TABLE OF CONTENTS

SECTION		PAGE
A	**Introduction and Overview**	**A-1**
	Southeastern Transportation Alliance	A-1
	Study Setting	A-2
	Study Purposes	A-3
	Public Outreach	A-4
	Study Team Approach	A-4
	Trade and Economic Development Opportunities (Section B)	A-5
	LATTS Strategic Transportation System (Section C)	A-8
	Investment Needs Perspective (Section D)	A-9
	Investment Strategies (Section E)	A-13
B	**International Trade And Economic Development Opportunities**	**B-1**
	Historical and Current Trade Patterns	B-1
B1	**Existing Trade Flows**	**B1-1**
	Trade Database	B1-1
	Three International Trade Components	B1-2
	LATTS Trade Database	B1-4
	Commodity Sectors	B1-4
	Trade Volume Measures: Tonnage Versus Value	B1-8
	Trade Summary	B1-8
	Seaborne Trade and the Alliance Region	B1-9
	Alliance Region Air Cargo Trade	B1-22
	Alliance Region Cross Border Trade with Mexico	B1-27
	Cross-Border Trade Commodity Groups	B1-27
B2	**Latin American Trade Forecasts**	**B2-1**
	Base Case Trade Forecast	B2-1
	High Case Trade Forecast	B2-7
	Sensitivity Analysis	B2-11
	Major Findings	B2-14
B3	**Tourism, Business, and Services Travel**	**B3-1**
	Latin American Tourism in the U.S.	B3-1
	Latin American Tourists and the Southeastern Alliance	B3-4
	Business and Services Travel to Latin America	B3-10
	Infrastructure Expansion	B3-11
	Business Services Trends and Data	B3-11
	Mexico	B3-12
	Management Expertise	B3-14
	Southeastern Alliance Travel to Developing Regions	B3-15
	International Leisure Travel From the Southeast	B3-16
	Alliance Travelers' Occupational Profile	B3-19
	Cruise Industry	B3-21

SECTION **PAGE**

B3 (cont'd)
Southern Cruise Ports B3-21
Characteristics Affecting Cruise Port Success B3-22
Metropolitan Population B3-25
Southeastern Alliance Cruise Growth B3-27

B4 Economic Development Impact of Latin American Trade B4-1
Summary of Economic Development Impacts B4-1
Economic Development Implications B4-7
Clusters and Economic Development B4-11
Hemispheric Integration: A Look at Trade Balances B4-12
Economic Impact B4-15

B5 International Trade Agreements and Barriers B5-1
Trade Barriers B5-1
Motivation for the Free Trade Movement B5-4
Impact of Trade Agreements on Global Trade B5-5
Principles and Evolution of Trade Agreements B5-6
The Evolving Nature of Latin American Regional Trade Agreements B5-10
Motivations for a Western Hemisphere Regional Trade Agreement B5-13
Other Trade Constraints B5-15

B6 Business Development Opportunities B6-1
Target the Incremental Growth Component B6-1
Growth in Exports Passing Through the Alliance Region B6-1
An Opportunity for the Alliance B6-5
The Alliance Needs to Remain Competitive B6-5
Latin American Exports Markets B6-5

C LATTS Strategic Transportation System C-1
LATTS Strategic Transportation System C-1
A Multimodal Transportation System C-1
Process for Defining the LATTS Strategic Transportation System .. C-2
Summary Features of the LATTS Strategic Transportation System C-3

C1 LATTS Strategic Port System C1-1
Port Criteria C1-1
LATTS Strategic Port System C1-5

C2 LATTS Strategic Airport System C2-1
Airports Identification Process and Criteria C2-1
LATTS Strategic Airports C2-5

C3 LATTS Strategic Rail System C3-1
System Designation Criteria C3-1
LATTS Rail Traffic C3-5

SECTION **PAGE**

C3 (Cont'd)
Rail Traffic Types....C3-5
Tonnage....C3-5
Significant Traffic Generators and Flows....C3-8
Rail System Implications....C3-18
Strategic Rail System Adjustments....C3-19
Final Strategic Rail System....C3-23

C4 LATTS Strategic Highway System....C4-1
Highway Identification Process and Criteria....C4-1
LATTS Strategic Highway System....C4-6
LATTS Highways vs. LATTS Trade Corridors....C4-8
Waterport and Airport Intermodal Connectors....C4-20

