I. GENERAL DATA

TRANSPORTATION ACCESS

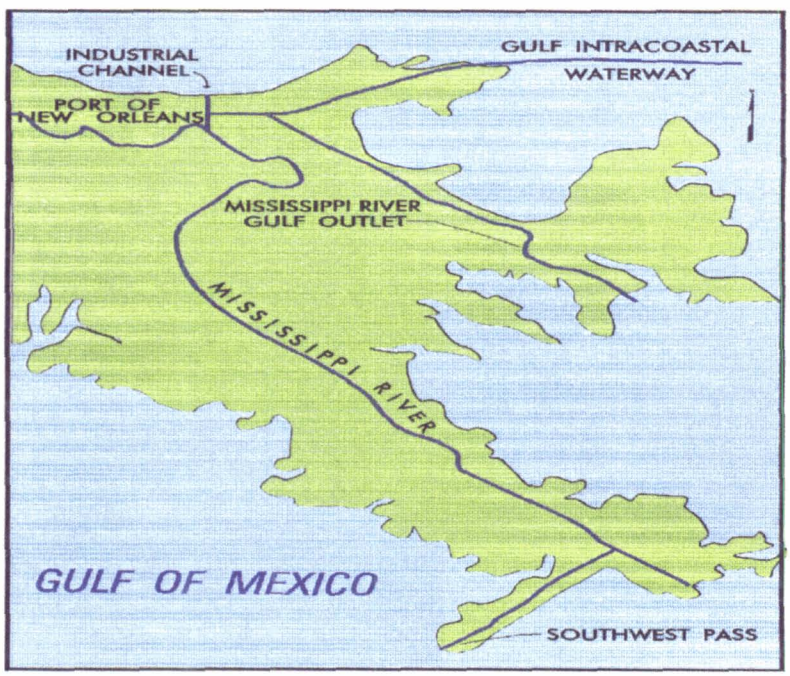
WATER

All together, the New Orleans Port Authority (Dock Board) controls about 13 miles of wharves that support various cargo types. This report analyzes the three terminals that are best for military operations. They are Henry Clay/Nashville, France, and Jourdan. The Henry Clay/Nashville (HC/N) Terminal is on the east bank of the Mississippi River. The France and Jourdan Terminals are on the Industrial Canal.

The Port of New Orleans, Louisiana, is in the southwestern part of the State. The facilities analyzed in this report are about 100 miles upstream (via the Mississippi River) from open water of the Gulf of Mexico.

Entrance to the HC/N Terminal is via the Southwest Pass and the Mississippi River. This route from the Gulf of Mexico is at least 40 feet deep and 500 feet wide. A 1,600-foot-wide by 36-foot-deep MLW turning basin is at the confluence of the Mississippi River Gulf Outlet and the Industrial Canal.

Access to the France and Jourdan Terminals from the Gulf of Mexico is by way of the Mississippi River Gulf Outlet, to the Industrial Canal. This route is at least 36 feet deep and 500 feet wide. In spite of their proximity, vessels cannot access the France and Jourdan Terminals from the Mississippi River. This is due to narrow locks between the Industrial Canal and the river. Ships may turn in the Mississippi River near the HC/N Terminal. In this area, the channel is 35 feet deep MLW and 1,500 feet wide. Ships with a draft greater than 35 feet must turn about 14 miles downstream, where the channel is 40 feet deep by 1,000 feet wide.



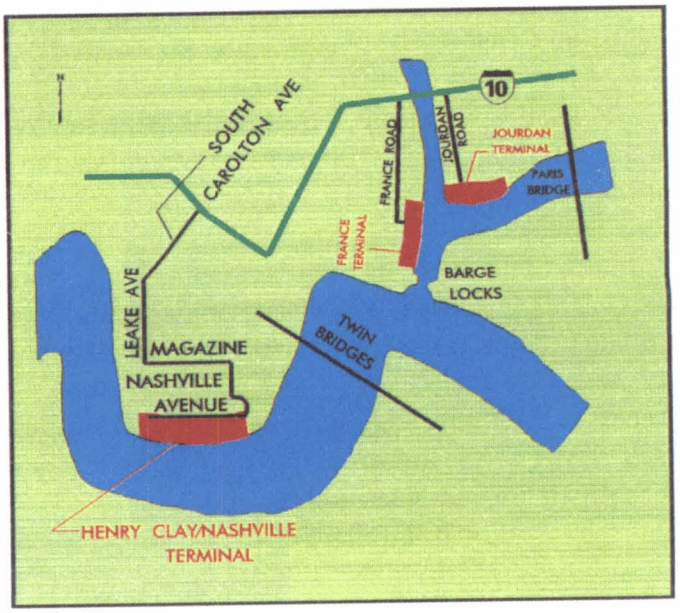
Water Access

Only three bridges cross downstream of the facilities chosen for analysis. The Greater New Orleans Twin Bridges cross the Mississippi River about 5-1/2 miles below the HC/N Terminal. These bridges each have a horizontal clearance of 750 feet and a vertical clearance of 149 feet mean high water (MHW). The Paris Road Bridge is about 5 miles downstream of the France and Jourdan Terminals and crosses the Mississippi River Gulf Outlet. This bridge has a horizontal clearance of 500 feet and a vertical clearance of 137 feet MHW.

	Twin Bridges	Paris Bridge
Upstream Terminal	HC/N	Jourdan & France
Height above MHW	149	137
Width of Channel	750	500

HIGHWAY

An extensive network of highways serves the Port of New Orleans. Interstate Route 10 provides access from the east or west.



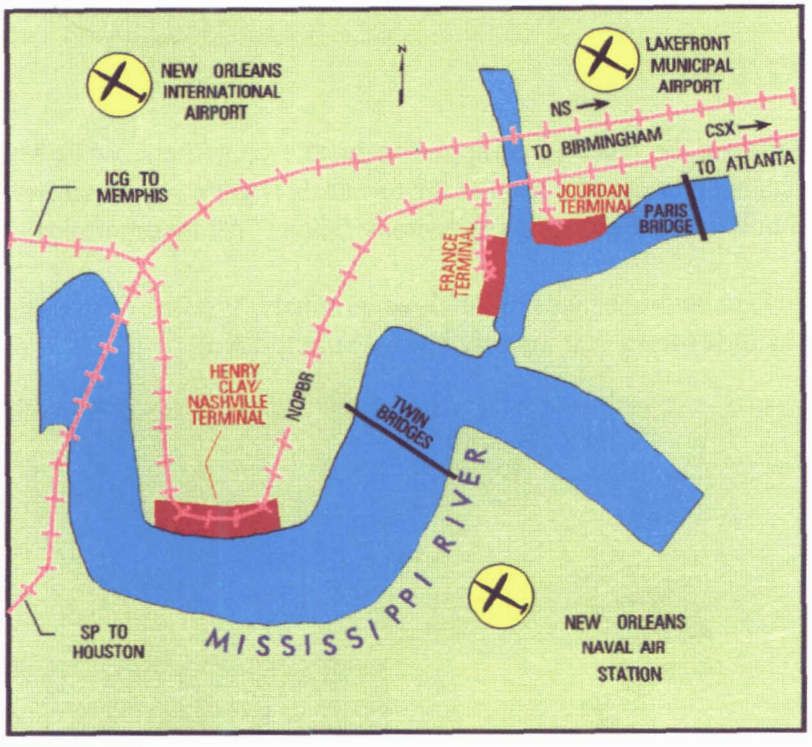
Highway Access

Gate at France Terminal

RAIL

The New Orleans Public Belt Railroad (NOPBR) acts as a switching carrier. The NOPBR serves all public wharves on the Mississippi River and the Industrial Canal.

Within a 12-mile radius of the port are six regional railyards, ranging in capacity from 900 to 2,000 railcars. The terminal's own rail spurs and sidings provide additional railcar storage.



Rail and Airport Access

AIR

Three airports are within a 10-mile radius of the port district of New Orleans. These airports are two commercial fields and one military.

AIRPORTS NEAR THE PORT OF NEW ORLEANS

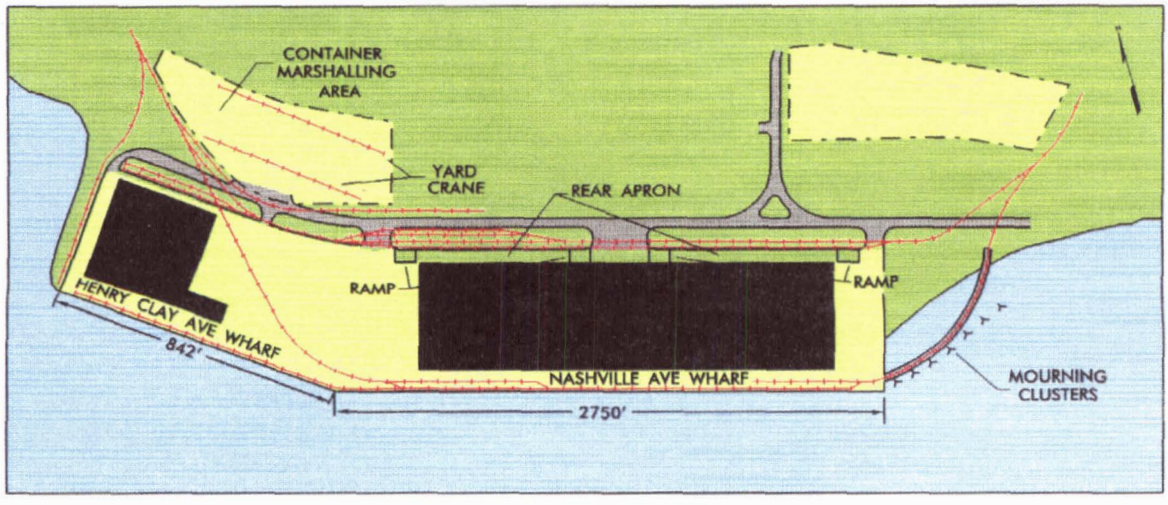
	NEW ORLEANS INTERNATIONAL AIRPORT	LAKEFRONT MUNICIPAL AIRPORT	NEW ORLEANS NAVAL AIR STATION
Main Runway:			
Length	9,200 ft	6,700 ft	8,000 ft
Width	150 ft	150 ft	200 ft

PORT FACILITIES

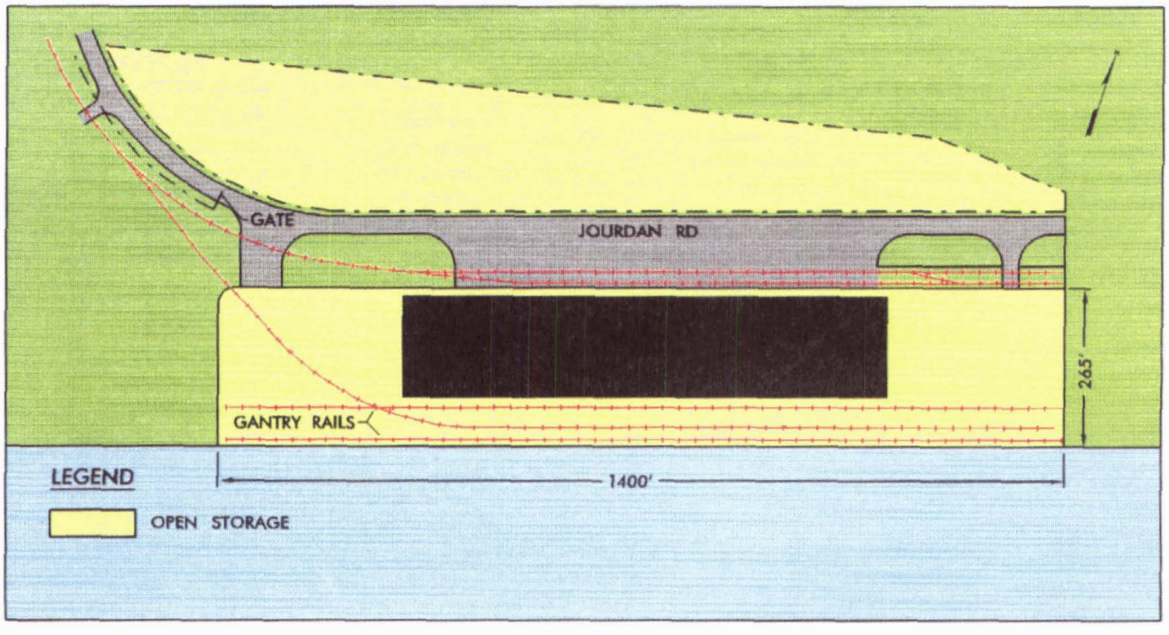
BERTHING

The France Terminal is equipped to handle containers, while HC/N and Jourdan are multicargo terminals. Pier construction at the terminals is generally concrete-filled steel piles, fronting a sheet-steel bulkhead. Fendering is generally timber. All three terminals are lighted for night operations.

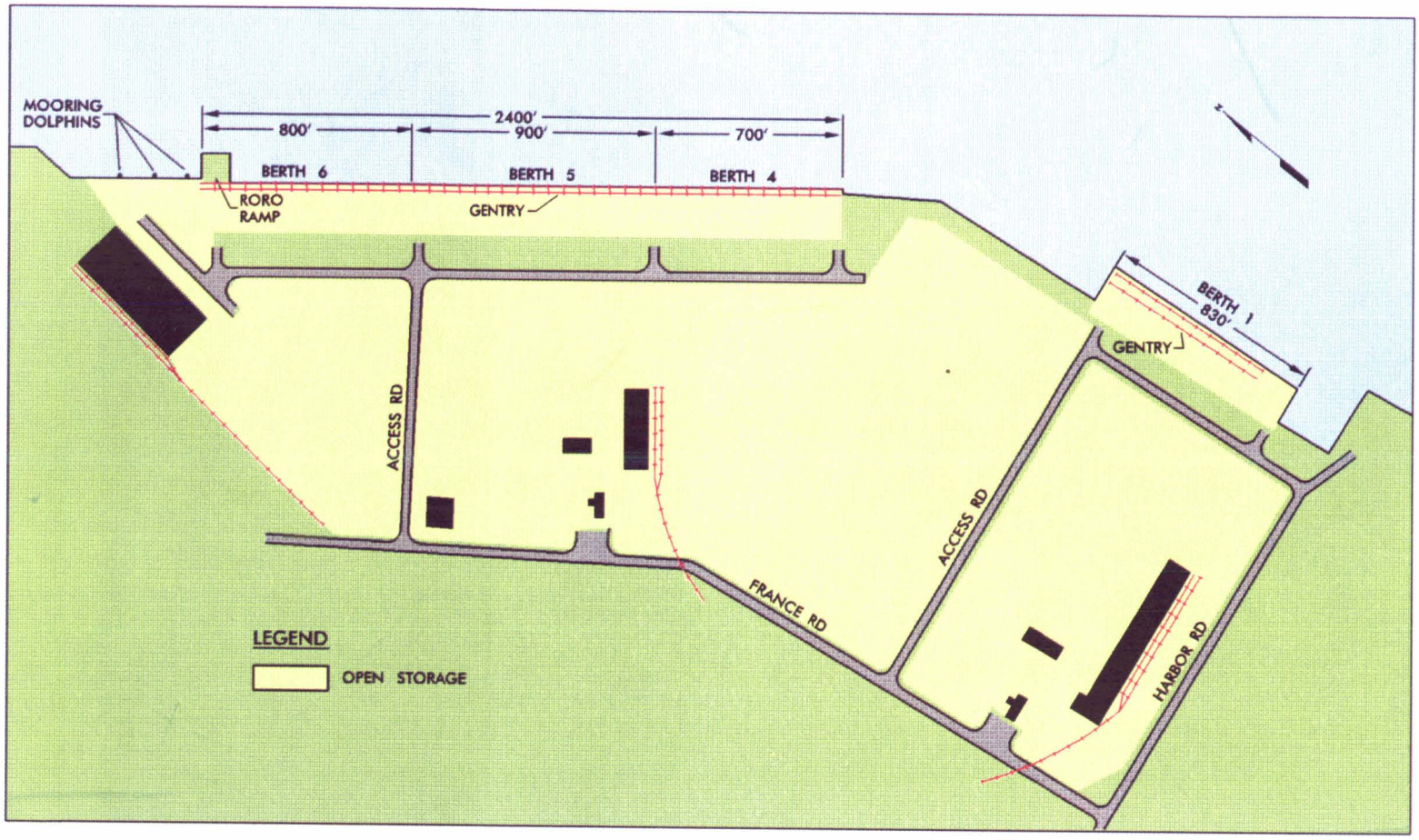
Below are land-use maps of the three terminals. Figures 1 through 3 are aerial views of the terminals and include tables that identify berth characteristics.



Henry Clay/Nashville Terminal Land-Use Map



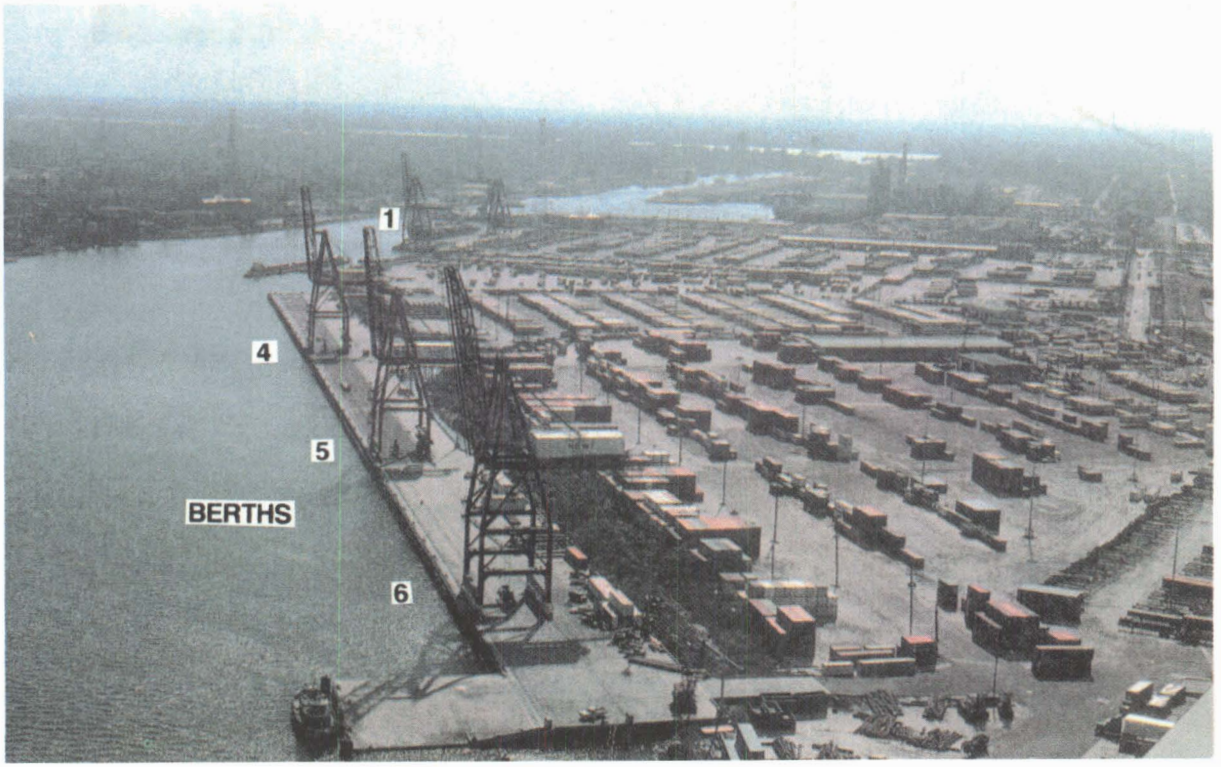
Jourdan Terminal Land-Use Map



France Terminal Land-Use Map

BERTH CHARACTERISTICS OF FRANCE TERMINAL

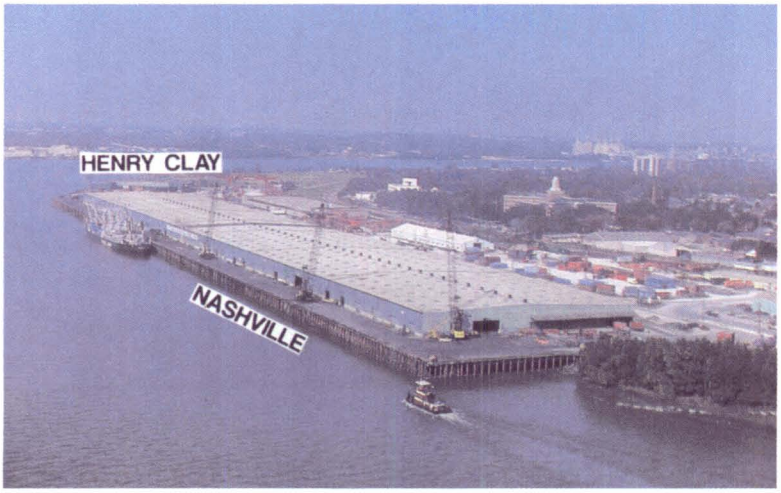
CHARACTERISTICS	*BERTHS*	
	1	4 - 6
Length (ft)	830	2,400
Depth alongside at MLW (ft)	36	36
Deck strength (psf)	750	850
Apron width (ft)	Open	Open
Number of container cranes	2	3
Number of wharf cranes	0	0
Apron lighting	Yes	Yes
Straight-stern RORO facilities	No	No
Apron length served by rail (ft)	0	0



France Terminal (Southward View)

BERTH CHARACTERISTICS OF HENRY/CLAY NASHVILLE TERMINAL

CHARACTERISTICS	BERTHS	
	HENRY CLAY	NASHVILLE
Length (ft)	842	2,759
Depth alongside at MLW (ft)	35	35
Deck strength (psf)	850	850
Apron width (ft)	Open	62
Apron height above MLW (ft)	22	22
Number of container cranes	0	0
Apron lighting	Yes	Yes
Straight-stern RORO facilities	No	No
Apron length served by rail (ft)	842	2,759



Henry Clay/Nashville Terminal (Westward View)

BERTH CHARACTERISTICS OF JOURDAN TERMINAL

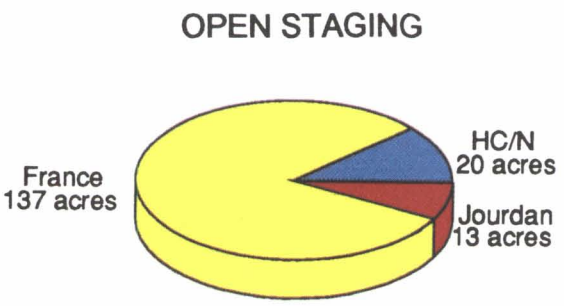
CHARACTERISTICS	BERTH
	JOURDAN
Length (ft)	1,400
Depth alongside at MLW (ft)	36
Deck strength (psf)	850
Apron width (ft)	70
Apron height above MLW (ft)	10
Number of container cranes	1
Apron lighting	Yes
Straight-stern RORO facilities	Yes
Apron length served by rail (ft)	1,400

Jourdan Terminal (Northward View)

STAGING

Open Staging

The three terminals in this report have about 170 acres of open staging. All the open staging is paved. Most of this staging is at the France Terminal.

