayette Total	Lake Charles Total	Monroe Total	New Orleans Total	Shreveport Total
	Water-offshore	0	0	0	0	0	0	0
1990	Water-continental	4,412,524	0	1,300,696	378,983	0	2,732,845	0
	Rail	5,354,441	21,729	199	32,042	190	5,237,564	62,717
	Truck	0	0	0	0	0	0	0
	Air	0	0	0	0	0	0	0
	Total	9,766,965	21,729	1,300,895	411,025	190	7,970,409	62,717
	Water-offshore	0	0	0	0	0	0	0
2000	Water-continental	6,951,514	0	2,049,123	597,052	0	4,305,339	0
	Rail	8,435,415	34,232	314	50,479	299	8,251,287	98,805
	Truck	0	0	0	0	0	0	0
	Air	0	0	0	0	0	0	0
	Total	15,386,929	34,232	2,049,437	647,531	299	12,556,625	98,805
	Water-offshore	0	0	0	0	0	0	0
2010	Water-continental	8,747,762	0	2,578,610	751,328	0	5,417,824	0
	Rail	10,615,098	43,077	395	63,523	377	10,383,391	124,335
	Truck	0	0	0	0	0	0	0
	Air	0	0	0	0	0	0	0
	Total	19,362,859	43,077	2,579,005	814,851	377	15,801,214	124,335
	Water-offshore	0	0	0	0	0	0	0
2020	Water-continental	11,008,153	0	3,244,914	945,469	0	6,817,771	0
	Rail	13,358,003	54,208	496	79,937	474	13,066,424	156,463
	Truck	0	0	0	0	0	0	0
	Air	0	0	0	0	0	0	0
	Total	24,366,156	54,208	3,245,411	1,025,405	474	19,884,194	156,463

APPENDIX 6

SUMMARY OF MAIN COAL AND GRAIN FACILITIES / CAPACITY CALCULATION TABLES

Summary of Louisiana's Main Coal Handling Facilities
Capacity Calculation of Louisiana's Main Coal Handling Facilities
Capacity Calculation of Floating Coal Terminals
Summary of Louisiana's Grain Elevators
Capacity Calculation of Louisiana's Main Land-Based Grain Elevators
Summary of Louisiana's Floating Grain Elevators
Capacity Calculation of a Typical Mid-Size Floating Grain Elevators
Capacity Calculation of Louisiana's General Cargo Terminals
Capacity Calculation of Louisiana's Intermodal Yards

Summary of Louisiana's Main Coal Handling Facilities

OPERATOR & LOCATION	BERTHING SPACE (FT)	DEPTH ALONGSIDE (FT)	HANDLING EQUIPMENT TYPE/RATE (TONS/HOUR)	STORAGE CAPACITY
NEW ORLEANS				
Electro-Coal Transfer, a TECO Energy Co. Mile 55.2 AHP	1,164	50	Two surge bin spouts (2,000); 4 cranes (750-1,500); conveyor system.	Direct transfer.
	1,620	55 - 70	Shiploader; conveyor system (6,000).	4,400,000 tons (open)
	1,200	12 - 20	Bucket unloader; conveyor system (6,000).	(See above reference)
	1,250	12	Bucket unloader; conveyor system (5,500).	(See above reference)
International Marine Terminals (IMT) Mile 57 AHP	1,271 & 600	46	Crane with 16-cubic yard bucket; conveyor (400).	Direct transfer.
	1,271	40 + 40	Bucket elevator; conveyor system (1,500).	750,000 tons (open).
	1,044+	46 - 40	Shiploader; conveyor system (7,000).	(See above reference)
	900	40	Floating crane with 28-cu.yd. bucket and floating elevator with belt conveyor system and loading spout (1,200).	Direct transfer.
St. James Stevedoring Co., Inc. Mile 167.3 AHP	865	50	6 floating cranes with 3 to 21-cu.yd. buckets (200-600)	Direct transfer.
BATON ROUGE				
Burnside Terminal, a division of Ormet Corp. Mile 169.5 AHP (Multi-bulk terminal)	1,000+ 695	40 & 15	2 unloading towers with 5- to 12-cu.yd. buckets (1,000); conveyor system and loading spout (1,500).	200,000 tons (bldg.) 225,000 tons (open)
	275	12	Conveyor system and 8 loading spouts (1,500).	30,000 tons (3 silos).
	900	50	Floating cranes with 6- to 20-cu.yd. buckets.	Direct transfer.
L&L Fleeting, Inc. Miles 171-180 AHP	1,300+ 1,300	45 & 40	Six floating cranes with 16- to 32-cu.yd. buckets.	Direct transfer.

Source: U.S. Army Corps of Engineers Port Series No. 20 (1990), No. 20A (1991), and No. 21 (1990).

Capacity Calculation of Louisiana's Main Coal Terminals

Name of Terminal	Unit	TECO	IMT	Ormet	Total
Vessel Loading:	Unit				
Export					
Vessel Loads	Tons	80,000	80,000	65,000	
Nominal Hourly Rate	Tons/Hour	6,000	6,000	1,500	
Effective Hourly Rate	Tons/Hour	2,100	2,100	1,000	
Effective Daily Throughput	Tons/Day	50,400	50,400	24,000	
Vessel Loading Time	Days	1.59	1.59	2.71	
Vessel Preparation Time	Days	0.33	0.33	0.33	
Vessel Berth Time	Days	1.92	1.92	3.04	
Inter-Vessel Time Coefficient	Days	0.33	0.33	0.33	
Inter-Vessel Time	Days	0.63	0.63	1.00	
Vessel Cycle Time	Days	2.88	2.88	4.37	
Berth Utilization		0.55	0.55	0.62	
Number of Berths		2.00	1.00	1.00	
Utilization Multiplier		1.10	1.00	1.00	
Effective Utilization		0.61	0.55	0.62	
Effective WorkingTime	Days/Year	221	201	226	
Annual Capacity of Loader	Tons/Year	11,137,305	10,124,823	5,422,890	26,685,018
Domestic					
Stationary Loader					
Vessel Loads	Tons	30,000	30,000		
Nominal Capacity	Tons/Hour	6,000	6,000		
Effective Capacity	Tons/Hour	2,000	1,700		
Effective Daily Throughput	Tons/Day	48,000	40,800		
Vessel Loading Time	Days	0.63	0.74		
Vessel Preparation Time	Days	0.20	0.20		
Vessel Berth Time	Days	0.83	0.94		
Inter-Vessel Time Coefficient		0.33	0.33		
Inter-Vessel Time	Days	0.27	0.31		
Vessel Cycle Time	Days	1.43	1.57		
Berth Utilization		0.44	0.47		
Number of Berths		2.00	1.00		
Utilization Multiplier		1.10	1.00		
Effective Utilization		0.53	0.47		
Effective Time	Days/Year	160	171		
Annual Capacity	Tons/Year	7,672,097	6,957,058		14,629,155
Annual Capacity of all Loaders	**Tons/Year**	**18,809,402**	**17,081,881**	**5,422,890**	**41,314,173**
Barge Unloading:					
Barge Load	Tons	1,500	1,500	1,500	
Nominal Rate	Tons/Hour	5,000	5,000	1,000	
Vessel Loading Time	Tons/Hour	1,800	1,700	600	
Effective Daily Throughput	Tons/Day	43,200	40,800	14,400	
Barge Loading Time	Hours	0.42	0.44	1.25	
Barge Preparation Time	Hours	0.00	0.00	0.00	
Inter-Barge Time	Hours	0.10	0.10	0.10	
Barge Cycle Time	Hours	0.52	0.54	1.35	
Berth Utilization		0.81	0.82	0.93	
Number of Unloaders		2.00	1.00	1.00	
Effective Available Time	Days/Year	581	293	333	
Time Lost for Vessels		155	0	158	
		426	293	175	
Annual Capacity of Unloaders	**Tons/Year**	**18,401,488**	**11,973,913**	**2,522,386**	**32,897,787**
Storage:					
Nominal Holding Capacity	Tons	5,000,000	1,350,000	475,000	
Modifier for Operating Space		0.80	0.80	0.80	
Effective Holding Capacity	Tons	4,000,000	1,080,000	380,000	
Average Dwell Time	Days	30	30	30	
Peak Factor		1.3	1.3	1.3	
Annual Capacity of Storage (indirect)	Tons/Year	37,435,897	10,107,692	3,556,410	
Direct Transfer Multiplier		1.25	1.25	1.25	
Annual Capacity of Storage (dir. & Indir.)	**Tons/Year**	**46,794,872**	**12,634,615**	**4,445,513**	**63,875,000**
Annual Terminal Capacity	**Tons/Year**	**18,401,488**	**11,973,913**	**2,522,386**	**32,897,787**

Capacity Calculation of Floating Coal Terminals

Name of Terminal		Floating Crane
Vessel Loading:	Unit	
Vessel Loads	Tons	50,000
Nominal Hourly Rate	Tons/Hour	1,000
Effective Hourly Rate	Tons/Hour	500
Effective Daily Throughput	Tons/Day	12,000
Vessel Loading Time	Days	4.17
Vessel Preparation Time	Days	0.5
Vessel Berth Time	Days	4.67
Inter-Vessel Time Coefficient	Days	0.5
Inter-Vessel Time	Days	2.33
Vessel Cycle Time	Days	7.5
Effective Utilization		0.56
Effective WorkingTime	Days/Year	200
Annual Capacity of Loader	Tons/Year	2,400,000

Summary of Louisiana's Grain Elevators

OPERATOR & LOCATION	BERTH LENGTH (FT)	DEPTH ALONG-SIDE (FT)	BARGE UNLOADING EQUIPMENT (BUSHELS/HR)	VESSEL LOADING EQUIPMENT (BUSHELS/HR)	STORAGE CAPACITY (BUSHELS)	REMARKS
NEW ORLEANS						
MFP Myrtle Grove Mile 61.8 AHP	790 (vessels) 1,020 (barges)	40 (vessels) 20 (barges)	Steel tower spanning barge slipway at rear of face is equipped with a 26-foot marine leg (50,000).	Four fixed, electric, revolving conveyor boom shiploader (50,000).	6,000,000	A 60-inch electric belt conveyor serves vessel loading spouts; a 54-inch reversible belt serves barge facility.
Continental Westwego Mile 103.1 AHP	1,837 (vessels) 720 + 1,800 (barges)	40 (vessels) 17 & 12 (barges)	One continuous bucket unloader (70,000). One catenary bucket unloader (60,000).	6 spouts (100,000 each berth).	3,388,000	Barge-loading spout is served by one of the ship-loading spouts. Several 42-54-inch conveyors serve loading spouts. One 54-inch conveyor serves each barge unloader.
ADM/Growmark Ama Mile 117.7 AHP	1,000 (vessels) 600 (barges)	50 (vessels) 40 (barges)	One bucket elevator marine leg on bridge over barge slip (50,000).	Four spouts, each mounted on conveyor boom (60,000).	5,250,000	Two 60-inch belt conveyors serve loading booms and one serves marine leg.
Bunge Corp. Destrehan Mile 120 AHP	1,000 (vessels) 1,000 + 200 (barges)	42 (vessels) 9 (barges)	One unitized 4-bucket elevator marine leg on bridge over barge slip (30,000). One standard bucket elevator marine leg (7,000).	Eight spouts (60,000 average).	6,513,000 (grain) 1,060,000 (meal)	Two 54-inch electric belt conveyors serve loading spouts; one 54- and one 42-inch belts serve the larger and smaller marine legs.
ADM/Growmark Destrehan Mile 120.5 AHP	1,000 (vessels) 700 (barges)	40 (vessels) 30 (barges)	One bucket elevator marine leg on bridge over barge slip (50,000).	Seven spouts (60,000 average).	5,000,000	Two 42-inch belt conveyors serve loading spouts and one 66-inch belt serves the marine leg.
ADM/Growmark Reserve Mile 139.2 AHP	1,000 (vessels) 800 (barges)	50 (vessels) 15 (barges)	One unitized 3-bucket elevator marine leg on bridge over barge slip (50,000).	Three spouts, each mounted on conveyor boom (85,000 average).	4,000,000	Two 48-inch electric belt conveyors serve loading booms; and one 48-inch belt as well as bottom of one shipping belt serves marine leg.
Cargill Reserve Mile 139.6 AHP	1,700 (vessels) 1,450 (barges)	39 (vessels) 12-18 (barges)	Two bucket elevator marine legs on bridge over barge slip (180,000).	Four traveling gantry, conveyor boom loaders (100,000 average).	6,800,000	Two 66-inch electric belt conveyors serve shiploaders and two 72/66-inch belt conveyors serve marine leg.
MFP Paulina Mile 150.5 AHP	900	45 (vessels) 20 (barges)	One unitized 4-bucket elevator marine leg on bridge over barge slip (60,000).	Two traveling gantry, conveyor boom loaders; one spout (70,000).	2,000,000	One 60-inch electric belt conveyor serves shiploaders and one 60-inch belt serves marine leg.
BATON ROUGE						
Zen-Noh Convent Mile 163.8 AHP	1,200 (vessels) 1,480 (barges)	50 (vessels) 35 (barges)	One bucket elevator marine leg on bridge over barge slip (100,000 max.).	Four spouts, each mounted on pneumatic booms (120,000 max.).	3,870,000	Two 54-inch belt conveyors serve loading booms and one 66-inch belt serves marine leg.
Cargill Port Allen Mile 228.9 AHP	600	40	Two marine legs at rear of face (30,000).	Five spouts (60,000).	7,500,000	Loading spouts served by 52-inch electric belt conveyor; one 36-inch electric belt conveyor system serves marine leg.

