SECTION 8 - DEEP-DRAFT ANALYSIS

OVERVIEW

Benefits to deep-draft navigation arise from two categories of deep-draft vessel activity. The major activity category, in terms of both number and magnitude of savings, is generated by lockages which may be called "intra-harbor" lockages. These lockages result from a vessel's desire to use deep-draft loading and unloading facilities in the two distinct sections that make up the complex of the Lower Mississippi River deep-draft facilities, the riverfront and the tidewater portion of the Port of New Orleans (the IHNC and the MR-GO). The second activity category arises from lockages for vessels departing from the tidewater section of the Port of New Orleans via the passes of the Mississippi River. These "thru" lockages are motivated by potential savings in vessel sailing time.

INTRA-HARBOR LOCKAGES

The major determinant of existing and potential lock usage, as reported from field interviews with industry representatives, is the need for a vessel to be serviced by cargo handling facilities in both deep-draft facility sections. In other words, the major deep-draft vessel use of the lock arises from ships discharging or loading cargo in one section of the port, such as the river, and then discharging or loading cargo in the other section before exiting the port for the next destination. If the vessel can fit through the lock and requires service from both riverfront and tidewater facilities, the vessel will use the lock. Interviews with industry representatives and vessel pilots revealed that vessels that are too large to traverse the existing IHNC Lock, voyage or "loop" from their initial point of cargo handling down the originally used entrance channel into the gulf and then travel up the other entrance channel to their second point of cargo handling. For example, a large vessel initially inbound to the MR-GO, after unloading its cargo at an IHNC facility, would then have to sail back down the MR-GO into the gulf, enter the Mississippi River through Southwest Pass, and subsequently travel to a loading terminal on the river.

Thus, the primary rationale for use of the IHNC Lock, whatever its size, is to facilitate backhauls within the port and to avoid the long loop voyage into the gulf and back up an entrance channel. This implies that the major benefits to the IHNC Lock are the cost-savings associated with avoiding the loop voyage, and that the determination of intra-harbor benefits to the lock will crucially depend upon a forecast of the vessels that will have a demand for backhaul access to both river and tidewater facilities. In addition, the benefits associated with a given lock size will be determined by the proportion of vessels demanding lockage that can meet the dimensional constraints imposed by that lock.

THRU LOCKAGES

While intra-harbor lockages represent the major component of lockage demand, a small number of vessels use the lock to exit tidewater facilities via the Southwest Pass of the Mississippi River. These vessels are typically destined for ports along the Texas coast. Analysis of these vessels indicate that this exit path from the tidewater facilities is taken in order to shorten the transit time by traveling a slightly shorter distance and also to make use of the river current to increase the vessel's relative ground speed. Benefits to these vessels are thus measured as the dollar value of savings in travel time. As is the case for intra-harbor lockages, a forecast of the vessels that will have a demand for this type of access, along with a determination of the proportion of vessels comprising thru lockage demand that meet the dimensional requirements of a given lock size, will determine the thru lockage benefits for each alternative.

EXCLUSION OF LIQUID BULK MOVEMENTS

During the discussion of the procedures that follow, liquid bulk movements by tanker have been excluded from the analysis. For tankers, the historical record indicates a low probability of lock usage. The primary reason for this is the absence of liquid bulk facilities in the tidewater section; and it appears that this situation will continue in the future. The large liquid bulk facilities are located on the river and with the advent of the Louisiana Offshore Oil Port (LOOP) in 1981, some of the larger tankers no longer actually enter the Lower Mississippi, but off-load near the coast of Louisiana. Also, the emphasis of development in tidewater facilities is container oriented. Recent and planned expansion has not included liquid bulk. For these reasons, it has been assumed that no tankers will demand lock use in the future. While perhaps not strictly true, the existing record, the structure of the port, and future investment trends indicate that, at best, only a negligible number of tankers would possibly demand lock use and these have been ignored in this analysis.

UNCONSTRAINED LOCKAGE DEMAND

Having identified the two reasons why a deep-draft vessel would desire lock service, the next step in determining the benefits to improved lock access was to estimate the existing level of potential lockages or unconstrained lockage demand. Unconstrained lockage demand is comprised of not only existing lock usage, but also includes those vessels not able to use the existing lock due to physical constraints. Those vessels that loop constitute a portion of the unsatisfied demand, as do vessels with a western gulf destination that depart the tidewater facilities via the MR-GO because they are too large to use the existing lock.