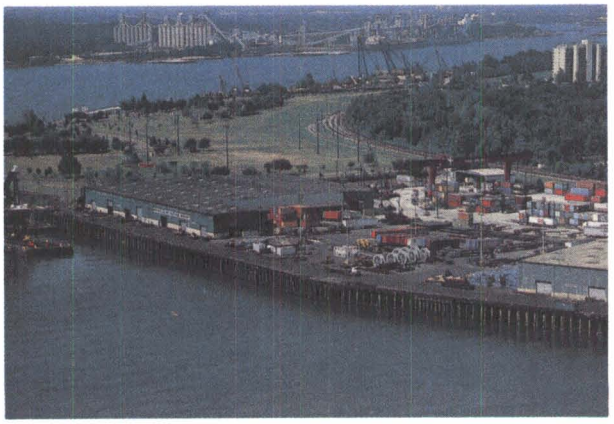


Helicopters can land in the open areas of the France Terminal, or inland of the Jourdan Terminal transit shed. The HC/N Terminal is too congested for helicopters to land.

Open Staging at France Terminal Berth 1

Covered Staging

Six sheds provide about a million square feet of covered storage. The Henry Clay/Nashville Terminal has most of it.

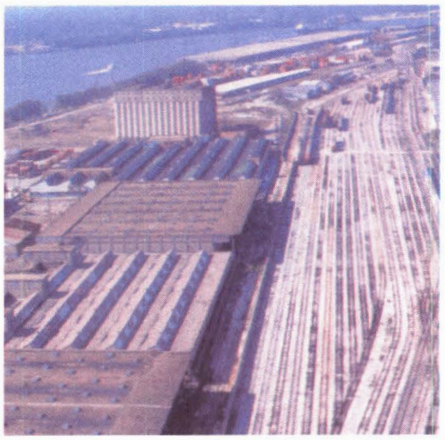


Covered Staging at Henry Clay Berth

RAIL

Rail trackage links the railyards to the port's storage yards, transit sheds, and apron tracks. Apron tracks are at the HC/N and Jourdan Terminals.

Railyards on port property can hold about 1,800 railcars.



Port-Owned Railyard at Napoleon Avenue

HIGHWAY

The France Terminal has two truck scales - one at berth 1 and one at berth 5. HC/N and Jourdan Terminals have none.

UNLOADING/LOADING POSITIONS

Ramps

The port has no permanent rail or truck end ramps; however, it has numerous locations available for the construction of temporary ramps. Two portable end ramps are available. These ramps could support the loading of flatcars or flatbed trailers.

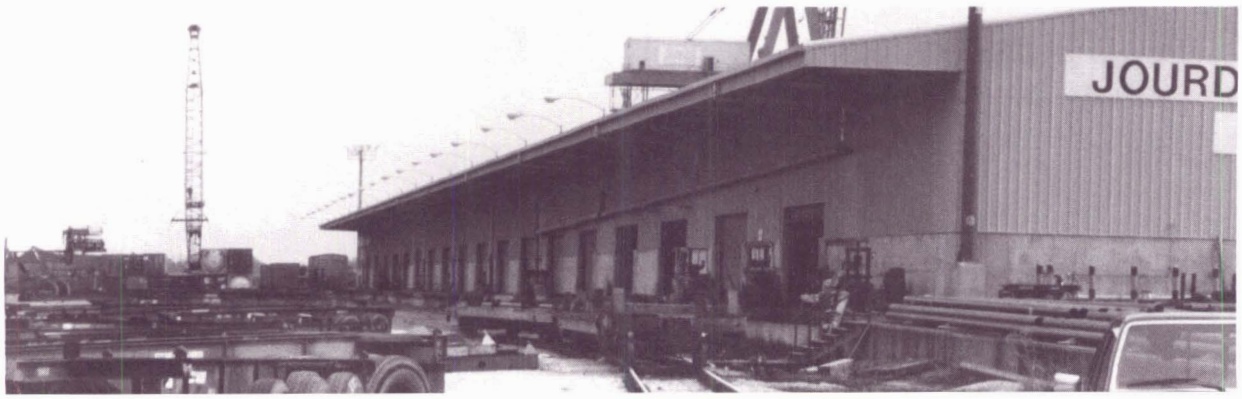
TERMINAL	VAN HANDLING POSITIONS
HC\N	32
Jourdan	10
France	60

Docks

All sheds have truck handling positions. Tracks and fences limit truck access to only one side, on some sheds.

All three terminals have two parallel railcar-level tracks along the inland side of their sheds. A total of 154 boxcars can be handled if placed on both tracks.

TERMINAL	BOXCARS PER TRACK
HC\N	44
Jourdan	15
France	18



Boxcar docks at Jourdan Terminal

MARSHALING AREAS

Onsite

The port has no marshaling areas. All open area within the port is required for staging military or commercial cargo.

Offsite

The New Orleans area is highly developed. It has no areas that are readily available for marshaling.

CONTAINER CRANES

TERMINAL/ BERTH	QUANTITY	CAPACITY (STON)
Jourdan	1*	30
France		
1	2*	30
4 - 6	3	40
*These cranes are not owned by the port authority.		

MATERIALS HANDLING EQUIPMENT

The Jourdan Terminal has a 30-ton container crane. The France Terminal has 5 container cranes.

Other MHE is available from local stevedore and rental companies.

The HC/N Terminal has a transtainer for chassis handling only.

RENTAL MHE

TYPE OF EQUIPMENT	*QUANTITY*	*CAPACITY (STON)*
Mobile Cranes	1	10
	2	15*
	1	25
	1	35
	1	40
Barge Cranes	5	15
	1	35
	3	40
	1	60
	1	75
	4	80
	3	135
Forklifts	over 100	various
*One of these is owned by the Port Authority		

Container Crane

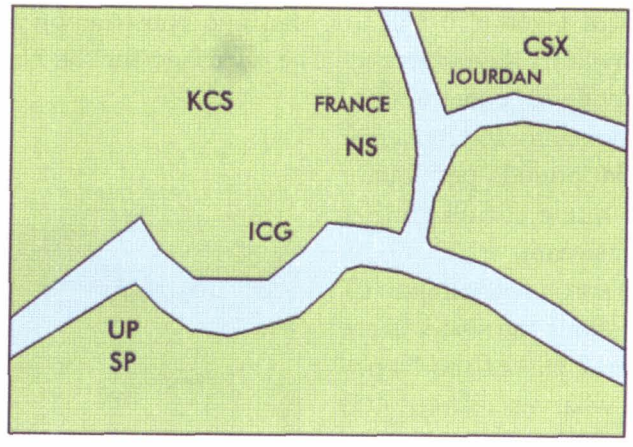
Container Handler

INTERMODAL FACILITIES

Four railroad companies operate intermodal railyards in the New Orleans area.

INTERMODAL RAILYARDS

Rail Company	Staging Spaces	Peak Lifts/Day
CSX	507	275
ICG	228	100
KSC	450	125
NS	225	75
SP	340	275
UP	210	(later)



Intermodal Railyards

FUTURE DEVELOPMENT

The Port of New Orleans has already broken ground for an extensive construction and upgrading project. The construction area of greatest interest for military operations is along the Mississippi River terminals. Smaller projects will improve the France and Jourdan Road Terminals, on the Industrial Canal.

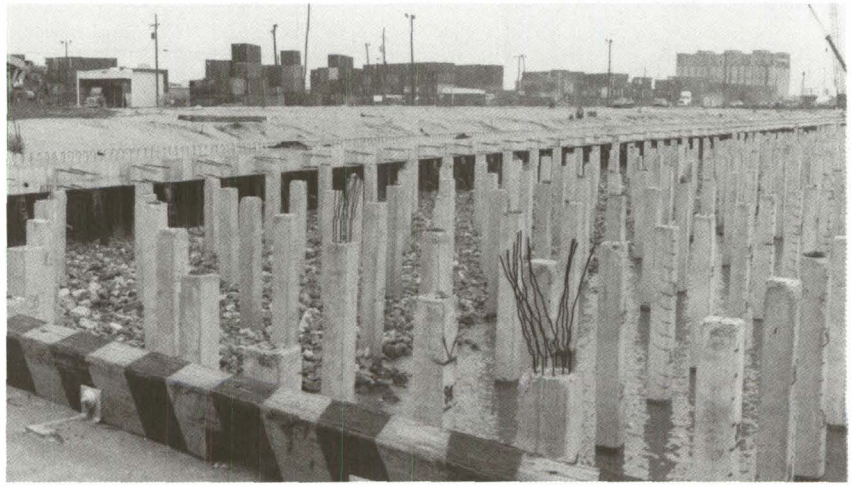
MISSISSIPPI RIVER TERMINALS

Part of the construction and improvement program for the Mississippi River Terminals is to build wharfage from the existing Nashville Avenue Terminal eastward to the Napoleon Avenue Terminal. The New Orleans Port Authority expects Nashville B to be operational in 1996. This will add 3,170 feet of wharfage to the port. Less than 800 feet will front a 150,000-square-foot transit shed and narrow apron. About 13 acres of open staging will be on the open apron and about 37 acres of marshaling will be further inland. Current plans call for container crane rails, but no container crane at this time.

Future Nashville Avenue Terminal

The port also has plans to improve the rail assets at this wharfage. Two gantry cranes will operate inland of the 37-acre marshaling area for intermodal operations. Two tracks will run between the container crane rails to support direct transfer. Tracks will also run to the rear of the transit shed.

Current plans also call for wharfage construction and reinforcement further downstream of the Nashville B development. The wharfage for the Napoleon Avenue Terminal, downstream of the Nashville B construction, will be reinforced from 350 to 800 pounds per square foot rating. Still further downstream, a 200-foot-wide apron will extend 767 feet along the water from the east end of the Napoleon wharves. About 400 feet of this apron will front the existing Milan Street transit shed.

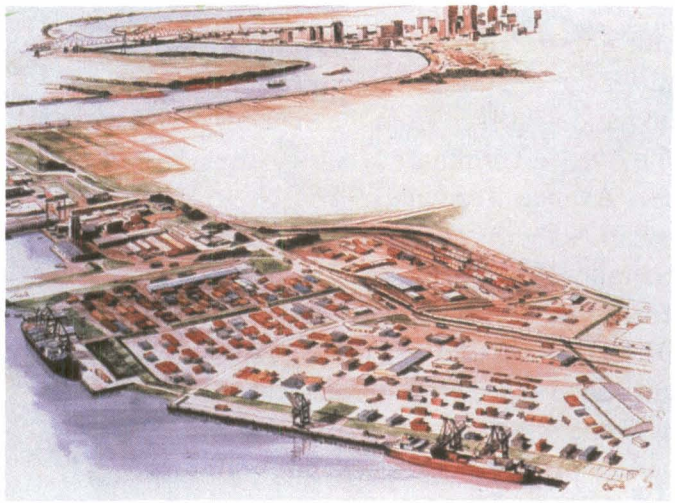


Nashville B Development

These wharfage additions and improvements will provide about 9,500 feet of continuous wharfage. About 4,500 feet of this wharfage will have at least 200 feet of apron width. Water depth along the wharf is unknown, but is expected to be at least 35 feet MLW.

FRANCE ROAD TERMINAL

Most of the projects for the France Road Terminal are still in the planning stage, or are merely reinforcements and maintenance of existing facilities, or are improvements in the flood control network protecting the city. One exception is the addition of paved marshaling areas totaling 8 acres. These areas will support container operations at berths 5 and 6. This pavement will be operational in early 1996.

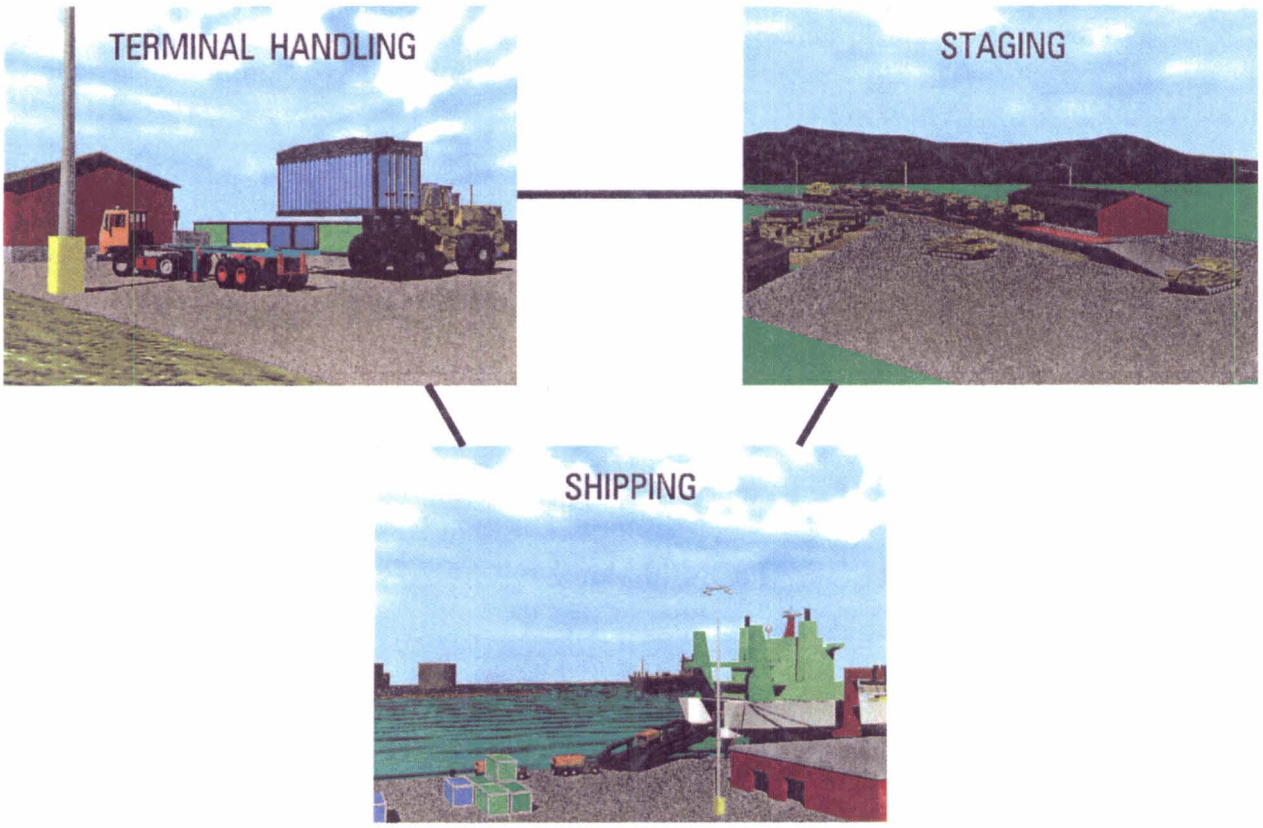


Future France Terminal

II. THROUGHPUT ANALYSIS

GENERAL

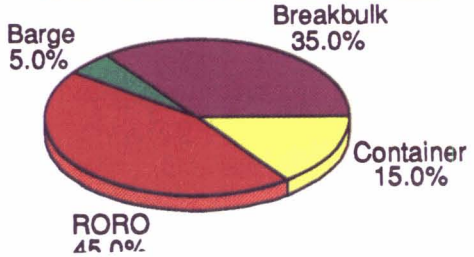
This section evaluates the throughput capability of the Port of New Orleans using the port operational performance simulator (POPS) computer model. The model is based on a weak-link analysis in which each subsystem is analyzed separately and then compared to find the least capable subsystem. The weakest subsystem defines the maximum throughput capability of the terminal. The model yields throughput capability values for three subsystems - shipping, staging, and terminal processing/ handling - in short tons (STON) per day.



Terminal Throughput Subsystems

The analysis assumes that 80 percent of the port facilities will support military deployments. Also, the ship mix is based on Desert Shield and Desert Storm statistics. We weighted the percentages to adjust for differences in cargo deadweights and expectations for future deployments.

SHIP MIX PERCENTAGES



RECEPTION/HANDLING

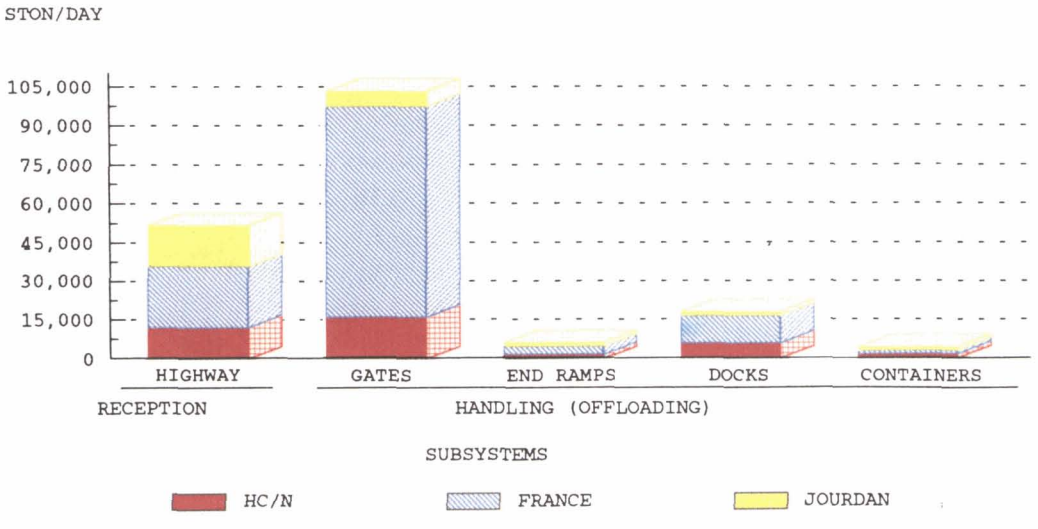
HIGHWAY

Interstate 10 provides access to the various terminals at the Port of New Orleans. Access to the HC/N Terminal is via Nashville Avenue. Access to the France Terminal is via France Road. Access to the Jourdan Terminal is via Jourdan Road. Five gates allow access into these three terminals. Three of the gates access the France Terminal. The road network in and out of terminals, including the gate processing of vehicles, could handle more than 42,000 STON of equipment and supplies per day.

