SECTION D1
INVESTMENT NEEDS FOR THE LATTS STRATEGIC PORT SYSTEM

As noted in Section C, a total of 35 coastal ports and17 inland ports were included in the LATTS Strategic Port System. Analyses were then undertaken to estimate the investment needs associated with this system of ports. The analyses identified some $22 billion in 20-year port needs. The process which developed this estimate is described below.

DATABASE

The data collection process addressed the following categories:

- Terminal Cargo Type
- Terminal Acres
- Number of Berths
- Public or Private Facility
- Published Terminal(s) Throughput Capacity
- Published Terminal(s) Throughput (most recent year)
- Other General Data Pertinent to the Study

While 1999 data was preferred, 1998 data was also accepted, and in some cases fiscal Year 1998-1999 was obtained.

Data were represented in short ton units for consistency with all of the various types of commodities. These commodities included:

- Containerized Cargo
- Break-Bulk
- Neo-bulk
- Dry Bulk
- Liquid Bulk

In some cases, certain commodities required conversion into short tons, such as in the case of containers. Containerized cargo is typically represented in industry standard format by Twenty-foot Equivalent Units (TEU). For example, one 40-foot container would then be equal to two TEUs. Other commodities, such as auto (neo-bulk) are often reported in units, which are equivalent to approximately 2,000 pounds, or approximately one-short ton per auto.

Information for the ports database was collected through a series of efforts. Basic information was initially developed during discussions between the consultant and the LATTS Working Committee. Then, using that base information as a starting point, telephone interviews were conducted with a representative of each port. The raw data thus acquired was entered into the study database, after which the initial results were then returned to each port representative by fax for verification. As an additional means of data verification, several maritime data periodical and reporting agencies were utilized to verify and validate the input data. These agencies consisted of the following:

- American Association of Port Authorities (AAPA)
- Containerization International - 1999 Edition
- U.S. Maritime Administration
- Maritime Services Directory

Yearly port throughputs were obtained for most of the major container ports in the Containerization International Yearbook – 1999 Edition. However, specific data, such as terminal acres, number of berths, etc., were not readily available through these sources. That information could only be obtained or provided by a specific port and validated by the port representative. In addition, many of the smaller ports, particularly the inland waterway ports, are not represented or mentioned in most periodicals, and therefore, information was limited. In those cases, only the individual port representative could validate or verify the actual data.

PERFORMANCE MEASURES AND METHODOLOGY

Once the data for each port terminal was entered into the computerized database spreadsheet, the capacities and throughputs of each port terminal was then quantified and compared based on each of the individual categories described earlier. The database takes into account all of the active individual terminals at each of the identified ports, based on cargo type. Therefore, the summary reports in the database not only identified the throughput and capacity of each state's marine cargo terminals, but they also revealed the throughputs and capacities by cargo type in each state.

The database not only organized the actual throughputs and estimated capacities for each of the terminals, but it also provided estimates of the throughput capacities for the identified terminals for which information was lacking. Terminal capacity can often be a very subjective issue that cannot always be easily quantified, or is often misrepresented. Therefore, in the event that terminal capacity was not known or available, the database utilized industry standard defaults that can estimate terminal's estimated throughput capacity based on criteria such as terminal acreage, number of berths and storage mode.

It is important to note that the LATTS analyses were not intended to develop a detailed estimate of current throughput and maximum throughput potential for each port. However, it represents a reasonable indication of capabilities within the maritime industry as a whole for the ports in the 13 States and Puerto Rico (the Alliance Region) that were considered. Also, there are some small privately owned terminals within the Alliance Region that are not reported in maritime data sources and do not keep accurate information. Therefore, the state- by-state throughput summaries were calibrated to the throughput projections created in the Future Facility Needs Assessment portion of this study. This calibration increased the accuracy of the study's analyses.

In summary, the database not only organized the actual throughputs and estimated capacities for each of the terminals, but it also provided estimates of the throughput capacities for the identified terminals for which information is lacking.

Specifically, the database estimated the throughput capacity by calculating the estimated capacity for each of the two key terminal components (storage area and wharf). The resulting estimated capacity is governed by the limiting component of the two.

Throughout this study, the estimated capacity was defined as the Maximum Practical Capacity (MPC). MPC typically represents the high end of a reasonable operating scenario, and is discussed in greater detail later in this report section.

Input Data

The following list of input data types illustrates the minimum data input required by the database to summarize and estimate the throughput and capacities of each port terminal, based on cargo type:

- Terminal acres
- Storage mode
- Number of berths available
- Berth type (dedicated or public)
- Published maximum capacity (tons/yr.)
- Published throughput (tons/yr.)

Each type of data served a specific function in the database assessment. The following provides a brief summary of each type of the input data and their functions.

Terminal Acres

The reported acreage of each terminal and terminal type was identified and input. Generally, the acreage includes the wharf area, storage and circulation areas, as well as the gate areas.

Storage Mode

The known mode of storage in each terminal was crucial for properly defining the terminal's capacities for each cargo type. The possible entry symbol used in the database for each of the storage modes and a brief description for each cargo type are as follows:

- Cw = Container wheeled: containers stored on chassis
- Cg = Container grounded: containers stacked by utilizing rubber tire gantries, top picks, or straddle carriers to access boxes.
- Cm = Container mixed: a combination of wheeled and grounded containers.
- NBo = Neo-Bulk outside: Bulk cargo such as automobiles, steel shapes and steel coil, etc., stored in open or uncovered areas.

- NBw = Neo-Bulk warehouse: Bulk cargo such as steel shapes, steel coil, etc., that require storage in warehouses or covered storage areas.
- NBm = Neo-Bulk mixed: A mixture of open/outside storage and warehoused or covered neo-bulk cargo.
- BBo = Break-Bulk outside: Break-bulk cargo, palletized or boxed cargo stored in open or uncovered areas.
- BBw = Break-Bulk warehouse: Break-bulk cargo, palletized or boxed cargo stored in warehouses or covered storage areas.
- BBm = Break-Bulk mixed: A mixture of open storage and warehouse/covered break-bulk cargo.
- DBo = Dry Bulk outside: Dry bulk cargo such as coal, scrap metal, sand or other dry commodity that can be stored in open or uncovered areas.
- DBs = Dry Bulk silo: Bulk cargo such as grain, cement, sugar, or other dry bulk cargoes that typically requires storage in protected silos, warehouses, or covered storage areas.
- DBm = Dry Bulk mixed: A mixture of open/outside storage, silo, warehouse or covered dry bulk cargoes.
- LBt = Liquid Bulk tank – Liquid bulk commodities such as petroleum products, chemicals, molasses, or other liquid products that are typically piped via manifolds to or from the berth area to a remote or nearby tank storage farm.

Numbers Of Berths Available

The reported number of berths were input into the model. Lay berths also were included. Berth lengths were determined by lookup tables within the database that consider the type of cargo and average berth length for that cargo based on industry standards.

Berth Type (Dedicated or Public)

Another piece of key input data was the rate of utilization for the available berths. A dedicated berth or private terminal was assumed to have a higher utilization factor for a particular commodity or cargo type. In addition, vessel calls are likely to be scheduled and therefore throughput capability will tend to be higher given the higher utilization factors for this type of berth. Public berths, on the other hand, are assumed to accommodate unscheduled vessel calls, and are therefore not always available for a particular commodity. This tends to produce lower throughput capacities. Public berths can also sometimes serve as lay berths if necessary.

Published Maximum Capacity

This input, given in tons per year, represents the documented maximum capacity generally found in terminal master plans, annual reports, or through other documentation. As previously mentioned, such data is not always readily available and is typically not found in public records.

Published Throughput

The published throughput for a respective terminal is the amount of cargo in tons that a terminal handles per year. Most ports document this information in their publications. In addition, there are many services and periodicals that publish this data.

Throughput Capacity Calculations

Given that each of the above data entry criteria are met, the database was capable of estimating the output data for the following:

- Storage Throughput Capacity (tons/yr.)
- Berth Throughput Capacity (tons/yr.)
- Calculated Practical Capacity
- Maximum Practical Capacity, MPC (tons/yr.)

Once the output data was assessed, it was then organized for reporting. The following represents a brief summary of each of the output data and their functions.

Storage Throughput Capacity

The storage throughput capacity was essentially calculated by taking the available acres for a particular cargo storage mode and comparing it to industry standards based on look-up tables in the database. For example, the look-up tables assumed the following storage capacities for the three different container storage modes:

- Wheeled Storage Capacity (TEU/acre) = 90
- Grounded Storage Capacity (TEU/acre) = 200-250
- Other/Mixed Storage Capacity (TEU/acre) = 150

Additional look-up data for the various types of cargoes included:

- The percentage of the total available acres for storage
- The dwell time, in days for outside storage, silo storage, warehouse storage and mixed storage
- Tons per TEU for containerized cargo (including empties)
- Peaking factors

For this study, all storage throughput capacity results were represented in tons per year.

Berth Throughput Capacity

The berth throughput capacity was based on the number of available berths and the status of that particular berth, dedicated or public. Based on that input, and employing look-up tables for typical berth utilization, the berth throughput capacity was calculated based on industry standards. The look-up tables considered the following berthing factors:

- Dedicated berth occupancy factor
- Public berth occupancy factor
- Cranes, conveyors or pipe manifolds per berth/ship
- Lifts or tons, per hour, per crane, conveyor or pipe manifold
- Tons (or TEU) per lift, per conveyor or per pipe manifold
- Peaking factors
- Berth down time percentages
- Berth operating hours per day

The look-up tables essentially consider the number of berths, type of cargo, and the average times to load/unload a vessel utilizing conventional loading and unloading equipment (cranes, conveyors, pipelines, etc.). The berth throughput capacity was represented in tons per year.

CALCULATED PRACTICAL CAPACITY

The calculated practical capacity was determined by considering the minimum value represented for the storage throughput capacity versus the berth throughput capacity. The lesser of the two values was considered to be the limiting component for that terminal, and thus represented the practical capacity of that terminal. In other words, the minimum value governs, or limits the ability of that terminal to produce additional throughput.

Because berths are traditionally major capital improvements, and also require available waterfront access, they can effectively govern a port's ability to increase throughput. It was assumed that equipment can always be added in order to increase loading and unloading productivity and operations, whereas new berths are expensive and require significant design, dredging and sometimes environmental mitigation. Similarly, storage is governed by the availability of backlands. Land not immediately adjacent to the berth is generally considered to be less efficient, due to additional drayage costs and other operational issues. Therefore, storage can simply be limited by too little land.