Available statistical data makes identification of these components of lockage demand fairly straightforward. However, there potentially remains another component of unsatisfied demand that is more difficult to identify. This component is represented by vessels too large to lock but unwilling to loop. Their unwillingness to loop would be explained by the fact that the cost of the approximately 275-mile, 22-hour loop, exceeds the value of access to both the riverfront and tidewater facilities.

In an effort to quantify this unobservable portion of lock demand, extensive interviews were made with knowledgeable industry sources representing shipping lines, steamship agents, stevedoring operations and terminal operators. Based on these industry sources it has been concluded that the amount of unobservable lock demand, i.e., vessels too large to lock but unwilling to loop, is extremely small, essentially zero, and is expected to remain this way over the period of analysis. This conclusion is supported by two factors: 1)industry's inability to identify any component of traffic that is discouraged from looping (due to cost), and 2) the increasing emphasis of tidewater activity on container operations. The second factor requires some elaboration.

There is unanimous industry opinion that container operations do not lend themselves to multiple calls within a port by the same vessel, especially if the additional cargo to be loaded or discharged is small. It is generally more efficient for the vessel to operate from a single point, moving cargo to the vessel instead of vice versa. As the ongoing program of MR-GO container facility expansion proceeds, while the investment in non-container facilities remains static, opportunities for intra-harbor lockages will remain limited to the traffic associated with existing non-container facilities on the MR-GO.

Therefore, because the existing non-container facilities do not generate any intra-harbor lockage demand that does not lock or loop and because discouraged loopers are essentially zero, total intra-harbor demand can be represented by the sum of lockers and observable loopers. Obviously lockers represent the portion of demand that is satisfied by the existing lock while loopers represent that portion of demand that can be satisfied only with a lock of larger dimensions.

The currently unmet portion of lockage demand can be estimated fairly directly by examining vessel itineraries. Bureau of Census records of port entrances and clearances provide the necessary data. Unmet intra-harbor lockage demand is represented by those vessels which enter one section of deep-draft facilities, depart that section by way of the originally used access channel, reenter by way of the other access channel, and finally depart by way of the second access channel. Unmet thru lockage demand can be identified from the same data source as for intra-harbor demand. It is represented by those vessels departing tidewater facilities via the MR-GO with westbound U.S. destinations, usually a Texas port.

Table 8 - 1 details the currently unmet portion of deep-draft lockage demand. The table breaks down the demand by lockage type (intra-harbor and thru), vessel type, and vessel deadweight tonnage (dwt). As the table shows, all unmet intra-harbor lockage demand is composed of dry bulk vessels. There is no unaccommodated intra-harbor lockage demand for general cargo or container vessels. By contrast, table 8 - 1 shows no unmet thru lockage demand for dry bulk vessels but a total of 51 and 32 demanded lock transits for general cargo and container vessels, respectively. However, close inspection of the initially identified thru lockage demand revealed the need to modify the demand estimate.

After comparing actual thru lockages under existing conditions with the initially identified thru lockage demand, and calculating the absolute amount of transportation cost savings associated with a thru lockage, it became apparent that the relatively small time savings associated with thru lockages required that a downward adjustment to the demand estimate be made. On average, vessels making a thru lockage save approximately 2.05 hours of travel time, after taking into account 1.25 hours of lock transit time. However, the gross cost savings associated with this time savings does not account for the tugboats that must be hired to assist the deep-draft vessels with the lockage. Therefore, these tugboat costs must be subtracted from the gross savings. Interviews with

Table 8 - 1

Unaccommodated Deep-Draft Demand
Existing Lock

Deadweight Tonnage (1,000)	Dry Bulk	General Cargo	Container
Intra-Harbor:			
20-30	16	0	0
30-40	20	0	0
40-50	4	0	0
Total	40	0	0
Thru:			
10-20	0	51	6
20-30	0	0	23
30-40	0	0	3
Total	0	51	32

industry sources, revealed the average cost of tug assistance to be approximately $581 dollars per hour. Using this estimate and multiplying it by 1.25 hours of lock transit time produced the per lockage cost of tug assistance of $726.