Source: U.S. Army Corps of Engineers Port Series No. 20 (1990), No. 20A (1991), and No. 21 (1990).

Summary of Louisiana's Floating Grain Elevators

OPERATOR & LOCATION	FACILITY NAME	LENGTH (FT)	WIDTH (FT)	DRAFT UNDER LOAD (FT)	TRANSFER RATE (TONS/HR)	REMARKS
NEW ORLEANS						
Cargill, Inc. Convent Mile 157.9 AHP	K - 2	330	75	8	1,000	Marine leg, 54-inch belt conveyor boom, and loading spout with 75-foot reach.
Delta Bulk Terminal, Inc. Convent Mile 158.6 AHP	Delta Conveyor	523	68	25	700	Two straight-line cranes with 20 cu. yd. buckets, 54-inch belt conveyor, revolving conveyor boom, and loading spout with 70-foot reach.
Total Transportation, Inc. Destrehan Mile 121 AHP	Gemini	200	70	6	750	Two revolving cranes with 9 cu. yd. buckets, 25-inch belt conveyor boom, and loading spout with 78-foot reach.
BATON ROUGE						
L & L Fleeting, Inc. Darrow Miles 171-180 AHP	Margaret "G"	250	58	12	300	Two revolving cranes with 10 cu. yd. buckets, 36-inch belt conveyor, and loading spout.
	America	230	120	3	800	Overhead crane with 50 cu. yd. bucket, 36-inch conveyors and traveling loading spout on boom with 80-foot reach.
	LST*	327	50	12	500	One revolving crane with 15 cu. yd. bucket, 36-inch belt conveyor, conveyor boom, and loading chute with 90-foot reach.
	R.G. 1	120	50	11	350	One revolving crane with 16 cu. yd. bucket, 36-inch elevator conveyor, and loading spout.

Source: U.S. Army Corps of Engineers Port Series No. 20 (1990), No. 20A (1991), and No. 21 (1990).

*Inactive, as reported by the operator on November, 1994.

Capacity Calculation of a Typical Mid-Size Floating Grain Terminals

	Unit	Value
Vessel Loading:		
Vessel Load	Tons	30,000
Nominal Transfer Rate per Berth	Tons/Hour	600
Rate Modifier		70%
Effective Transfer Rate	Tons/Hour	420
Effective Daily Throughput	Tons/Day	10,080
Vessel Loading Time	Days	2.98
Vessel Preparation Time	Days	0.20
Vessel Berth Time	Days	3.18
Inter-Vessel Time Coefficient		0.30
Inter-Vessel Time	Days	0.95
Vessel Cycle Time	Days	4.13
Berth Utilization		0.72
Number of Berths		1.00
Utilization Multiplier		1.00
Effective Utilization		0.72
Effective WorkingTime	Days/Year	263
Annual Capacity of Loader	Tons/Year	2,651,943

APPENDIX 7

CASE STUDIES OF MARINE AND RAIL HIGHWAY INTERMODAL TERMINAL ACCESS

1. OBJECTIVES

Public port access issues and problems were addressed through a series of "case studies". The case study approach was used to identify the existence of unique institutional characteristics that apply to particular ports and terminals as well as common access related circumstances from which generalizations could be made. Rail and highway accesses were reviewed for three deep draft public ports and for the emerging shallow draft port at Shreveport. The problems and issues at each location relative to rail and truck access will be presented in the following subsections.

2. BATON ROUGE

Truck access to the port via arterial highways is among the best of all public port facilities statewide. The port has direct access to Interstate 10 and LA-1. The primary truck access problem is within the port itself relative to the width and condition of the short port access road between I-10 and LA-1 and the major transshipment facilities in the deep water complex. It appears that without some external assistance the port will be unable to achieve any improvements to the slow speed route that serves approximately 50,000 loaded vehicles per year (port transshipment only).

Direct rail access to the port is via the Union Pacific Railroad (UP). Historically the port was served directly by its own rail link that connected with three linehaul railroads which evolved into the current IC, KCS and UP systems. The port owned and maintained its own direct rail connection between West Bridge Junction, approximately 5 miles north of the port and one mile south of Lobdell Junction, to the main facilities adjacent to North Canal Road. At West Bridge Junction the port trackage was accessed directly by the KCS and IC as well as the UP. Each carrier shared the port tenant trackage operation, including switching duties, alternating on an annual basis.

Approximately twenty years ago the port entered into an agreement with MP, the predecessor of UP, to perform all the port switching continually with reciprocal switching privileges extended to the other two connecting railroads, KCS and IC. The KCS and IC would have access by MP (UP) switching to the port via receiving and holding tracks at West Bridge Junction. It was agreed that MP would reimburse the port for all maintenance (labor) expended on the deep water rail infrastructure other than leased facilities to tenants, as well as supply needed track materials. Subsequently, the port removed its own trackage that extended to West Bridge Junction paralleling the MP line along the west side of LA-1 to North Canal Road. A small five track receiving and storage yard was retained at West Bridge Junction that is owned and maintained by the port.

Almost no trace of the port trackage that paralleled the UP (MP) along LA-1 is discernible today. However, the port still owns and maintains trackage at West Bridge Junction used for receipt of cars from connecting railroads. UP is the sole service provider connecting the port with the IC and KCS. The service pattern is for UP to operate a "river job" (local train) that performs interchanges with the IC in Baton Rouge and handles all IC port traffic across the Mississippi River bridge to West Bridge Junction. UP also handles any KCS Louisiana intrastate traffic from Baton Rouge to the port via the Mississippi River bridge in the same manner as IC traffic. Interstate KCS traffic from the west is delivered by this carrier to West Bridge Junction via Lobdell Junction connection with the UP on the west bank.

The primary rail access issue affecting the port has been the consistency and quality of the level of switching service received from UP. The port has maintained that rail switching services as performed by UP have been slow and inconsistent. Currently the port is switched once per day five days a week. Switching service problems, characterized by missed days, delays or missed cars, can affect operations at facilities that depend on regular daily rail service. The port indicates that service improvements have been spasmodic and reoccurring failures require constant monitoring to avoid out of control situations.

Attempts to negotiate an agreement with UP wherein the port would assume responsibility for its own switching, including leasehold tenants at the Deepwater complex, have not been successful. While the port is concerned about the lack of consistency of UP switching it is also constrained by apparent inability to reach a settlement with UP which would sufficiently compensate the port for the costs of performing its own local switching. Moreover, although the port does not maintain any records of carloads handled via its facilities and that of tenants, it appears that annual rail cars handled in the entire Deepwater complex have declined from about 8,000 to close to 5,000.

The continued operation and volume of rail grain movements through the port will be a major determinant of the future demand for rail car switching at this location. The feasibility of independent switching operations at the port would appear to be a function of the extent to which the port would be able to control the consistency of service. The most limited scope of port operation relative to enhancing service quality would be to have the port only provide switching services within the deep water terminal complex with no direct access to West Bridge Junction via the UP. The port would still be dependent on UP for all connecting deliveries between West Bridge Junction and the deep water complex. The timing of switching within the port complex would be directly controlled by the port but car supply from connections would remain under the discretion of the UP.

The most desirable extent of port rail switching from an operations service perspective would be to have trackage rights via the UP to the West Bridge Junction to pickup and place cars for connection with all three railroads. In effect the port would be using the UP track along LA 1 in lieu of its former trackage in this same location. The storage yard adjacent to the port could still be used for overflow and as a holding area for loaded and empty equipment on order.

A direct port connection with West Bridge Junction via trackage rights on the UP would only be useful to receive and deliver west bound cars for the KCS. Under current operations east bound cars to and beyond Baton Rouge would still be handled by the UP "river job" across the Mississippi River bridge on behalf of the KCS and IC. Therefore, to fully enhance port rail connections operations would have to be contemplated across the Mississippi River bridge that is owned by the state. Alternatively, the KCS could conceivably be able to handle cars across the bridge for eastern connections.

The cost for an independent switching service is primarily fixed related to locomotive rental or ownership and maintenance plus crewing with supervision and overhead. It is estimated that a service package could be developed for about $250,000 per year, excluding insurance and existing track maintenance and running fees across the UP or the Mississippi River bridge. This would require approximately $50 a carload switching allowance from UP for the port to breakeven not including current reimbursement and track materials received from UP for track maintenance. The full costs to staff and operate all functions, embracing switching and track maintenance, would be close to $400,000, excluding train operations insurance. The average total cost per carload would be $80 for 5000 carloads and less than $50 for 8000 carloads per year.

The success of a port switching services venture is predicated on several interrelated factors each of which requires quantification: (1) volume and characteristics of carloads to be handled at the marine terminals at the port and other facilities within the port complex requiring rail service, relative to multiple car switching such as grain or single car spotting such as general cargo wharves; (2) possible application of the service beyond the immediate port property to adjacent locations to both sustain the port concept such as connections with the KCS (westbound) via West Bridge Junction and/or with the KCS (eastbound) and IC via the Mississippi River bridge, as well as possibly serving other non-port industries; (3) response of current port rail service users to service improvements in terms of increased carload volume; and (4) use of the switching service to promote enhanced industrial development of the port property or adjacent areas, depending on the extent of the services provided within and beyond the deep water port complex.

The most important determinant of service feasibility is the volume of traffic to be handled and the perceived benefits to UP in terms of operational savings relative to crews and engine hours. If the savings to UP from eliminating switching service at the port or between West Bridge Junction and the port are negligible relative to crew and engine assignments little incentive exists for UP to allow any real or perceived encroachment on its franchise at these locations. However, if UP could achieve reduced crew starts or engine assignments a firm basis for the port to negotiate a switching car allowance and possibly trackage rights to West Bridge Junction would exist. Unless UP has real tangible savings from reduced service commitments (port switching) the concept will depend on individual leverage that port users might have with UP relative to their willingness to pay for the service.

3. SHREVEPORT

3.a Riverport

Highway access to the emerging barge port on the Red River is via LA-1 approximately five miles south the junction of the temporary terminus of the Inner Loop, LA-3132, at LA-1. The Inner

Loop is planned to extend beyond its terminus with the Industrial Loop, LA-526, toward a direct connection with LA-1 which if completed would possibly provide a continuous expressway link to the port from I-49 as well as I-20. Until a bypass is provided for the eastern portion of the city, all port access will be by LA-1 and local connections to I-20 and I-49. Port connections to I-20 involve several routes, all requiring the use of LA 1 north of its junction with LA-3132. Average daily traffic (ADT) for LA-1 north of LA-3132 was reported by DOTD to be 25,064. Generalized capacity estimates for this four lane divided urban highway are 27,000 (refer to Table VI.5), indicating congestion on this link to I-20.

Connections to the port from I-49 South involve LA-3132 to LA-1 via LA-526. Traffic counts on LA-3132 are reported by DOTD to be 8,970 between I-49 to LA-526 and 22,019 from LA-526 to LA-1. The latter segment is a four lane divided highway which would have an ADT to capacity ratio of approximately 0.80, indicating congestion in peak periods. Highway traffic coming to the port from I-49 North can use LA-175 which is a very low volume two lane rural road with several speed restricted areas. Traffic statistics for LA-175 indicate 855 ADT for the segment between I-49 and LA-1, indicating that this is primarily a rural access road. It seems likely that heavy vehicles requiring access to the port from I-49 North will use LA-3132 to LA-526 to LA-1. Unless improved the LA-175 connection appears to offer little time savings for heavy vehicles compared to longer but superior roads.