MAXIMUM PRACTICAL CAPACITY (MPC)

The database was used to assess the minimum value between the storage throughput capacity, berth throughput capacity, and the published throughput capacity, in tons per year. This quantity represents the maximum practical capacity of a given terminal. Maximum Practical Capacity (MPC) is defined as the high end of a realistic operating scenario. For containerized cargoes, this throughput is measured in either lifts or 20-foot equivalency units (TEU). However, for the purpose of this study, TEUs were converted into short tons, or approximately 7.5 tons per TEU. For break-bulk/neo bulk, liquid bulk and dry bulk, the units of measurement are also in short tons. Automobiles are measured in number of vehicles per year. For the purpose of this study, automobiles were converted to approximately one-short ton per automobile unit.

Although the MPC of a terminal is defined as the high end of a realistic operating scenario, this represents the peak operation of a terminal and sustained operation at this level for a significant period of time is generally uneconomical, impractical and unsafe.

An analogy associated with this characteristic is the speed capacity of a car. Although a car may be capable of traveling at speeds of 120 mph, this is not the safest, practical, or most economical speed at which to drive the car.

In reality, during peak times, a terminal can operate at, or close to MPC. However, a terminal operating at MPC (very high TEUs or Tons/acre/year) for a sustained period is stretching the envelope with respect to their respective capacity. For practical planning purposes, operations at MPC are not sustainable over prolonged periods. It should also be noted that prolonged operations at MPC tend to drive up operating and maintenance costs and is considered unrealistic for long durations.

For this reason, a sustainable capacity for each terminal was estimated and used as a particular terminal's capacity. This capacity is known as the Sustainable Practical Capacity (SPC). Past experience in applying capacity models suggests that the sustainable practical capacity of a terminal is generally 75 percent of a terminal's Maximum Practical Capacity (MPC). For throughput to exceed the SPC, a port would have to operate at uneconomical or unsafe levels, build additional terminals, or expand the existing ones. This threshold generally may vary between terminals, but past experience has shown that the breaking point generally is near 75 percent.

For planning and estimating purposes, Sustainable Practical Capacity (SPC) was used as the basis for the Future Facility Needs Assessment. In essence, this equates to a throughput capacity that is estimated to be approximately 75% to 85% of the terminal's MPC.

The estimated SPC per each planning module was adjusted (between 75% and 80% MPC) over each approximate ten to fifteen-year interval. This was done to reflect the likelihood that there will be throughput increases due to improvements to cargo handling equipment and higher productivity levels, as well as the addition of other types of technological advancements in automated improvements. It can be safely assumed that these technological improvements and productivity increases are likely to occur within the Alliance Region over the next few decades.

CAPACITY AND THROUGHPUT ESTIMATES - CURRENT

A state-by-state (and Puerto Rico) summary was compiled from the results of the terminal throughput capacity spreadsheets. **Exhibit D1-1** contains the current total published capacities and throughputs, in tons per year, for the entire LATTS Region. In addition, **Exhibit D1-2** represents a summary of the LATTS Region for each Alliance member's current total published capacities and throughputs, in tons per year, for each of the following cargo types:

Exhibit D1-1
CURRENT (1996) LATTS REGION PORT CAPACITY AND THROUGHPUT ESTIMATES
(in Short Tons/Year)

CARGO TYPE	CURRENT THROUGHPUT ESTIMATE	CURRENT CAPACITY ESTIMATE
Containerized Cargo	80,139,147	104,025,351
Break-Bulk	50,255,428	50,683,819
Neo-Bulk	6,954,929	11,152,395
Dry Bulk	179,669,037	245,894,604
Liquid Bulk	259,917,296	312,151,999
Total	**576,935,837**	**723,908,168**

Exhibit D1-2
CURRENT PORT CAPACITY AND INTERNATIONAL THROUGHPUT ESTIMATES BY STATE
(in short tons/year)

CARGO TYPE	CURRENT THROUGHPUT ESTIMATE	CURRENT CAPACITY ESTIMATE
ALABAMA		
Containerized Cargo	508,408	1,500,000
Break-Bulk	4,315,105	5,025,000
Neo-Bulk	442,899	1,725,000
Dry Bulk	16,067,802	29,100,000
Liquid Bulk	590,532	825,000
TOTAL STATE	21,924,746	38,175,000
ARKANSAS		
Containerized Cargo	67,916	61,124
Break-Bulk	595,246	571,295
Neo-Bulk	0	0
Dry Bulk	512,257	757,944
Liquid Bulk	3,587	239,135
TOTAL STATE	1,179,006	1,629,498
FLORIDA		
Containerized Cargo	8,316,742	25,054,866
Break-Bulk	4,815,814	6,763,304
Neo-Bulk	1,168,917	4,490,095
Dry Bulk	10,287,399	13,461,180
Liquid Bulk	18,001,632	36,706,982
TOTAL STATE	42,590,504	86,476,427

Exhibit D1-2 (cont'd)
CURRENT PORT CAPACITY AND INTERNATIONAL THROUGHPUT ESTIMATES BY STATE
(in short tons/year)

CARGO TYPE	CURRENT THROUGHPUT ESTIMATE	CURRENT CAPACITY ESTIMATE
GEORGIA		
Containerized Cargo	6,188,571	7,535,272
Break-Bulk	2,693,952	2,332,884
Neo-Bulk	247,958	204,565
Dry Bulk	1,373,445	5,117,949
Liquid Bulk	1,410,155	7,893,581
TOTAL STATE	11,914,081	23,084,251
KENTUCKY		
Containerized Cargo	0	0
Break-Bulk	0	0
Neo-Bulk	658,614	974,546
Dry Bulk	1,589,757	4,059,533
Liquid Bulk	22,711	191,308
TOTAL STATE	2,271,082	5,225,387
LOUISIANA		
Containerized Cargo	7,568,194	7,248,823
Break-Bulk	30,150,172	26,740,004
Neo-Bulk	2,128,962	1,830,644
Dry Bulk	73,780,859	72,993,000
Liquid Bulk	83,811,353	122,185,962
TOTAL STATE	197,439,540	230,998,433
MISSISSIPPI		
Containerized Cargo	1,263,040	1,377,844
Break-Bulk	2,164,020	2,306,289
Neo-Bulk	0	0
Dry Bulk	754,370	1,290,841
Liquid Bulk	0	0
TOTAL STATE	4,181,430	4,974,974
NORTH CAROLINA		
Containerized Cargo	694,950	1,303,963
Break-Bulk	922,815	1,043,382
Neo-Bulk	0	0
Dry Bulk	3,296,025	5,439,762
Liquid Bulk	0	0
TOTAL STATE	4,913,790	7,787,107
PUERTO RICO		
Containerized Cargo	8,963,715	11,839,934
Break-Bulk	785,309	1,553,969
Neo-Bulk	72,226	279,596
Dry Bulk	1,089,112	1,462,500
Liquid Bulk	3,485,159	6,011,690
TOTAL STATE	14,395,521	21,147,689

Exhibit D1-2 (cont'd)
CURRENT PORT CAPACITY AND INTERNATIONAL THROUGHPUT ESTIMATES BY STATE
(in short tons/year)

CARGO TYPE	CURRENT THROUGHPUT ESTIMATE	CURRENT CAPACITY ESTIMATE
SOUTH CAROLINA		
Containerized Cargo	9,516,673	10,745,711
Break-Bulk	508,883	490,295
Neo-Bulk	0	0
Dry Bulk	1,888,746	3,367,798
Liquid Bulk	0	0
TOTAL STATE	11,914,302	14,603,804
TENNESSEE		
Containerized Cargo	1,528,874	3,301,172
Break-Bulk	61,498	140,940
Neo-Bulk	0	0
Dry Bulk	2,292,953	4,991,625
Liquid Bulk	2,270,428	5,564,194
TOTAL STATE	6,153,753	13,997,931
TEXAS		
Containerized Cargo	26,259,005	23,593,870
Break-Bulk	2,464,419	2,589,776
Neo-Bulk	2,235,353	1,647,949
Dry Bulk	32,771,877	40,166,677
Liquid Bulk	150,321,739	132,534,147
TOTAL STATE	214,052,393	200,532,419
VIRGINIA		
Containerized Cargo	9,263,059	10,462,772
Break-Bulk	778,195	1,126,681
Neo-Bulk	0	0
Dry Bulk	33,392,000	55,500,000
Liquid Bulk	0	0
TOTAL STATE	43,433,254	67,089,453
WEST VIRGINIA		
Containerized Cargo	0	0
Break-Bulk	0	0
Neo-Bulk	0	0
Dry Bulk	572,435	8,185,795
Liquid Bulk	0	0
TOTAL STATE	572,435	8,185,795

- Containerized Cargo
- Break-Bulk
- Neo-Bulk
- Dry Bulk
- Liquid Bulk

In addition to the state-by-state summaries, the database provided the opportunity to compile the throughputs or capacities for any combination of state and/or cargo type.

THROUGHPUT ESTIMATES - FUTURE

PIERS data were used to properly assess the future market expectations and subsequent annual growth rates for each Alliance member. PIERS is an acronym for Port Import/Export Reporting Services and is a publishing branch of the Journal of Commerce, a highly respected daily periodical of trade logistics. The PIERS data represents the latest cargo projections by cargo type as well as modal type (i.e. highway, rail, etc.) for the years 2000, 2005, 2010, 2015, and 2020.

In total, the throughput and capacity of the Alliance Region assessed for current activity as well as projected activity. In corresponding PIERS data, based upon actual shipping manifests for United States Customs districts, to port-provided data, an actual accounting of current private activity not measured by public ports was performed. In discussions with relevant port representatives, the designation and location of private terminals importing or exporting commodities were determined. Typically, these private enterprises were contacted and cargo / terminal data was obtained. The port's information was compared to the PIERS data and future projections were developed in the Projection Model which is a part of the database

LATTS PROJECTION MODEL

The LATTS projection model tied the PIERS data with the port-provided data. A process of correlating port reported tonnage and PIERS data required a significant analysis. To perform this analysis, several assumptions were made, as follows.

- In comparing PIERS related data to port-provided data, it was noticed that a direct correlation was not possible. If PIERS data was greater than port-provided data, it was assumed that the cargo that could not be specifically accounted was attributable to private terminals. The Mississippi River system, inclusive of its tributaries, as well as the Gulf and Atlantic coast, consists of private terminals not managed by the typical public port entities. For example, located near Virginia Port Authority terminals are privately managed bulk terminals. Specific accountability of these private terminals was included only if the terminal information was provided.