Roadable vehicles in convoys will process directly to the staging areas. Vehicles on commercial or military flatbed trailers without integral ramps will offload at portable ramps. The port has no permanent truck end ramps at any of these terminals. Our analysis assumes one portable ramp inland of the HC/N terminal, one portable ramp inland of the Jourdan Terminal, and two portable ramps inland of the France Terminal. These four ramps could offload more than 6,400 STON from flatbed trailers per day.

Supplies in van semitrailers will proceed to the 102 van-handling positions. These docks can offload about 18,000 STON of van semitrailer-shipped material per day. Containers on chassis will move to the staging areas to be offloaded by cranes. The transtainer at the HC/N Terminal, cranes at the France Terminal, and a container handler at the Jourdan Terminal could offload about 4,500 STON of cargo from their chassis per day.

HIGHWAY RECEPTION/HANDLING CAPABILITY



RAIL

Rail reception at all three terminals is very good, with four major railroad companies accessing the New Orleans area. Port-owned railyards at or near the three terminals can hold about 1,800 railcars.

RAIL DELIVERY

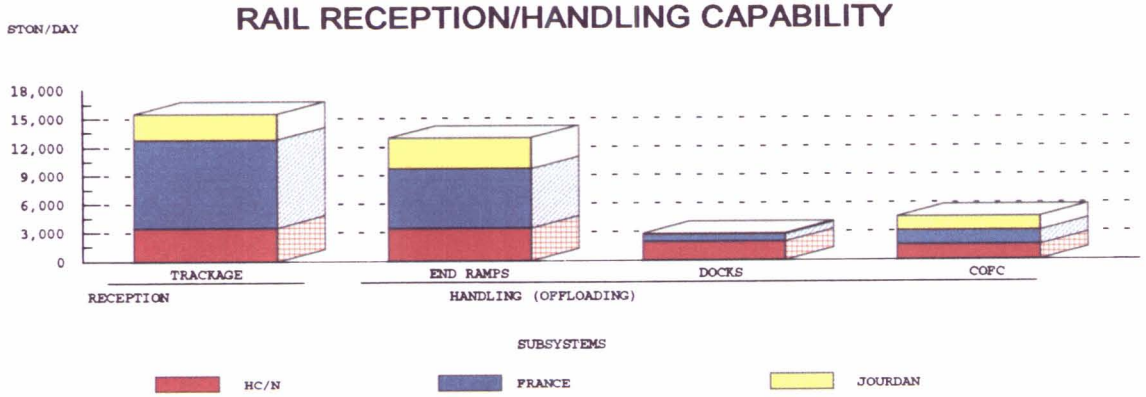
Terminal	*Train Length*	*Trains per Day*
HC/N	50	2
France	80	3
Jourdan	75	1

Vehicles on flatcars could be offloaded using four portable end ramps. Boxcars could be offloaded at the transit sheds, where about 102 boxcar handling positions are available. Containers could be offloaded with a container handler at each terminal.

PORTABLE END RAMP LOCATIONS AND LENGTHS

Location	*Railcars*
HC/N behind shed	20
France berth 6 CFS	5
France railyard	10
Jourdan behind shed	9

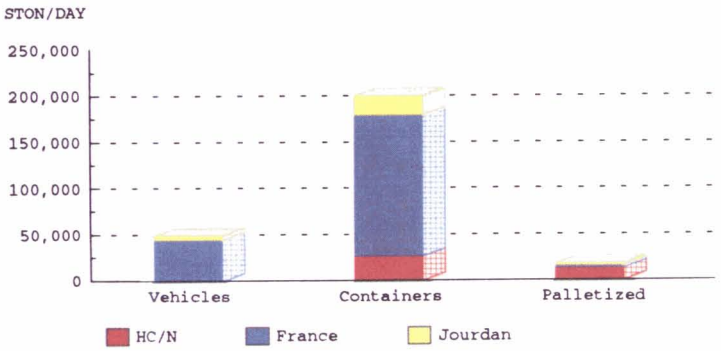
RAIL RECEPTION/HANDLING CAPABILITY



STAGING

The three terminals have about 175 acres of open staging. Most of it is at the France terminal. They also have more than a million square feet of covered storage. Our analysis does not include the HC/N Terminal for RORO staging. The apron height and water depth are insufficient for any RORO ship to berth.

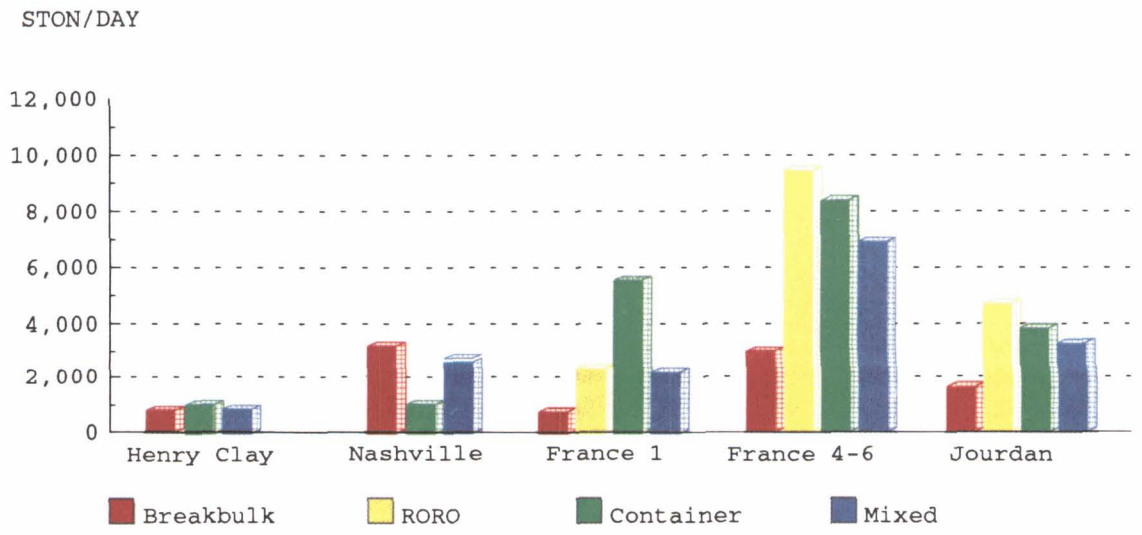
STAGING CAPABILITY



SHIPPING

Throughputs shown below for each terminal are based on various factors, including MHE used, loading, operational, and berth usage rates, as well as berth/ship compatibility.

BERTH THROUGHPUT CAPABILITY



The berth/ship compatibility for various vessel types are shown in tables 1 through 3. The tables shows, for each type of ship, the number of vessels that can be accommodated at each berth. They also provide the limitations that can hinder shipping operations.

The type of ship preferred at each berth is based on the methodology described in the appendix. The evaluation is based on a snapshot view of the current physical characteristics of the berths and the MHE available. The evaluation gives no considerations for enhancements, such as equipment.

The France Terminal berths provide the largest throughput capacity for container and RORO vessels. Berth 4-6 is the best berth, because of its length, cranes, and RORO ramp.

PREFERENCE BERTH SELECTION

BERTH	*BB*	*RORO*	*CNTNR*
Henry Clay/Nashville			
HC	1	-	-
N	1	-	-
France			
1	5	3	2
4 - 6	4	2	1
Jourdan			
	3	1	3

TABLE 1
SUMMARY OF BERTHING CAPABILITIES OF HENRY CLAY/NASHVILLE TERMINAL

VESSEL	Berths	
	Henry Clay	Nashville
Breakbulk	1	5
C3-S-33a	1	5
C3-S-37c	1	5
C3-S-37d	1	5
C3-S-38a	1	4
C4-S-1a	1	4
C4-S-1qb and 1u	1	4
C4-S-58a	1	4
C4-S-65a	1	4
C4-S-66a	1	4
C4-S-69b	1	4
Seatrain		
GA and PR-class	1	4
Barge		
LASH C8-S-81b	1	3
LASH C9-S-81d	a,c	a
LASH lighter	6	19
SEABEE C8--S-82a	a,c	a
SEABEE barge	4	13
RORO		
Comet	d,i,j	d,o
C7-S-95a/Maine-class	i,j	i,j
Ponce-class	h	b,h
Great Land-class	h	b,h
Cygnus/Pilot-class	i,j	i,j
Meteor	d,i,j	d,o
AmEagle/Condor	i,j	i,j
MV Ambassador	d	d
FSS-class	c	i,j,n
Cape D-class	i,j	i,j
Cape H-class	a	a
Container		
C6-S-1w	1,e	4,e
C7-S-68e	1,e	3,e
C8-S-85c	1,e	3,e
Combination		
C5-S-78a	1,e	4,e
C5-S-37e	1,e	4,e

a = maximum vessel draft limited to berth depth
b = inadequate apron width
c = inadequate berth length
d = no straight stern-ramp facilities
e = no container-handling equipment
f = inadequate berth depth, adequate anchorage depth
g = inadequate channel depth
h = no shore-based ramps available
i = insufficient ramp clearance at low tide
j = insufficient ramp clearance at high tide
k = excessive ramp angle at low tide
m = excessive ramp angle at high tide
n = parallel ramp operation only
o = insufficient apron width for side-ramp operation

Note: Ramp clearance and ramp angle based on maximum vessel draft.

TABLE 2

SUMMARY OF BERTHING CAPABILITIES OF FRANCE TERMINAL

VESSEL	Berths	
	1	4 - 6
Breakbulk	1	4
C3-S-33a	1	4
C3-S-37c	1	4
C3-S-37d	1	4
C3-S-38a	1	4
C4-S-1a	1	4
C4-S-1qb and 1u	1	4
C4-S-58a	1	4
C4-S-65a	1	4
C4-S-66a	1	4
C4-S-69b	1	3
Seatrain		
GA and PR-class	1	4
Barge		
LASH C8-S-81b	1	2
LASH C9-S-81d	a,c,g	a,g
LASH lighter	5	17
SEABEE C8--S-82a	a,c,g	a,g
SEABEE barge	4	12
RORO		
Comet	d,i,j	i,j
C7-S-95a/Maine-class	1	3
Ponce-class	h	h
Great Land-class	h	h
Cygnus/Pilot-class	1	3
Meteor	d,i,j	i,j
AmEagle/Condor	i,j	i,j
MV Ambassador	d	4,m
FSS-class	c	2
Cape D-class	i,j	i,j
Cape H-class	1	3
Container		
C6-S-1w	1	3
C7-S-68e	1	3
C8-S-85c	1	2
Combination		
C5-S-78a	1	3
C5-S-37e	1	3

a = maximum vessel draft limited to berth depth	h = no shore-based ramps available
b = inadequate apron width	i = insufficient ramp clearance at low tide
c = inadequate berth length	j = insufficient ramp clearance at high tide
d = no straight stern-ramp facilities	k = excessive ramp angle at low tide
e = no container-handling equipment	m = excessive ramp angle at high tide
f = inadequate berth depth, adequate anchorage depth	n = parallel ramp operation only
g = inadequate channel depth	o = insufficient apron width for side-ramp operation

Note: Ramp clearance and ramp angle based on maximum vessel draft.

TABLE 3

SUMMARY OF BERTHING CAPABILITIES OF JOURDAN TERMINAL

VESSEL	Berth Jourdan
Breakbulk	
C3-S-33a	2
C3-S-37c	2
C3-S-37d	2
C3-S-38a	2
C4-S-1a	2
C4-S-1qb and 1u	2
C4-S-58a	2
C4-S-65a	2
C4-S-66a	2
C4-S-69b	2
Seatrain	
GA and PR-class	2
Barge	
LASH C8-S-81b	1
LASH C9-S-81d	a,g
LASH lighter	10
SEABEE C8--S-82a	a,g
SEABEE barge	7
RORO	
Comet	i,j
C7-S-95a/Maine-class	1
Ponce-class	b,h
Great Land-class	b,h
Cygnus/Pilot-class	2
Meteor	i,j
AmEagle/Condor	i,j
MV Ambassador	2,m
FSS-class	1,n
Cape D-class	i,j
Cape H-class	1
Container	
C6-S-1w	2
C7-S-68e	1
C8-S-85c	1
Combination	
C5-S-78a	2
C5-S-37e	2

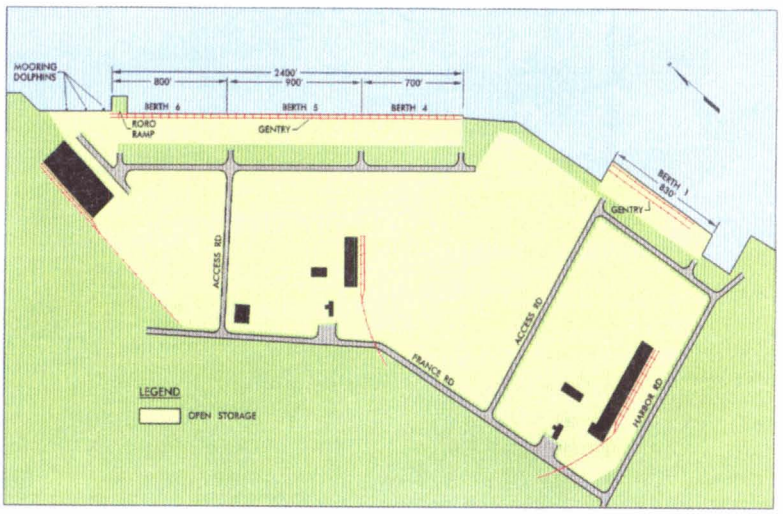
a = maximum vessel draft limited to berth depth	h = no shore-based ramps available
b = inadequate apron width	i = insufficient ramp clearance at low tide
c = inadequate berth length	j = insufficient ramp clearance at high tide
d = no straight stern-ramp facilities	k = excessive ramp angle at low tide
e = no container-handling equipment	m = excessive ramp angle at high tide
f = inadequate berth depth, adequate anchorage depth	n = parallel ramp operation only
g = inadequate channel depth	o = insufficient apron width for side-ramp operation

Note: Ramp clearance andramp angle based on maximum vessel draft.

III. APPLICATION

GENERAL

In this section, we evaluate the port's throughput capability for deploying a notional mechanized infantry division using mainly FSS vessels. The Planning Orders Digest, issued by MARAD, does not include agreements for military use of the Port of New Orleans. However, this analysis will consider what facilities would likely support military operations, in place of planning orders. Of the three terminal studied, military operations would likely occur at the France Terminal



France Terminal

REQUIREMENTS

The likely requirement for the Port of New Orleans is to deploy a notional mechanized infantry division in 6 days of reception and throughput. The division has to move about 7,800 vehicles and 600 containers. The movement to the port will require 1,055 (176 per day) railcars using the convoy/rail option. Under this option, about 3,654 (609 per day) roadable vehicles would be driven and about 2,321 (137 per day) would be towed.

MECHANIZED INFANTRY DIVISION

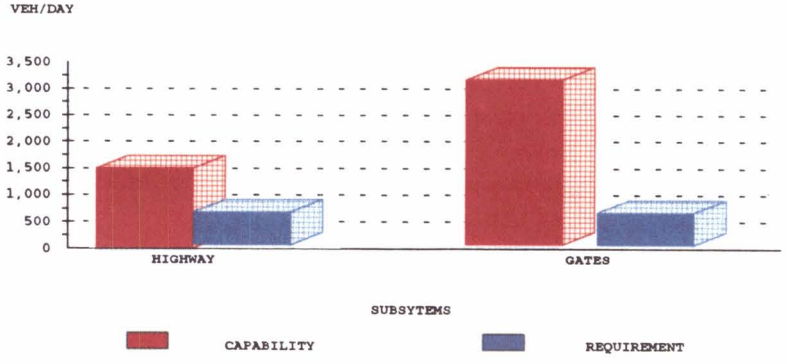
Total Equipment	
Volume	274,518 MTON
Weight	95,019 STON
Area	1,422,844 SQ FT
Vehicles	7,800
Containers	600

TERMINAL HANDLING

HIGHWAY

Vehicles and containers on chassis would access the terminals through the three-lane gate at berth 5-6, off France Road. Both the access road and the gate can handle more than 1,500 vehicles per day.

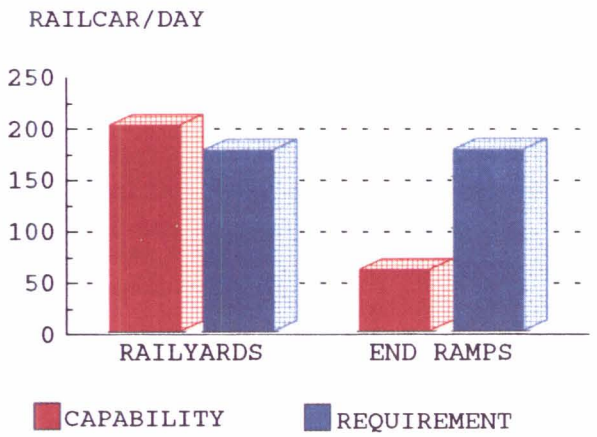
HIGHWAY INPROCESSING CAPABILITY



RAIL

The classification yards near the France Terminal could receive about 200 railcars per day. The two portable rail end ramps could offload 15 flatcars every 5 hours, or 60 per day. This offloading capability is insufficient to meet the requirement. Additional offsite portable end ramps are required.

RAIL INPROCESSING/HANDLING CAPABILITY

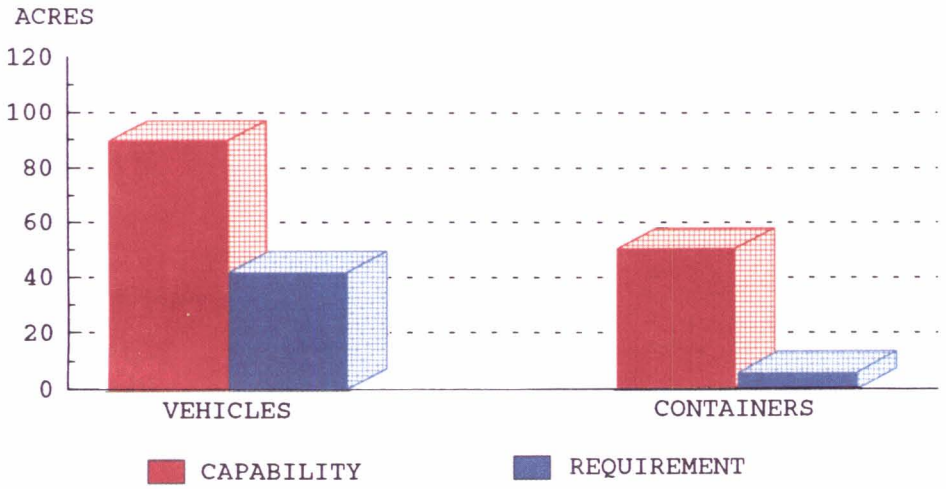


STAGING

Ten FSS-sized ships are required to deploy the entire division. This analysis assumes that current downsizing continues, and that 9 FSS-sized ships will deploy an entire notional mechanized infantry division. Three ships will depart every two days. Because of this, the staging requirement is to support three sustained loading operations. Although an FSS-load of cargo can be staged and loaded on 10 acres, 16 acres are required for sustained loading operations. Of these 16 acres, about 2 acres are required for the staging of the 73 containers for each FSS. The three simultaneous ship loading operations will require 48 acres of open staging, of which about 6 acres are dedicated to containers.