Railway access to the port is via a UP secondary line that begins at Marshall, Texas and runs to Livonia. The segment from Shreveport to Alexandria has about 4 million gross tons of traffic per mile per year in each direction. This would be about two trains a day in each direction. No other railroads have direct access to the port except via the UP. The port is not in the switching limits of Shreveport which means that all traffic handled by rail to the port is captive to the UP. Connecting railroads would have to establish joint rates to serve the port via the UP or pay the UP a local linehaul rate to handle traffic from Shreveport or other on line connections to the port. The UP will probably require a linehaul rate in the vicinity of $200 to $400 per carload on noncompetitive traffic for the connecting railroads, KCS and SP, at Shreveport. Unless unusual competitive situations prevail, most rail traffic for the port will likely be handled exclusively by UP. There will be comparatively little opportunity for KCS, based on expected length of haul relative to the likely level of linehaul connection charge levied by UP, and less opportunity for SP participation based on its generally perceived similar route structure with UP and the competitive rivalry between these two major systems.

Opportunities to improve railway access for the port are premature given the lack of any appreciable volume at this time. If and when sufficient rail volume via KCS or SP existed that was not UP competitive the port should pursue opportunities to have the UP open the port property to reciprocal switching. However, it is not clear that the UP would have any incentive to do so unless there were perceived offsetting benefits to UP obtaining similar privileges via KCS and SP at other Shreveport locations not served by UP.

3.b Rail Highway Intermodal Terminals

Shreveport has been served by two rail intermodal facilities (refer to Table VI.4). Historically, Shreveport had rail-highway intermodal service from KCS which operated circus style equipment handling consisting of truck access bulkheads to drive trailers on and off rail intermodal flat cars. Similar services were provided at Texarkana and Alexandria until early 1994 and also at Lake Charles. The limited nature of the KCS system until recently meant that it has been a low volume operator of rail intermodal service. Most on line locations other than Kansas City and New Orleans before 1994, such as Shreveport, were low volume ramps operating without mechanized loading equipment. The KCS Shreveport ramp was reported to be generating about 6,000 loads per year in 1994. The unimproved facility occupies approximately five acres with sufficient track capacity to transfer 36 containers via circus style on and off loading.

The other rail highway intermodal facility at Shreveport is currently operated by the Caddo Bossier Parishes Port Commission (CBPC). The facility is on the site adjacent to a former large American Telephone and Telegraph (AT&T) facility which formerly employed as many as 15,000 persons but has since been almost closed. The facility was acquired with a $2.5 million dollar Louisiana Capital Outlay for an Intermodal Container Handling Freight Facility (ICHFF) matched with a $1 million U.S. Department of Commerce/EDA grant to purchase 10 acres and equipment. The ICHFF consists of a single track, 2640 feet in length that parallels the SP main line to Houston. The facility has a side loader. PTL was initially engaged as a contractor to operate the facility in 1990. However, for several reasons PTL did not continue in this relationship and was subsequently succeeded by CBPC in 1991. Volume has grown from near zero following the cessation of PTL operations in 1991 to about 3,500 units per year in 1994. All efforts to promote access by other railroads, KCS and UP, to the facility were unsuccessful.
Rail highway intermodal service has not achieved appreciable volumes at Shreveport for several reasons. The primary reason is that the high fixed costs of rail highway intermodal terminal operations and equipment dictates that modern hub and spoke transfer facilities have much larger volume than what was handled under the "circus style" ramp facilities. The circus style low capital intensity ramps have all but disappeared due to the consolidation of rail highway terminals near large centers of activity. For example in 1994 "circus ramps" were closed at Alexandria and Lake Charles. Other low volume ramps at Texarkana and Marshall have also been closed. The threshold for sustaining these terminals is usually several times what can be currently generated by the local economies.

Of the three linehaul railroads serving Shreveport, only the KCS has a local orientation with respect to its north-south route structure and historical pattern of operations that center on the Deramus Yard facility at Shreveport. The other two systems serving Shreveport, UP and SP, both have an east west orientation with major intermodal facilities at Dallas, approximately 173 rail miles (via UP) from Shreveport. Towards the east both UP and SP have intermodal facilities near New Orleans at Avondale on the west bank of the Mississippi River. Consequently, Shreveport is not well situated to be served by dedicated rail intermodal trains by either SP or UP.

Only KCS is potentially in an operating posture to service Shreveport as part of a dedicated intermodal service between New Orleans and Kansas City. Moreover, the acquisition of trackage rights to Dallas, including service to an intermodal facility at Garland, Texas, and subsequent network expansion east of Shreveport via MidSouth to Meridian, Mississippi has transformed Deramus Yard into the operating hub of a north-south and east-west KCS railroad. It is through this operating center at Shreveport, that KCS has inaugurated dedicated east-west intermodal trains between Atlanta and Dallas via North Southern (NS) at Meridian. Consequently, Shreveport can now receive east-west intermodal service to supplement the limited north-south potential it had via the former KCS operating configuration.

The possibility of a partial reorientation of KCS to intermodal traffic in conjunction with the east-west and north-south linkages at Shreveport has enabled serious discussions to be nearly formalized on closing the ICHFF and shifting all operations over to a modernized KCS ramp. It is estimated that the shifting of all rail-highway transfers to the KCS would enable the facility to handle 10,000 units in the first year of operation. With sufficient rail equipment it is estimated that the KCS facility could handle nearly 20,000 units annually. While this would still be a relatively low volume operation it is approximately three times the current volume handled at the KCS.

The ICHFF would be closed and likely leased out for trailer or container repair or whatever else could use a heavy loading density concrete surfaced lot (18 inches thick) with dimensions of 2510 by 180 feet. The most valuable asset of the ICHFF, the side loader, would be repositioned to the KCS in conjunction with rebuilding and expanding the current team track layout to accommodate mechanized trailer and container handling. The maximum market potential of a rail-highway facility at Shreveport has been estimated to be about 100,000 units per year. The major market is within 125 miles of Shreveport, including Natchez, Mississippi, outskirts of Dallas, Hope, Arkansas and Alexandria.

4. LAKE CHARLES

Lake Charles consists of three different port facilities and locations. Access to each is sufficiently different to be treated separately here. Accordingly, the following sections will discuss highway and rail access for the City Docks, Industrial Canal South Shore and bulk terminal transfer facility (west side).

4.a City Docks

As noted previously in section VI.B.1 highway access to City Docks is via two lane city streets that can experience congestion. Fortunately there are several alternatives to reach Sallier Street from I-10 from the east and I-210 from the west. Once vehicles reach Sallier Street the relative lack of development west of Lake Street has resulted in low ADT and ease of access to the City Docks at the western terminus of Sallier Street (refer to Table VI.7).

Rail access to City Docks is via a port owned line that extends approximately two miles from its terminus at the port to a connection with a UP branch line near Ryan Street. The UP line is a low density branch from Kinder to Lake Charles, a distance of approximately 31 miles. According to UP tonnage chart in 1993 the Kinder to Lake Charles branch had 1.23 million gross tons per mile (MGT) southbound and 0.49 MGT per mile northbound. Train service between Kinder and Lake

Charles was provided five days a week until late 1990 when it was reduced to three days per week.

At Lake Charles the branch line has a small holding yard immediately west of the LA-14 crossing that is used primarily to store cars for the Port. The branch proceeds west of the holding yard for a distance of about one mile where it forks to the west and the north. The line proceeds west for approximately one mile toward Ryan Street where it joins the port access trackage that leads to the City Docks. The portion of the line that turns north at the fork runs parallel to Enterprise Boulevard to the SP east-west main line at Railroad Avenue for a distance of about two miles. The UP line formerly crossed the SP east-west main line at grade and made a physical connection with the KCS on the north side of the SP. It was this connection that enabled the KCS to move large quantities of bagged rice in box cars to the City Docks via the UP under reciprocal switching. The UP line now ends at the SP main line at Railroad Avenue where it makes a physical connection with the SP. This connection is used by the SP to serve the City Docks under a reciprocal switching arrangement with UP. The at grade crossing of the SP main line has been removed along with the UP-KCS connection.

The City Docks have always been served directly by the UP with reciprocal switching open to the SP and KCS (former Louisiana and Arkansas subsidiary). The KCS operated to Lake Charles via a branch line from DeQuincy. The KCS reached Lake Charles by a bridge over the Calcasieu River. Its line terminated east of the Calcasieu River bridge at a small yard and had a spur that made a physical connection with the UP line that crossed the SP at Railroad Avenue and paralleled Enterprise Boulevard toward the port access spur adjacent to 12th (Sallier Street) Street.

In December 1982 the KCS bridge over the Calcasieu River was struck by three loaded barges. The bridge collapsed and was subsequently demolished to remove an obstruction to navigation and potential hazard to the SP mainline bridge adjacent to the KCS crossing. In return for abandoning its damaged bridge the KCS was granted reciprocal switching privileges via the SP to reach the UP connection that had been severed. Subsequently, KCS removed all of its trackage on the east side of the Calcasieu River and the UP connection that crossed the SP main line at Railroad Avenue was also removed.

The KCS began to use the SP to move its City Docks traffic a short distance over the SP's Calcasieu River bridge to the SP-UP interchange at Railroad Avenue. Shortly thereafter there was a series of increases in reciprocal switching charges between the SP and UP that were applied across each other's system, including Lake Charles. The reciprocal switching fees between SP and UP were increased from $125 to $200 per carload and subsequently escalated to over $400 per (loaded) carload. Consequently, the fee assessed to KCS to reach the UP via SP increased from $125 to over $400 per carload. Normally reciprocal switching fees are absorbed by the linehaul railroad (in this case KCS). Therefore, the increase in reciprocal switching reduced KCS contribution per car by approximately $300. The reciprocal switching fee structure between SP and UP that was applied to KCS traffic increased to a level that erased KCS profit margins for this traffic relative to movements to other ports in Texas such as Beaumont and Port Arthur where it had lower cost access compared to Lake Charles.

Formerly the KCS moved annually as much as 3000 carloads and 300,000 tons of bagged rice to City Docks from Arkansas and Louisiana. Today KCS handles Louisiana and Arkansas rice shipments longer distances to Texas ports instead of Lake Charles because of the lack of competitive access to City Docks. As a result Lake Charles handles practically no rice or other general cargo via KCS at City Docks. Louisiana or Arkansas rice shippers who historically used Lake Charles no longer have competitive access to the port via KCS. These shippers have to use another carrier, UP or SP, or use an intermediate KCS-UP routing through DeQuincy that is usually more costly than KCS single line service direct to Beaumont or Port Arthur.

The port has had a long standing series of discussions spanning almost a decade with officials from all three railroads to attempt to reduce the reciprocal switching charges between SP and UP for Lake Charles City Docks and improve the cost of access for the KCS to the City Docks relative to the UP-SP reciprocal switching charges. The issues have been complex, primarily influenced by the competitive rivalry between SP and UP. Complicating the issues has been a reluctance of all three railroads to collectively resolve their competitive differences for Lake Charles City Docks traffic relative to broader distinctions between their commercial interests. Clearly, UP has the exclusive franchise to serve City Docks. SP for operational reasons has found Texas ports, particularly Houston, to be more attractive for Louisiana and Arkansas rice. Neither of the two dominant east-west carriers, SP or UP, has any vested interest in abetting north-south rail access via KCS to City Docks following KCS's decision not to replace its damaged Calcasieu River bridge in 1982.

Consequently, negotiations between the port and SP and UP dragged on and involved various interested parties, including local, state and national elected representatives. In 1989 after several years of protracted discussions and meetings the reciprocal switching fee for port traffic between the UP and SP was reduced to $250 per car for Lake Charles City Docks. The SP ultimately agreed to handle KCS cars for the port over its Calcasieu River bridge crossing to the UP Railroad Avenue interchange connection for $60 per (loaded) car. Initially, the agreement required KCS to spend approximately $150,000 to upgrade SP yard trackage adjacent to the UP Railroad Avenue interchange connection to accommodate KCS business and not interfere with existing SP capacity constraints at this yard.

KCS was reluctant to provide this investment without firm business prospects and sought port participation in this project. The capital investment requirement to complete the agreement was ultimately suspended, pending development of traffic. However, prior to implementation of this operation SP withdrew from the agreement over expressed concern that the capacity of the UP-SP interchange, 30 cars, would not be sufficient to accommodate existing daily SP-UP traffic, 16 cars, and unrestricted KCS access to UP via SP. Subsequently, SP suggested that KCS pursue direct access to the UP via DeQuincy or operate over SP's Calcasieu River bridge via existing trackage rights to the UP Railroad Avenue interchange connection.