- If the PIERS related data was less than the port-provided data, it was assumed that transshipment and over-the-road (OTR) cargo was a factor. In other words, cargo which enters a port may be counted as it exits the port via a different mode of transportation as well as being counted by another port within the same state as an entry. PIERS data is based upon United States Customs data and therefore is only counted as it enters or exits the United States. U.S. Customs data is based upon the origin or destination of the commodity or cargo, noted by the "bill of lading". It is important to note this factor because cargo that is counted at least twice could suggest that the sustained or maximum practical capacity has been reached contemporarily when that may not actually be the case.

- The description and assumptions of each port should be noted, as described under the noted projection cargo for each state. Each terminal surveyed has different "characteristics-of-operation." For example, some ports manage their terminals on a daily basis while other "public" port operations managed private facilities. Private port operations complicated data collection.

Therefore, if the port-provided number was greater than the PIERS number, the PIERS data - current and projected - was considered the relevant cargo throughput to be used and the surplus port registered cargo was assumed to be transshipment and/or OTR cargo. Since all facilities, notably private bulk terminals, could not be specifically researched or determined, it was considered more appropriate to work with data that was known. If the PIERS data was greater than the port-provided number, then the port-provided number was utilized for the same reason yet grown at the rates noted by PIERS.

Data for inland (non-coastal) states were not available to any significant level of detail such as transportation mode or cargo type. Additionally, inland state PIERS data was only available for current (1996) and 2020. Growth rates, in order to determine projected cargo amounts for 2000, 2005, 2010, and 2015, were taken from the coastal state that was most likely to affect the relevant inland state. For example, while West Virginia is located adjacent or closer to Virginia, the more appropriate growth rate would be Louisiana; West Virginia is not connected to Virginia via waterway while it is connected to Louisiana. The mix of cargo for the inland states was again taken from port-provided data, a known factor.

GENERAL METHODOLOGY

In general, port data was compared to PIERS data. As noted, port cargo descriptions by port complicated matters. PIERS data breaks out cargo transportation by mode which has some provision of cargo type (i.e., containerized, break-bulk, neo-bulk, dry bulk and liquid bulk cargo). PIERS transportation modes consist of:

- Truck container
- Rail Intermodal (container)
- Truck non-container
- Rail non-container

- Water
- Other (pipeline, water)

These modes provided a hint regarding cargo type, but in performing the capacity analysis for the Alliance ports, the following five types of cargo were used:

- Container
- Break-bulk
- Dry bulk
- Liquid bulk
- Neo-bulk

The PIERS transportation modes were converted into the above five cargo types. The steps for performing this conversion included analyzing and disseminating cargo types between PIERS and port-provided data. The following steps were used:

1. Determine, at the state level, the current mix of the five cargo types (as noted above).

2. Compare the total port cargo tonnage provided at the state level for the terminals included in this analysis to the total PIERS-based data,

3. Allocate the containerized cargo amount provided by the ports to that provided by PIERS.

4. Determine the breakdown of cargo types (i.e., percentage at the state level).

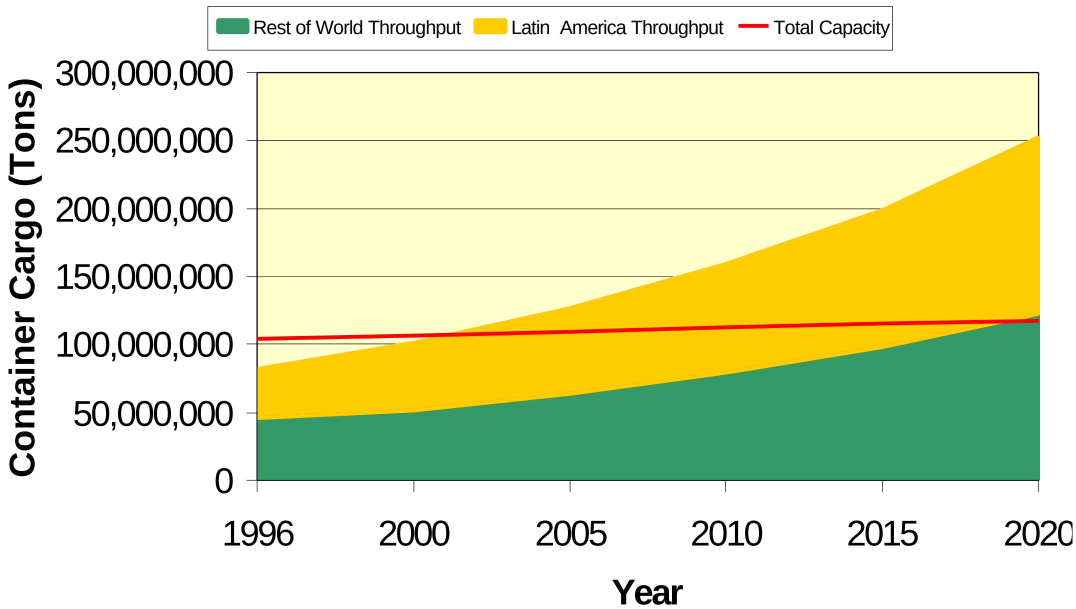
5. Consider the amount of PIERS containerized cargoes that are provided by each source and are dependant upon the breakdown of cargo that is provided by the ports (matching the mix in the PIERS data to the mix in port data).

In effect, the allocation of cargo carried by the PIERS-based modes of transportation was correlated with the five basic types of cargo. Thus, it was noted how much of each of the five cargo types were "carried" by each PIERS-based mode of transportation. The result was real numbers of cargo tonnage for each type of cargo – allocated from PIERS – for the 20-year outlook in five-year increments after 1996 – 2000, 2005, 2010, 2015 and 2020.

FUTURE NEEDS ESTIMATES

Exhibit D1-3 compares cargo throughput with capacity for each of the cargo types. The graphs show that for each cargo type, throughput in the Alliance will exceed capacity. The deficiency in capacity is the basis for estimating marine terminal needs.

Exhibit D1-3
LATTS REGION CONTAINER THROUGHPUT vs CAPACITY



LATTS REGION BREAK-BULK THROUGHPUT vs CAPACITY

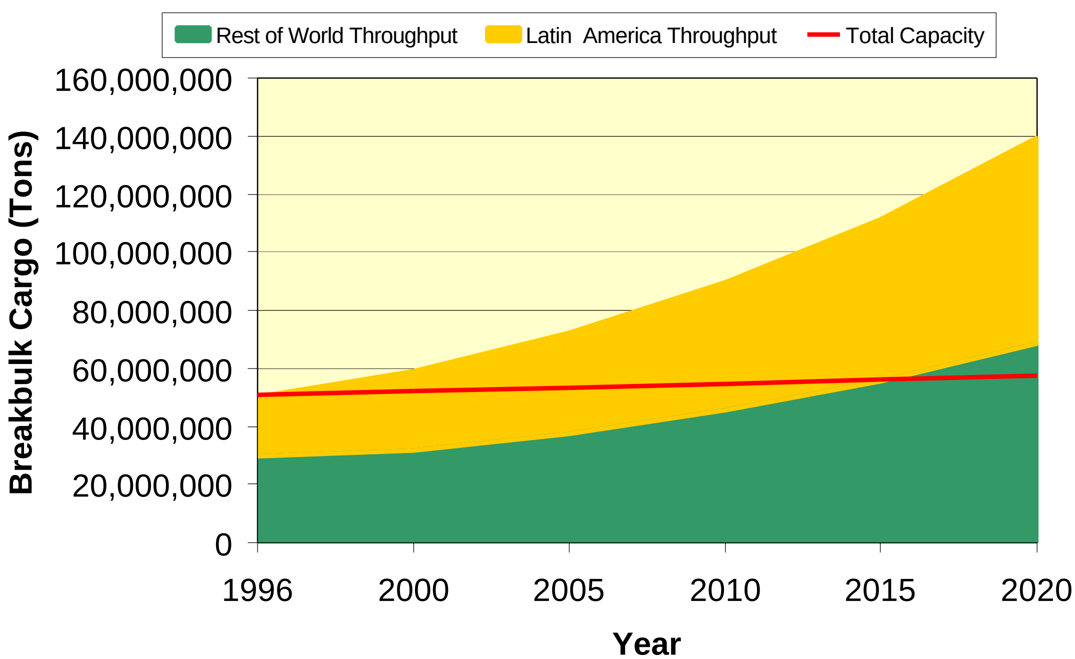
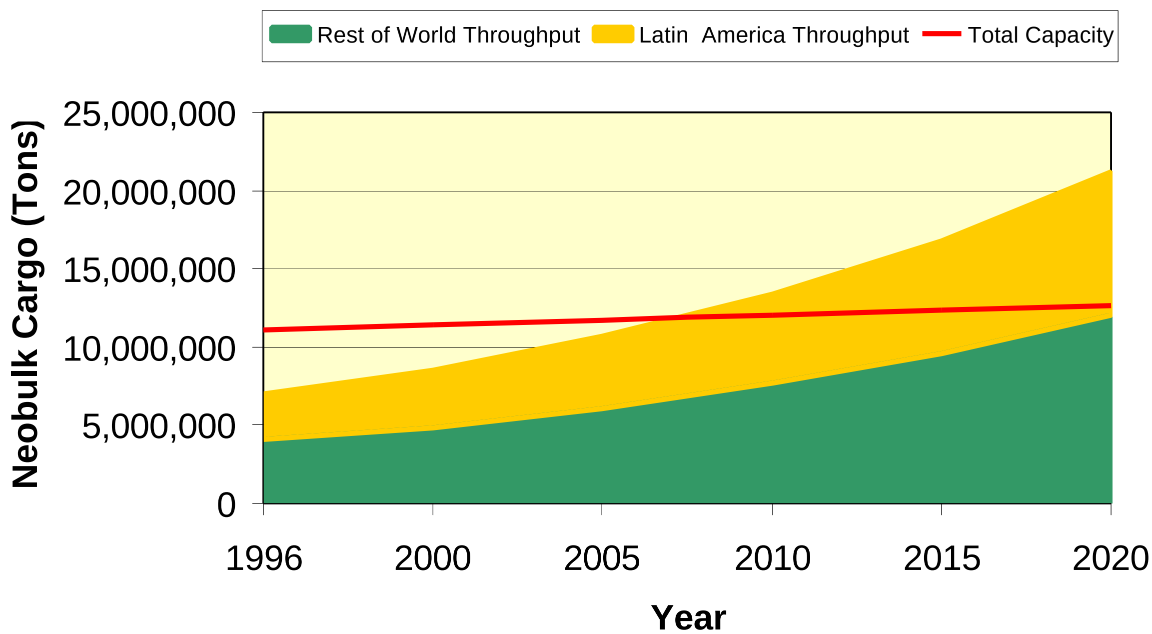