D Investment Needs....D-1
Total Investment Needs....D-1

D1 Investment Needs for the LATTS Strategic Port System....D1-1
Database....D1-1
Performance Measures and Methodology....D1-2
Calculated Practical Capacity....D1-6
Maximum Practical Capacity....D1-6
Capacity and Throughput Estimates-Current....D1-7
Throughput Estimates-Future....D1-11
LATTS Projection Model....D1-11
General Methodology....D1-12
Future Needs Estimates....D1-13
Conclusions....D1-17

D2 Investment Needs for the LATTS Strategic Airport System....D2-1
Baseline Freight Volumes....D2-1
Baseline Cargo Buildings....D2-1
Air Cargo Forecasts....D2-5
Additional Cargo Building Requirements....D2-6
Cargo Ramp and Apron Area Requirements....D2-8
Infrastructure Needs Cost Estimate....D2-8

D3 Investment Needs for the LATTS Strategic Highway System....D3-1
Overview....D3-1
LATTS Strategic Highway Network....D3-1
Needs Categories....D3-11
LATTS Highway Connectors....D3-39
Jurisdictional Responsibility for LATTS Connectors....D3-40
Connectors with Pavement Problems....D3-41
Connectors with Geometric/Physical Problems....D3-42
Summary....D3-46

SECTION **PAGE**

E Alliance Region Investment Strategies E-1
Overall Approach E-1
Goal E-1
Objectives E-2
Investment Strategies and Transportation Issues E-4
LATTS Strategic Port System Issues E-7
LATTS Strategic Port System Strategies E-14
LATTS Strategic Airport System Issues E-19
LATTS Strategic Airport System Strategies E-23
LATTS Strategic Rail System Issues E-28
LATTS Strategic Rail System Strategies E-30
LATTS Strategic Highway System Issues E-35
LATTS Mainline Highway System Strategies E-37
Intermodal Highway Connector Strategies E-42

APPENDIX

I Outreach and Coordination ..... A I-1
Newsletters ..... A I-1
Web Site ..... A I-2
Targeted Contacts ..... A I-2
Study Presentations ..... A I-3
Briefing Reports ..... A I-3

II International Economic Overview and Market Potentials ..... A II-1
Latin American Economic Summary ..... A II-2
Argentina ..... A II-8
Bahamas/Jamaica ..... A II-11
Bolivia ..... A II-12
Brazil ..... A II-14
Chile ..... A II-17
Colombia ..... A II-19
Cuba ..... A II-21
Dominican Republic ..... A II-24
Ecuador ..... A II-25
French Guiana/Guyana/Suriname ..... A II-27
Haiti ..... A II-28
Mexico ..... A II-29
Panama ..... A II-32
Paraguay ..... A II-34
Peru ..... A II-35
Uruguay ..... A II-37
Venezuela ..... A II-39
Other Caribbean Economies ..... A II-41
Other Central America Economies ..... A II-42
World Regions ..... A II-43
Canada Overview ..... A II-43

APPENDIX

II (Cont'd)

Western Europe Overview....A II-46
Asia Overview....A II-47
Rest of World Overview....A II-49

III Trade Policies in Latin America....A III-1
Argentina....A III-1
Bahamas....A III-2
Bolivia....A III-2
Brazil....A III-3
Chile....A III-4
Colombia....A III-4
Costa Rica....A III-5
Dominican Republic....A III-6
Ecuador....A III-6
El Salvador....A III-7
Guatemala....A III-7
Haiti....A III-8
Honduras....A III-8
Jamaica....A III-8
Mexico....A III-9
Nicaragua....A III-10
Panama....A III-10
Paraguay....A III-11
Peru....A III-12
Summary....A III-12

IV Port Terminal Planning Modules....A IV-1
Container Module....A IV-2
Neo-Bulk Module....A IV-2
Break-Bulk Module....A IV-6
Dry Bulk Module....A IV-7
Liquid Bulk Module....A IV-12

V Port Conceptual Development Cost Estimates....A V-I

VI Intelligent Transportation Systems....A VI-1
National ITS Architecture....A VI-1
ITS and the LATTS Goal....A VI-1
ITS Application in the LATTS Region....A VI-3
ITS Technical Infrastructure....A VI-3
ITS Organizational Infrastructure....A VI 7
ITS Border Crossings....A VI-9
Summary and Conclusions....A VI-13
Glossary of Acronyms....A VII-17

ACKNOWLEDGEMENTS

The LATTS study was initiated and developed in 1996 at two meetings of SASHTO personnel convened by former Mississippi DOT Executive Director Dr. Robert L. Robinson, and attended by then FHWA Administrator Rodney E. Slater. The FHWA agreed to provide significant funding, and initiate a scope of work and prospectus; the Mississippi DOT agreed to manage the work as a pooled fund study; and the other SASHTO States agreed to provide funding and working level guidance during the study.