Although KCS was allowed to use the SP to reach the UP operating problems remained with joint access involving two railroads, SP and KCS, to the UP via the same interchange trackage. Moreover, UP already had an existing interchange agreement with the KCS at DeQuincy which would remain in effect while a new agreement for the Railroad Avenue connection at Lake

Charles would be needed. It is doubtful that UP saw any incentive to a new interchange agreement with the KCS at Railroad Avenue when UP could theoretically assume control of the same traffic at DeQuincy and receive a division of the road haul revenue. It would appear that UP could move the KCS traffic from DeQuincy to Lake Charles for a greater net revenue contribution than it would receive for performing a switching service at Lake Charles on behalf of the KCS. In other words UP stood to receive very little benefit from working with the KCS at Railroad Avenue, and possibly could risk short hauling itself. The UP-KCS interchange issue appears to have never been resolved such that KCS would or could move traffic to Lake Charles compared to Beaumont and Port Arthur.

At the same time that negotiations between SP and UP were taking place the UP unilaterally reduced road train service between Kinder and Lake Charles from five days a week (daily) to three days a week (tri-weekly). Although the port was assured that the flow of cargo to the City Docks would not be impeded because of tri-weekly road train service it is obvious that a transshipment facility such as a break bulk marine terminal requires daily switching service and generally the same level of connecting service to avoid bunching of cars and erratic service levels. There is evidence that suggests that bunching and erratic service levels did in fact occur following the inauguration of tri-weekly service by UP to reduce operating costs. The following examples serve as indicators of the problems experienced by the port from a letter of October 12, 1990 from G. K. Winn, Managing Director, Lake Charles Harbor & Terminal District to P. N. Crabtree, UP Manager of Transportation Service:

> Tuesday evening or Wednesday morning, October 9 or 10, hours of service rules prevented spotting cars at the (City) docks. The unloading stevedore was assured that spotting would begin at 7:00 A.M. Wednesday morning. At 7:00 AM, they were told the engine would be available at 10:00 AM. At 10:00 AM, they were advised that the engine would in the port about 12:30 or 1:00 PM but that API would receive priority for switching. As a result of this, 30 people could not be used after noon on that day. Further, 15 cars that should have been unloaded were not unloaded because of belated switching causing a build-up of cars to be unloaded.
>
> Thursday evening, October 11, no service was performed. The unloading stevedore was assured the engine would be switching at 6:30 AM today, October 12. The engine began switching about 9:30 AM this morning. This, in spite of the fact that the engine was parked outside our gate on Sallier Street. The reason given for this failure was that the crew first had to switch cars of ballast in the yard.
>
> We are puzzled that both of these failures occurred on days when trains were not scheduled to arrive in Lake Charles. Apparently, the loads that were to be spotted Tuesday evening and Thursday evening were already in the Lake Charles yard. If this is true, it is obvious the crew did not allow adequate time to accomplish its switching objective at the Port.

The port has attempted to investigate the feasibility of establishing its own switching service. The UP offered the port $20 per car allowance to switch the City Docks. In the interim the City Docks stevedore leased a surplus switch engine from a shortline operator for a very nominal fee of approximately $4000 per month to perform car switching when UP service was not available. The direct cost of the engine is very nominal when distributed across an annual average of nearly 670 cars per month (refer to Table VI.3 wherein it is estimated that City Docks handles about 8,000 loaded cars per year). However, the true direct expenses for a dedicated switching operation using market prices for a full service locomotive rental with crew, but excluding track maintenance and supervision, would be about $13,000 per month. This corresponds to about $20 per carload which is what UP offered the port as an allowance.

Apparently frustrated in its inability to bring the UP to make any thing more than token concessions to the problems of City Docks access to all three railroads the port expanded its horizons for engaging in rail operations as a solution to the UP, SP and KCS web of inertia. In late 1991 the port accompanied by a short line operator visited the UP to discuss establishing a terminal switching railroad that would combine the UP, SP and KCS switching operations under a single short line. On February 6, 1992 the port wrote UP regarding possible purchase or lease of the Kinder to Lake Charles line. The UP replied March 18, 1992 that it would perform preliminary analysis of a "spin off" of the Lake Charles line and be in communication with the port by May 15 with more specifics about UP level of interest in pursuing this further as well as a time frame and procedures. On May 15 the UP responded that it was, "willing to move up the priority of the Kinder-Lake Charles segment in our overall redeployment analysis". The UP advised that if a decision was made to sell the line that it would follow a competitive bidding process which would include the port as well as other bidders. On May 31, 1994 the UP advised the port that the Kinder-Lake Charles line was not for redeployment: "As you know, we have looked at this one (Kinder-Lake Charles segment) a number of occasions in the past, and have concluded for the time being that we will maintain the existing operation at this time."

The port believes that the sale or lease of the Kinder-Lake Charles segment is not a "dead issue". It is possible that the acquisition of this segment by the port or a short line operator could open the way for direct low cost connections between City Docks and SP and KCS as the first step of consolidating the switching operations of all three railroads at all three port facilities and potentially expanding coverage to include other facilities on both sides of the Calcasieu River (refer to section VI.D.4.b and VI.D.4.c), particularly the west bank petrochemical complex. In the meantime for City Docks the rail access situation remains unimproved since the destruction of the KCS physical connection to UP and the implementation of changing commercial practices of rail deregulation that were legislated in 1980 and introduced during the early 1980's. In many respects the Lake Charles City Docks rail access is more complicated than the rudiments of UP tri-weekly road haul service, and the removal of practical participation of KCS at the City Docks. However, these elements constitute the best examples of the frustrations and inhibitions of the port to remain competitive in a market place in which it has little direct control, and in the case of the railroads, very little influence.

4.b Industrial Canal South Shore

Highway access from I-210 is by two lane roads, Nelson Road and LA-384 (Big Lake Road). Both Nelson Road and LA-384 are congested, particularly LA-384. Other parallel routes are available that are also two lanes.

The site is served directly by SP and UP via a port access rail line that extends 71,861 feet from a junction with the UP and SP lines north of the intersection of LA-14 and LA-397 to the bulk cargo facilities on the South Shore. SP and UP provide service twice weekly alternating every other year. In response to interest by the port in performing its own switching on this line in 1989, the SP offered an allowance of $35 per loaded car tendered by SP to the port at the junction to the line (near LA-14 and LA-397) or $45 per loaded car tendered to the UP at the SP-UP Railroad Avenue interchange. The latter arrangement would presume that the port could reach an agreement with UP to provide switching services via its Railroad Avenue SP connection to the port industrial canal access for the SP traffic or that the UP would grant the port or its agent operating rights to handle SP cars from the Railroad Avenue interchange in conjunction with handling UP cars. This low level of switching allowances together with the necessity to reach a similar agreement with UP effectively mitigated against further actions toward providing port switching services on this low density spur line.

4.c Bulk Terminal No. 1

The site has direct access from I-10 by LA-108 with an access connection via a two lane road. There is no evidence of sustained traffic congestion affecting the site given its short 2.7 mile distance from I-10.

Rail service is provided by the KCS and SP, alternating every other year on the industrial switching network of access spurs to local industry on the west bank of the Calcasieu River. The port maintains an access track, approximately 7,700 feet, connecting with the joint KCS/SP industrial trackage along the west bank. Inside the bulk facility the port has three loop tracks encompassing 14,600 feet in length.

While there were no allegations of service problems at this facility the port views the overall operation and maintenance of the joint facility trackage along the west bank as a potential area for expansion and improvement. There has been consideration of port switching encompassing larger segments of this joint facility west bank trackage but no action has been taken independent of more pressing concerns for service to the City Docks that would integrate KCS into this facility (refer to section 4.a).

5. New Orleans

Distinct differences in the characteristics of highway and rail access exist for various facilities in the Port of New Orleans. In general most of the port is served by highway through a combination of rail-highway intermodal terminals and local access and connecting roads. In recent years the decline of much of the break bulk portion of rail carload service has left the port primarily dependent on trucks for direct service at most facilities (refer to Table VI.3). For this reason highway connections to all major port facilities will be reviewed first followed by rail access.

5.a Highway Connections

The major highway connections to the port can be discussed for the Mississippi River Terminal Complex and the France and Jourdan Road intermodal facilities. Access to the Mississippi River Terminals is currently performed by truck routes that pass through residential neighborhoods. The following truck routes will be closed upon completion of the Tchoupitoulas Corridor project: (1) Henry Clay; (2) Louisiana Avenue; and (3) Jackson Avenue. Data in Table VI.7 indicate that the primary artery for this traffic, Louisiana Avenue, is congested. The alternate route, Tchoupitoulas Street, has very limited capacity pending renovation and is also congested.

The Tchoupitoulas Corridor project will provide for a dedicated two lane port access roadway, commencing west of the existing flood wall at the intersection of Felicity and Tchoupitoulas Street. The port truck access corridor will run along the west river side of the New Orleans Public Belt Railroad (NOPB) and Illinois Central (IC) tracks between Felicity and Henry Clay. The railroad tracks will be relocated east adjacent to the flood wall to accommodate the port access truck corridor. The two lane truck port corridor will serve the Milan, Napoleon, Nashville and Henry Clay Wharves and the IC Rail-Highway transfer facility.

Based on 3 million tons of cargo handled across the wharves annually at these facilities it is estimated that 150,000 loaded trucks are generated by port cargo at these terminals (Table VI.3). In addition approximately 50,000 loaded truck units (trailers or containers) are transferred by the IC intermodal facility (Table VI.4). Total annual loaded truck movements generated in this corridor is about 200,000. If each loaded truck trip results in an empty repositioning movement along the corridor a total of 400,000 truck movements will occur annually or roughly 1500 truck movements per day.

The entire Tchoupitoulas Corridor will run from the east side of the Pontchartrain Expressway Crescent City Connection Mississippi River Crossing (formerly Greater New Orleans Bridge) to Henry Clay Avenue. The Tchoupitoulas Corridor from the Crescent City Connection to Felicity will be configured to operate as two separate one way streets each having two lanes. Up river traffic will operate on a two lane one way artery that is now Religious Street up to Felicity Street. Down river traffic from the port corridor access at Felicity Street will operate on a two lane one way reconstructed Tchoupitoulas Street using the existing right of way. At the junction of what is now Religious Street and Felicity the upriver corridor lanes (Religious Street) will swing toward existing Tchoupitoulas Street. At this intersection all upbound port traffic will cross Tchoupitoulas Street and enter the port via a dedicated two lane roadway passing through the floodwall and proceeding to its terminus at Henry Clay Wharf. All other (nonport) local upbound traffic will proceed to turn right on to the existing reconstructed Tchoupitoulas Street.

The existing Tchoupitoulas Street right of way will continue to be configured as a one lane two way street upriver beyond the interchange with Felicity. Local traffic from Henry Clay down river will use one lane of Tchoupitoulas Street to the intersection of Felicity and Tchoupitoulas. Thereafter down river traffic will proceed on a one-way two lane Tchoupitoulas Street using the current right of way. Down river traffic from the port Mississippi River Terminal Complex will use the two lane port corridor until the intersection with existing Tchoupitoulas Street at Felicity.

Traffic coming out of the port will turn right and proceed on the two lane one-way corridor to the Crescent City Connection using the existing right of way of Tchoupitoulas Street. Access ramps have been constructed at the Crescent City Connection to handle east-west traffic to and from Tchoupitoulas Corridor.

The major drawback of the Tchoupitoulas Corridor as it is now planned is that traffic between the west (I-10/US 61 toward Baton Rouge) will have to enter the central business component of the I-10 expressway system to proceed to or from the upriver wharves of the Mississippi River Complex. The I-10 routes east and west of the Pontchartrain Expressway are heavily congested with existing traffic. Average daily traffic (ADT) furnished by DOTD indicate that severe congestion exists for most of I-10 between the Causeway and the Industrial Canal. Moreover, limited data for US 90 adjacent to Louisiana Avenue indicate severe congestion (ADT = 81,149 resulting in a capacity utilization ratio over 125 percent).

I-10 Section	1993 ADT (DOTD)	Capacity Utilization (refer to Table VI.5)
West of Causeway	124,517	122
East of Causeway	138,446	136
West of US 90	127,762	125
East of US 90	77,502	76
West of Elysian Fields	79,206	78
East of Elysian Fields	66,648	65
West of Louisa	117,489	115
East of Louisa	120,397	118

The I-10 ADT statistics indicate that congested entry to the center city will affect access to the Tchoupitoulas Corridor unless new road capacity is augmented such as the possible extension of the Earhart Expressway. Constrained access to the Tchoupitoulas Corridor in its current configuration is particularly important in view of the lack of upriver access to I-10 and US 90 west except by Leake Avenue as it extends to River Road. For all practical purposes the Tchoupitoulas Corridor is a loop flow configuration from the Crescent City Connection into and out of the Mississippi River Terminal Complex. Tchoupitoulas Corridor unless extended beyond Henry Clay via Magazine Street or other alternatives toward Leake Avenue will not resolve the need for unconstrained western access to the River Terminal Complex.