Exhibit D1-3 (cont'd)
LATTS REGION NEO-BULK THROUGHPUT vs CAPACITY



LATTS REGION DRY BULK THROUGHPUT vs CAPACITY

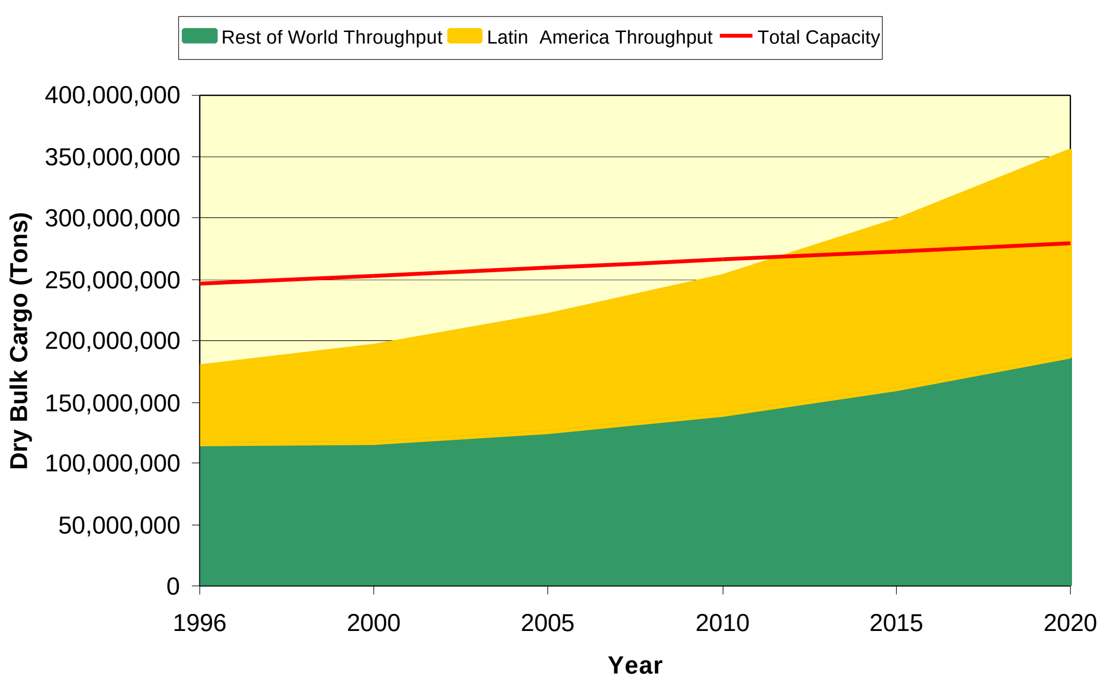
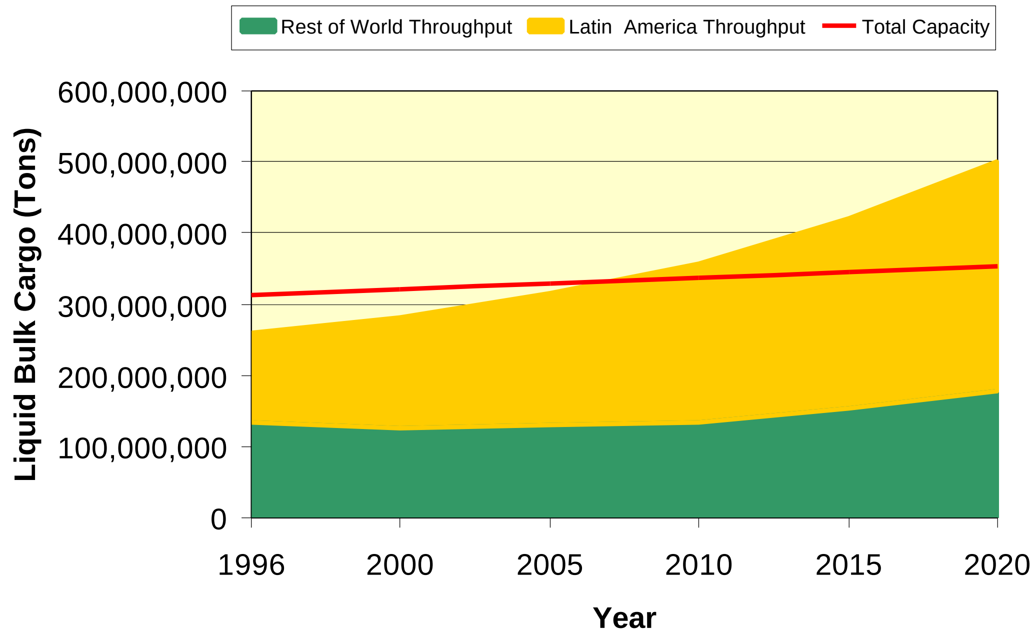
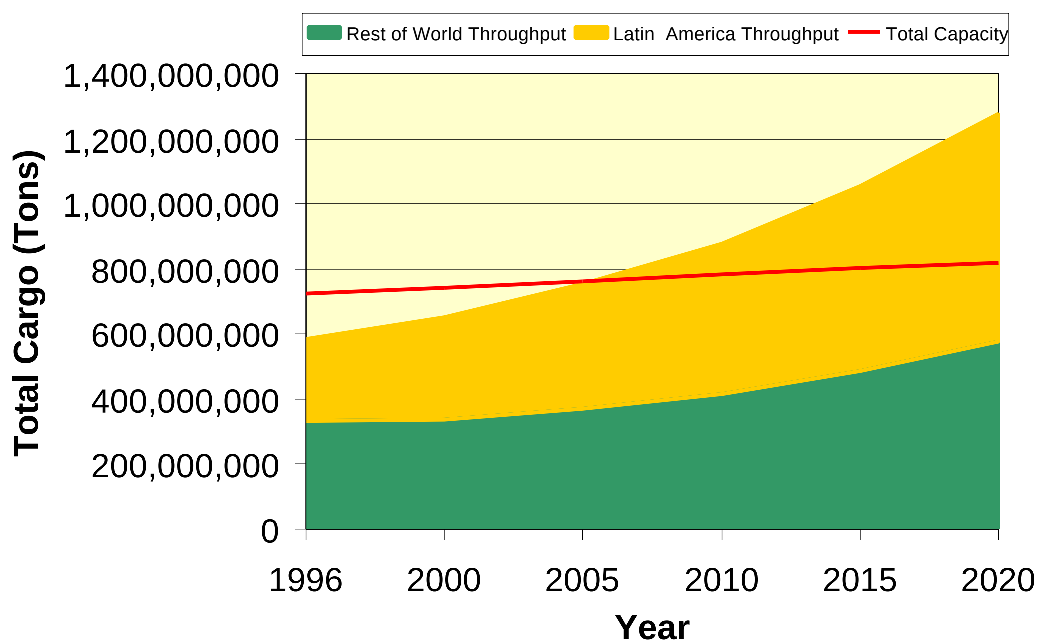


Exhibit D1-3 (cont'd)
LATTS REGION LIQUID BULK THROUGHPUT vs CAPACITY



LATTS REGION ALL CARGOES THROUGHPUT vs CAPACITY



Working from the current and future throughput modeling data, the future facility needs assessment for the LATTS Region was performed. The SPCs of existing facilities, for each cargo type were subtracted from the medium cargo forecasts provided by the PIERS data. This process enabled the identification of possible future shortfalls or over-capacities of any given cargo type. If a shortfall was identified, the estimated tonnage of the capacity shortfall was divided by the appropriate capacity of the associated terminal planning module. Terminal planning modules describe the characteristics and capacity of cargo terminals typically associated with the LATTS Region. Typical terminal modules were developed for five types of facilities, viz. Containers, Neo-Bulk, Break-Bulk, Dry-Bulk and Liquid-Bulk. (Planning modules are described in greater detail in the Appendix.) The capacity shortfall for a particular cargo type was translated into the number of planning modules which would be required to serve that particular volume of cargo.

Exhibit D1-4 summarizes the estimated module throughput capacities and conceptual development costs for the five types of LATTS marine terminal modules (refer to the Appendix for more detail on the cost estimates). All modules except for the liquid bulk terminal have three estimated throughput capacities for the different storage modes that were described earlier in this report section. The database considered the current storage mode split by terminal acreage to determine the average module throughput. For example, if the container terminals in a given state consist of wheeled storage (50%) and grounded storage (50%), then the average container module throughput capacity for that state was considered to be approximately 1,467,000 short tons/year. This procedure was used for all cargo types to estimate the future amount of modules needed in each state/commonwealth from the calculated tonnage needs.

CONCLUSIONS

Because the LATTS Region includes a number of ports with widely varying characteristics, it was necessary to conduct these analyses on a generalized basis. Therefore, since the analysis was performed from such this type of perspective, the conclusions for the infrastructure needs are shown in a general summary format.

The needs assessment was summarized on the basis of cargo type by state. In addition, a summary of all states and all cargo types is provided to show the future needs for the entire Region.