The Texas DOT quickly became a study partner with SASHTO and subsequent to a qualifications based consultant selection process, a contract was signed in July 1997 by Wilbur Smith Associates, on behalf of a consortium of consultants and Mississippi DOT on behalf of the Alliance.

The Commonwealth of Puerto Rico became a study partner in 1998. During this study, the Mississippi DOT, under the leadership, encouragement, and support of Kenneth I. Warren and W. Hugh Long (subsequent MDOT Executive Directors) have provided diligent, fair and efficient administration of the contract. At the same time, FHWA has provided effective coordination and a constant vision and focus and the Alliance members have provided timely and insightful guidance.

As lead consultant, we gratefully acknowledge the contributions of all the aforementioned and those who otherwise contributed, specifically the study Steering and Working Committee members, Special Alternates and the Mississippi DOT Study Coordination Team (see list on next page). As a result of their contributions, this study will surely become known as one of the corporate highlights of Wilbur Smith Associates.

More importantly, we think, it will show the way to a new and better form of collaborative planning. Most importantly of all, it will, as study recommendations are implemented, result in significant and important transportation and economic benefits for the people in the Alliance; benefits that will increase over time.

LATIN AMERICAN TRADE AND TRANSPORTATION STUDY
STEERING AND WORKING COMMITTEES

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LATIN AMERICA TRADE AND TRANSPORTATION STUDY

Report to the Southeastern Transportation Alliance

- Alabama
- Arkansas
- Florida
- Georgia
- Kentucky
- Louisiana
- Mississippi
- North Carolina
- Puerto Rico
- South Carolina
- Tennessee
- Texas
- Virginia
- West Virginia
- Federal Highway Administration

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DRI/McGraw-Hill
R.K. Johns and Associates
VZM/Tran Systems
HNTB Corporation
WHM Transportation Engineering

March, 2001

SECTION A
INTRODUCTION AND OVERVIEW

In the last decade, great economic progress has been achieved throughout Latin America. Monetary reform, political stability and social and economic reforms have created a climate in which international trade has increased. At the first Summit of the Americas (1994), then President Clinton noted that these conditions presented opportunities for increased U.S. exports to Latin America:

> *"The commitment to democratic government in Latin America coupled with continued economic reform and market-opening policies in most countries of the region should result in U.S. exports growing at a rate faster than average in future years. Additionally, the passage of NAFTA has given a new impetus to the interest of Latin countries in working towards a hemispheric free trade zone."*

SOUTHEASTERN TRANSPORTATION ALLIANCE

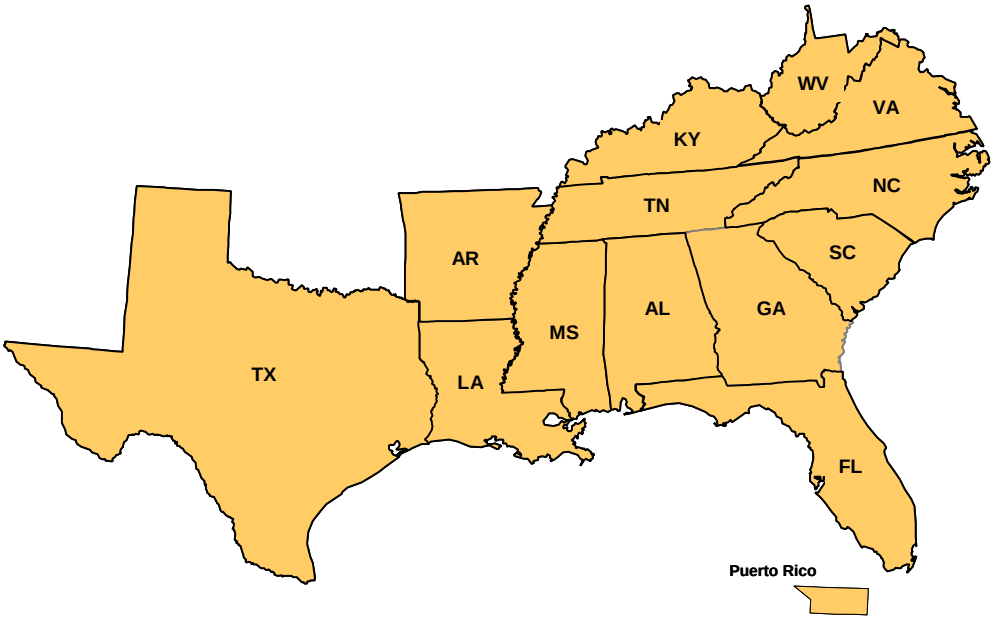
Others also recognized the increased opportunities that have emerged in recent times. They also understood that positive, well planned, and decisive actions were required if these opportunities are to be exploited fully. Dr. Robert L. Robinson, then Executive Director of the Mississippi Department of Transportation, stated:

> *"It is the prediction of many that South and Central America are going to provide the next major economic expansion--similar to the Pacific Rim Nations. If we work together as a region, get ready and move appropriately, the Southeast is in the right place at the right time. If we are to get the maximum benefit from both South and Central America's economic expansion, we must be pro-active and not after the fact reactive."*

This vision of opportunity and responsibility led to the formation of the Southeastern Transportation Alliance. The Alliance is an organization of the state transportation agencies in the states/commonwealths of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Puerto Rico, South Carolina, Tennessee, Texas, Virginia, and West Virginia, in cooperation with the United States Department of Transportation, Federal Highway Administration. The Alliance, shown in **Exhibit A-1**, is an informal agreement between these partners to provide a means of financing and conducting the Latin America Trade & Transportation Study (LATTS).

For purposes of this study, Latin America was defined by the Alliance as all western hemisphere nations south of the United States.

Exhibit A-1
SOUTHEASTERN TRANSPORTATION ALLIANCE



STUDY SETTING

There are many indications that Latin America may be on a prosperity threshold. Restrictive and discriminatory import duties are declining, multi-lateral trade agreements are occurring, and hemisphere-wide free trade is a possibility. Under these conditions, international trade could substantially increase. (**Exhibit A-2**)

Exhibit A-2
POTENTIAL FOR INCREASED LATIN AMERICAN TRADE

LATIN AMERICA: Poised for Growth

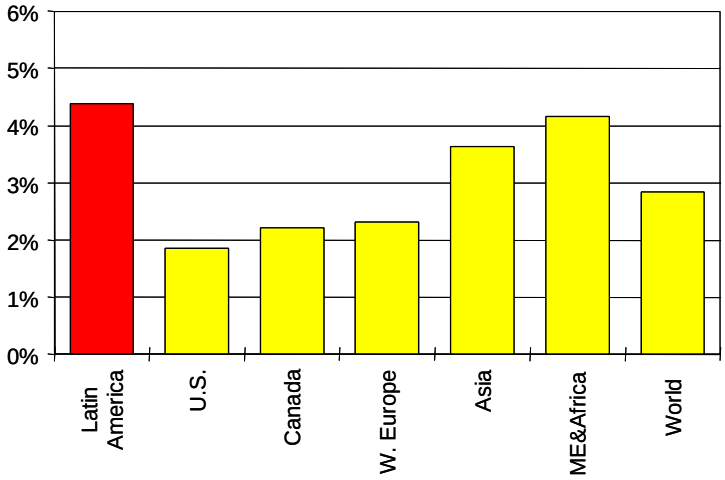
1) **Continued Economic Restructuring**
   - **Privatization**
   - **Increased government capital**
   - **Newly privatized industries attract new capital**
   - **Need for high tech equipment & services**
2) **Trade Liberalization**
   - **Lower tariffs**
   - **Declining barriers**
   - **Highest tariff 20%**

↓

LARGE TRADE POTENTIAL

The Wilbur Smith Associates Consultant Team included the firm of DRI/McGraw-Hill, an organization that regularly analyzes the world's economies, and makes forecasts of both international economies and trade. Shown on **Exhibit A-3**, the DRI forecasts for 1997-2020 indicate annual economic growth rates of 4.6% for Latin America (compared with 1.85% for the U.S.).