For some of the smaller vessels, once tug assistance costs are netted from gross savings, the resulting net savings are only slightly positive. To justify the added complication of the lockage logistics, some minimum level of savings is required. A threshold level of savings equal to one hour of vessel operating cost approximates the required inducement. Therefore, demand for a thru lockage results when there is a positive net level of savings over and above one hour of vessel operating costs. Since all vessel sizes save the same amount of time with a thru lockage, the effect of establishing a one hour of equivalent operating cost threshold is to specify a minimum size vessel that finds thru lockages to be economic. The details of this calculation are displayed in table 8 - 2 by vessel type and dwt. The table includes the calculations for dry bulk vessels. These are displayed for illustration purposes only. No dry bulk thru lockage demand was identified in the initial demand estimate.

To illustrate the results of the process discussed above, a 12,000 dwt container vessel, would not be included in thru lockage demand even though there is a positive level of net savings ($547). Only container vessels greater than or equal to approximately 16,000 dwt generate enough savings to be included in lockage demand.

Of note is the 3,000 dwt general cargo vessel. These vessels represent the "miniship" series of oceangoing vessels. Because of the relatively small dimensions (50-foot width and 250-foot length) and greater maneuverability, these vessels do not require tug assistance for lock transit. As a result, the "miniships" are included in total thru lockage demand while larger dwt general cargo vessels that require tug assistance are excluded.

Table 8 - 3 details the currently unmet portion of deep-draft lockage demand after adjusting thru lockage activity as described above. Compared to table 8 - 1, which did not reflect adjustment to thru lockages, table 8 - 3 includes no general cargo vessel demand and slightly lower container vessel demand.

Total deep-draft lockage demand, the sum of existing lockages and unaccommodated adjusted demand, is summarized

Table 8 - 2

Economic Feasibility Of Thru Lockages

DWT	1993 At Sea Oper Cost	Gross Thru Savings (Oper Cost * 2.05 Hrs)	Tug Assist Cost	Gross Thru Savings - Tug Asst Cost	Net Thru Savings - 1.00 Hr Oper Cost	Equivalent Hours Saved	Thru Lock Demand 1/
Container (Foreign)							
12,000	621	1273	726	547	-74	0.88	NO
16,000	723	1482	726	756	33	1.05	YES
20,000	828	1697	726	971	143	1.17	YES
24,000	956	1960	726	1234	278	1.29	YES
28,000	1,057	2167	726	1441	384	1.36	YES
32,000	1,162	2382	726	1656	494	1.43	YES
38,000	1,354	2776	726	2049	695	1.51	YES
42,000	1,460	2993	726	2267	807	1.55	YES
48,000	1,611	3303	726	2576	965	1.60	YES
50,000	1,724	3534	726	2808	1084	1.63	YES
General Cargo (Foreign)							
3,000	308	631	0	631	323	2.05	YES
11,000	473	970	726	243	-230	0.51	NO
14,000	536	1099	726	373	-163	0.70	NO
16,000	578	1185	726	459	-119	0.79	NO
20,000	664	1361	726	635	-29	0.96	NO
24,000	744	1525	726	799	55	1.07	YES
30,000	868	1779	726	1053	185	1.21	YES
Dry Bulk (Foreign)							
15,000	504	1033	726	307	-197	0.61	NO
25,000	559	1146	726	420	-139	0.75	NO
35,000	607	1244	726	518	-89	0.85	NO
40,000	635	1302	726	576	-60	0.91	NO
50,000	681	1396	726	670	-11	0.98	NO
60,000	727	1490	726	764	37	1.05	YES

1/ Assumes vessels would transit the lock if the cost savings of locking are greater than 1.0 hours of operating cost.

Table 8-3

Unaccommodated Deep-Draft Demand
Existing Lock
(Adjusted for Thru Lockage Feasibility)

Deadweight Tonnage (1,000)	Dry Bulk	General Cargo	Container
Intra-Harbor:			
20-30	16.0	0	0
30-40	20.0	0	0
40-50	4.0	0	0
Total	40.0	0	0
Thru:			
10-20	0	0	2.4
20-30	0	0	23.0
30-40	0	0	3.0
Total	0	0	28.4

by lockage type, vessel type, and vessel size in table 8 - 4.