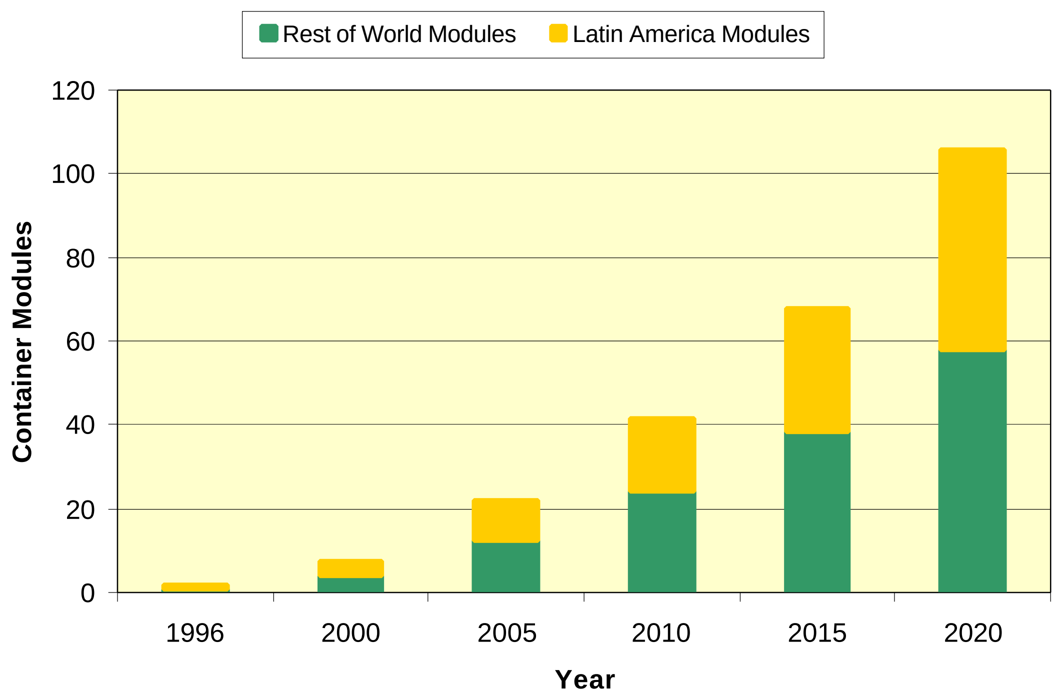
Container

In accordance with the capacity analysis methodology as described earlier, the sum of all container terminal modules needed for accommodating the future throughput projections for the entire LATTS Region was developed (refer to **Exhibit D1-5**). The Region's needed container modules are shown in five-year increments throughout the planning life and their association with Latin American Cargo or World Cargo. The graph depicts cumulative module needs during the five-year increments.

Exhibit D1-4
ESTIMATED MODULE CAPACITIES

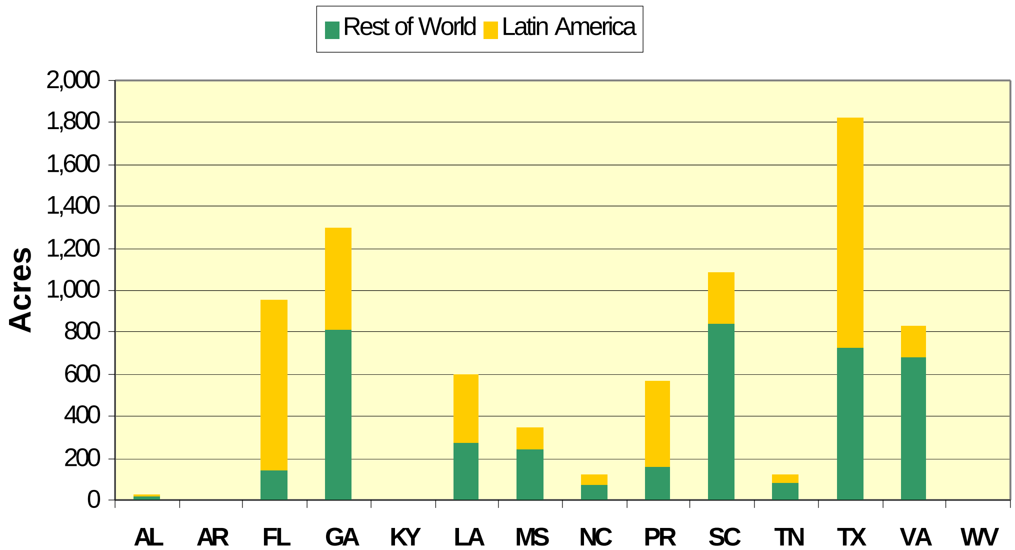
CARGO TYPE/ESTIMATED COST	STORAGE MODE	ESTIMATED CAPACITY (TONS/YR)
CONTAINER $32,000,000	Wheeled – Cw Grounded - Cg Other/Mixed - Co	880,000 1,739,000 1,467,000
BREAK-BULK $20,600,000	Outside – BBo Warehouse – BBw Mixed - BBm	148,000 187,000 142,000
NEO-BULK $14,600,000	Outside – NBo Warehouse – NBw Mixed - NBm	202,000 140,000 178,000
DRY BULK $17,600,000	Outside – DBo Silo – DBs Mixed - DBm	2,218,000 2,218,000 1,684,000
LIQUID BULK $19,300,000	Tank - LBt	2,048,000

Exhibit D1-5
NEEDED CONTAINER MODULES - LATTS REGION



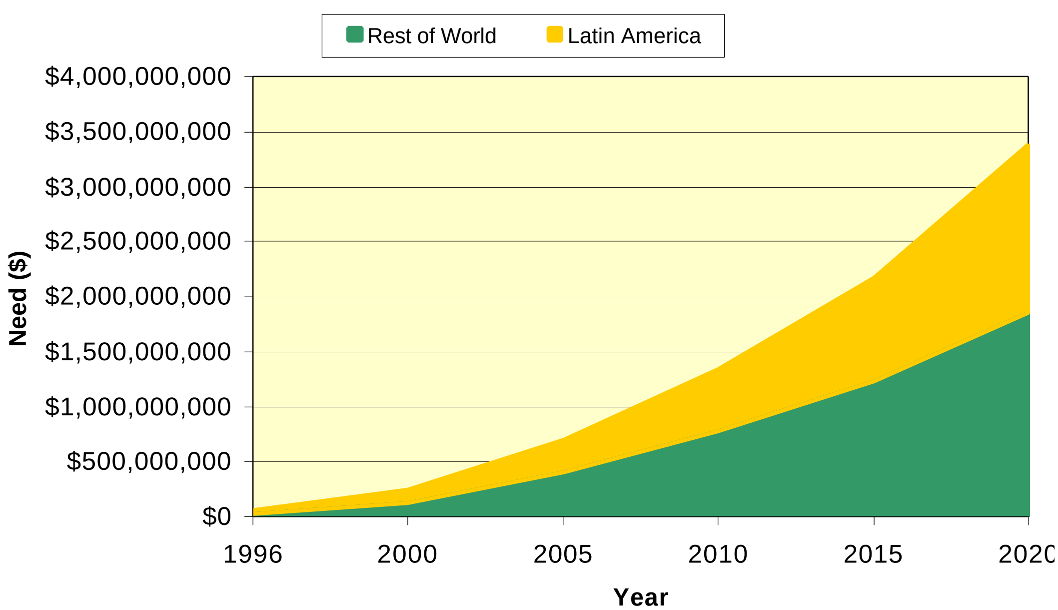
To better understand the future infrastructure needs, a state distributed acreage summary for the LATTS region is presented in **Exhibit D1-6**. The infrastructure need in this graph is shown for Latin America Cargo as well as Rest of World Cargo similar to the module need graph.

Exhibit D1-6
NEEDED CONTAINER TERMINAL ACREAGE - LATTS REGION



Total container needs for the Region through 2020 are equivalent to $3.4 billion. The graph in **Exhibit D1-7** shows the distribution of these needs over the 20-year forecast period.

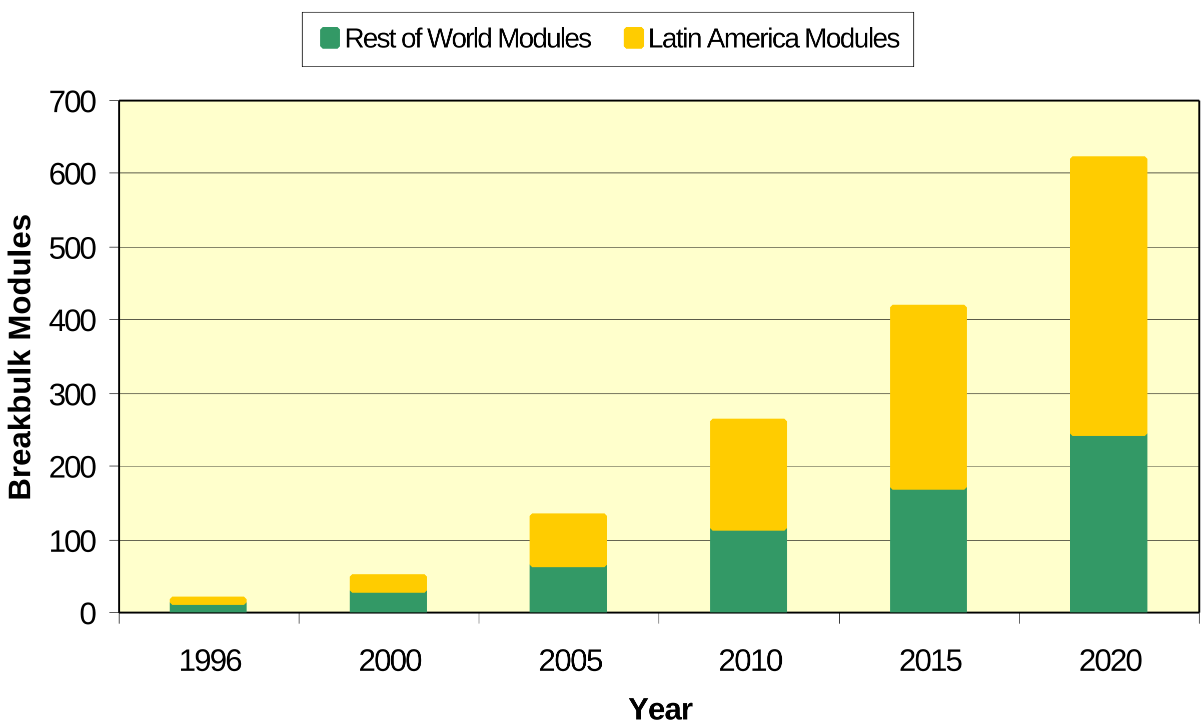
Exhibit D1-7
LATTS REGION ESTIMATED CONTAINER INFRASTRUCTURE NEED



Break-Bulk

A summary of all break-bulk terminal modules needed for accommodating the future throughput projections for the entire LATTS Region was developed (refer to **Exhibit D1-8**). The Region's needed break-bulk modules are shown in five-year increments throughout the planning life and their association with Latin American Cargo or Rest of World Cargo. The graph depicts cumulative module needs during the five-year increments. The number of future required ten-acre break-bulk modules exceeds 600.

Exhibit D1-8
NEEDED BREAK-BULK MODULES - LATTS REGION



To better understand the future break-bulk infrastructure needs, a state distributed acreage summary for the LATTS Region is presented in **Exhibit D1-9**. The infrastructure need in this graph is shown for Latin America Cargo as well as Rest of World Cargo similar to the module need graph.

Total 20-year break-bulk infrastructure needs for the Region approximate $12.8 billion. **Exhibit D1-10** shows the ramp-up of these needs through 2020.