The ease of truck access to the Port of New Orleans marine intermodal facilities adjacent to the Inner Harbor Canal is dependent on direction of flow, eastbound or westbound via I-10, and origin destination with respect to France Road or Jourdan Road. Direct access exists between I-10 eastbound and France Road via Almonaster Avenue. Access for westbound I-10 traffic to France Road is via Louisa Street and Old Gentilly Road. Access for westbound or eastbound traffic from France Road to I-10 is via Almonaster Avenue and Louisa Street.

There is currently no direct east or westbound access between I-10 and Jourdan Road. Both westbound and eastbound I-10 traffic exit to US 90 and proceed to Jourdan Road. From Jourdan Road to I-10 traffic must turn right on to Old Gentilly Road and proceed along narrow two lane deteriorated streets to reach Downman Road before proceeding right on to US 90 to travel approximately one mile to the I-10 interchange.

Westbound traffic on US 90 to Jourdan Road has direct access via the existing ramp at Downman Road. Plans exist to remove this westbound ramp from US 90 to Jourdan Road and replace it with an off ramp leading north of the existing US 90-Jourdan ramp and also to provide a ramp for westbound traffic from Jourdan to US 90. In addition an eastbound ramp will be constructed for traffic on US 90 to have direct access to Jourdan Road. Traffic between Jourdan Road and I-10 will still have to proceed east on US 90 to make an I-10 connection.

Connections between the port facilities and the rail-highway intermodal terminals are primarily for the France Road complex and to a lesser degree Jourdan Road. Further expansion of the Mississippi River Terminal Complex may lead to more containers handled at this location. Each rail intermodal facility will be summarized (refer to Table VI.4) relative to access to the two major marine terminal complexes of the port on the river and the Industrial Canal, respectively.

Existing drayage time for one way gate-to-gate movements between the rail-highway terminals and France Road have been estimated as follows.

Terminal	Off-Peak	Peak	Miles
Kansas City Southern	25	35	10
Illinois Central	25	35	10
Norfolk Southern	5	10	1
CSX	10	20	1.5
SP/UP	40	60	18

Gate-to-gate transit time between rail highway terminals, excluding CSX, and Jourdan Road on the east bank of the Industrial Canal is 5 and 10 minutes longer in the off-peak and peak compared to France Road, respectively. Transit time between CSX and Jourdan Road is approximately 5 and 10 minutes shorter than for France Road in the off-peak and peak, respectively. The relative ease of access of CSX to the Industrial Canal marine intermodal facilities is a major factor for deramping SP intermodal port traffic, primarily Sea-Land west coast mini-bridge cargo at this facility using run through intermodal trains across the Huey Long Bridge to make a rail intermodal interchange. To a lesser degree UP has also been indicated to have used the CSX Gentilly facility for access to the port (refer to section 5.c).

The close proximity of both CSX and NS intermodal facilities to the port effectively provide gate-to-gate transit times of a "near dock" variety of intermodal transfer facility. The potential reduction of transit time for a closer facility dedicated to France Road marine traffic is very low notwithstanding the capital required, land commitments and most importantly the issue of shared rail access over NOPB. For these reasons direct on dock or "near dock" intermodal transfer of marine containers at France Road does not seem to be easily justifiable unless one or more of the existing rail highway terminals, particularly CSX and NS, experience sustained capacity or access problems.

The existing low volume of containers handled at the Mississippi River Terminal Complex did not result in gate-to-gate transit times being specified for these terminals. The overall pattern above would be largely reversed with IC having minimal access time and CSX and NS having the largest east bank access times.

5.b Rail Access - New Orleans Public Belt Railroad

Rail access to marine intermodal facilities in New Orleans is primarily by the New Orleans Public Belt Railroad (NOPB). For all practical purposes NOPB does not participate in container cargoes. Therefore, rail carload access to marine terminals via NOPB will be discussed separately from rail access to rail-highway intermodal terminals.

The history of the NOPB as a city-owned independent terminal switching railroad has been covered in sufficient detail elsewhere so as to not require repetition for this report. In days preceding containerization, mini-bridge and the demise of the public grain elevator, the Belt maintained multiple rail yards, Cotton Warehouse, Race Street (abandoned) and Claribome (out of service) and operated as many as 40 switching jobs a day. In 1971 the Belt handled over 100,000 revenue cars. Thereafter, traffic began to significantly decline. The Belt handled nearly 50,000 cars by 1980. By 1985 traffic had diminished to 18,000 cars. Since 1985 until recently the NOPB's volume had stabilized and remained in the vicinity of 18,000 to 20,000 revenue cars switched annually. Most of the railroad access via the Belt is related to "interline" switching where NOPB handles a revenue car between a local industry and a connecting railroad for a tariff rate of $175 per load empty round trip. In some instances contract rates exist as well as tariff discounts for multiple cars, etc. In 1993 the Belt had 17,475 interline revenue cars.

The other sources of switching activity and related revenue for the Belt are very minor. The Belt still performs "intermediate" switching wherein it moves cars between connecting linehaul carriers, serving as an interchange agent. Most of the linehaul carriers serving New Orleans perform their own interchanges directly. The only intermediate switching performed by the Belt is between the UP and KCS. Intermediate switching entailed 1339 revenue cars in 1993. The Belt receives $140 per car for intermediate switching.

The Belt also performs "intraterminal" switching wherein it moves a loaded car from a shipping point on its line to a receiving point on its line. The only existing intraterminal switching currently active is for shipments of lime handled from U.S. Gypsum facility on the Industrial Canal to the New Orleans Sewer and Water Board, which is also served directly by the IC at the same location. The Belt handled 85 Sewer and Water Board intraterminal shipments in 1993 at a rate of $201.74 per carload. The other source of switching revenue for the Belt is a fee of $125 for "reorder" when cars are repositioned for loading or unloading at the same industry. The Belt handled 35 "reorder" movements in 1993.

Table VI.10 indicates railroad access between marine terminals at the Port of New Orleans and connecting railroads. Most of the port, except for facilities at Louisiana Avenue and Alabo Street, is served exclusively by the NOPB. Table 7.1 indicates the extent which the six linehaul connecting railroads at New Orleans utilize the NOPB as an "interline" connection to local users.

The data represents the 1993 calendar year but excludes any traffic handled to the defunct New Orleans Public Bulk Terminal. The Public Bulk Terminal in its last full year of operation, 1993, contributed nearly 4,000 revenue "interline" cars, of which nearly sixty percent were handled less than one mile from the CSX interchange at Almonaster yard to the former bulk transshipment facility near Jourdan Road.

Excluding the bulk plant from the 1993 interline car movements provides a reasonably current view of the existing and expected future traffic level for the Belt and it associated distribution among the six independent connecting railroads. The Belt's traffic base without the Public Bulk Terminal will be about 14,000 interline revenue cars per year. Traffic may exhibit cyclical fluctuations, particularly neobulk cargoes handled through the port such as steel and rubber. If cyclical fluctuations are sustained over a calendar year the Belt's existing traffic base could range as low as 12,000 to 13,000 cars.

A very important factor that will fluctuate significantly is the volume of imported steel for Midwest accounts handled by the port that is not mid-streamed to barge and potentially available to the Belt. Rail car supply for the steel movements is critical both with respect to timing and quantity of cars. The Belt must depend on the willingness and ability of connecting railroads, primarily CSX and NS, to guarantee the supply cars for loading. Otherwise the business will be diverted to barge, truck or other ports.

The Belt's traffic statistics for 1993 have a similar distribution among connecting railroads as data for 1992 and part of 1994. The IC, UP and KCS constitute the largest users of the Belt, collectively representing about 80 percent of the annual volume total interline switching. The least important carrier is SP with about three percent of the total annual volume of interline switching. NS and CSX are also relatively small. The small share attributed to CSX reflects the omission of the Public Bulk Terminal interline cars from 1993. The share of CSX may increase subject to its participation in imported slab steel shipments as the linehaul connecting carrier.

Table 7.1 represents approximately 40 customer and/or switching locations on the NOPB grouped into four geographical segments. The Mississippi River Terminal Complex is represented by group 2. The most important connecting carriers are the IC, KCS and UP. The IC maintains an intermodal facility nearly adjacent to the NOPB Cotton Warehouse Yard as well as a small yard for carload traffic. IC delivers and picks up from the Belt at the Cotton Warehouse Yard. KCS delivers cars to the Belt at the Cotton Warehouse Yard and the Belt delivers cars to the KCS yard adjacent to Airline Highway. UP delivers to and picks up from the Belt at the Cotton Warehouse Yard.

The smallest user of the Belt, SP may deliver and pick up at the Cotton Warehouse Yard but usually sets off cars to the Belt at a storage track immediately north of East Bridge Junction interlocking tower. The Belt leaves cars at this location for the SP as well as picks up the SP set offs when it switches East Bridge Junction local industries twice weekly. Linehaul carriers make deliveries to the Belt daily or on an "as needed basis". The Belt interchanges cars with NS at a small yard at Press Street. Interchanges with CSX are made at Almonaster Yard.

The Mississippi River Terminal Complex break bulk facilities are the largest source of traffic for the Belt, constituting nearly one-half of the total interline revenue cars switched in 1993 (excluding the Public Bulk Terminal). The next largest group is the industries along the Industrial Canal adjacent to France and Jourdan Roads. The Belt does not normally handle any intermodal trailers or containers between connecting railroads and France or Jourdan Road marine terminals. An experimental rate reduction to encourage this traffic about ten years ago had little result. There is a height clearance restriction at the underpass of St. Claude Avenue bridge that would have to be removed to handle double stack containers between France Road and Cotton Warehouse Yard via the Belt.

The third largest cluster of Belt traffic is handled for a wide range of small facilities from First Street to Florida Avenue and Galvez Street Wharf. One third of this traffic is for older port facilities extending between First Street Wharf to Thalia Street Wharf. The majority of this portion of the traffic is handled to the vicinity of First and Seventh Street Wharfs. The other older wharves downtown from Army to Press Street collectively accounted for about 1200 interline carloads in 1993.

The least important segment of the Belt is the industrial area adjacent to East Bridge Junction. In recent years traffic has declined sharply at this location. In 1993 local industries by East Bridge Junction accounted for 200 fewer interline revenue cars than 1992. The Belt reduced its service to this area from tri-weekly to bi-weekly.

Table 7.2 contains a rudimentary financial analysis of the Belt during the period of time in which its traffic base had stabilized at or near 18,000 annual car loads. The Belt has incurred annual cash losses based on net operating revenue after taxes (NORAT net of depreciation), ranging from a high of $1.875 million in 1984 to a low of nearly $0.765 million in 1988. Average annual cash losses (after tax accruals) from train operations have been nearly $1.0 million for the period 1984 to 1993. In the past three years, 1991 to 1993, the Belt incurred operating cash losses of nearly $900,000 per year before non-operating income.

Interest income from nearly $8 million in temporary investments along with approximately $270,000 income from nonoperating property and $160,000 rent income have allowed the Belt to maintain total revenues that are greater than total expenses and have a positive cash flow. The Belt has no major long term debt and there are no mandatory capital outlays required to sustain current operations. In recent years total cash flow has fluctuated substantially, ranging from nearly $115,000 in 1990 to $670,000 in 1993. Overall positive total cash flows for the Belt are substantial given the significant deficits sustain from train operations.

The existing locomotive fleet is more than adequate for the traffic base with respect to the number and condition of equipment. The track has been generally adequately maintained for a slow speed switching railroad. Portions of the Belt associated with public improvements projects along the river front have been or are undergoing rehabilitation. One of the two tracks on the NOPB mainline linking Cotton Warehouse Yard to East Bridge Junction has been out of service for several years. However, substantial portions of the track structure remain in place available for salvage and reuse elsewhere on the system. Elsewhere much of the abandoned Race Street yard and out of service Claribome Yard remain in place awaiting salvage.

In its current configuration the Belt could continue to operate for a substantial period of time without requiring capital investment to sustain its connection switching activities. Where new investment may be warranted it is for the benefit of third parties such as Tchoupitoulas Corridor and possible improvements at East Bridge Junction. The latter is typical of the general physical condition and requirements of NOPB operations on the east bank. The configuration and condition of track structure at East Bridge is more than adequate for the Belt which currently operates over the main line between Cotton Warehouse Yard and East Bridge Junction bi-weekly for local switching and SP interchange. Improvements to East Bridge Junction would be for the purpose of accommodating approximately 100 daily train movements through the interlocking complex are completely independent from the current local switching operations of the Belt (except for deliveries of the UP and SP to the Belt at Cotton Warehouse Yard and East Bridge Junction, respectively).