There are 137 acres of open staging that could support military operations. The France Terminal has enough staging area for the three simultaneous FSS-loading operations. The France Terminal has sufficient open staging to support the requirements.

OPEN STAGING CAPABILITY



SHIPPING

Although this analysis assumes that only nine FSS-sized ships can deploy the notional mechanized infantry division, the table at right provides ship quantities for the current division size. The number of ships required depends on the shipping mix selected. The best ship mix would consist of all eight FSS ships, plus two Cape H RORO ships.

FSSs and Cape H RORO ships cannot berth at the France Terminal. This is because the clearance below the Paris Road bridge (137 feet above MHW) restricts light FSSs and Cape H RORO ships from passing. For this reason, the France Terminal cannot meet the requirement to deploy the division by FSSs.

UNIT MOVEMENT REQUIREMENTS
MECHANIZED INFANTRY DIVISION

	Vessel Types			
Loading Condition Sample Ship Mix	FSS (ROR)/Comb)	Cape H (RORO/Comb)	C3/C4 (Breakbulk)	C6/C7/C8 (Container)
Minimum Containerization:				
All FSS*	8.00	1.93		
FSS and Cape H	6.69	3.00		
All Breakbulk			37.88	
Maximum Containerization:				
FSS and Container	7.95			2.00
FSS, Cape H and	4.67	3.00		2.00
Breakbulk and Container			29.61	2.00

*Only eight FSS are available. Unit shipping requirements exceed the capacity of these eight vessels. Other vessel types are required to make up the FSS shortfall (Cape H).

Legend:
RORO - roll on/roll off
FSS - fast sealift ship

Source: MTMCTEA Report OA 90-4f-22, Deployment Planning Guide, Aug 91.

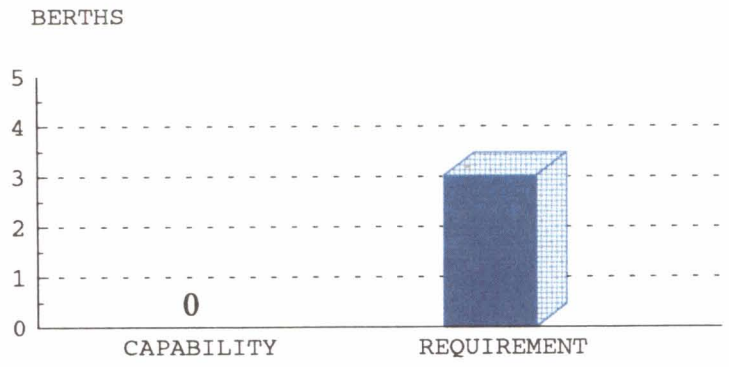
SUMMARY

Although the France Terminal has abundant open paved staging, it cannot accommodate FSSs. The port receiving capabilities are adequate, provided additional offsite rail end ramps are used.

RECOMMENDATION

Designate only small RORO vessels to deploy military equipment from the France or Jourdan Terminal because of bridge and berth limitations.

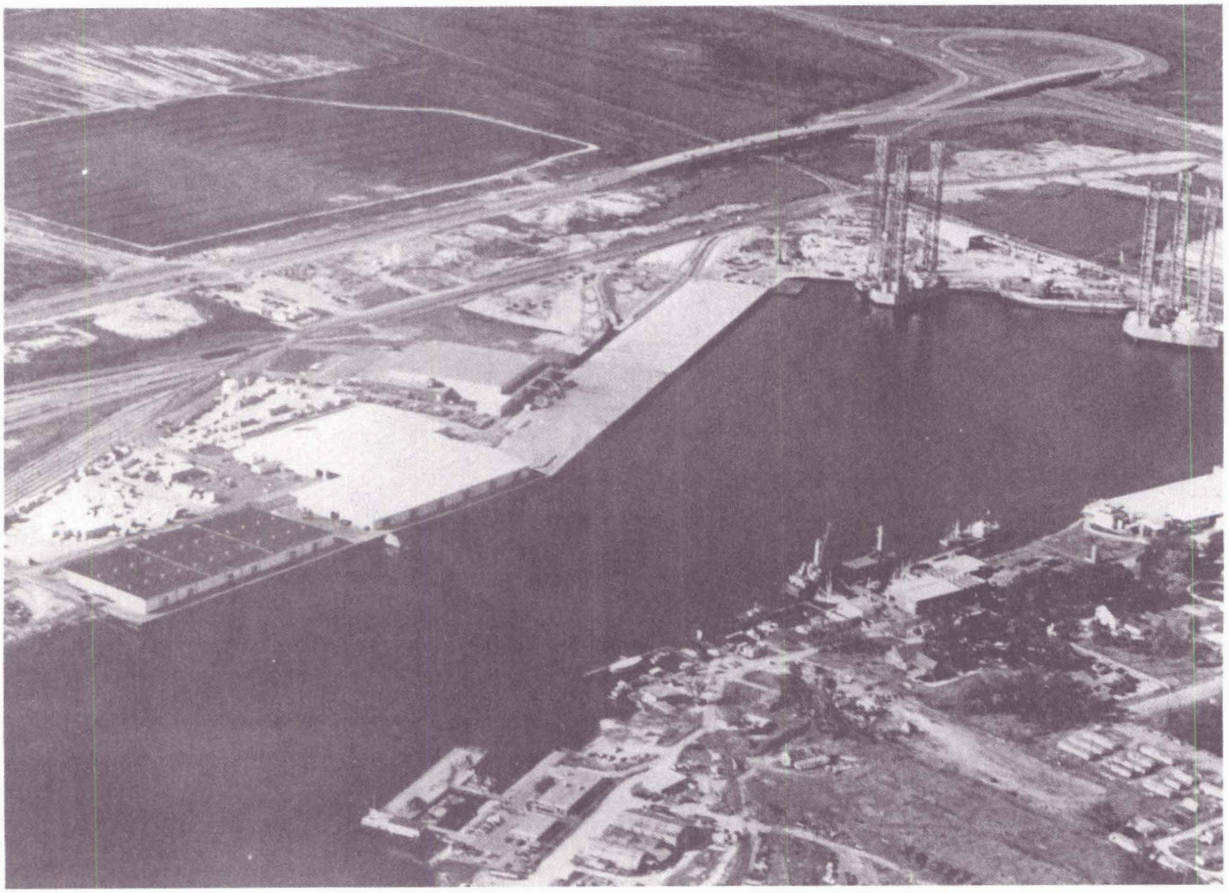
FSS SHIPPING CAPABILITY



PASCAGOULA

PORT OF PASCAGOULA

PASCAGOULA, MISSISSIPPI



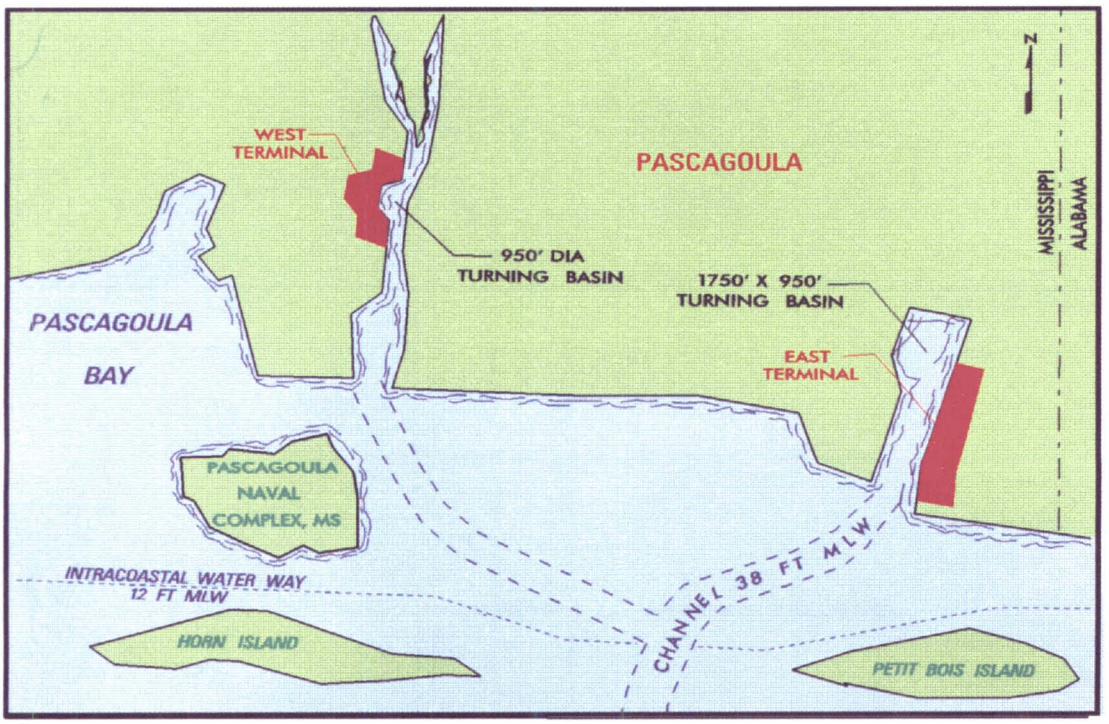
I. GENERAL DATA

TRANSPORTATION ACCESS

WATER

The Port of Pascagoula is in the southeastern tip of Mississippi, about 35 miles southwest of Mobile, Alabama. It consists of two terminals (West and East), which are about 11 miles apart by road.

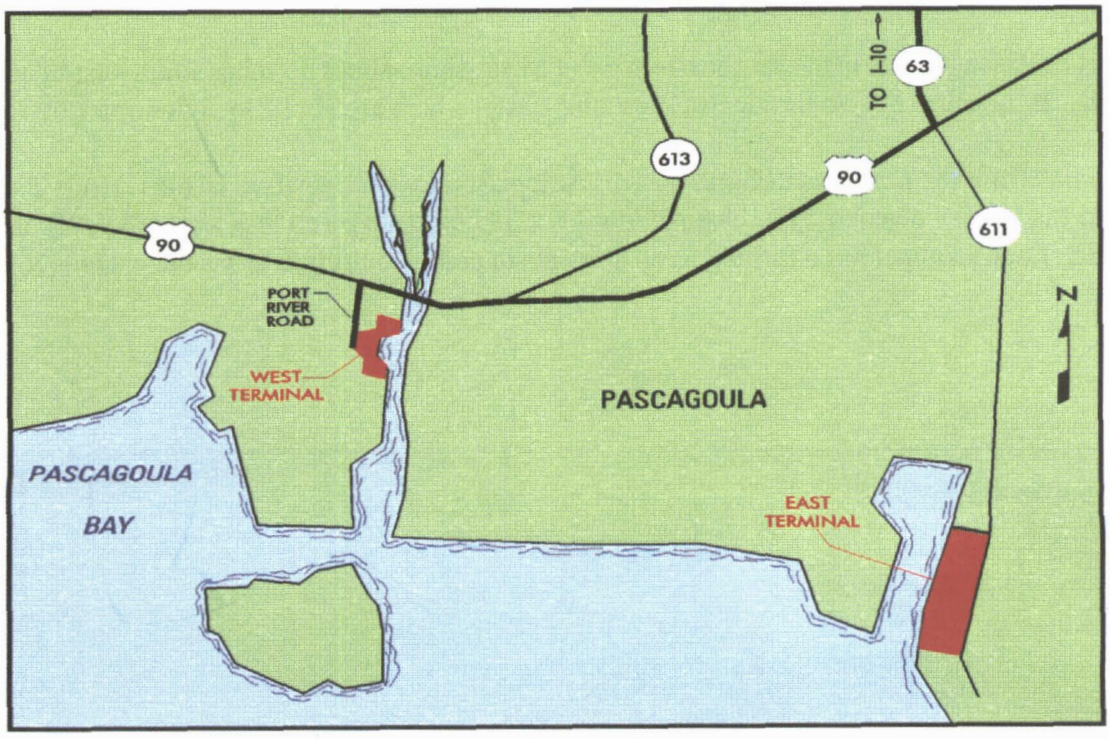
The channel from the port cuts through the Mississippi Sound, between two islands (Horn and Petit Bois), to the Gulf of Mexico. The channel is at least 38 feet deep mean low water (MLW) and 225 feet wide. Each terminal has a turning basin at its north end. No bridges cross the channel to either terminal.



Water Access

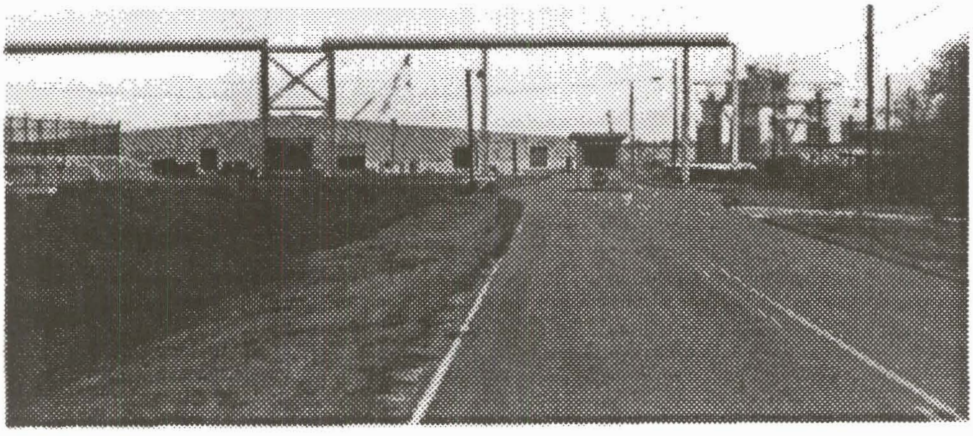
HIGHWAY

The Port of Pascagoula has access to Interstate Route 10 and US Route 90. From the East Terminal, access to I-10 and US 90 is via Mississippi Routes 611 and 63. Access to US 90 from the West Terminal is direct via Port River Road.



Highway Access

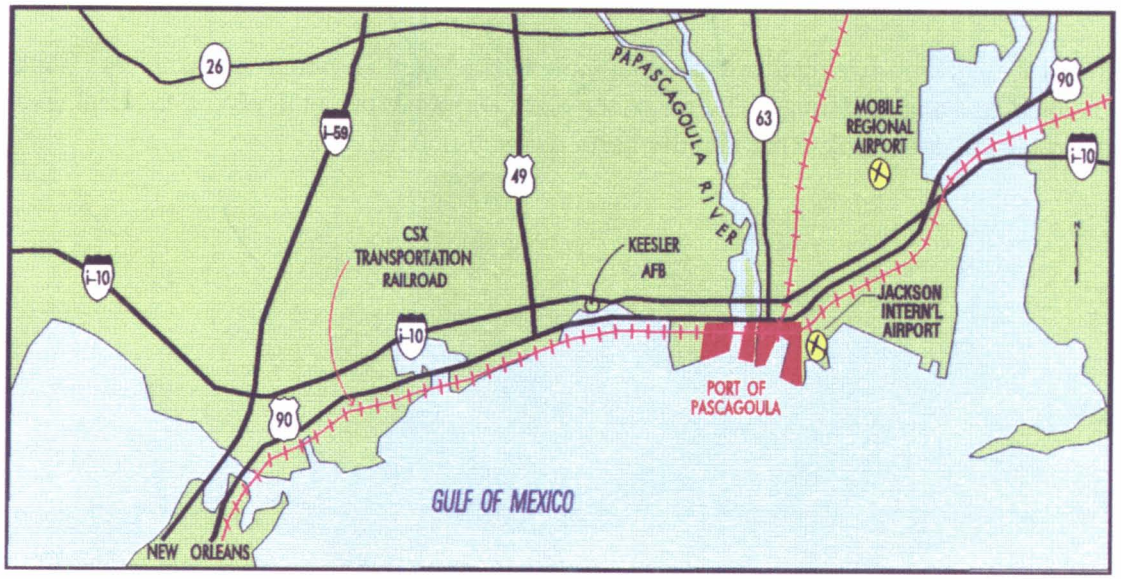
Each terminal has only one gate. The roads within the port are generally two laned. The terminals have very little congestion, except during commuting hours at the West Terminal. Access roads to the West Terminal are shared with the adjacent shipyard.



Gate at East Terminal

RAIL

The CSX Railroad serves the Port of Pascagoula and provides switching services. One track runs to each of the two terminals. Each terminal has a port-owned railyard, and a CSX railyard within 1 mile. These railyards have a capacity of 35 to 50 railcars. Rail clearances are sufficient for bilevel and trilevel railcars. However, no ramps are available.



Rail and Air Access

AIRPORTS

Mobile Regional Airport is the nearest major commercial airport. The nearest military airfield is Keesler Air Force Base.

	MOBILE REGIONAL AIRPORT	*JACKSON INT AIRPORT*	*KEESLER AIR FORCE BASE*
Location			
Distance	East	North	West
Direction	35 miles	6 miles	25 miles
Main Runway			
Length	8,500 feet	8,500 feet	5,030 feet
Width	150 feet	150 feet	150 feet

PORT FACILITIES

BERTHING

The Port of Pascagoula is a two-terminal multicargo port with marginal wharves. The West Harbor has two general-cargo berths, which are 1,044 and 1,450 feet long. The East Harbor terminal has five berths, which are 516 to 737 feet long. Wharf construction at both terminals is concrete decking supported by concrete piles. All berths are fronted with timber fendering. Lighting is good except for berths C and D, which will require portable lighting for night operations.

Figures 1 and 2 are a land-use map and an aerial view of the West Terminal, respectively. Figures 3 and 4 are a land-use map and an aerial view of the East Terminal, respectively. The aerial views of the terminals also include tables that identify berth characteristics.