Exhibit D1-9
NEEDED BREAK-BULK TERMINAL ACREAGE - LATTS REGION

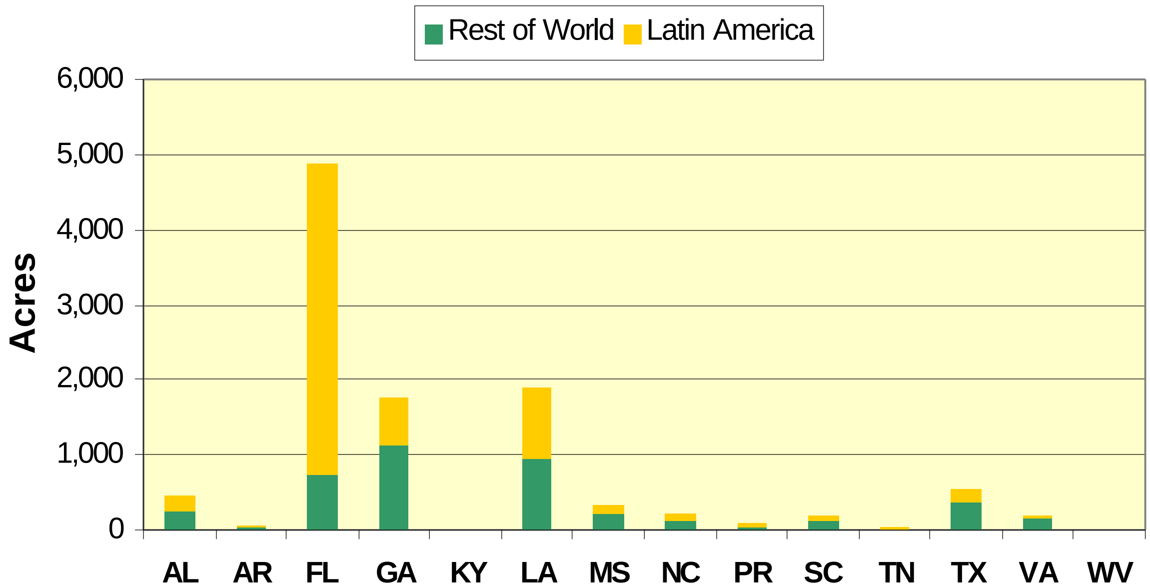
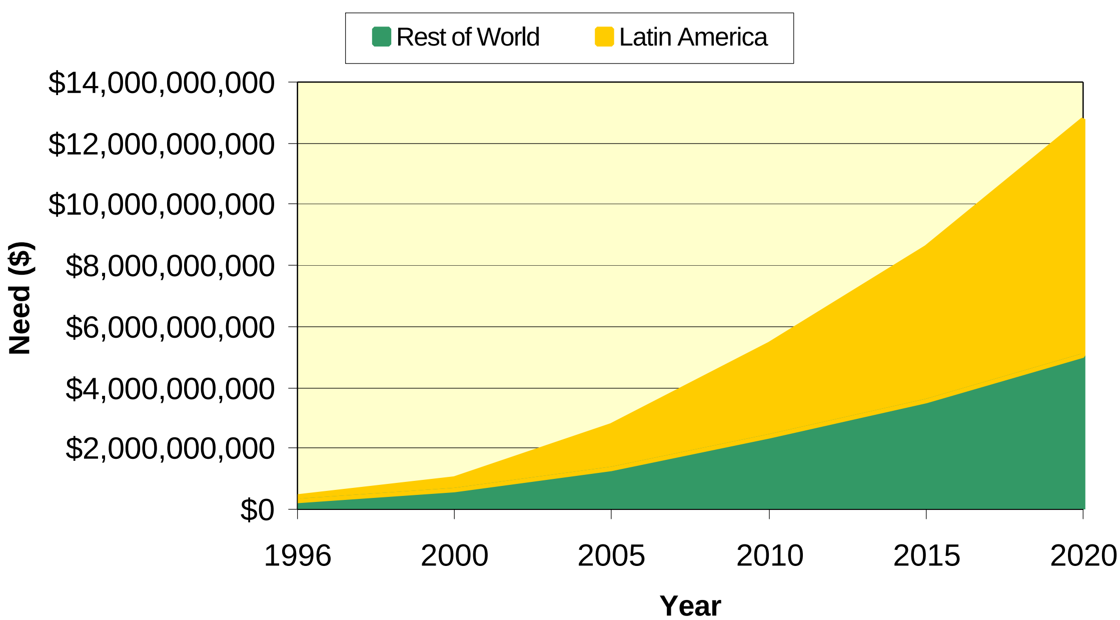


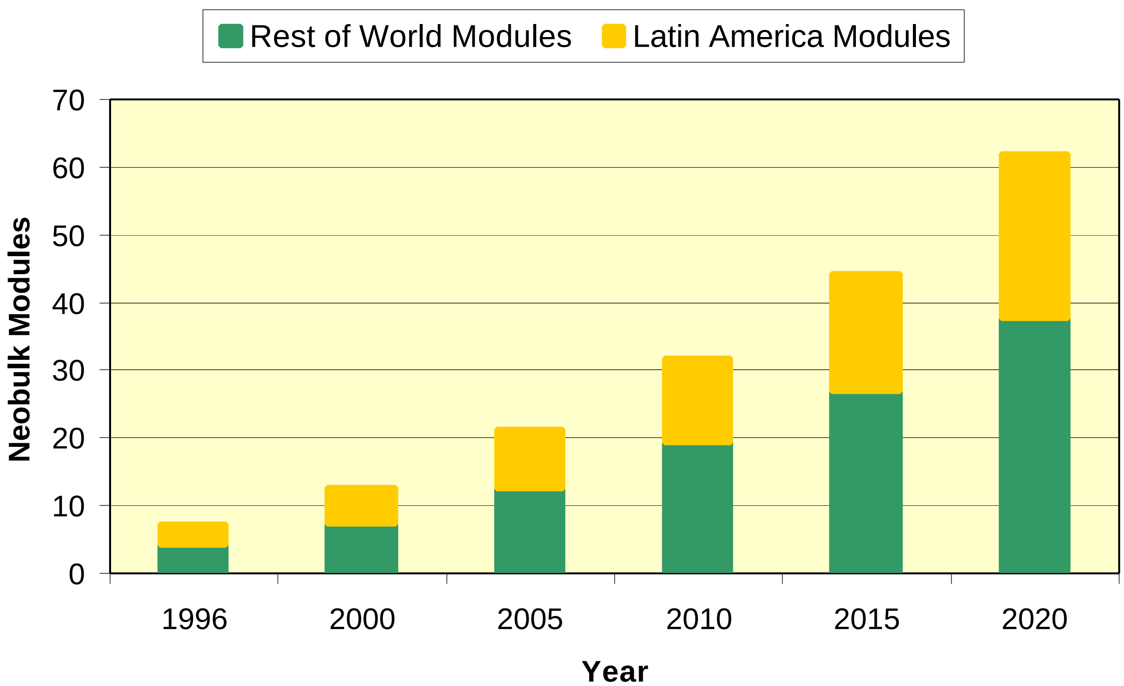
Exhibit D1-10
LATTS REGION ESTIMATED BREAK-BULK INFRASTRUCTURE NEED



Neo-Bulk

From the capacity analysis described in the needs assessment, the sum of all neo-bulk terminal modules needed for accommodating the future throughput projections for the entire LATTS Region was developed (refer to **Exhibit D1-11**). The Region's needed neo-bulk modules are shown in five-year increments throughout the planning life and their association with Latin American Cargo or Rest of World Cargo. The graph depicts cumulative module needs during the five-year increments.

Exhibit D1-11
NEEDED NEO-BULK MODULES - LATTS REGION



In addition, the future infrastructure needs are shown as a state distributed acreage summary for the LATTS Region (refer to **Exhibit D1-12**). The infrastructure need in this graph is shown for Latin America Cargo as well as Rest of World Cargo similar to the module need graph.

The total estimated Neo-Bulk infrastructure needs equivalent is $904 million through 2020. **Exhibit D1-13** shows the ramp-up of these needs estimates.

Exhibit D1-12
NEEDED NEO-BULK TERMINAL ACREAGE - LATTS REGION

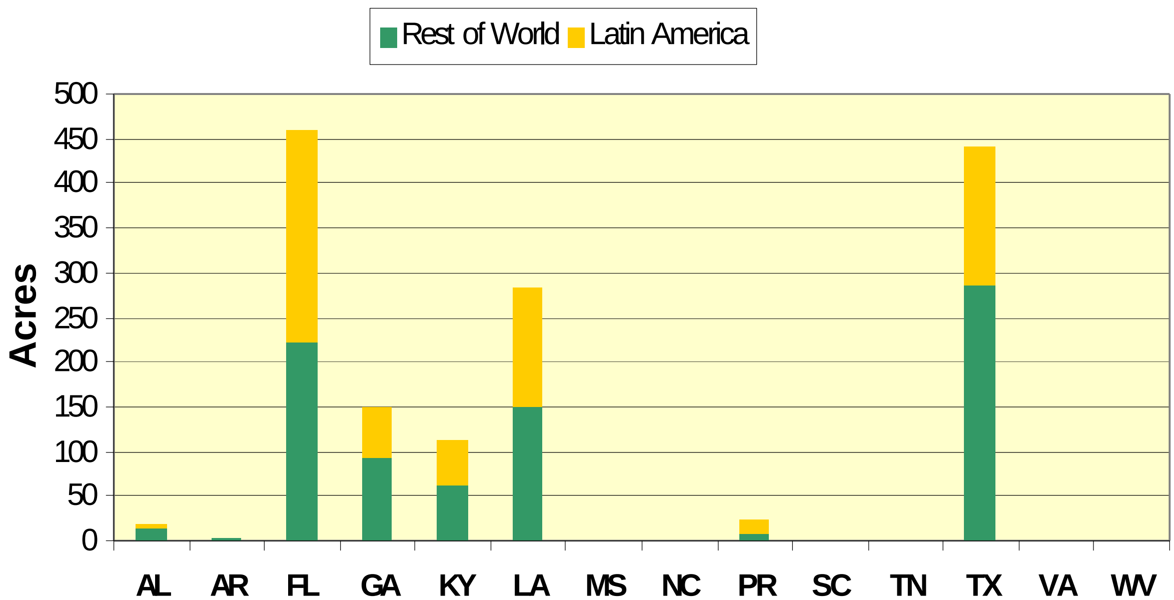
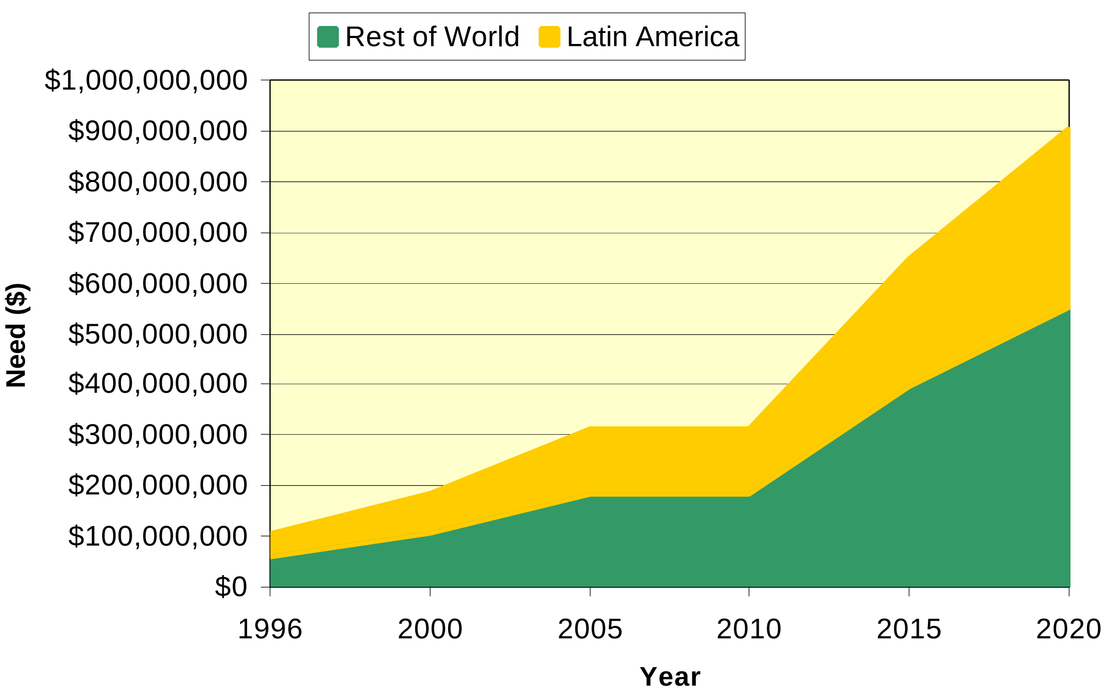