Exhibit A-3
REAL GDP GROWTH IN EMERGING AND DEVELOPED COUNTRIES
1997-2020



In the changing global marketplace, lower operating costs offer a competitive advantage for companies. Since transportation costs are a significant element in the total delivered costs of goods, a state-of-the-art transportation infrastructure with which to move goods and services just in time and cost effectively is essential for competing in the future.

The proximity of the Alliance Region to the Latin American markets, coupled with a good intermodal transportation system, will provide competitive advantages for companies in the Alliance states.

STUDY PURPOSES

In recognition of these potentials, the Southeastern Transportation Alliance was formed "... to assess infrastructure development required to capitalize on international trade stimulated by increased trade with Latin America." The purpose of the Alliance in undertaking LATTS was to enhance economic development in the Alliance States, collectively and individually, by taking advantage of the accelerating opportunities for trade with Latin America.

This will increase economic production in the Alliance Region and provide more jobs, increased wage earnings and additional prosperity, for the Region's people.

The study assisted the Alliance in attaining its goal by accomplishing the following:

1. Investigated and identified trade opportunities between the USA and other countries, with special emphasis on Latin America;

2. Identified how the economies of the Alliance States could benefit if they are able to capture "their fair share" of this international trade;

3. Evaluated existing relevant transportation infrastructure and its ability to meet the increased demands associated with growth in Latin American trade; and

4. Developed strategies to optimize investments in the Region's ports, waterways, airports, railroads, major highway corridors, and intermodal facilities.

The trade information assembled, analyzed and forecast during the study is directly related to the transportation investment strategies that are a principal study product. The reasons are, first, that expanding foreign trade is related to increased domestic job opportunities; second, that growth in foreign trade as well as rising domestic economic activity, increases the demands on transportation facilities; third, that changes to the transportation system can accommodate, facilitate or inhibit this increasing use; and fourth, that the partners in this study have both a common and individual stake in investing in transportation improvements to make the most of the opportunities arising from this situation.

PUBLIC OUTREACH

The Southeastern Transportation Alliance determined that, for LATTS to be successful, a proactive public involvement process was to be conducted at all stages of the project; i.e. early and continuous involvement. This would ensure that there was public availability of study information and that there were ample opportunities for study inputs, comments and suggestions by the general public, major stakeholders, and affected public agencies.

The distribution of study newsletters on a periodic basis helped achieve these goals. Through these means, information about the study was disseminated. Also, a contact person was designated in each state who was available to receive inputs that interested parties might want to make to the Study Team.

A second means for sharing information and receiving comments, suggestions and information involved the use of the Internet. A LATTS web site was

developed and maintained during the study. The web site was updated periodically with the latest information concerning the study.

STUDY TEAM APPROACH

The Study Team for the Latin American Trade & Transportation Study was composed of participants from the state transportation agencies constituting the Alliance, the Federal Highway Administration, and the Wilbur Smith Associates Consultant Team.

Steering Committee

The Chief Administrative Officer of the respective state transportation agencies, along with the Federal Highway Administrator, constituted the Steering Committee for this study. This committee had active control of all decisions relating to this study.

Working Committee

This committee was appointed to coordinate the technical elements of the study. Each state and the Federal Highway Administration had one representative on the Working Committee.

Consultant Team

The Consultant Team was supervised and guided by the Steering Committee and the Working Committee. Following a competitive selection process, the Alliance selected the Wilbur Smith Associates Consultant Team to conduct the study. This team is comprised of:

- Wilbur Smith Associates (WSA), the prime contractor for the study. WSA is an international consulting, engineering, economic and planning firm which specializes in the transportation sector.
- DRI/McGraw-Hill is the economics-consulting unit of Standard and Poor's, a division of the McGraw-Hill Companies, a global information services company.
- R.K. Johns and Associates is a maritime consulting firm.
- VZM/TranSystems specializes in cargo ports.
- HNTB Corporation assisted WSA with the airport component of the study.
- WHM Transportation Engineering provided support services regarding Intelligent Transportation Systems (ITS).