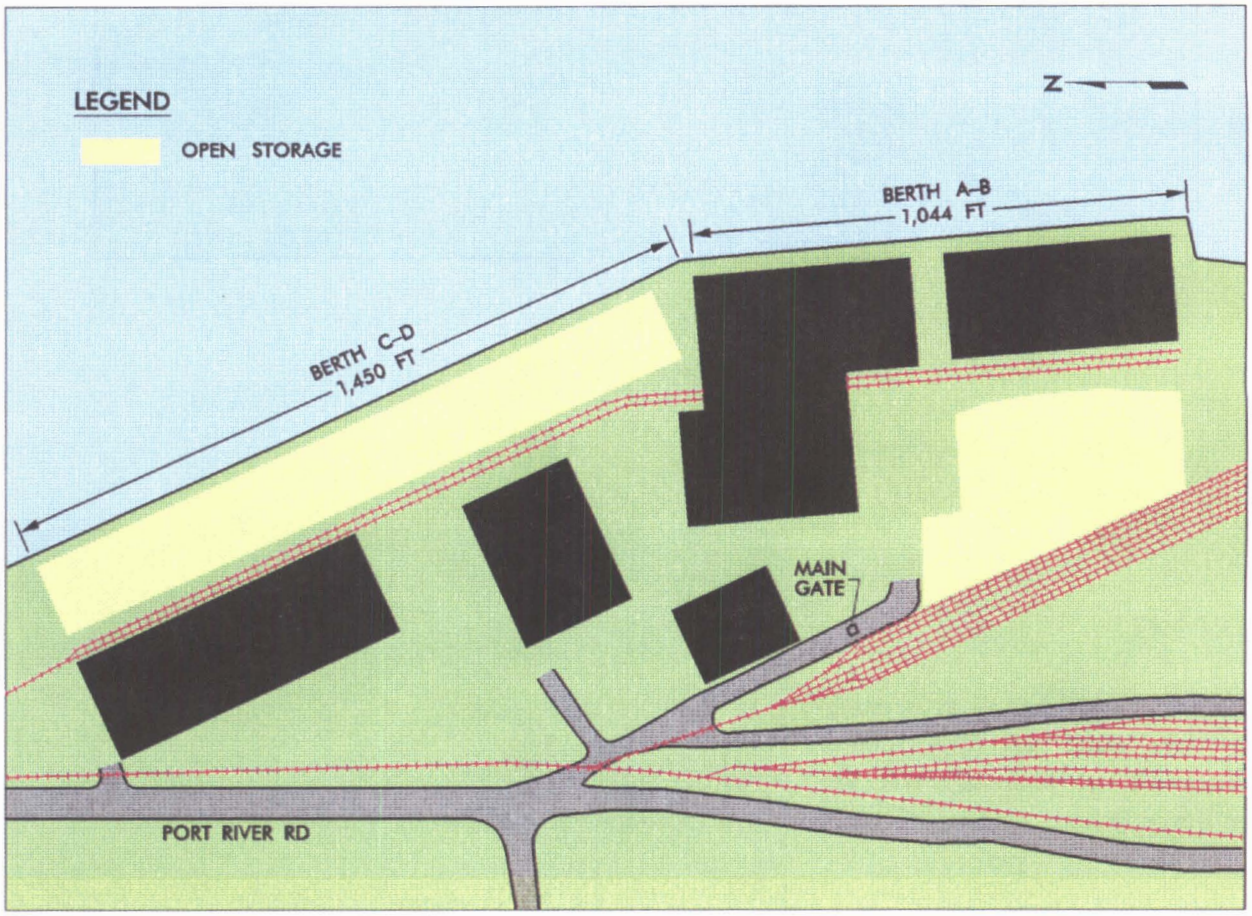
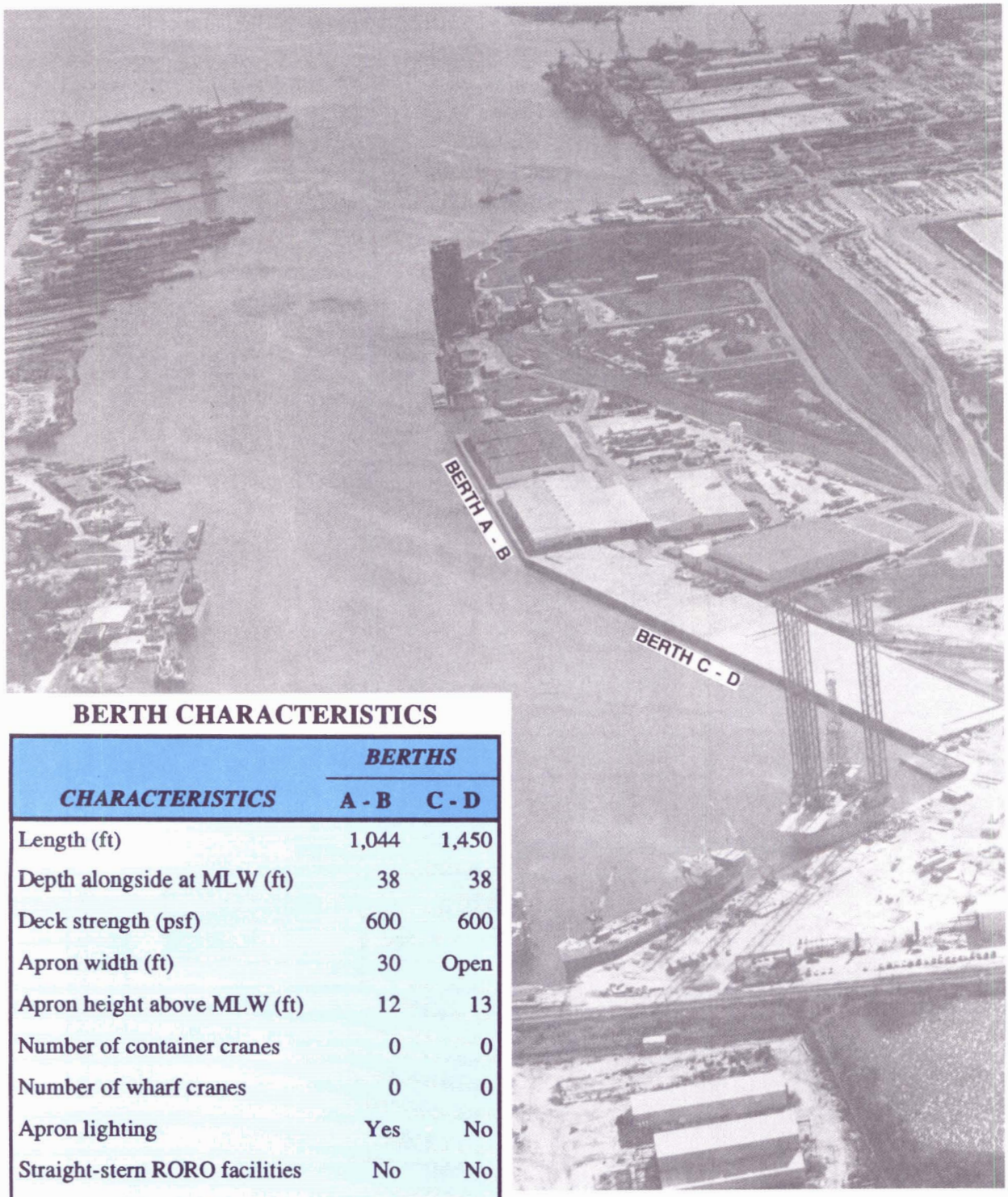


Figure 1. Land use map, West Terminal.



BERTH CHARACTERISTICS

CHARACTERISTICS	BERTHS A - B	BERTHS C - D
Length (ft)	1,044	1,450
Depth alongside at MLW (ft)	38	38
Deck strength (psf)	600	600
Apron width (ft)	30	Open
Apron height above MLW (ft)	12	13
Number of container cranes	0	0
Number of wharf cranes	0	0
Apron lighting	Yes	No
Straight-stern RORO facilities	No	No
Apron length served by rail (ft)	0	0

Figure 2. West Terminal (southward view).

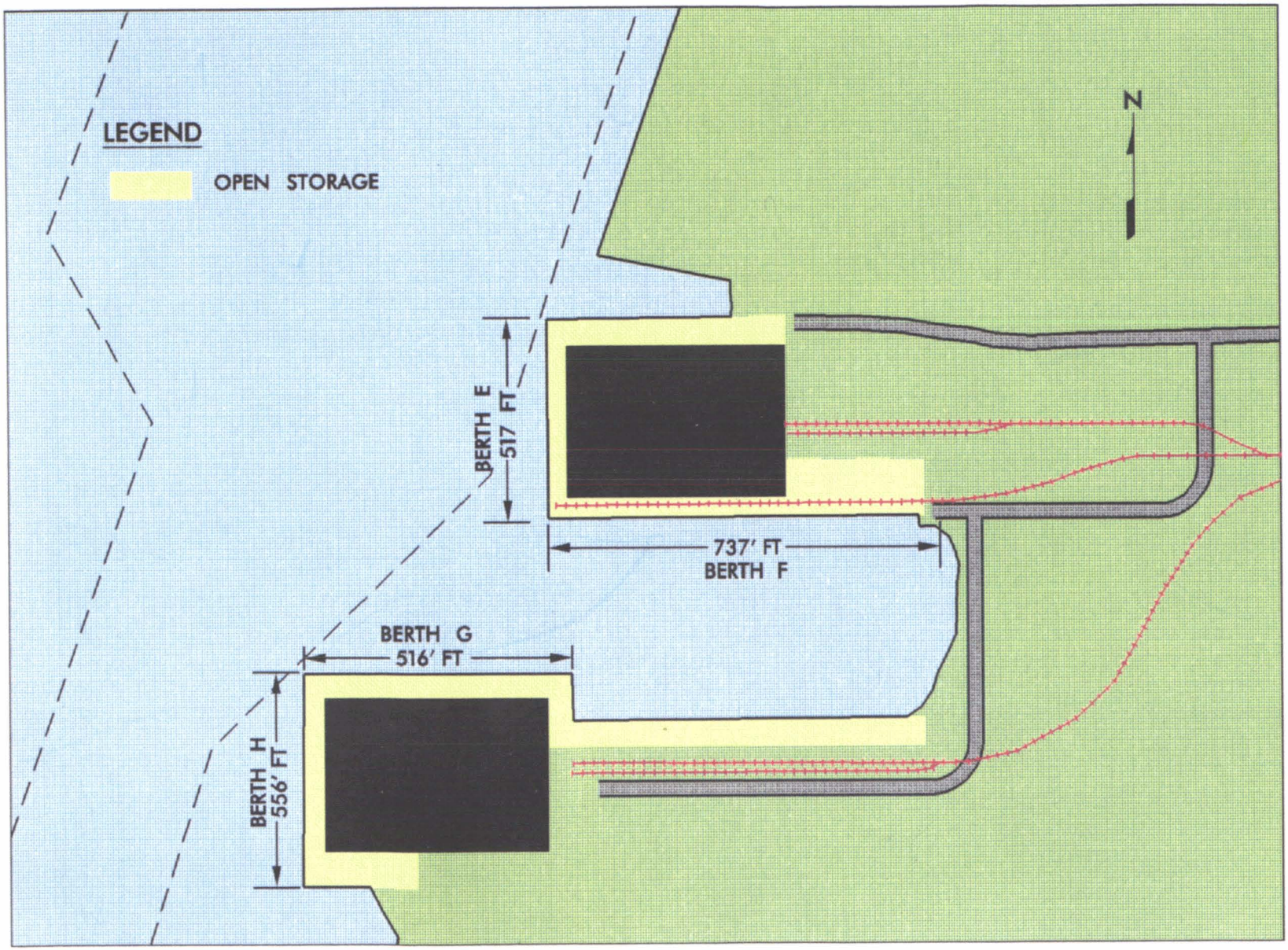
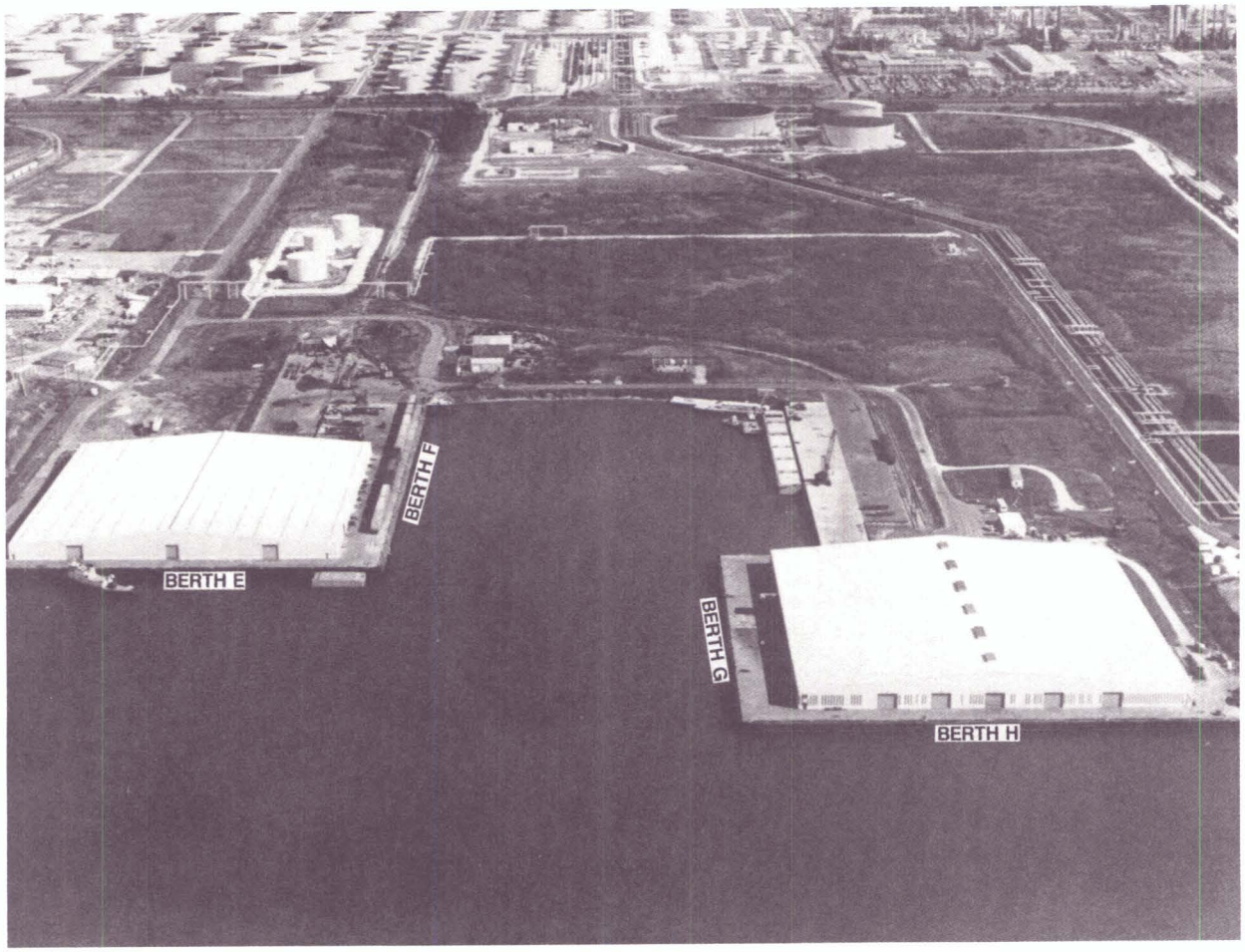


Figure 3. Land-use map, East Terminal.



BERTH CHARACTERISTICS

CHARACTERISTICS	BERTHS			
	E	F	G	H
Length (ft)	517	737	516	556
Depth alongside at MLW (ft)	38	38	38	38
Deck strength (psf)	600	600	600	600
Apron width (ft)	37	55	60	34
Apron height above MLW (ft)	12	12	12	12
Number of container cranes	0	0	0	0
Number of wharf cranes	0	0	0	0
Apron lighting	Yes	Yes	Yes	Yes
Straight-stern RORO facilities	No	No	No	No
Apron length served by rail (ft)	0	737	0	0

Figure 4. East Terminal (eastward view).

STAGING

Open Storage

The Port of Pascagoula has about 19 acres of open staging. Nine acres are paved. The remaining area is grass covered. Most of the paved area supports the West Terminal. The grass-covered area supports the East Terminal.

Open Staging at Berth C-D

Helicopter operations are limited at the West Terminal. To load, helicopters should land, reduce, and shrink wrap at Homeport Pascagoula. Commercial trucks with air suspensions should deliver the cocooned helicopters to the apron for ship loading.

At the East Terminal, helicopters could land on the grass-covered area. Either shed could support shrink-wrapping and reduction operations.

Covered Storage

The Port of Pascagoula has eight transit sheds, but two of them are refrigerated. Military equipment would not use refrigerated transit sheds. For this reason, this report only recognizes 670,000 square feet of covered staging. About half of this covered staging is at each of the two terminals.

Transit Shed at Berth C-D

RAIL

One CSX lead track serves the West Harbor. The track runs behind the wharf aprons and transit sheds and extends the entire length of the terminal (fig 1). Berth D and part of berth C open storage areas are platform-level high and provide side railcar-loading capability. A covered rail-loading platform is between transit sheds B and B backup.

CSX also provides one lead track to the East Harbor. The track splits into three rail spurs that serve the transit sheds at berths G, H, E, and F and the apron at berth F.

Railyards owned by the port have storage capacity for about 82 railcars. Railyards within 1 mile of the port can store another 85 cars.

HIGHWAY

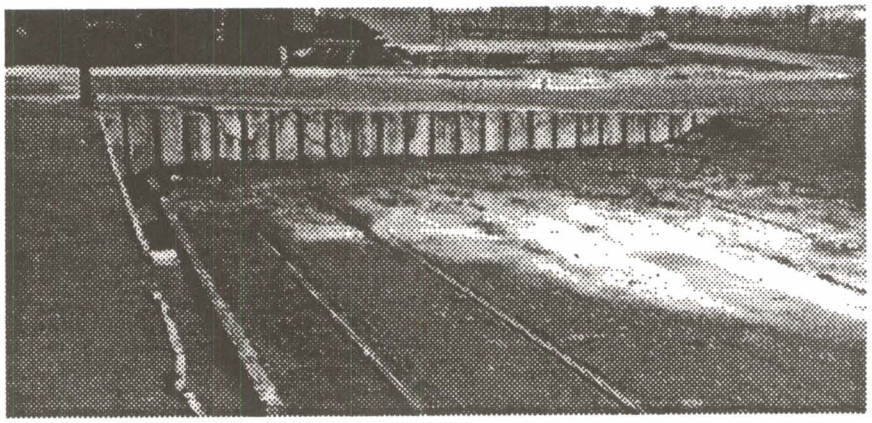
All of the roads within the terminals are two laned. The terminal roads have no clearance restrictions.

UNLOADING/LOADING POSITIONS

Ramps

The port has no rail end ramps suitable for military equipment. However, with minor modification, the ends of the tracks behind shed A (West Terminal) could support circus-style offloading.

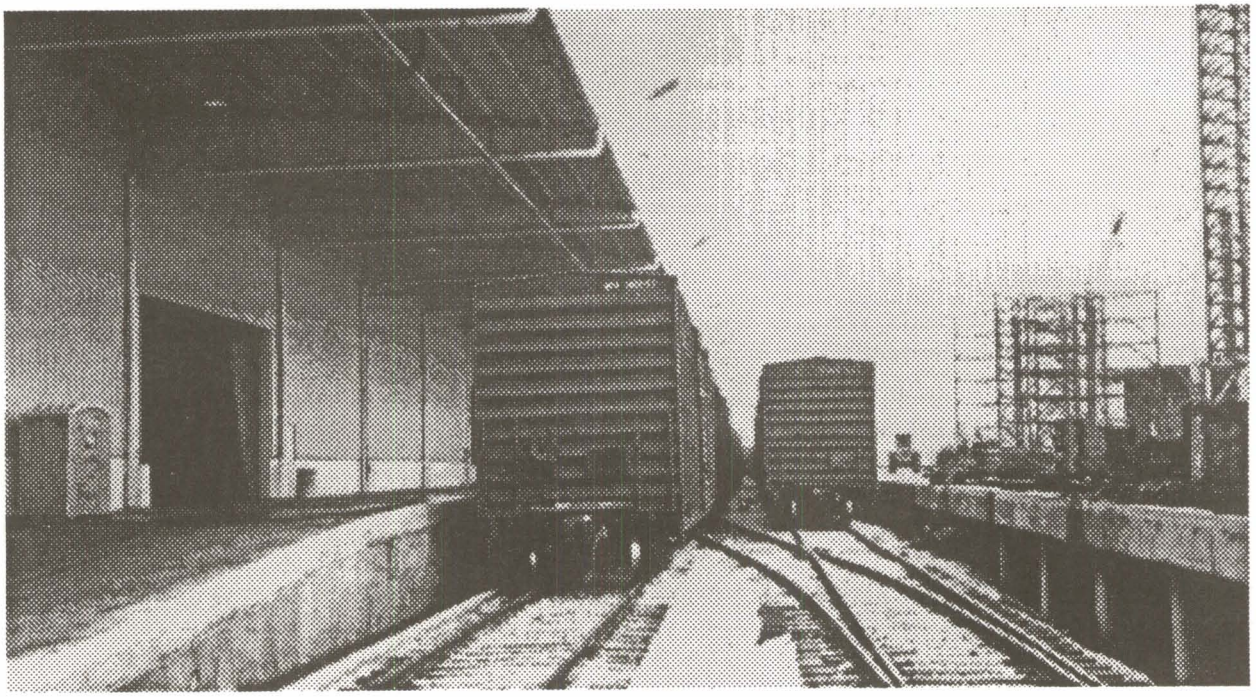
The West Terminal has a truck end ramp at the inland edge of the apron of berth C-D. This ramp can accommodate two trucks. The East Terminal has a truck end ramp at the apron extension of berth F. This ramp can also accommodate two trucks.



Track Ends at Transit Shed A

Docks

All the transit sheds have railcar-level platforms for boxcar unloading and truck-level docks for van unloading. The port can handle 57 boxcars and 8 vans simultaneously.