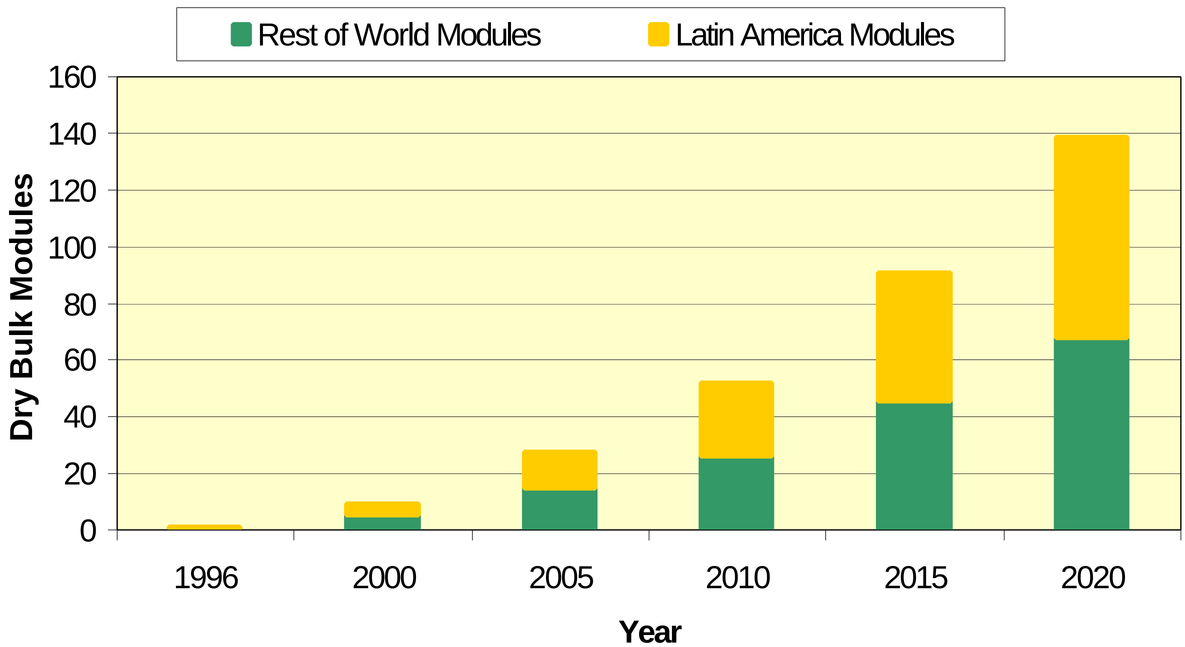
Exhibit D1-13
LATTS REGION ESTIMATED NEO-BULK INFRASTRUCTURE NEED



Dry Bulk

The sum of all dry bulk terminal modules needed to accommodate the future throughput projections for the entire LATTS is presented in **Exhibit D1-14**. The Region's needed container modules are shown in five-year increments throughout the planning life and their association with Latin American Cargo or rest of World Cargo. The graph depicts cumulative module needs during the five-year increments.

Exhibit D1-14
NEEDED DRY BULK MODULES - LATTS REGION



To better understand the dry bulk needs, a state distributed acreage summary for the LATTS Region is shown in **Exhibit D1-15** The infrastructure need in this graph is shown for Latin America Cargo as well as Rest of World Cargo and is similar to the module need graph.

Total dry bulk needs for the region is an equivalent of $2.4 billion through 2020. **Exhibit D1-16** shows the accumulation of these costs over the 20-year period.

Exhibit D1-15
NEEDED DRY BULK TERMINAL ACREAGE - LATTS REGION

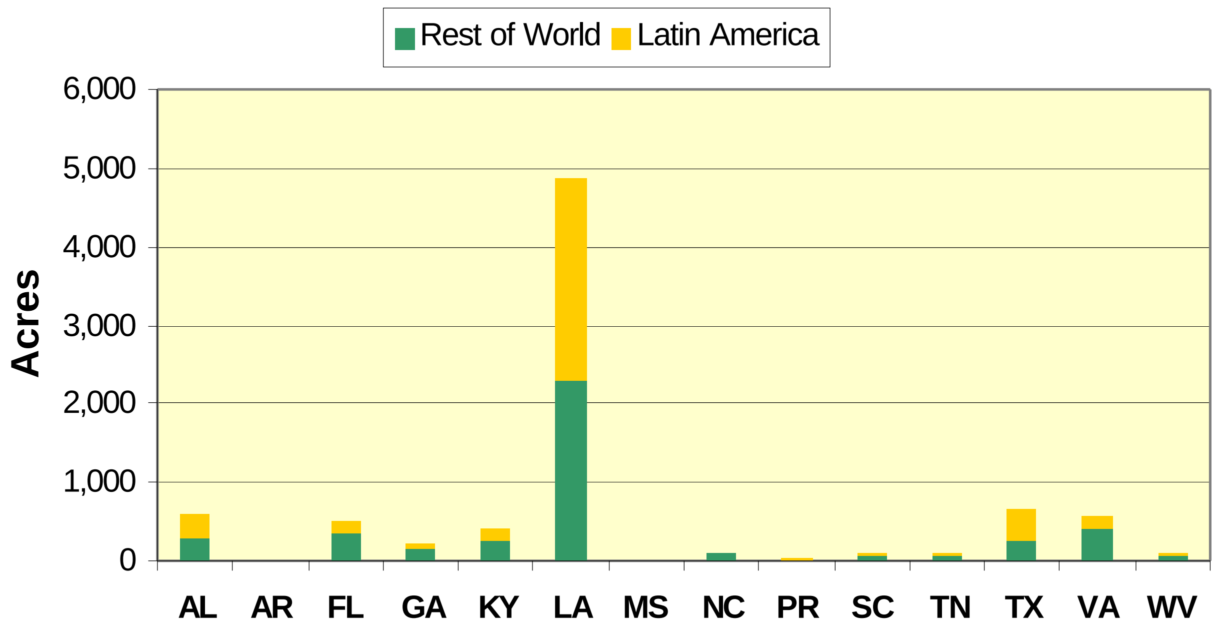
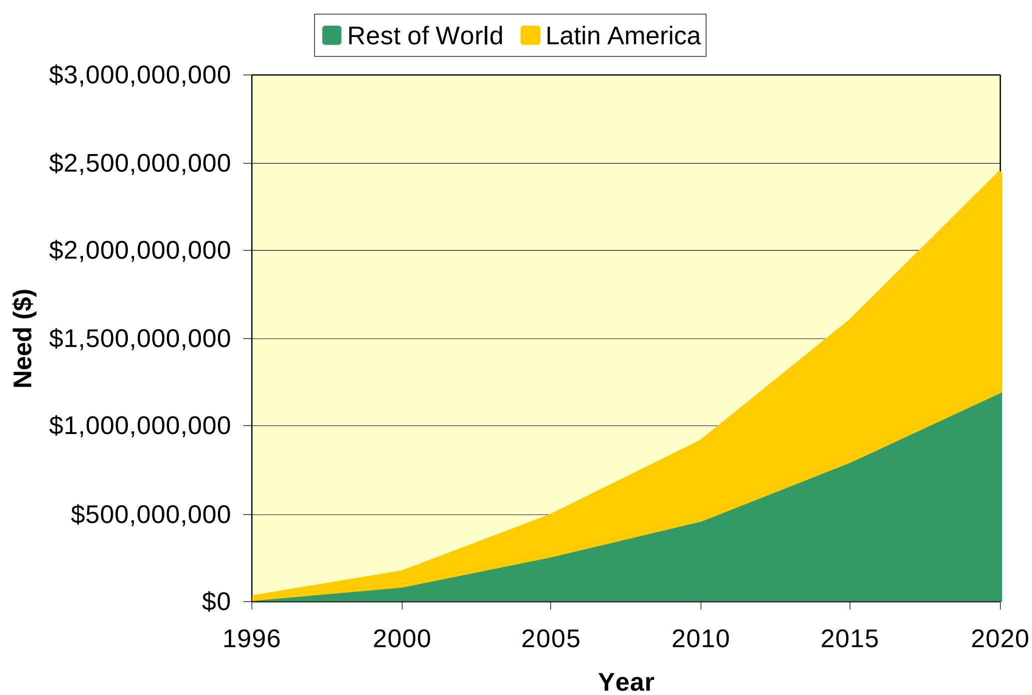