The future of the Belt as it relates to local carload switching services on the east bank will depend on the likelihood of the future level and cyclical fluctuations of the existing traffic base which had appeared to have stabilized until the cessation of the Public Bulk Terminal. Currently without imported steel movements the Belt's existing traffic is approximately 12,000 to 14,000 annual interline revenue cars which is marginal relative to sustaining a positive cash flow at current levels of operating income, expenses and other income. The future of the Belt under a status quo level of switching activity is contingent on the ability of its management to control cash expenses, primarily payroll. Unfortunately, the current configuration of the railroad is not conducive to further significant reductions in service or the work force directly related to train operations. Therefore, it is possible that in the absence of a restoration of traffic to revenues commensurate with the Bulk Plant that the Belt will gradually deteriorate financially over a period of sustained negative cash flows that could occur under very low traffic volumes (12,000 cars per year) and no major changes in train operations or staffing.

The difficulty of the Belt problem is that no one connecting railroad has a dominant interest in the present services. Table 7.1 indicates that none of the major carriers using the Belt, IC, KCS or UP, has a predominant focal point relative to the four geographic clusters for interline revenue. All three railroads have about the same volume of interline carloads handled by the Belt for locations adjacent to Industrial Canal as for locations along the Mississippi River Terminal Complex (refer to groups 2 and 4 in Table 7.1). Over one-half of the annual revenue carloads handled by the Belt are for the IC, KCS and UP for port locations adjacent to the Mississippi River Terminal Complex or the France and Jourdan Road Industrial Canal area.

The future of linehaul railroad access to the facilities served by the Belt is related to the long term secular decline in break bulk marine rail carload service in particular and the decline in general for other industries served by the Belt. The current and future volume at any one of the major groupings will likely remain insufficient to sustain an independent terminal switching railroad organized and staffed like the current NOPB. Accordingly, none of the linehaul railroads has any incentive to remedy the problem since the Belt is owned by the City of New Orleans and is sufficiently endowed with cash and other assets such that non-operating income has thus far generally been more than adequate to off set very large annual cash operating deficits. If this endowment is depleted the link between the Belt's direct operating and financial performance will have to be addressed by users and beneficiaries of rail access to the port and adjacent facilities currently served by the Belt.

5.c Rail Access to Intermodal Facilities

Rail linehaul access to rail-highway intermodal facilities in New Orleans is by institutionalized connections between the railroads using a series of trackage rights and in some instances highway drayage. Each of the railroads has their own intermodal facilities at New Orleans (refer to Table VI.4). In general these facilities have sufficient capacity and can be expanded to accommodate future growth (refer to Chapter V).

New Orleans is among several major mid-continent cities where there are originating and terminating points of rail-highway intermodal facilities of connecting rail line terminals that are not contiguous to each other. The cities of Chicago, St. Louis, Kansas City, Memphis and New Orleans serve as gateways between originating and terminating railroads for connecting shipments. Frequently, the connections between railroads require the use of slow speed urban trackage which may be shared among multiple users or types of users such as commuter, intercity passenger and local and through freight movements.

Rail access links for intermodal traffic between connecting carriers across major gateways can be "steel wheel" variety or "rubber tire" interchange. The "steel wheel" variety reflects all rail movements between connecting carriers. The "rubber tire" variety reflects the use of highway drayage between rail-highway intermodal terminals in the same area for connecting or through rail service. Data from a special study on the volume of "rubber tire" interchanges appears in Table 7.3. For many reasons Chicago is an aberration with respect to the large volume of "rubber tire" interchange estimated to take place there.

The data in Table 7.3 are limited to two years and can reflect shifts in intermodal movements as well as railroad operations. Within the limitations of the data New Orleans is a significant user of "rubber tire" interchange for intermodal connections between linehaul railroads. While trailer volume of "rubber tire" interchange remained low, the volume of container highway interchange between connecting railroads soared from about 8,000 units in 1988 to nearly 40,000 units in 1989.

The reasons most often cited for "rubber tire" interchange are as follows: (1) to obtain reliable crosstown connections; (2) to reduce transit time; (3) to reduce loss and damage; (4) to resolve rail operating problems related to small volume movements or mixed destinations; (5) to reduce switching costs; (6) to assist in controlling intermodal car supply; and, (7) to cope with a variety of other operating and service issues. Rubber tire interchange should be viewed as a means which is generally less cost effective than steel wheel access between railroads in urban areas where there are significant blocks of inter-regional movements between major systems not separated by geographic, institutional or operational barriers.

The major users of "rubber tire" interchange in New Orleans appear to be KCS and IC to connect with east-west systems. The KCS indicated that approximately 25 percent of its intermodal traffic was drayed to CSX and NS rail-highway terminals. This would constitute about 30 trips per day or about 7,500 trips per year. IC indicated about a similar volume of trips annually between its Napoleon Avenue facility and CSX rail-highway terminal at Gentilly. The use of rubber tire interchange by other railroads at New Orleans is unknown.

Train movements in New Orleans indicate that there is a major movement of rail-highway traffic between SP to the intermodal terminal of CSX at Almonaster Yard. Confidential data from the rail waybill confirmed that SP has a large annual volume of intermodal traffic that is loaded and unloaded at Almonaster Yard. CSX indicated that SP traffic that is handled at Almonaster ranges from 40 to 120 units a day. UP and KCS were also indicated to use the Almonaster rail-highway intermodal facility although to a much smaller degree than SP.

Aside from the above reasons favoring "rubber tire" interchange, all of the railroads in New Orleans in theory have direct access to each other's terminals with the possible exception of UP and KCS that still use the Public Belt intermediate switching operation via the Cotton Warehouse Yard for carload interchange. The major east and west bound linehaul railways, SP - UP and NS - CSX, respectively, both operate run-through trains through each other's terminal facilities. Given sufficient volume of intermodal traffic for preblocking there are no major physical impediments for west bank railroads, SP and UP, to operate intermodal trains into the east bank facilities of CSX or NS. This is in fact what has been happening for a large block of port related minibridge traffic from Sea-Land that flows between Los Angeles and New Orleans via SP direct into Almonaster Yard.

The only use of the Public Belt in promoting shared access to rail-highway intermodal terminals for "steel wheel" interchange is the Mississippi River Bridge. The train operations of the Belt have no relationship to the flow of containers and trailers between connecting railroads. Moreover, it appears that a reconfigured Public Belt would not have any opportunity to effectively participate in this traffic unless absolute capacity constraints developed at the existing rail-highway facilities that are near France and Jourdan Roads.

The major impediments to rail-highway terminal access in New Orleans are the connections between CSX and the western carriers via trackage rights on the NS and connections between the NS/CSX and SP/UP via East Bridge Junction. The character of these linkages is described in Chapter IX because it transcends all connecting rail operations. The major issue for intermodal is the delay and uncertainty of maintaining scheduled connections via "steel wheel" service between the west bank and France Road via CSX or NS terminals. Transit times of 12 to 14 hours reportedly exist to move a train from the west bank to the east bank (CSX Almonaster or NS Florida Avenue) and return. These delays hamper the use of SP and UP crews and locomotives for linehaul operations beyond Avondale. Operational savings to these carriers, both in New Orleans and at possible redundant intermediate crew change points, need to be considered as part of the benefits of proposed alternatives to enhance west and east bank rail access via the NOPB Mississippi River Bridge and NS "back belt".

Table 7.1
Linehaul Railroad Access To New Orleans Locations Via New Orleans Public Belt Railroad (NOPB): Annual Carloads By Location, 1993

NOPB Group	CSX		IC		KCS		NS		SP		UP		Total	
	Cars	%	Cars	%	Cars	%	Cars	%	Cars	%	Cars	%	Cars	%
1	339	49	163	24	26	4	97	14	20	3	50	7	695	100
2	371	7	1642	29	1584	28	626	11	176	3	1303	23	5702	100
3	162	5	1164	37	259	8	477	15	57	2	1057	33	3176	100
4	144	4	1094	28	1276	32	186	5	106	3	1132	29	3938	100
Total	1016	8	4063	30	3145	23	1386	10	359	3	3542	26	13511	100

Source: NPWI analyses of NOPB switching settlement electronic files.

Notes (1) Excludes 3,964 cars handled on account of New Orleans Public Bulk Terminal.
(2) Group 1 includes local industries at East Bridge Junction and New Orleans Sewer and Water Board.
(3) Group 2 includes Mississippii River Terminal Complex from Henry Clay to Louisiana Avenue.
(4) Group 3 includes First Street Wharf to Florida Avenue and Galvez Street Wharf.
(5) Group 4 includes Industrial Canal, excluding Public Bulk Terminal.

Table 7.2
Financial Analysis for New Orleans Public Belt Railroad, 1984 -1993

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Operating Revenue	2,887,211	2,491,388	3,243,225	3,420,618	3,778,334	3,094,443	2,823,231	3,142,764	3,038,692	3,051,540
Operating Expenses	3,940,429	3,542,975	3,513,381	3,377,991	3,651,866	3,553,929	3,508,649	3,302,863	3,382,733	3,263,669
Depreciation	127,168	128,153	126,853	127,175	119,769	107,771	103,236	110,087	129,143	150,197
Net Operating Revenue Before Taxes (NORBT)	(1,180,386)	(1,179,740)	(397,009)	(84,548)	6,699	(567,257)	(788,654)	(270,186)	(473,184)	(362,326)
Tax Accruals	694,182	651,700	725,079	728,079	771,285	704,244	671,169	626,545	596,346	523,223
Net Operating Revenue After Taxes (NORAT)	(1,874,568)	1,831,440	(1,122,088)	(812,627)	(764,586)	(1,271,501)	(1,459,823)	(896,731)	(1,069,530)	(885,549)
Rent Income	245,020	228,211	230,592	206,386	198,230	164,493	149,105	135,774	137,241	175,559
Other Income	1,278,858	1,275,353	1,070,944	1,008,345	1,203,553	1,304,062	1,322,227	1,292,588	1,249,642	1,231,354
Income Before Interest	(350,690)	(327,876)	179,448	402,104	637,197	197,054	11,509	531,631	317,353	521,364
Interest Expense	13,146	7,164	1,474	0	0	0	0	0	0	0
Net Income	(363,836)	(335,040)	177,974	402,104	637,197	197,054	11,509	531,631	317,353	521,364
Net Income less Other Income	(1,642,694)	(1,610,393)	(892,970)	(606,241)	(566,356)	(1,107,008)	(1,310,718)	(760,957)	(932,289)	(709,990)
Cash Flow - Operations	(1,053,218)	(1,051,587)	(270,156)	42,627	126,468	(459,486)	(685,418)	(160,099)	(344,041)	(212,129)
Cash Flow - Ordinary	(236,668)	(206,887)	304,827	529,279	756,966	304,825	114,745	641,718	446,496	671,561
Cash Flow - Extraordinary	155,034	0	370,933	0	0	0	0	0	0	0
Cash Flow - Total	(81,634)	(206,887)	675,760	529,279	756,966	304,825	114,745	641,718	446,496	671,561
Operating Ratio	1.36	1.42	1.08	0.99	0.97	1.15	1.24	1.05	1.11	1.07

Source: Public Belt Railroad Commission Financial Statements.

Notes:
Cash Flow- Operations = Operating Revenue less Operating Expenses.
Cash Flow - Ordinary = Net Income & Depreciation.
Cash Flow - Extraordinary = Revenue from nonrail operations, excluding reoccurring rent and other income.
Cash Flow Total= Cash Flow Ordinary + Cash Flow Extraordinary

Table 7.3
Estimated Rubber-Tired Interchanges by Gateway

Gateway	1988 Trailers	1988 Containers	1988 TOTAL	1989 Trailers	1989 Containers	1989 TOTAL	1988-1989 AVERAGE
Birmingham	1,600	0	1,600	0	0	0	800
Chicago	135,400	21,526	156,566	146,880	156,882	303,762	230,164
Kansas City	33,120	10,000	43,120	12,000	4,960	16,960	30,040
Memphis	16,000	1,600	17,600	11,200	3,200	14,400	16,000
New Orleans	3,200	7,840	11,040	1,600	37,760	39,360	25,200
St. Louis	40,000	28,800	68,800	17,600	0	17,600	43,200
TOTAL	228,960	69,766	298,726	189,280	202,802	392,082	345,404

Source: Association of American Railroads, Intermodal Trends, Volume IV, Number 1 (February 11, 1992)

APPENDIX 8

REVIEW OF OTHER STATES' PARTNERSHIP INITIATIVES

The State of Washington has an extensive port network that includes seventy-eight separate port districts of both large deep draft ports (i.e. Seattle, Tacoma) and smaller ports (Everett, Bellingham, Olympia, Townsend, Port Angeles, etc.) that contribute to a significant maritime component of the state's overall economy; encompassing over 150,000 jobs annually, according to the Washington Public Ports Association (WPPA). The port association functions as a lobbying entity for the numerous and diverse public port interests. The state level association focuses primarily on legislative issues that affect environmental, safety and navigational aids, channel and harbor maintenance programs with related levels of state taxation/fees needed to support these programs, and Federal/national issues that could affect the state's ports through the U.S. Army Corps of Engineers dredging programs, U.S. Customs issues, and Federal DOT programs.