Boxcar Handling Positions at Transit Shed D

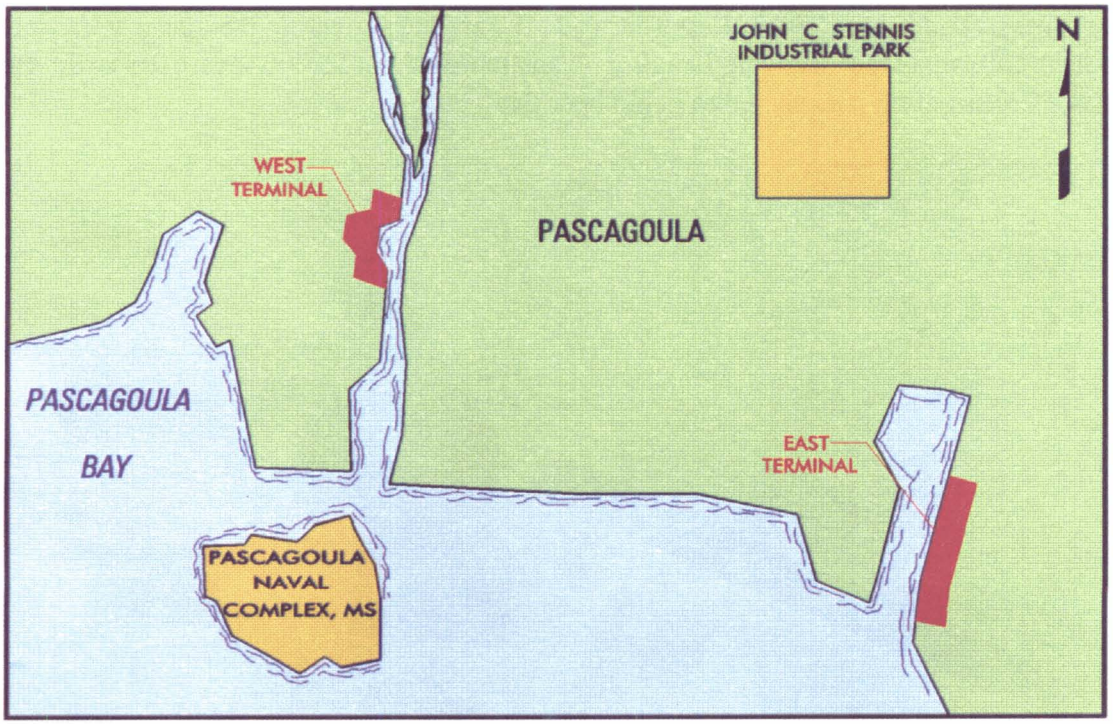
MARSHALING AREAS

Within Port

No marshaling areas are within the port. All open area within the port is required for staging.

Homeport Pascagoula

Homeport Pascagoula is built on a dredge-spoil island about 3 miles south of the West Terminal. The only access is a two-lane, 2.8-mile causeway. No rail access is available. A total of 180 acres are developed to support four frigates. Broken into several different areas, about 30 acres are available for marshaling. The frigate pier could support limited ship loading, if necessary.



Marshaling Areas

Stennis Industrial Park

This 605-acre area is about a mile north of the East Terminal. Formerly the Jackson County Airport, the land is slowly being developed for industrial use. One CSX rail spur runs into the center of the area. This rail spur is long enough to support the offloading of about 22 railcars. About 345 undeveloped and 15 paved acres are available for marshaling.

MATERIALS HANDLING EQUIPMENT (MHE)

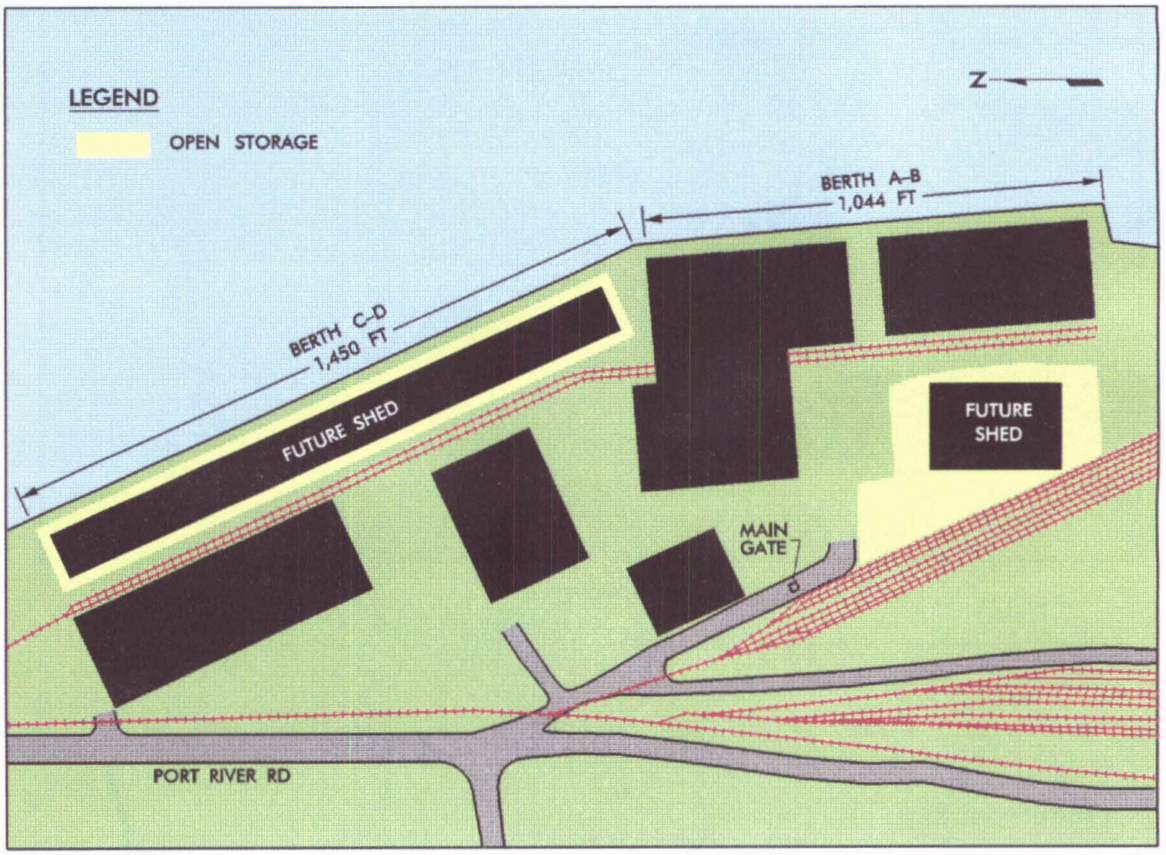
The port does not own any MHE. Various stevedore companies can provide mobile or floating cranes ranging in capacity from 20 to 80 STON.

INTERMODAL FACILITIES

The nearest intermodal railyards are in Mobile, Alabama. The PND report of the Port of Mobile provides information on these facilities.

FUTURE DEVELOPMENT

The port plans to build sheds at the West Terminal. A new shed covering the apron at berth D will add about 60,000 square feet of covered staging. A small shed (about 35,000 square feet) will be inland of berth A. Construction is expected to begin later this year.



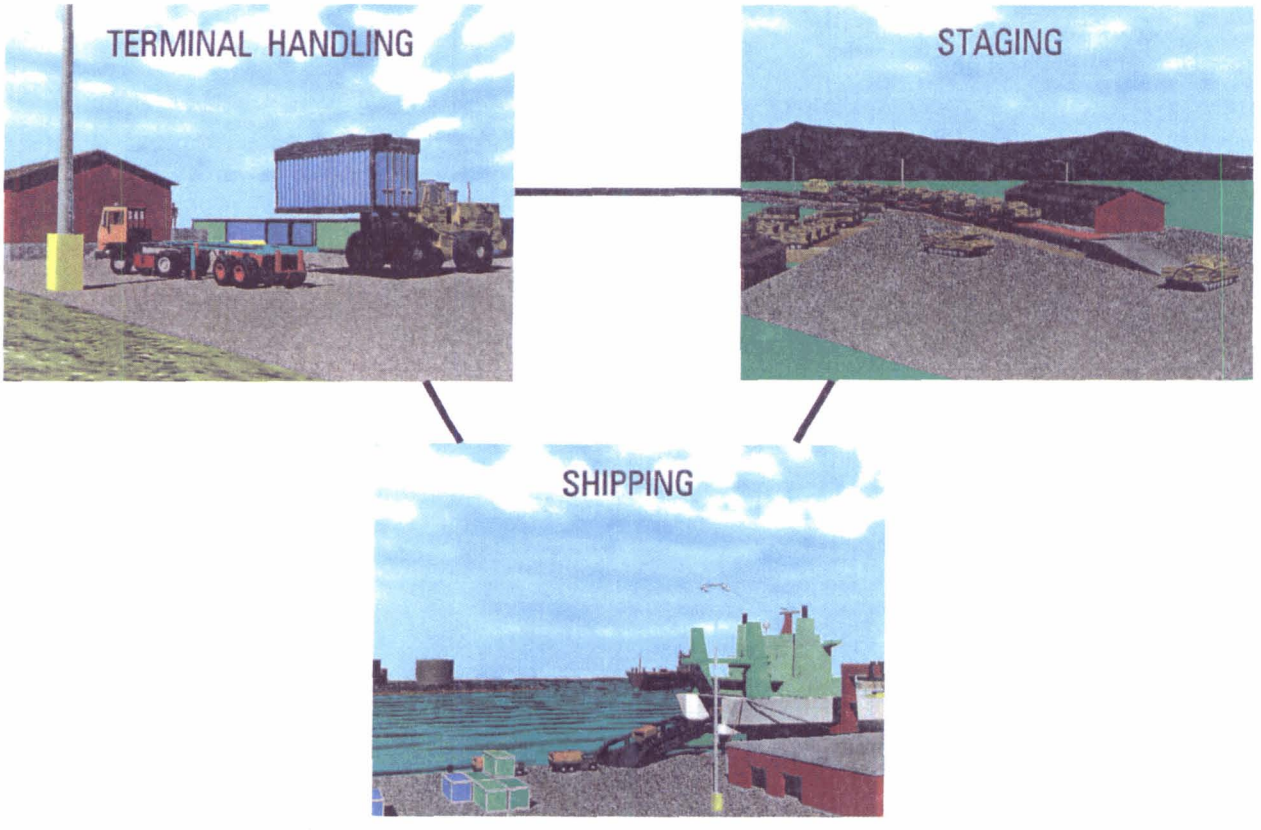
Future Sheds at the West Terminal

The port also expects to widen the East Terminal channel, and add a 1,150-foot turning basin south of the terminal. Work will begin in 1996.

II. THROUGHPUT ANALYSIS

GENERAL

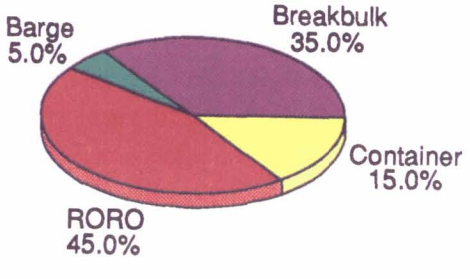
We evaluated the theoretical throughput capability of the Port of Pascagoula using the port operational performance simulator (POPS) computer model. The POPS model is based on a weak-link analysis in which each subsystem is analyzed separately and then compared to find the least-capable subsystem. The weakest subsystem defines the maximum throughput capability of the terminal. The model yields throughput capability values for three subsystems - shipping, staging, and terminal processing/ handling - in short tons (STON) and measurement tons (MTON) per day.



Terminal Throughput Subsystems

The analysis assumes that 80 percent of the port facilities will support the military deployment. Also, the ship mix is based on Desert Shield and Desert Storm statistics. We weighted the percentages to adjust for differences in cargo deadweights and expectations for future deployments.

SHIP MIX PERCENTAGES

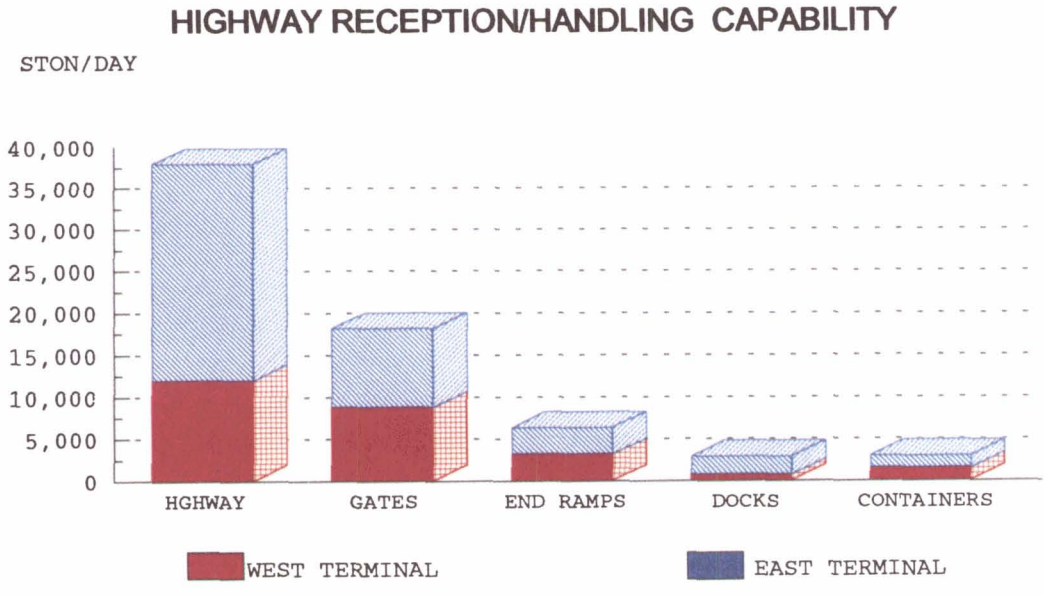


TERMINAL RECEPTION/HANDLING

HIGHWAY

Traffic to and from either terminal is restricted by two-laned roads. West Terminal access is via Port River Road. East Terminal access is via Mississippi 611. Each terminal has only one gate. The road network in and out of the port, including the gate processing of vehicles, could handle more than 18,000 STON of equipment and supplies per day. This capability is almost divided evenly between the two terminals.

Roadable vehicles in convoys will move directly to the staging areas. Vehicles on commercial or military flatbed trailers without integral ramps will offload at the two ramps on the railroad tracks just south of shed D, or the two ramps on the edge of the berth F apron. These ramps could offload more than 6,400 STON from flatbed trailers per day. Supplies in van semitrailers will proceed to the eight handling positions. These truck docks can offload about 3,000 STON of van semitrailer-shipped material per day. Containers on trucks will move to the staging area to be offloaded. A container handler will offload 1,500 STON in containers from their chassis per day at each terminal.

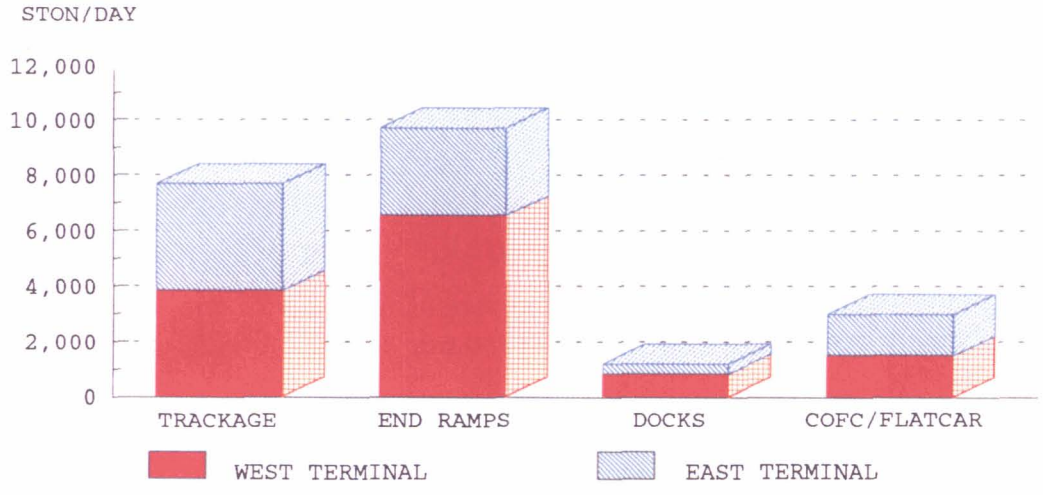


RAIL

Port-owned railyards could store 82 railcars. Also, commercial railyards within a mile of the port could store 85 additional railcars. Only CSX provides rail service to the port. On an average day, one 30-railcar train goes to each terminal. If necessary, each train could be as long as 100 railcars.

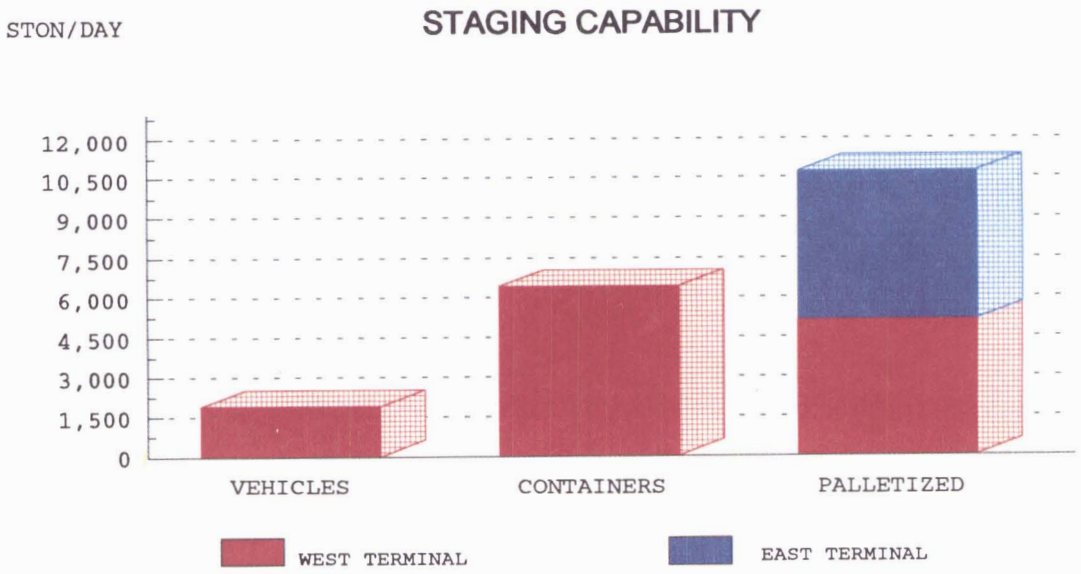
With fabricated end ramps, vehicles on about 28 flatcars could circus-style offload at the ends of the two tracks behind shed A. The apron track at berth F could also support circus-style offloading of eight railcars with a portable end ramp. About 11 boxcars could be unloaded on the track next to shed D. Tracks inside of sheds E and F and G and H can support the unloading of about 27 boxcars. A container handler will offload 1,500 STON in containers from flatcars per day at each terminal.

RAIL RECEPTION/HANDLING CAPABILITY



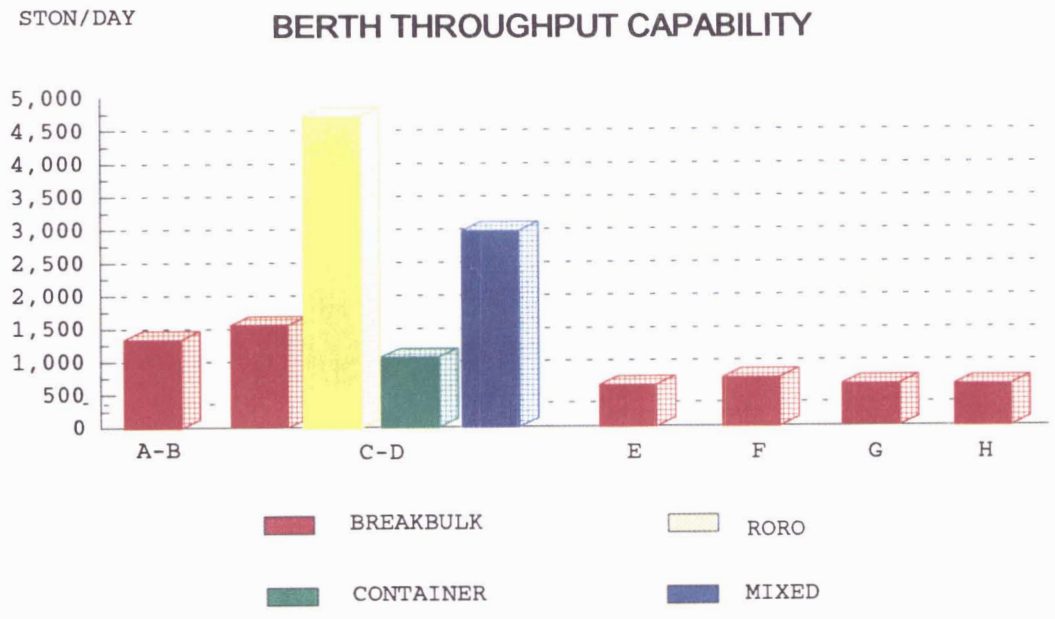
STAGING

The port has about 19 acres of open staging area for vehicles and/or containers. Also, about 670,000 square feet of covered staging are available.