TRADE AND ECONOMIC DEVELOPMENT OPPORTUNITIES (SECTION B)

A macro-scale analysis was performed to assemble, evaluate and forecast international trade information, consistent with the first two study purposes presented earlier. The major findings of these analyses are presented in Section B and are summarized as follows:

Historical and Current Trade Patterns

In response to a number of factors, Latin America is experiencing unprecedented economic growth. Study analyses revealed that:

- There is a sustained pattern of growth in trade between Latin America and the United States.
  - In recent times, the growth rate in trade has escalated above historical patterns.
- For a number of reasons, including its advantageous geographical relationship to Latin America, trade between the United States and Latin America tends to gateway in the Alliance Region (i.e., enter or leave the United States through the Region).
  - 86 percent of Latin America imports into the United States enter through the Alliance Region.
  - 71 percent of all U.S. exports to Latin America depart through the Alliance Region.
- Of the total Latin American trade gatewaying in the Region, 80 percent of the tonnage and 60 percent of the commodity value was seaborne trade.
- Trade crossing the Texas/Mexico border accounts for 20 percent of the tonnage and 38 percent of the value of gateway traffic.
- In relative terms, the smallest component of trade with Latin America enters or leaves the United States by air. Nevertheless, airborne freight is a very important element for certain commodities.

Trade Forecasts

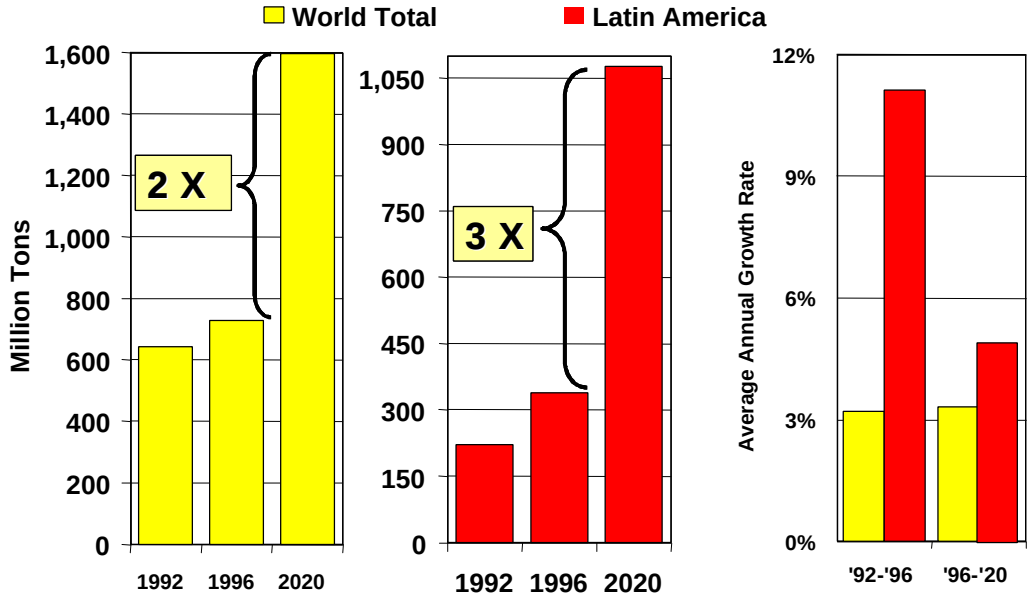
Forecasts developed by the study clearly show that trade with Latin America will be even greater in the future, in both relative and absolute terms.

- As noted in **Exhibit A-4**, total international trade by the Alliance Region is expected to double by the year 2020.
- The Latin American component of total international trade is expected to triple during this time span.

These "Base Case" forecasts assume a continuation of recent trends and conditions until 2020. Nevertheless, there are significant events which could result in a "High Case" scenario. These events could include:

- Increased liberalization of trade, e.g. a Western Hemisphere Free Trade Agreement,
- Higher economic growth trends for Latin America and/or the United States, and
- Changes in U. S. policies regarding Cuba.