UNCONSTRAINED FUTURE LOCKAGE DEMAND

As described in section 2, future unconstrained lockage demand has been developed directly from the estimate of existing unconstrained lockage demand. Existing unconstrained lockage demand has been used as a base, with future unconstrained demand projected by applying an appropriate growth factor to the existing level. By using the mid scenario growth factor and the sum of existing intra-harbor lockages and loopers to represent total demand for intra-harbor lockages, table 8 - 5 displays total demand by vessel type and year assuming the most likely or mid-level growth scenario. In a similar manner, table 8 - 6 displays total thru lockage demand.

LARGEST VESSEL ACCOMMODATED BY ALTERNATIVE

Potential lockages, as previously defined, represent maximum lock usage that would occur assuming that the IHNC Lock was large enough to pass all vessels demanding lock transit. The estimated total lock usage for a given alternative would, therefore, be determined by potential lockages and the largest vessel, by type, that could safely navigate each alternative.

In estimating the largest allowable vessels for each alternative, it was necessary to incorporate the appropriate minimum safety clearances associated with each physical dimension. The values used for clearances were as follows. For width, a total of ten inches or approximately 0.83 feet of difference between chamber width and vessel beam was used. For length, a total of 14 feet between useable chamber length and vessel length was used. And finally, for draft, five feet between the sill elevation and vessel transit draft was used. For length and width the clearances were based on actual experience with the existing lock. It is not anticipated that practices with the larger chambers would be significantly different. For draft, the assumed clearance represents a design standard based on the requirements of safe navigation.

Unfortunately, observation of actual practice at the existing lock does not provide useful information regarding minimum acceptable draft clearance that could be compared to the design standard. The depth of the sill is rarely approached during existing lockages. The combination of the 75-foot width, which limits vessel size and the light-loading practices prevalent with existing lockages, produces the environment which does not push the limits of

Table 8 - 4

Total Deep-Draft Lockage Demand
By Lockage Type, Vessel Type, and Deadweight Tonnage
(1991)

Deadweight Tonnage (1,000)	Dry Bulk	General Cargo	Container
Intra-Harbor:			
3	0	95.0	0
3-10	1.0	3.0	0
10-20	4.0	20.0	0
20-30	16.0	0	0
30-40	20.0	0	0
40-50	4.0	0	0
Total	45.0	118.0	0
Thru:			
3	0	15.0	0
3-10	0	0	0
10-20	0	0	2.4
20-30	0	0	23.0
30-40	0	0	3.0
Total	0	15.0	28.4

Table 8 - 5

Intra-Harbor Lockages
Total Demand

Vessel Type: Dry Bulk

DWT (1,000)	1991	2000	2010	2020	2030	2040	2060
0-10	1	1.2	1.4	1.7	2.0	2.4	3.4
10-20	4	4.7	5.6	6.7	8.0	9.6	13.7
20-30	16	18.8	22.5	26.8	32.1	38.3	54.8
30-40	20	23.5	28.1	33.6	40.1	47.9	68.5
40-50	4	4.7	5.6	6.7	8.0	9.6	13.7
50-60	0	0.0	0.0	0.0	0.0	0.0	0.0
60-70	0	0.0	0.0	0.0	0.0	0.0	0.0
70-80	0	0.0	0.0	0.0	0.0	0.0	0.0
80-90	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	45.0	52.8	63.2	75.5	90.2	107.9	154.1

Vessel Type: General Cargo

DWT (1,000)	1991	2000	2010	2020	2030	2040	2060
3	95	111.5	133.3	159.4	190.5	227.7	325.3
3-10	3	3.5	4.2	5.0	6.0	7.2	10.3
10-20	20	23.5	28.1	33.6	40.1	47.9	68.5
20-30	0	0.0	0.0	0.0	0.0	0.0	0.0
30-40	0	0.0	0.0	0.0	0.0	0.0	0.0
40-50	0	0.0	0.0	0.0	0.0	0.0	0.0
50-60	0	0.0	0.0	0.0	0.0	0.0	0.0
60-70	0	0.0	0.0	0.0	0.0	0.0	0.0
70-80	0	0.0	0.0	0.0	0.0	0.0	0.0
80-90	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	118.0	138.6	165.6	198.0	236.6	282.8	404.1