SHIPPING

We identified the throughput capability per berth in STON per day for breakbulk, RORO, container, and mixed vessels. These results were based on various factors, including MHE used, loading, operational and berth usage rates, as well as berth and ship compatibility.



The berth and ship compatibility for various vessel types is shown in table 1. The table also provides the limitations that can hinder shipping operations.

TABLE 1
SUMMARY OF PASCAGOULA BERTHING CAPABILITIES

VESSEL	BERTHS					
	A - B	C - D	E	F	G	H
Breakbulk						
C3-S-33a	2	2	1	1	1	1
C3-S-37c	2	2	1	1	1	1
C3-S-37d	2	2	1	1	1	1
C3-S-37a	2	2	1	1	1	1
C4-S-1a	1	2	c	1	c	c
C4-S-1qb and 1u	1	2	c	1	c	c
C4-S-58a	1	2	c	1	c	c
C4-S-65a	1	2	c	1	c	c
C4-S-66a	1	2	c	1	c	1
C4-S-69b	1	2	c	1	c	c
Seatrain						
GA and PR-class	1	2	c	1	c	c
Barge						
LASH C8-S-81b	1	1	c	c	c	c
LASH C9-S-81d	1	1	c	c	c	c
LASH lighter	7	10	3	5	3	3
SEABEE C8-S-82a	a,g	a,g	a,c,g	a,c,g	a,c,g	a,c,g
SEABEE barge	5	7	2	3	2	2
RORO						
Comet	d,o	d,i,j	d,o	d,o	d,o	d,o
C7-S-95a/Maine-class	b	1	b,c	b	c	b,c
Ponce-class	b,h	h	b,c,h	b,h	b,c,h	b,c,h
Great Land-class	b,h	h	b,c,h	b,c,h	b,c,h	b,c,h
Cygnus/Pilot-class	b	2	b,c	b	c	b,c
Meteor	d,o	d,i,j	c,d,o	d,o	c,d,o	d,o
AmEagle/Condor	b	i,j	b,c	b	c	b,c
MV Ambassador	d	d	c,d	d	c,d	d
FSS-class	b	1	b,c	b,c	c	b,c
Cape D-class	b	i,j	b,c	b	c	b,c
Cape H-class	b	1	b,c	b,c	c	b,c
Container						
C6-S-1w	1,e	2,e	c,e	1,e	c,e	c,e
C7-S-68e	1,e	1,e	c,e	1,e	c,e	c,e
C8-S-85c	1,e	1,e	c,e	c,e	c,e	c,e
Combination						
C5-S-78a	1,e	2,e	c,e	1,e	c,e	c,e
C5-S-37e	1.e	2,e	c,e	1,e	c,e	c,e

a = maximum vessel draft limited to berth depth
b = inadequate apron width
c = inadequate berth length
d = no straight stern-ramp facilities
e = no container-handling equipment
f = inadequate berth depth, adequate anchorage depth
g = inadequate channel depth
h = no shore-based ramps available
i = insufficient ramp clearance at low tide
j = insufficient ramp clearance at high tide
k = excessive ramp angle at low tide
m = excessive ramp angle at high tide
n = parallel ramp operation only
o = insufficient apron width for side-ramp operation

Note: Ramp clearance and ramp angle based on maximum vessel draft.

The type of ship preferred at each berth is based on the methodology described in the appendix. The evaluation is based on a snapshot view of the current physical characteristics of the berths and the MHE available. The evaluation gives no considerations for enhancements, such as equipment.

Berths C and D provide the largest throughput capacity for container and RORO vessels. Also, this berth is compatible for all ship types.

PREFERENCE BERTH SELECTION

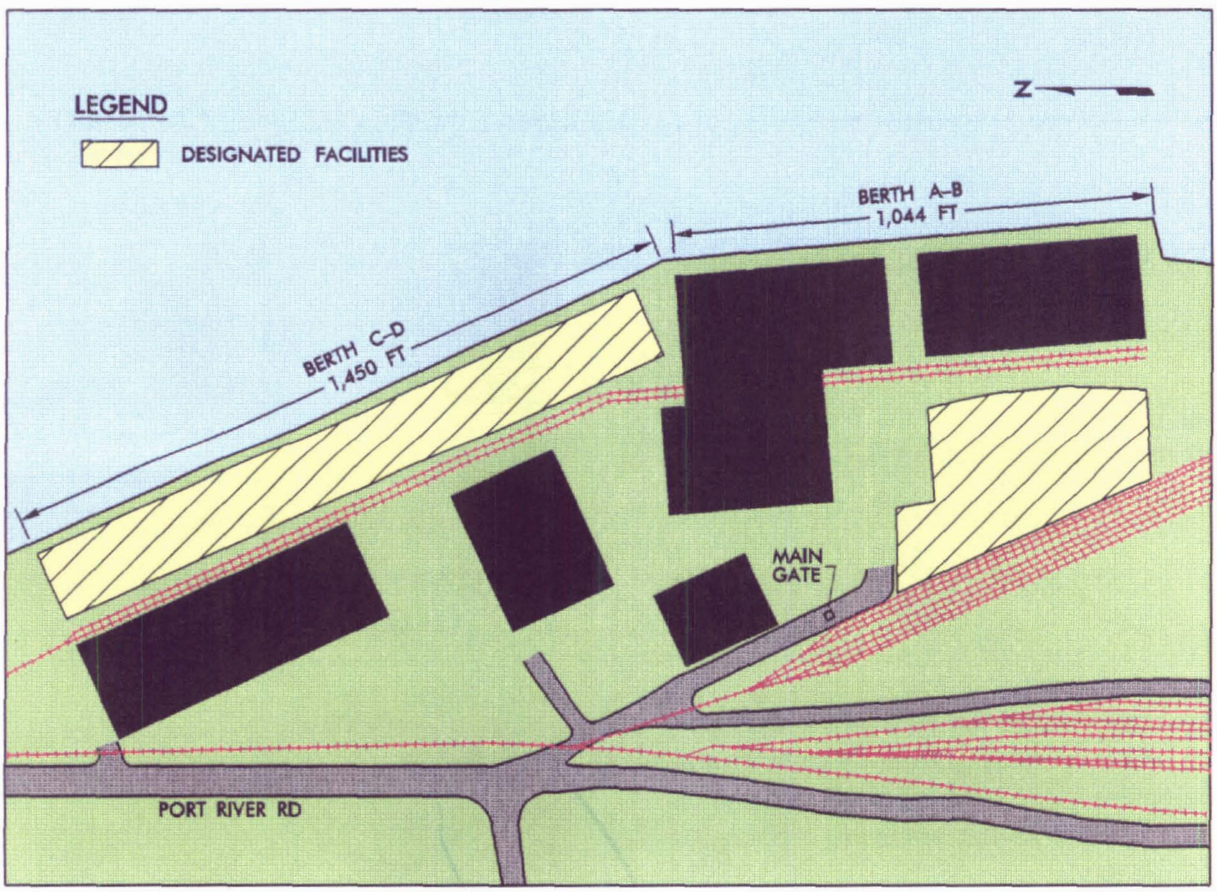
LOADING TYPE	*BERTHS*					
	A - B	**C - D**	**E**	**F**	**G**	**H**
Breakbulk	3	2	4	1	4	4
RORO	-	1	-	-	-	1
Container	-	1	-	-	-	-
NOTE: Berths marked "-" are not recommended for these operations.						

III. APPLICATION

GENERAL

This section will evaluate the port's throughput capability for deploying a notional mechanized infantry brigade using three FSSs.

The *Planning Orders Digest*, issued by MARAD, does not include agreements for military use of the Port of Pascagoula. However, this analysis will consider what facilities would likely support military operations, in lieu of planning orders. Only berths C and D can support FSS operations. Therefore, this report analyzes operations at berths C and D, with all of the West Terminal's 8.25 acres of paved area for staging.



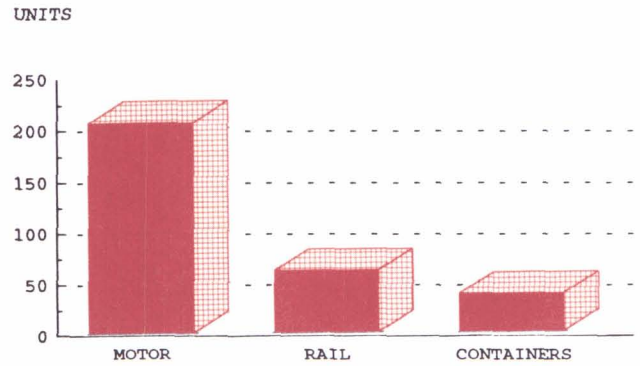
REQUIREMENTS

The likely requirement for the Port of Pascagoula is to deploy a notional mechanized infantry brigade in 6 days of reception and throughput. The brigade has to move about 2,600 vehicles and 220 containers. The movement to the port will require 360 (60 per day) railcars using the convoy/rail option. Under this option, about 1,220 (205 per day) roadable vehicles would be driven and about 775 (130 per day) would be towed.

MECHANIZED INFANTRY BRIGADE

Total Equipment	
Volume	91,506 MTON
Weight	31,670 STON
Area	474,300 SQ FT
Vehicles	2,600
Containers	220

DAILY DEPLOYMENT REQUIREMENT

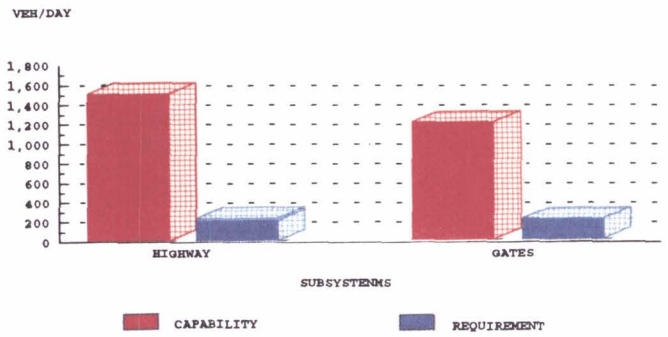


TERMINAL HANDLING

HIGHWAY

Both the access road and the West Terminal gate can handle an additional 1,200 vehicles per day.

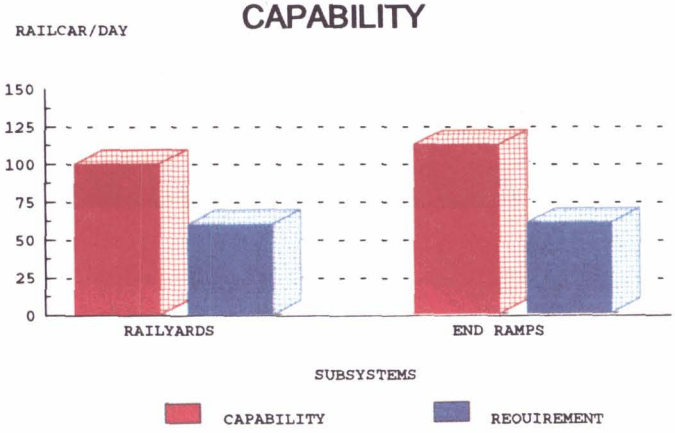
HIGHWAY INPROCESSING CAPABILITY



RAIL

The railyard within the terminal could receive 100 railcars per day of military vehicles and equipment. Also, the two rail end ramps could offload 28 flatcars every 5 hours, or 112 per day.

RAIL INPROCESSING/HANDLING CAPABILITY



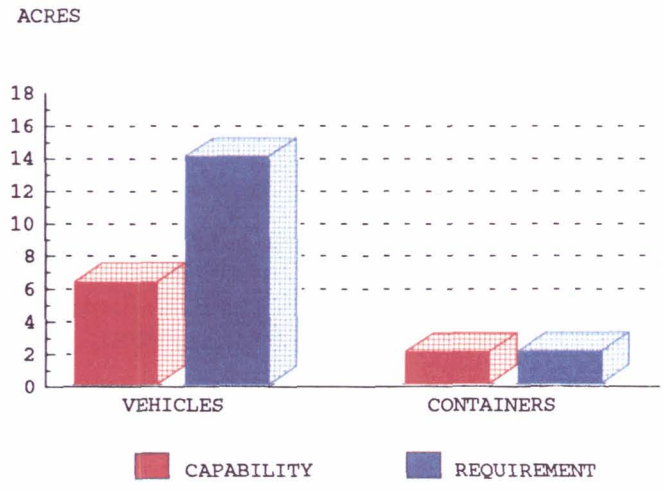
STAGING

This analysis assumes that current downsizing continues and that three FSS-sized ships will deploy an entire notional mechanized infantry brigade. One ship will depart every 2 days. Although an FSS cargo load can be staged on 10 acres, 16 acres are required for a sustained loading operation. Of these 16 acres, about 2 acres are required for staging the containers for each FSS.

There are only 8.25 acres of open staging that could support military operations. Because of this, some vehicles would have to stage on nearly 8 acres outside the port.

Convoy vehicles could use Homeport Pascagoula's grass-covered areas for the additional staging. The rail-deployed vehicles and the containers should receive priority for staging area within the port.

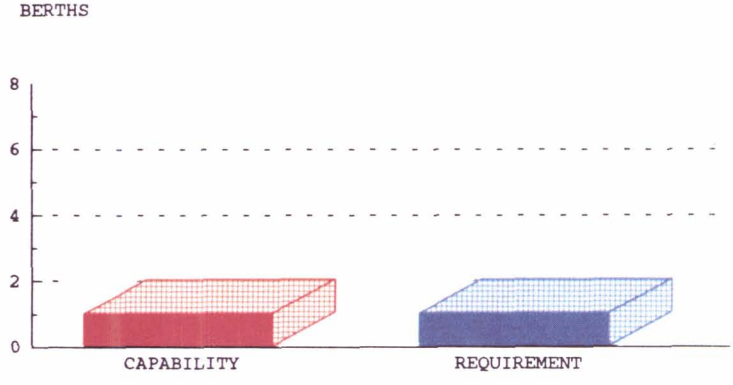
OPEN STAGING CAPABILITY



SHIPPING

Although this analysis assumes that only three FSS-sized ships can deploy the notional mechanized infantry brigade, the table below provides ship quantities for the current brigade size. The number of ships required depends on the shipping mix selected. The best ship mix would consist of 3.33 FSSs.

FSS SHIPPING CAPABILITY



UNIT MOVEMENT REQUIREMENTS
MECHANIZED BRIGADE

LOADING CONDITION/ SAMPLE SHIP MIX	*VESSEL TYPES*			
	FSS (RORO/COMB)	**CAPE H (RORO/COMB)**	**C3/C4 (BREAKBULK)**	**C6/C7/C8 (CONTAINER)**
Minimum Containerization				
All FSS	3.33			
FSS and Cape H	2.22	1.00		
All Breakbulk			12.57	
Maximum Containerization				
FSS and Container	2.64			0.67
FSS, Cape H, and Container	1.54	1.00		0.67
Breakbulk and Container			9.86	0.87
Legend:				
RORO - roll on/roll off				
FSS - fast sealift ship				

SUMMARY

The berthing restrictions of the FSS vessels limit the Port of Pascagoula to one FSS support system. The port receiving capabilities can support FSS operations, however additional staging area is required. The mechanized infantry brigade can deploy in the 6-day receiving period.

RECOMMENDATIONS

1. Designate only one brigade of equipment to deploy through the Port of Pascagoula because of berth limitations.

2. Designate berth C-D, all open staging at the West Terminal, and at least 8 offsite acres to support the one FSS vessel system.

PORT OF PORT ARTHUR

PORT ARTHUR, TEXAS

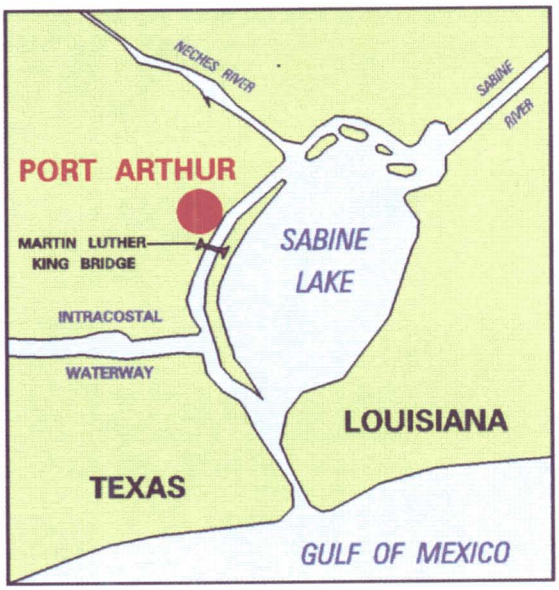
I. GENERAL DATA

TRANSPORTATION ACCESS

WATER

The Port of Port Arthur is 19 nautical miles above the Sabine Pass entrance from the Gulf of Mexico, on the western side of Sabine Lake. The port is 5 miles west of the Texas/Louisiana border and 85 miles east of the Houston city limits.

Access to the Port of Port Arthur is via the Port Arthur and Sabine-Neches Canals. The Sabine Pass entrance from the gulf is at least 40 feet deep at mean low water (MLW) and at least 500 feet wide. The rest of the route to the Port of Port Arthur is 40 feet deep at MLW and at least 400 feet wide. The channel continues 29 miles above the Port of Port Arthur to the Port of Beaumont.



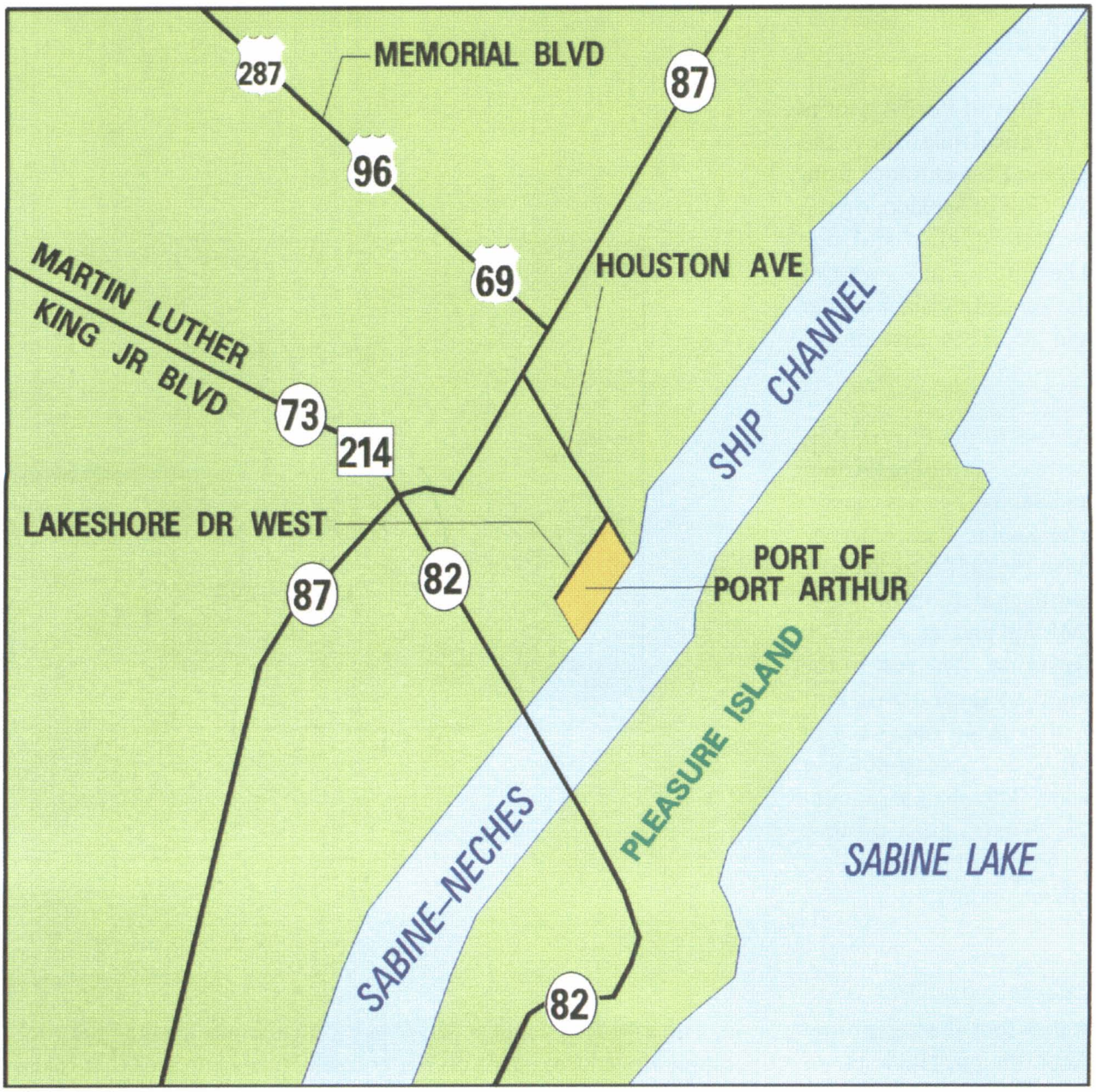
Water Access

A 900-foot-diameter turning basin, with a 40-foot depth at MLW, is less than a mile north of the port. According to Navy standard operating procedures, ships do not normally turn in an area that is less than 1.5 times their length. Based on this guideline, Navy ships more than 600 feet long will not normally use this basin.