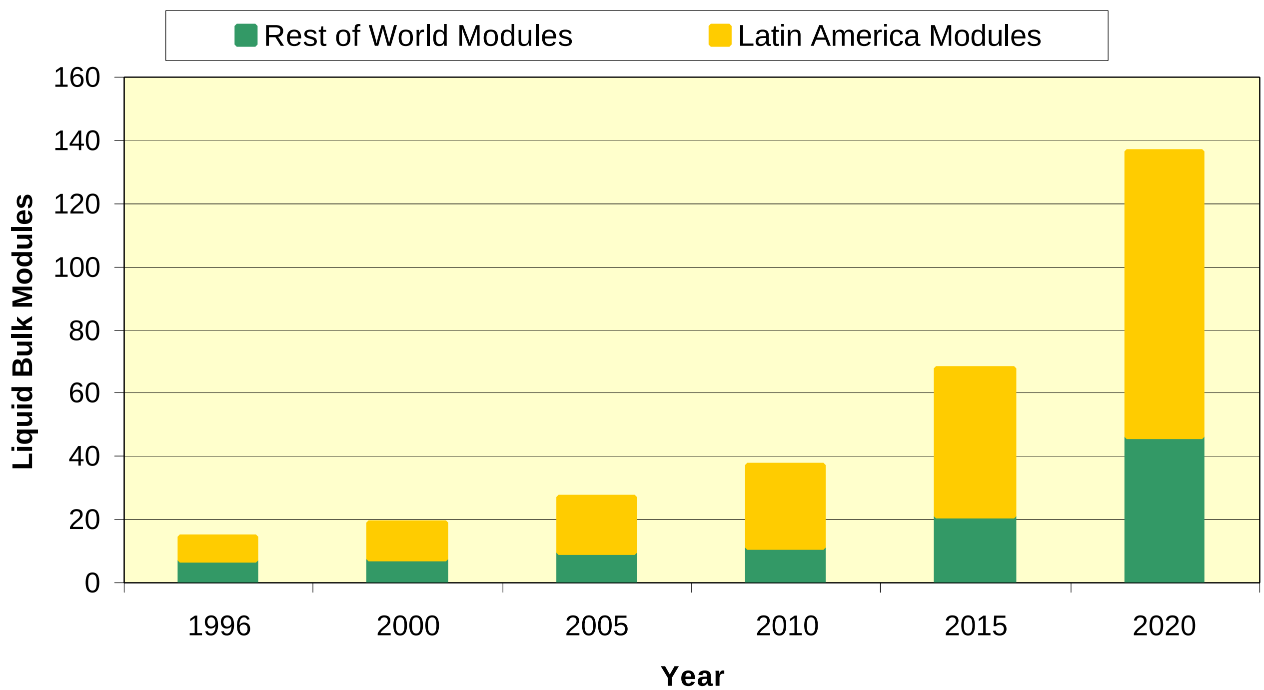
Exhibit D1-16
LATTS REGION ESTIMATED DRY BULK INFRASTRUCTURE NEED



Liquid Bulk

In accordance with the capacity analysis methodology as described earlier, the sum of all liquid bulk terminal modules needed for accommodating the future throughput projections for the entire LATTS Region was developed (refer to **Exhibit D1-17**). The needed liquid bulk modules are shown in five-year increments throughout the planning life and their association with Latin American Cargo or Rest of World Cargo. The graph depicts cumulative module needs during the five-year increments.

Exhibit D1-17
NEEDED LIQUID BULK MODULES - LATTS REGION



A state distributed acreage summary for the LATTS Region is provided in **Exhibit D1-18**. The infrastructure need in this graph is shown for Latin America Cargo as well as Rest of World Cargo similar to the module need graph.

The 20-year liquid bulk infrastructure needs for the Region is an estimated $2.6 billion. **Exhibit D1-19** shows the ramp-up of these needs.

Exhibit D1-18
NEEDED LIQUID BULK TERMINAL ACREAGE - LATTS REGION

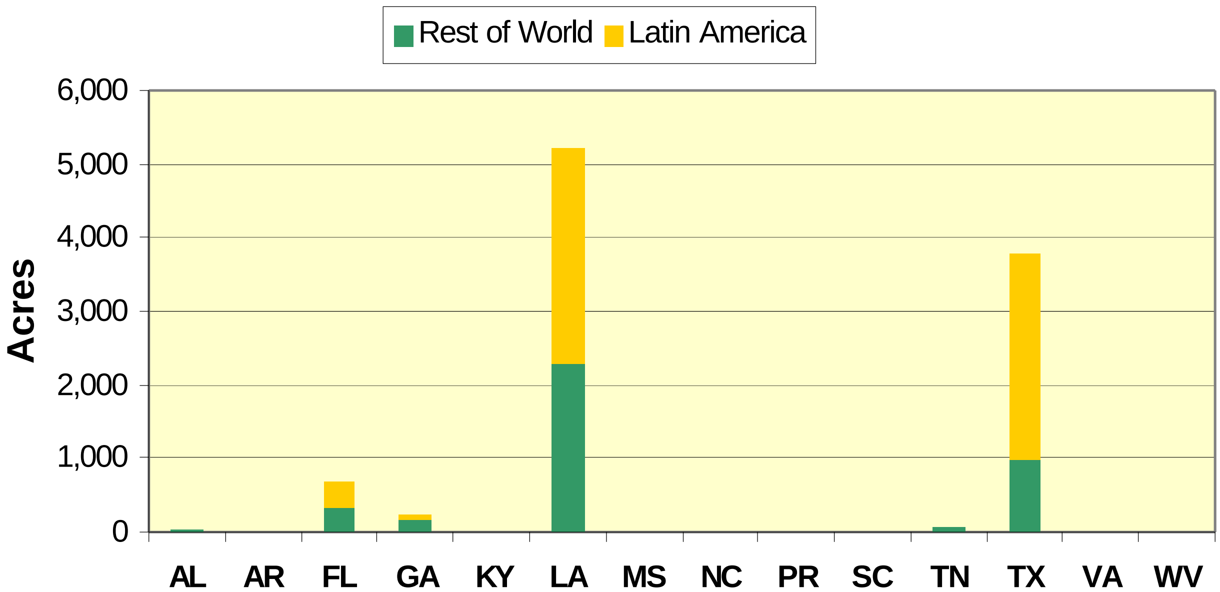
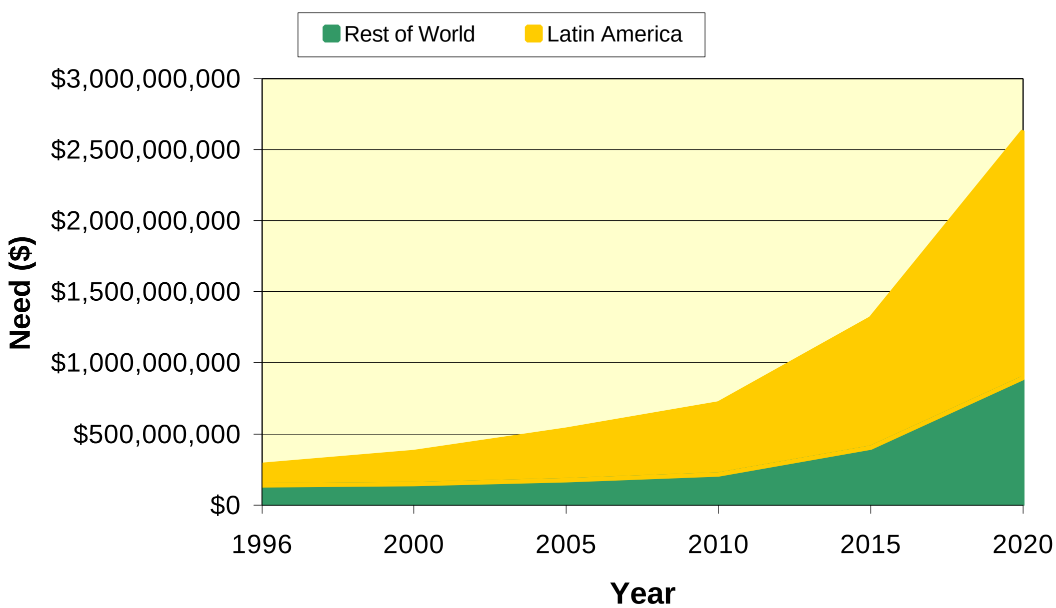


Exhibit D1-19
LATTS REGION ESTIMATED LIQUID BULK INFRASTRUCTURE NEED



All Cargo Types

The 2020 infrastructure needs are summarized by acreage and by 1999 U.S. dollars for all cargo types in **Exhibit D1-20**. The most significant increase in terminal acreage and required infrastructure development funding is due to the estimated break-bulk cargo growth projections. Container cargo needs are second to break-bulk needs in acreage increase and estimated development cost. Although neo-bulk acreage needs are increasing at a higher rate than dry bulk and liquid bulk, the two bulk cargo needs are more demanding from an infrastructure investment perspective.

Exhibit D1-20
TOTAL LATTS REGION PORT NEEDS SUMMARY

Cargo Type	Additional Acres			Infrastructure Improvement Needs (000)		
	Current	2020 Need	% Increase	Latin America	Rest of World	World
Container	**3,548**	**7,776**	**119**	**$1,525,522**	**$1,854,871**	**$3,380,393**
Break-Bulk	**4,400**	**10,594**	**141**	**$7,727,284**	**$5,032,655**	**$12,759,939**
Neo-Bulk	**877**	**1,496**	**71**	**$353,266**	**$551,149**	**$904,415**
Dry Bulk	**5,476**	**8,256**	**51**	**$1,249,544**	**$1,195,247**	**$2,444,791**
Liquid Bulk	**7,327**	**10,051**	**37**	**$1,739,491**	**$890,385**	**$2,629,877**
	TOTAL			**$12,595,108**	**$9,524,307**	**$22,119,415**

The cumulative Latin America cargo investment needs are higher than the cumulative Rest of World cargo investment needs for all cargo types. However, this difference is due to the large demand from future Latin American liquid bulk, dry bulk and break-bulk cargo growth. Container cargo and neo-bulk cargo growth indicate a greater demand from other international sources than from the Latin American trade.

The following graph (**Figure D1-21**) shows the ramp-up of total marine terminal infrastructure needs for the Region.

Exhibit D1-21
LATTS REGION ESTIMATED ALL CARGOES INFRASTRUCTURE NEEDS