Table 8 - 6

Thru Lockages
Total Demand

Vessel Type: Container

DWT (1,000)	1991	2000	2010	2020	2030	2040	2060
0-10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-20	2.4	2.8	3.4	4.0	4.8	5.8	8.2
20-30	23.0	27.0	32.3	38.6	46.1	55.1	78.8
30-40	3.0	3.5	4.2	5.0	6.0	7.2	10.3
40-50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60-70	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70-80	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80-90	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	28.4	33.3	39.9	47.6	56.9	68.1	97.3

Vessel Type: General Cargo

DWT (1,000)	1991	2000	2010	2020	2030	2040	2060
3	15	17.6	21.1	25.2	30.1	36.0	51.4
3-10	0	0.0	0.0	0.0	0.0	0.0	0.0
10-20	0	0.0	0.0	0.0	0.0	0.0	0.0
20-30	0	0.0	0.0	0.0	0.0	0.0	0.0
30-40	0	0.0	0.0	0.0	0.0	0.0	0.0
40-50	0	0.0	0.0	0.0	0.0	0.0	0.0
50-60	0	0.0	0.0	0.0	0.0	0.0	0.0
60-70	0	0.0	0.0	0.0	0.0	0.0	0.0
70-80	0	0.0	0.0	0.0	0.0	0.0	0.0
80-90	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	15.0	17.6	21.1	25.2	30.1	36.0	51.4

Note: Total demand for thru lockages was revised to reflect the fact that only containerships above the 16,000 DWT class would find it economical to transit the lock. This result occurs after ships take into account the added expense of tug assistance when transiting the lock and the requirement of a minimum level of savings equal to 1.0 hours of operating cost. The 3,000 DWT class among the general cargo vessels refers to miniships that do not require tug assistance when transiting the lock.

the 31.5-foot sill depth. Because it is anticipated that the design standard would be enforced (and this would not be difficult within the controlled access environment of a lock chamber) the design underkeel has been projected to represent actual practice in the with-project condition.

The following is an example of how the maximum allowable vessel dimensions were determined given the minimum clearances described above. A lock 110 feet wide was assumed to be compatible with vessels up to 109.17 feet wide assuming that the other dimensions were not binding. Likewise, a lock 900 feet long could accommodate a vessel with a length of 886 feet. However, treatment of draft was not as straightforward. While it is a simple matter to subtract five feet from the sill elevation in order to identify the maximum draft allowable for a specific alternative, it is not so simple to identify the maximum vessel size associated with a given draft because of vessel light-loading. Existing lockages of light-loaded vessels undoubtedly reflect the rationale that the majority of lock use occurs with vessels having unloaded some portion of their cargo in one section of the port and then, after transiting the lock, loading cargo in the other section of the port.

To account for light-loading, an analysis was performed on existing lockage vessel drafts. The analysis showed that, on average, dry bulk vessels transiting the lock were loaded to 64 percent of their maximum draft, while general cargo vessels were loaded, on average, to 72 percent of their maximum draft. To insure logical consistency with the rationale for intra-harbor lockages and to account for historical light-loading at the lock, these light-loading factors were used in the determination of the maximum vessel draft corresponding to a given lock depth. Because there are no existing lockages of container vessels, it was not possible to calculate an observable average percent of container vessel maximum draft during lockage. As a surrogate measure, the light-loading practices of general cargo vessels were assumed for container vessels.

The relationship between vessel size, measured in dwt, and each physical vessel dimension, including draft adjusted for light-loading, was established using formulas developed by the Institute for Water Resources in their FY 1992 memorandum on deep draft vessel costs. Table 8 - 7 displays these functional relationships. The estimates of the maximum allowable vessels for each dimension produced by these formulas are presented in table 8 - 8.

The first binding constraint among width, length, and draft determines the largest vessel that may transit a lock.

Table 8 - 7

Functional Relationships Between
Vessel Dimensions and Deadweight Tonnage

Vessel Type:	Dry Bulk
Length:	DWT=(Length/28.5457)^3.4129
Width:	DWT=(Width/3.1751)^3.1458
Draft:	DWT=(Draft^3.2047) x .3613
Vessel Type:	Container
Length:	DWT=(Length/11.2363)^2.4992
Width	DWT=(Width/4.2733)^3.3106
Draft:	DWT=(Draft/1.5961)^3.3342
Vessel Type:	General Cargo
Length:	DWT=(Length/22.6103)^3.1179
Width:	DWT=(Width/4.4237)^3.4747
Draft:	DWT=(Draft/1.2551)^3.0516