The only bridge between the Gulf of Mexico and the Port of Port Arthur is on Martin Luther King Boulevard, Texas Route 82. It has a horizontal clearance of 400 feet and a vertical clearance of 138 feet at mean high water (MHW). It crosses the Sabine-Neches Canal 1 mile below the port.

HIGHWAY

The main routes to the port are US Routes 69, 96, and 287 (from northwest) and Texas Routes 87 (from north or south), 73 (from west), and 82 (from east). Main Gate is on Lakeshore Drive West.



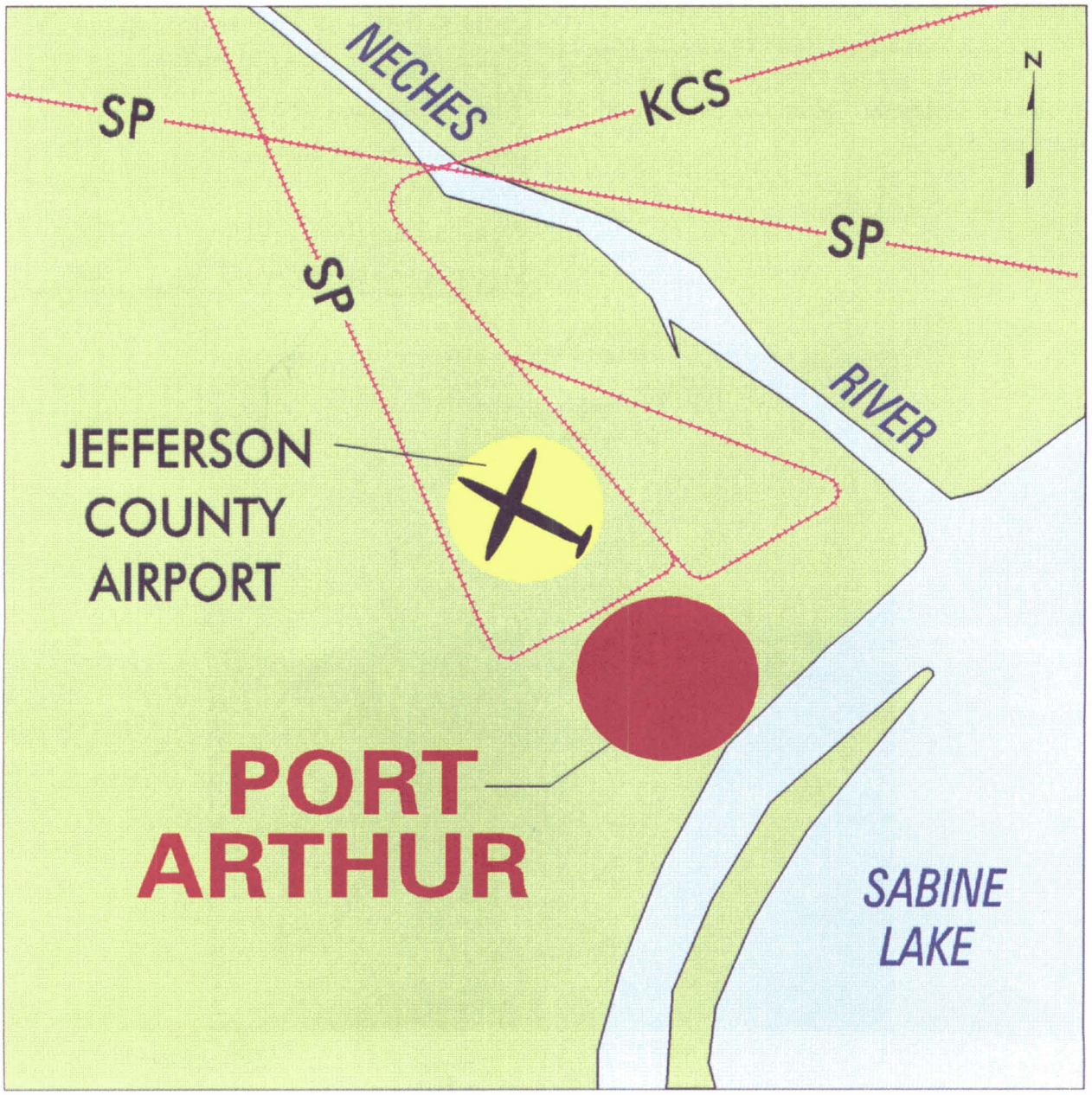
Highway Access

RAIL

Kansas City Southern (KCS) serves the port directly, and Southern Pacific (SP) serves the port under a long-term reciprocal switching agreement.

AIR

The nearest airport is the Jefferson County Airport. The airport has two commercial runways. One is 5,070 feet long, and the other is 6,750 feet long. Both are 150 feet wide. The nearest military airfield, at Ellington Air Force Base, is about 80 miles from the Port of Port Arthur.



Rail and Air Access

PORT FACILITIES

BERTHING

The Port of Port Arthur has berths numbered 1 and 2. These berths form a single wharf 1,200 feet long, with a depth alongside that is 40 feet at MLW. Dolphins allow for ship overhangs at each end of the wharf. The apron is 100 feet wide along berth 1 and most of berth 2. At berth 2, 120 feet of the wharf has an open apron. The Port of Port Arthur has a 6-foot-high fence around the perimeter. There is lighting throughout the port and around the perimeter. Main Gate is manned 24 hours per day.

BERTH CHARACTERISTICS

CHARACTERISTICS	BERTHS 1-2
Length (ft)	1,200
Depth alongside at MLW (ft)	40
Deck strength (psf)	800
Apron width (ft)	100*
(120 ft of berth 2 has an open apron)	
Apron height above MLW (ft)	15
Number of container cranes	0
Number of wharf cranes	1
Apron lighting	Yes
Straight-stern RORO facilities	No
Apron length served by rail (ft)	1,200

Figure 2. Aerial view of Port of Port Arthur Ocean Terminal and berth characteristics.

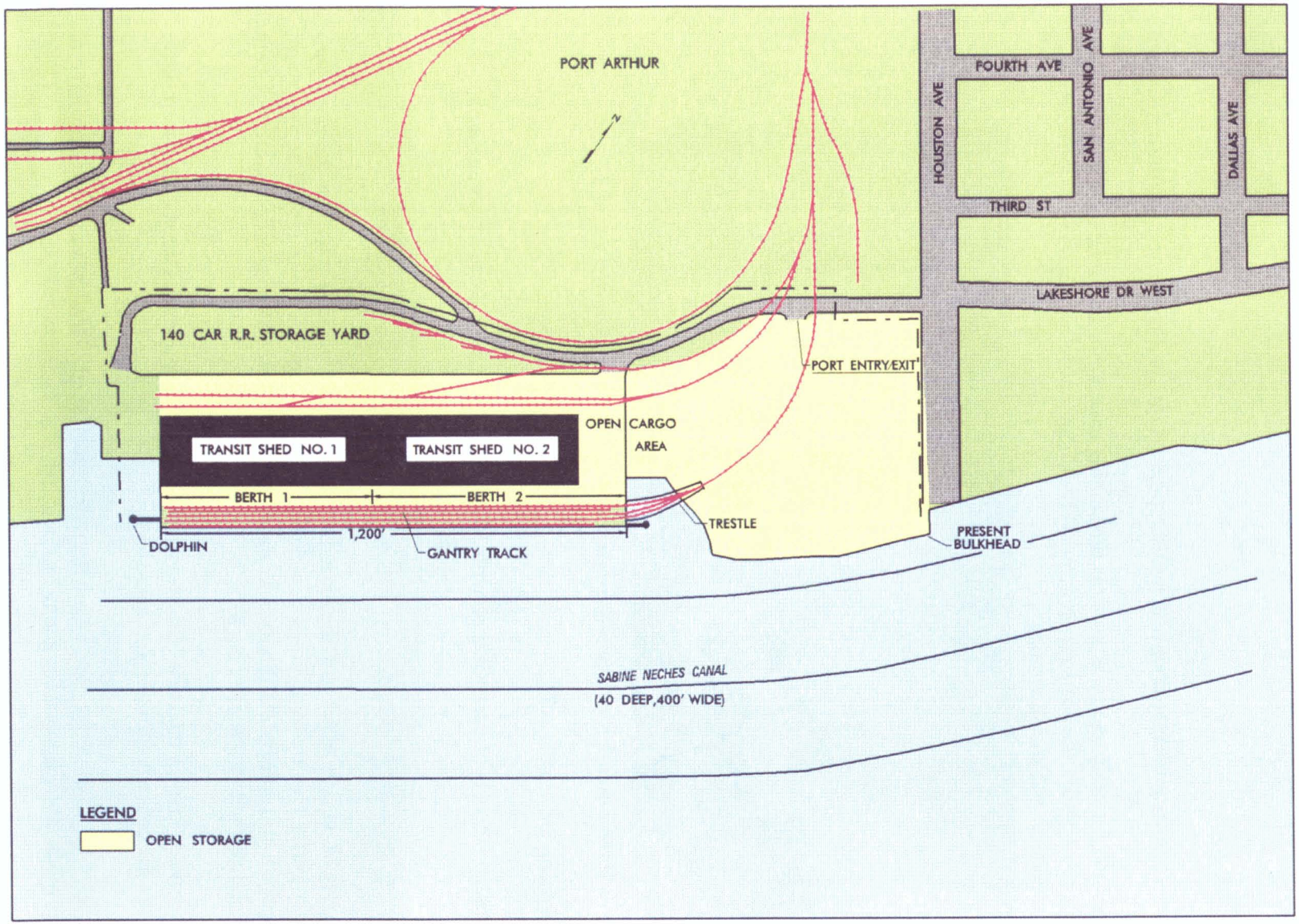


Figure 1. Site map.

STAGING

Open Staging

The port has 125,000 square feet (about 3 acres) of asphalted open storage area behind the transit shed.

The best location for helicopter operations is the staging area northeast of the transit sheds. After removing the rotor blades, the port support activity (PSA) can tow the helicopters into the transit shed for further reduction and shrink wrapping.

Open Staging for Port of Port Arthur Along Apron of Berths 1 and 2

Covered Staging

Covered storage consists of a transit shed with 194,400 square feet of covered storage area.

RAIL

Before entering Main Gate of the port, the track diverges into three tracks (fig 1). One of these tracks leads to the wharf. This track diverges into three tracks that run the entire length of the wharf, providing space for 60 railcars. All three tracks are within reach of the 75-ton crane. This arrangement provides excellent direct transfer of cargo.

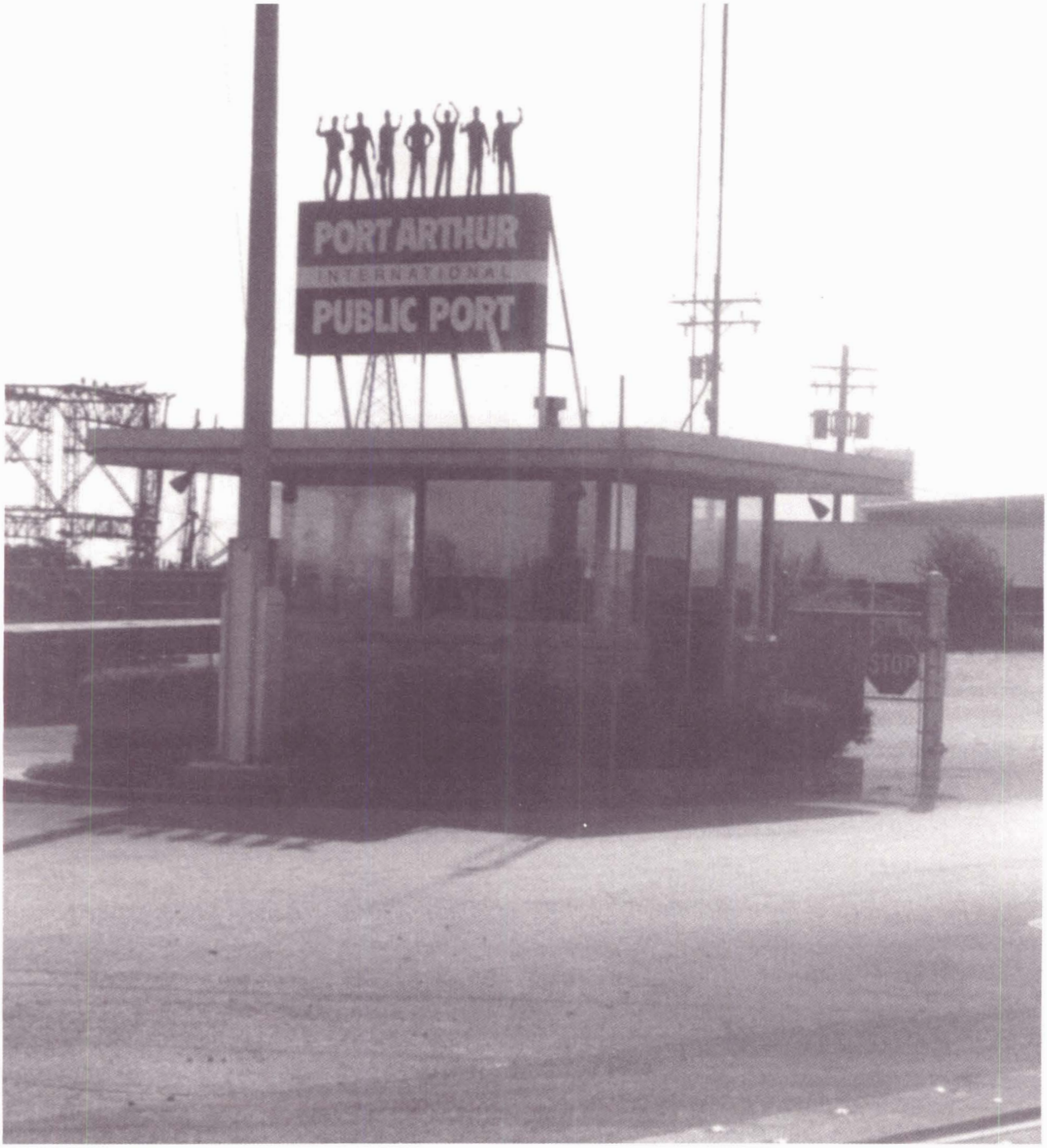
Another track leads to the inland side of the transit shed. This track diverges into two platform-level tracks that run the entire length of the transit shed.

The third track leads to a storage yard inland from the transit shed. This track diverges into several tracks that provide storage space for about 140 railcars.

Rail clearances to the port are sufficient for bilevel and trilevel railcars. However, the port has no ramp equipment for these railcars.

HIGHWAY

The Port of Port Arthur has only one access gate. No clearance restrictions are inside the port facility. The access to the cargo storage area and apron is paved. The maximum loading limit on the apron, inside the transit shed, and cargo storage area is 800 psf. The port has no truck scales.



Main Gate at Port of Port Arthur

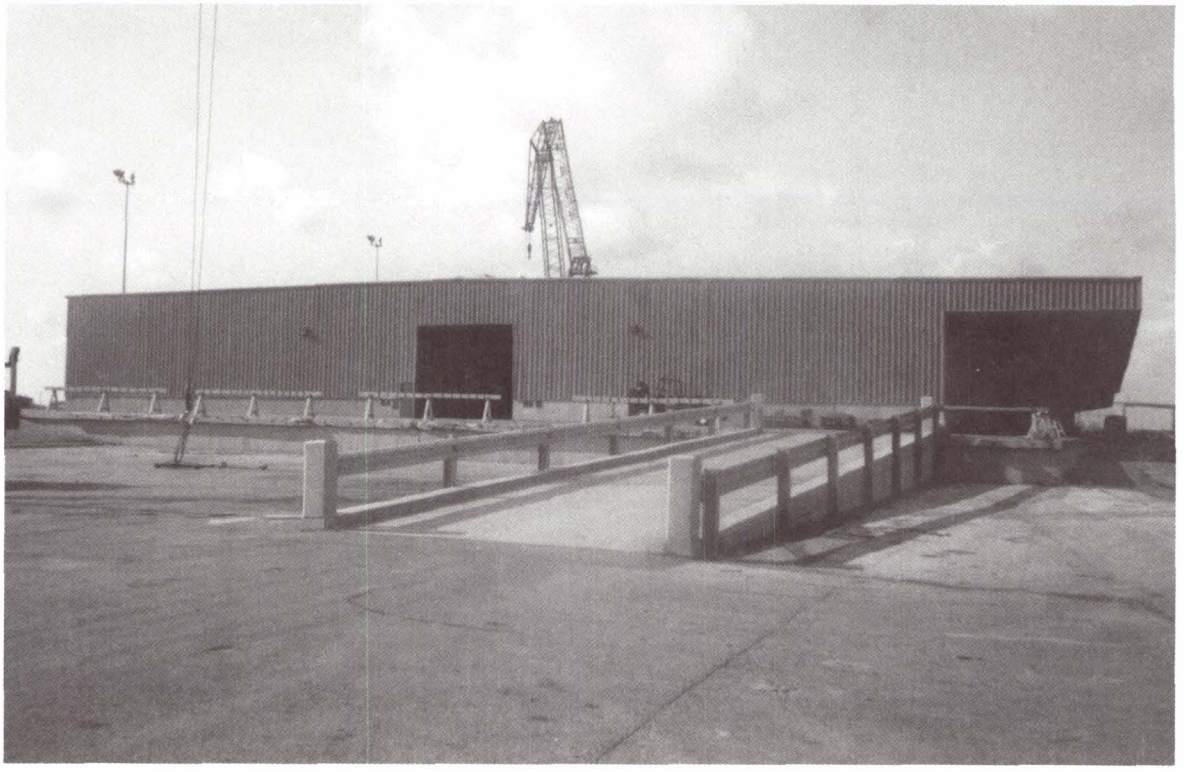
UNLOADING/LOADING POSITIONS

Ramps

The Port of Port Arthur has no end ramps available for loading or unloading railcars circus style.

Docks

One hundred five truck docks are along the transit shed of berth 2. A ramp allows access to the truck docks. Also, two platform-level railroad tracks run along the inland side of the transit shed. The transit shed platform allows easy access onto the railcars from the transit shed. The 75-ton crane has access to all railcars parked on the apron.



Port of Port Arthur Unloading/Loading Facilities on Northeast Side of Transit Shed

MARSHALING AREAS

Two areas exist that are suitable for marshaling. Neither of these areas has pavement, drainage, lights, or fencing. Both areas are near railroad tracks. The marshaling area that is nearer to the port is on the southwest side of the port. The port authority recently purchased this land (33 acres) and plans to develop it into additional port facilities. The other area is about a quarter mile inland from Main Gate. It contains 25 acres of land northeast of Houston Avenue and is owned by the port.