In 1990, a group of the state's ports located primarily in the Puget Sound region decided that a more regional approach was needed to promote port cooperation. A Ports Association of Puget Sound was formed by seven ports including the ports of Seattle, Tacoma, Anacortes, Everett, Port Angeles, Bellingham, and Olympia. The group initially focused on shared advertising and marketing materials and identified a unifying theme - "Puget Sound Ports : The Great Gateway"- which was used by all port members and in joint marketing/advertising programs. Port productivity and diversity of cargo handling facilities (i.e. forest products, containers, automobiles, dry bulk coke/sulfur operations, and breakbulk/steel facilities) were also emphasized in joint promotional programs and brochures. The group began promoting the importance of ***the port region*** rather than any specific port. It was considered a bold and unconventional move at the time of a world-wide recession and fierce competition for every ton of cargo. However, it was considered important to both the Puget Sound port group and the state that they have a quality water transportation system in place that could capture the maximum amount of cargo without duplicating unneeded facilities. Extra facilities aimed at the same cargo sources would have to compete by lowering already declining prices and revenues .

The results were positive and in 1993 the ports all signed a formal "Letter of Intent". This is almost like a formal "partnership agreement" in which the ports have now agreed to develop work programs in each of the following areas:

- Share and present annual multi-year capital, operating, and budget plans;
- Develop strategies for greater utilization of existing port facilities;
- Share marketing resources to jointly market and promote respective member ports through marketing materials, joint cooperative planning by marketing staffs, and group contracting for vendor-generated marketing data bases such as PIERS;
- Establish communications and public relations plans, including a government relations plan in coordination with the Washington Public Ports Association;
- Develop a regional intermodal transportation strategy, including ground transportation links between and among member ports and other transportation facilities;

- Prepare a strategy/strategies for increasing Puget Sound's market share of trade flows;
- Encourage the exchange of environmental data, including clean-up actions, as well as strategies for environmental compliance and;
- Joint efforts to identify and promote tourism in the region.

The overall thrust of this type of regionalization seems to be better allocation of resources and use of existing talents to support common goals and expenses (i.e. market research, environmental costs, intermodal access costs, etc.).

The State of Maryland

The state of Maryland has one principal deep water public port in Baltimore, but also owns smaller facilities in Cambridge and Crisfield that were primarily niche or localized port facilities. The port of Cambridge, located in a depressed economic region of the state, was particularly hard hit when the port's major industrial tenant and port user pulled up stakes and left in the 1980's. The local community requested and received help from the Port of Baltimore's marketing department in locating another tenant and port user. Cost considerations for handling cargo also meant that concessions on ILA labor (i.e. gang size, etc.) and work rules had to be negotiated before any meaningful progress could be made. These concessions were achieved and new cargo activity occurred.

The Cambridge port's limited water depth at 20-21 feet also provided limited market opportunities and chances for longterm success as a cargo handling facility. The local port representatives eventually came to the conclusion in 1993 that the highest and best economic use of the port property would be for local and retirement waterfront housing as well as a marina for recreational use. Once again, management and commissioner support by the Port of Baltimore was requested and received. In early 1994 a developer was identified who added a hotel concept as well, and proposed a federal Housing and Urban Development (HUD) Community Block Grant funding approach. The state has since negotiated a new long term lease with the developer for the Cambridge property (June 1994) and plans are proceeding well according to state and port officials.

The Port of Baltimore also created a cargo pooling/consolidation service for smaller shippers in 1988. Under a joint venture with the Illinois Trailer on Flatcar Association (Itofca) and later Richmond Transportation (RT) based in Chicago (1990), the port created this value added service under the name of "Port-Link" (name owned/marketed by the port) with these experienced freight consolidators. The port issued a competitive request for proposals and structured the arrangement so that it essentially cost the port minimal free office space rental for the current RT staff of three people. Richmond Transportation essentially acts as consultants to the smaller shippers and obtains volume agreements with inland rail carriers and steamship lines that currently provide discounts/savings of 25%-30% because of the wholesale pricing they are able to obtain for consolidated container volumes. Currently, monthly volume is approximately 600 international loads through Baltimore, over 7,000 annually, from smaller port customers. This represents about three times the volume level of initial startup operations. There are no current restrictions to soliciting non-port local accounts but the overall focus of RT is about 90% international movements versus only 10% domestic local moves. RT was awarded a six year concession (3 years with a renewal option for 3 years) and has just begun their renewal option period. Company and port officials are pleased with progress and success of the venture to date. RT officials in Baltimore expressed interest in setting up similar operations out of a Gulf port such as New Orleans.

The State of Georgia

The state of Georgia has a deep water public port at Savannah and smaller general cargo and bulk facilities located in Brunswick and Garden City. The state also controls two inland barge facilities in the central and western part of the state. Marketing and promotion of the ports and inland barge facilities are coordinated out of Savannah by the statewide Georgia Ports Authority. The smaller ports are geared to handle niche cargoes such as forest products, clay, automobiles, fertilizer, and chemicals. The larger facility at Savannah focuses on container, RoRo and general cargo operations. The state tries to market the facilities jointly through trade missions and a statewide directory that is published every other year listing facility capabilities and infrastructure details (i.e. draft, sheddage, ground storage, equipment, intermodal connections available, etc.). They are concerned about not marketing facilities against each other (i.e. promoting the use of only one port versus another for all port calls) and even have some of the same lines calling at more than one port in the state. This can occur when a smaller port is used to reduce congestion at Savannah or is closer to the ultimate inland destination/plant location. The state also owns inland barge facilities (concentrated in the Northwest region of the state) that move primarily domestic bulk fertilizers and chemicals along the Altamaha, Oconee, Ocmulgee, Apalachicola and Savannah rivers with some transshipment at the Brunswick port.

The statewide port authority has identified port access bottlenecks in either rail or road connections and has presented these issues to local/county metropolitan planning organizations for incorporation into their respective transportation planning processes. Additionally, the authority has discussed similar issues with private rail operators (CSX and Norfolk Southern) so that cooperative efforts can be achieved with negotiated cost sharing wherever possible.

The Columbia River Initiatives

The states of Oregon, Washington, and Idaho have collectively formed the Columbia Snake River Marketing Group based in Portland, Oregon. Marketed under the umbrella name "The Columbia Snake River System", the group of port participants (5 deep water and 20 shallow draft barge ports) emphasizes the multiplicity of commodities handled and the river system that serves 25 port districts. Commodities highlighted include: containers and reefer/refrigerated containers, lumber and paper products, agricultural and grain handling facilities, and other bulk handling capabilities for petroleum and wood chips. The joint marketing efforts include an annual guide to marine facilities and industrial properties along the Columbia River region cosponsored with the Merchants Exchange of Portland; an annual magazine called "The Great Waterway" sent to targeted shippers and transportation service providers, and periodic trade missions to key trading regions.

Additional joint marketing tools developed by the group to provide system updates include newsletters, brochures and a portable display used at trade shows and international conferences, a six minute video presentation in both English and Japanese, and a four color map distributed widely in the United States and to media and corporate leaders overseas. The U.S. Maritime Administration

(MARAD) provided a matching grant for production of the color map in 1993. The group also sponsors an annual trade conference that offers members and guests the opportunity to hear from national and worldwide experts regarding trade, transportation, port management, environmental, and other important maritime related issues. The port members are extremely pleased with these collective marketing efforts[1] that have produced record container-on-barge volumes for the river system last year (1993).

A recent cost sharing example among member ports included the Port of Portland and Port of Vancouver. Vancouver had been acquiring land for future port expansion and, when Portland found that a major Japanese automobile client was looking for a new plant location, worked with Vancouver to keep this business in the Columbia River system. Vancouver also acquired additional surplus equipment from Portland to operate the facility to customer specifications. Seven Columbia River ports including Vancouver and Portland are conducting a joint feasibility study with the U.S. Army Corps of Engineers to deepen the 40-foot shipping channel of the Columbia River to 43 feet to better accommodate new and larger vessels.

Other State Initiatives

The state of Florida encourages port cooperation through its Florida Seaport Transportation and Economic Development Council. This group is composed of the Florida Ports Council (a statewide port association) and the state's departments of Commerce, Community Affairs, and Transportation. The Council produces the Florida seaports five-year capital plan. Florida ports will receive about $10 million in state funds during the upcoming year versus about $8 million in capital funds provided during 1994. Furthermore, ports normally competing with each other in Florida, are also forming strategic alliances, primarily as a result of legislative concerns for funding projects leading to excess capacity. Faced with the prospect of consolidating three ports into a single port organization, an agreement was signed between the competitive ports of Tampa, Manatee, and St. Petersburg to study and explore ways that the three ports can work together for increased safety and efficiency in the use of Tampa Bay. The study is expected to result in a formal agreement in which these ports will jointly finance projects of interest to all three ports, and combine or share expenses for lobbying, promotion, and marketing efforts for the Tampa Bay region.

The competing ports of Los Angeles and Long Beach have also initiated an alliance for pursuing actions of mutual interest. The two ports participated in joint contingency planning for preventing and responding to marine-related incidents, have jointly financed an intermodal container transfer facility, and are now part of an alliance including seven California cities to develop the Alameda intermodal corridor. This approach not only relieves some of the financial strain being felt by ports, but it also recognizes that a cost sharing arrangement is appropriate among various beneficiaries of the project. Federal support under the Intermodal Surface Transportation Efficiency Act (ISTEA) was also received for this project. The two ports have subsequently created and funded the Alameda Transportation Authority, the entity charged with overseeing the corridor's development. Faced with increasing financial constraints brought about by a California law that permits cities to divert revenues from the port to the cities' general funds, the two ports are currently negotiating an agreement for

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[1] *Journal of Commerce*, "Ports Building Bridges not Walls", October 12, 1994.

additional areas of cooperation, including land swaps and joint financing of highway interfaces, grade separations, and access roads. Other California ports are considering direct cooperative efforts because of the realities of excess capacity, competitive pricing pressures, and ports preserving or capturing market niches. The Port of San Francisco is now weighing the feasibility of leasing two container cranes to its longstanding rival - the Port of Oakland.

Pennsylvania is planning a similar capital support effort for its deep water facilities in Philadelphia as well as shallow draft facilities in the western areas of the state (i.e. Pittsburgh). The Port of Philadelphia is being merged with the Port of Camden N.J. across the Delaware River in a bi-state cooperative effort to reduce the need for duplicated facilities and share in the marketing of Delaware River capabilities with New Jersey. The Port of Philadelphia is also evaluating the feasibility of investing in a reefer warehouse facility in Central America to preserve its fruit trade.

An interesting cooperative port effort in Europe, that has potential application to a trailer ferry type joint venture project between New Orleans and a Mexican Gulf port, is the recent Fastship joint venture undertaken by the ports of Gothenberg (Sweden), and Zeebrugge (Belgium). Although these ports are not involved in vessel operations, the two ports are jointly investing in the development of air-cushioned lifter systems required for loading/unloading operations from Fastships at each of their ports. The ports do not consider themselves competitors, but rather as strategic partners, for serving a market that will have a significant payoff for each port. The Delaware River Port Authority (DRPA) has also approved a $10 million contract with FastShip Atlantic ($7 million in port funds, $3 million in private investment) to help build a fleet of high-speed cargo vessels that will cross the North Atlantic and use the Port of Philadelphia as their hub port for the East Coast of North America. The company would create a companion hub port serving Europe.

APPENDIX 9

REVIEW OF OTHER STATES' PRACTICES IN FINANCING PORT AND INTERMODAL DEVELOPMENT PROJECTS

The following presents the information received through interviews with state transportation and port officials.

Virginia

The State of Virginia in 1988 created the Transportation Trust Fund, which sets aside certain percentages of various tax sources, including general sales, aviation fuels, retail sales, motor fuels, and auto sales. The four modes include highway, airports, ports, and mass transit. Transportation Trust Fund revenues are allocated to funds for each of the four modes; the fund for ports is referred to as the Port Commonwealth Fund.