Table 8 - 8

Estimated Maximum Vessel Accommodated By Lock Dimension
By Vessel Type

Lock Dimensions	DWT (Rounded to the nearest 1,000 DWT) Dry Bulk	General Cargo	Container
Length (ft)			
640	38,000	31,000	23,000
900	124,000	W.F.	55,000
1,200	W.F.	W.F.	W.F.
Width (ft)			
75	20,000	18,000	13,000
90	36,000	34,000	23,000
110	68,000	W.F.	46,000
Draft (ft)			
22	13,000	8,000	8,000
36	91,000	W.F.	59,000

Notes: W.F. = Largest vessel of world fleet
Largest vessel calculations for the draft dimension assume five feet underkeel clearance and a light-loaded vessel.

Table 8 - 9 shows the largest vessel for each vessel type that could transit locks of various sizes. As can be seen in table 8 - 9, 18,000 dwt, 20,000 dwt, and 13,000 dwt, are the largest general cargo, dry bulk, and container vessels, respectively, capable of safely transiting the existing lock. For each of these vessel types, width is the binding constraint. For a lock 1200 x 110 x 36, the world fleet maximum, 68,000 dwt, and 46,000 dwt are the largest general cargo, dry bulk, and container vessels, respectively, capable of safe navigation. For the two limited vessel types, dry bulk and container, width is the binding constraint. For general cargo vessels, the dwt associated with the maximum allowable dimensions for this lock is in excess of the largest dwt general cargo vessel existing in the world fleet.

ESTIMATED LOCKAGES AND BENEFIT DETERMINATION

Given the maximum dwt vessel that can transit a given alternative and unconstrained lockage demand, total lockages by lockage type can be computed. For example, table 8 - 9 shows that for the 900 x 90 x 22 alternative, the largest dry bulk vessel that could use this lock is 13,000 dwt. To find the actual number of dry bulk intra-harbor lockages for this alternative, one needs to view table 8 - 5. In the year 1991, all ships in the 0 - 10,000 dwt category (1 ship) and 30 percent of the ships in the 10,000 - 20,000 dwt category (1.2 ships) would have a demand for intra-harbor lockages. (Uniform vessel distribution within a dwt range was assumed. Therefore, since the largest accommodated vessel, 13,000 dwt, represents 100 percent of the 0 - 10 dwt category and 30 percent of the 10 - 20 dwt category, 100 percent of the total vessels in the 0 - 10 dwt category and 30 percent of the total vessels in the 10 - 20 dwt category were identified as satisfied demand). These calculations were used in table 8 - 11. In addition, estimated demand in tables 8 - 11 through 8 - 16 and 8 - 18 through 8 - 23 were calculated in the same manner.

To convert calculated lockages into benefits, it was necessary to develop an alternative for those ships unable to use the lock, and to assign a cost for this alternative behavior. Based on the rationale presented earlier for intra-harbor lockages, the alternative for this type of lockage is to loop. Based on speeds on the river and the MR-GO, and the distances to be traveled, looping would require approximately 22.85 hours. If all vessels wanting, but unable, to use the lock were to loop, then the total intra-harbor benefits associated with a specific lock alternative would be 21.60 hours (22.85 hours loop time minus 1.25 hours lock time), times the vessel cost per

Table 8 - 9

Maximum Vessel Sizes Accommodated By Alternative
(Rounded to the Nearest 1000 DWT)

Alternative 1/	General Cargo	Constraining Dimension	Dry Bulk	Constraining Dimension	Container	Constraining Dimension
640 x 75 x 31.5	18,000	Width	20,000	Width	13,000	Width
900 x 90 x 22	8,000	Draft	13,000	Draft	8,000	Draft
900 x 110 x 22	8,000	Draft	13,000	Draft	8,000	Draft
900 x 110 x 36	W.F.	-	68,000	Width	46,000	Width
1200 x 90 x 22	8,000	Draft	13,000	Draft	8,000	Draft
1200 x 110 x 22	8,000	Draft	13,000	Draft	8,000	Draft
1200 x 110 x 36	W.F.	-	68,000	Width	46,000	Width

1/ Assumes 5 ft of underkeel clearance is required for all vessels.
W.F. = Accommodates largest vessel of world fleet