The Virginia Port Authority submits every two years (Virginia is on a two-year capital outlay cycle) its capital outlay request to the state's Department of Planning and Budget, where it is incorporated into the Governor's capital budget, which is then submitted to the legislature. Because the Port Authority's request is financed through dedicated revenues, legislative approval is considered a rubber stamp process.

Virginia law also requires that the Port Authority administer a $700,000 annual grant program (Aid to Local Ports Program) for projects associated with the movement of commerce. This means that eligible projects will not necessarily be related directly to cargo handling, but could also be used for financing publicly owned reefer facilities for storing seafood products, berths for fishing vessels, and so on. The funds cannot be used for recreational boat marinas. Grant eligibility requires that the applicant, usually a municipality or the Port of Richmond, provide a 50% match, which can be inkind or cash. The applicant must submit an application that presents the economic feasibility of the project; VPA staff reviews the applications in terms of their economic feasibility, and submits the projects for approval from VPA's Board of Commissioners, which has final approval authority for these projects. The Program is funded out of the Port Commonwealth fund, and is treated as part of VPA's operating budget.

As earlier noted, the State also has a Highway Trust Fund, financing from which is based on a combination of criteria including traffic counts, population, and economic impact. Smaller communities tend to complain about the process because it is difficult to use these criteria to compete with larger urban areas. There is no special provision for "intermodal" projects in Virginia, although this is becoming an issue.

A rail corridor/vehicle movement improvement project is now being considered for Hampton Boulevard, a major traffic artery for both freight and passenger transport. The Virginia Department of Transportation and the Port have agreed to discuss joint financing of this project from the Highway and Port Commonwealth funds. Agreement has not yet been reached on how the cost is to be allocated, and there has been some mention that the railroads pick up part of the cost.

Florida

The State of Florida allocates a centralized fund of $10 million/year for port related projects. There is currently a proposal before the state legislature to increase this amount to $25 million. Ports propose projects to the statewide Port Counsel, composed of officials from the transportation, commerce, and community affairs departments and representatives of each of the ports. The Counsel determines in its deliberations which of the projects are to be financed, although no quantitative evaluation criteria are used. It is simply a qualitative assessment of the project. All projects funded from this program require a 50% cost share from non-state sources; there is no restriction on the source of the cost-share requirement, meaning it can come from the federal, county. municipal governments, or from the port itself. Although the assessment of proposed projects is qualitative in nature, officials believe the 50% cost share requirement is enough to discourage the submittal of unworthy proposals.

Florida's ports also have three other options to pursue financing. The first is through self-generated revenues and the second is to proceed (in the case of intermodal projects) through financing by the state's transportation department. In all cases, where U.S. Department of Transportation funding is sought for a highway/intermodal project, ports must proceed through their MPOs, who establish priorities for transportation-related projects. A state transportation department representative sits on the MPO board, and the prioritization of projects is the result of deliberations of the board (with public meeting inputs). No formalized evaluation criteria are established for this aspect of the process; it is more a qualitative assessment of what is needed. The same process is required for all projects that might be financed in part by federal funds, including intermodal projects. All projects going the MPO route are expected to have shared financing. Generally, if federal financing is involved, the federal share is usually 80% (although this is a maximum standard typical of all state construction programs), with the balance provided by other non-federal sources, including the state, municipality, or port. If federal funds are not to be used, and in the event that funding is not received or sought from the port trust fund, ports still have the option to receive state funds. This has been done in the past, primarily for projects that improve port accesses; in this situation, the port will still work with the state transportation department to convince them that they should finance the project; in so doing, they circumvent the MPO process.

Washington

The state of Washington does not allocate funds for port construction. Ports generally cover their own costs for facility improvement and expansion, and their efforts are often the result of "cooperative" decisions made by the Port Cooperative Development Committee of the Washington Public Ports Association. Ports present their plans, and Committee members discuss their merits.

The state changed its treatment of roads that end at ports, classifying them as state roads, thereby being eligible for state and federal funds. The state prioritizes using three criteria for measuring benefit streams; these include time delay/person, time delay/truck, and safety. In previous research, the State determined that addressing the delay/truck "automatically" incorporates the economic benefit aspects for the proposed project, an approach promoted by AASHTO. The evaluation process, however, in the case of port access roads, does not consider the commercial benefits associated with port activity. However, projects that have an intermodal aspect to them are given "bonus" points in their evaluation.

Generally, the ports' attitude is that if the facility is outside the port's gates, then it is a matter of the city or state. However, the state, city, and ports have in the past cost shared on intermodal projects. An example is the ferry queuing area in Seattle, which runs along the access road to the port's terminals and rail yard. Cars would line up waiting for the ferry, blocking gate accesses. To mitigate this, the state, city, and port contributed to finance the construction of a new queuing area under a viaduct in the ferry landing area. This alleviated congestion at the terminals' gates. In this instance, the port contributed about $1 million; the city and state also contributed to the cost, although the exact extent was unknown by the people interviewed.

The Port of Seattle recently completed its Port Access Study, which in part defined the access requirements in light of its future capital construction program. The Study is being reviewed today to determine revenue sources for financing. Near term cost sharing possibilities lie in the Port's current expansion of the APL terminal. The terminal is being doubled in size in a $270 million program. The expansion is requiring modifications of port access routes, and the state, city, and port in the near future will be involved in a process of determining priorities for financing these access improvements.

In 1990/1991, the state of Washington passed the Growth Management Act. Among its various provisions are that the planning processes for project identification are to be done concurrently. This streamlined the project identification/authorization process, as the concurrency approach requires that the port, local government, and state government work together concurrently to move a project forward for authorization. This is done in part through the system of Regional Transportation Planning Organizations.

Although Washington has had examples of cost-sharing projects, there are certain Constitutional limitations that restrict the revenues from certain taxes to highway construction. These same revenue sources are logical sources of financing of intermodal projects as well, but if the project is not a highway or bridge, then these funds cannot be used. Washington has recognized this limitation and will be working in the near future to address it. Also, irrespective of past cost-share efforts, the state wishes to develop a policy specifically addressing intermodal projects. During the next two years, they will be developing a "Multimodal Tradeoff Analysis Process" to determine the prioritization of intermodal projects versus other specific mode projects for financing.

Minnesota

As in most states, Minnesota separates its highway construction program from other capital financing projects. The program is called the Trunk Highway Program, and projects for the category "major construction and reconstruction" are evaluated according to five technical criteria, including sufficiency rating (35%), cost effectiveness (20%), goods movement/market arteries (20%), peak month traffic (5%), and functional class (20%). Projects of other categories (e.g. bridge replacement, bridge repair, resurfacing and reconditioning, etc.) are evaluated using fewer and possibly different criteria. After the technical evaluation, "various considerations and constraints" are applied to candidate projects of each category. These are qualitative factors that are not easily quantifiable, and include such items as statewide priorities, district priorities, regional and local priorities, degree of project readiness, coordination with other modes, system continuity, and many others. For highways, standard policy requires that there be a match to any federal funds used for the project. Generally, projects are funded with 80% federal funds, 10% from the state funds for trunk highway financing, and 10% from other sources, usually from state general funds or a local match (e.g. municipality).

Minnesota has no special set asides for ports. Ports requiring capital assistance go directly to the legislature, and are treated in the same fashion as a university building. However, the State did approve in 1991 the Port Improvement Program, which is a loan fund set up to provide low- or no-interest loans for port in their capital programs. The legislature, however, has never appropriated funds for this program. Also, there is some question if ports would use it anyway. The program is restricted somewhat by limiting loans to 50 % of non-federal sources; the ports, which generally request funds in the $500,000 range, state that the low- or no-interest rate is not worth much to them when considering the investment of time to develop the project.

Wisconsin

Wisconsin's Transportation Trust Fund finances the Harbor Assistance Program, a set aside fund for port capital construction projects that receives about $4 million every two years. In the 14-year history of the program, the largest state contribution has been a $2.3 million dock rehabilitation project at the port of Green Bay, while the smallest project has been a $20,000 mooring pilings repair program at the port at Prairie de Chien. Average project funding has been $596.5 thousand.

The state has an analytical methodology for prioritizing port projects funded by the program, based primarily on four criteria: economic impact, project urgency, project type, and cargo volumes. The benefit/cost ratio must exceed 1 to avoid outright denial for funding. A project is considered "urgent" if the harbor depth is less than what is required for safe navigation, a dockwall is deteriorated to the point that it cannot be used, or cargo/passenger throughput would decrease by 25% or more if the project was not completed. The evaluation methodology also provides for a "pecking" order for project financing: maintenance dredging outside COE jurisdiction is the number 1 priority, dockwall repair/maintenance number 2, maintenance dredging and disposal number 3, and so on. Higher priority is also given to projects with higher amounts of tonnage or waterborne transportation.

The project financing process actually starts with each port/city/county providing a 3-year capital programming plan to the state's Department of Transportation (Bureau of Railroads and Harbors) describing the projects in which they intend to seek federal and/or state assistance. The Harbor Assistance Program has two grant cycles each year, and up to 80% of the total project cost can be financed by the program. The remaining 20% is to come from "local" match, which can come from cities, counties, or the private sector. In those cases where federal financing is sought, the state will cover up to 50% of the non-federal share of the project, with the balance again coming from local government or private sources.

Public ports in Wisconsin are creatures of city or county governments, although they are generally established as independent commissions, but under the auspices of the local government. The state has one "premier" port at Milwaukee; the remaining ports are primarily private terminals for handling specialized cargoes, although the ownership situation is changing for these terminals. This is because only public terminals/ports in the state can receive funds. Therefore, some private terminal operators have transferred ownership to the city as a means for qualifying for Harbor Program funding. The city in turn will lease the facility back to the operator, and collect wharfage within the lease as a means for funding port improvements, such as dredging alongside the berth. For land access routes, the cities are coming back to the operators for contributing to the cost of the improvement.

The state has just completed its statewide intermodal plan, within which is discussed the alternative policies for financing intermodal projects. The state expects that a separate intermodal fund will be established to cover all types of intermodal projects, but it is likely that this will apply to facilities or projects related to trunk highways. Route improvements to ports on trunk highways can be funded under the intermodal access fund, but the port fund is likely to contribute funds for improvements to the gate on a cost shared basis. This appears to be one of only two states surveyed that is seriously considering this possibility.

Oregon

Oregon has two funds targeted towards the port sector. The Navigation Improvements Fund, which currently has $5 million, funds a 50% cost share for capital dredging projects sanctioned by the U.S. Army Corps of Engineers. The cost share may cover feasibility studies as well as actual construction costs. There is no minimum or maximum funding requirement for the fund; rather, ports determine future capital dredging requirements in advance, and the Oregon Ports Association will then lobby for the necessary funding from the state legislature on behalf of all the ports.

The second fund is the Port Revolving Loan fund, which usually provides loans to ports at concessionary interest rates. Current fund assets amount to $10 million, and the loans can be used for any port related project, inside (e.g. warehouse facilities, dock improvements) or outside (e.g. port access roads) the port's gates. Application for a loan requires submittal of financial data to facilitate a thorough financial evaluation by the State Finance Committee, a state entity responsible for approving capital construction financing. The Committee is composed of representatives from the Economic Development Commission as well as other persons appointed by the governor. Loans under this program require that the port provide collateral, such as the land where a facility is to be constructed.

Although legally feasible, ports are discouraged by the Oregon Ports Association from obtaining funds through the legislative budget process. However, ports also have access to two other funds with which they may obtain financing to construct intermodal facilities. One is the Immediate Opportunity Fund, which targets projects not listed in the 6-year highway improvement program. The state set up this fund because it recognized that under certain circumstances the need for certain projects could not be anticipated for consideration in the 6-year highway plan. The 6-year highway plan is the product of the MPO planning process for prioritization of projects, meaning that if a project was not listed in the 6-year plan, it had little hope of being financed. This also offers an additional opportunity to obtain financing for a project that may have been unfairly considered during the MPO process. To be considered, the request for funding must clearly show economic development potential and, in this regard, economic impact data is sought.

For intermodal and other capital projects, ports may also seek funding from the Special Public Works Fund. This Fund also recognized that there may be unanticipated capital construction needs. The caveat here, however, is for job creation. Funding requests must clearly demonstrate the extent of job creation impact directly tied to the project, in the event it comes to fruition. Job creation is related both to the jobs created as a result of construction activity as well as coming from the operation of the facility. Secondary job creation impact is also a consideration.

There is no formal policy or legal requirement that ports or any other entity applying to the above funds share the project costs. However, cost sharing is encouraged through deliberations by the various sponsors, and the cost share can come in the form of cash or in-kind (e.g. detailed facility design, land, etc.).