Exhibit A-4
ALLIANCE TRADE GROWTH TRENDS: FORECASTS



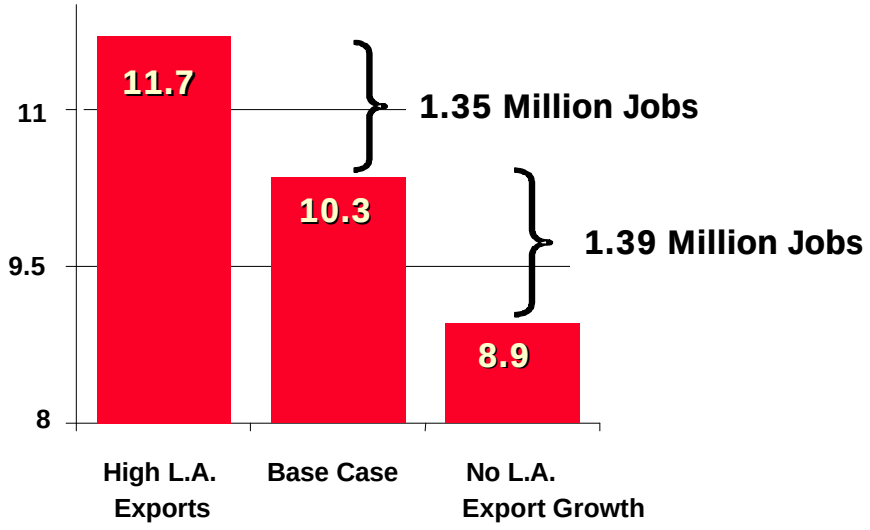
Under a "High Case" scenario, the volume of trade with Latin America through Southeast Alliance gateways is forecast to increase to 1.1 billion metric tons, more than 22 percent higher than the "Base Case" forecast for 2020.

Economic Development Impacts

Trade with Latin America leads to additional jobs for the people of the Southeastern Alliance Region. Given the Region's position in the Western Hemisphere's economy, these jobs are likely to be created in value-added industries and in the higher wage occupations within those industries. Using a system of macroeconomic models, simulations have been undertaken to predict the impact of Latin American trade on the Alliance. Levels of Alliance

employment were compared for the "Base Case" and the "High Case." To demonstrate the importance of Latin American trade upon job formation in the Alliance Region, these analyses also produced an estimate of employment levels if there were no growth in trade with Latin America. Results of these analyses are depicted **in Exhibit A-5**.

Exhibit A-5
CHANGE IN ALLIANCE EMPLOYMENT
FROM 2000 TO 2020
(Millions of Jobs)



- The "Base Case" scenario will result in 1.39 million additional jobs, i.e. jobs that are created through increased trade with Latin America under the "Base Case" growth assumptions.

- If the "High Case" growth scenario is realized, an additional 1.35 million jobs will be created in the Alliance Region.

  - That is, under the "High Case" growth scenario, there will be an additional 2.74 million jobs created in the Alliance Region which are attributable to increased trade with Latin America.

LATTS STRATEGIC TRANSPORTATION SYSTEM (SECTION C)

The role of the Alliance Region as the United States' major gateway for Latin American trade flows places a significant responsibility on the Alliance to maintain a transportation system adequate to serve these flows as well as other freight and passenger traffic.

Accordingly, a process was undertaken which led to the identification of those transportation facilities which either currently are of significant importance to Latin American trade flows or which could become significantly important.

The resulting LATTS Strategic Transportation System consists of all four modes typically used for freight transportation, i.e., waterports, airports, railroads and highways. Each mode plays an important role in trade and economic development.

The main features of the LATTS Strategic Transportation System are discussed in Section C and are summarized as follows:

- Waterports
  - A total of 42 wateports within the Alliance Region were included in the Strategic Transportation System.
  - This included 31 coastal ports and 11 inland riverports.

- Airports
  - The Strategic Transportation System included 48 airports.
  - Of this total, 46 were existing facilities and two were proposed airports.

- Railroads
  - Some 22,285 miles of railroads were included in the Strategic Transportation System.

- Highways
  - The mainline portion of the LATTS Strategic Highway System totaled 22,859 miles.
  - Interstate highways comprised 14,602 miles (or nearly two-thirds) of the mainline portion of the system. Non-interstate facilities made up the remaining 8,257 miles.
  - The LATTS Strategic Highway System also included 123 individual intermodal connectors to wateports and airports.

INVESTMENT NEEDS PERSPECTIVE (SECTION D)

The analysis of investment needs as reported in Section D of this report provides a perspective for the adoption of investment strategies that will achieve the LATTS goal and its seven supporting objectives. The overview and perspective below indicates the magnitude of the challenge that lies ahead as well as various characteristics of the total investment needs. These features, in turn, influenced the particular strategies which were adopted by the study and which are reported in Section E.

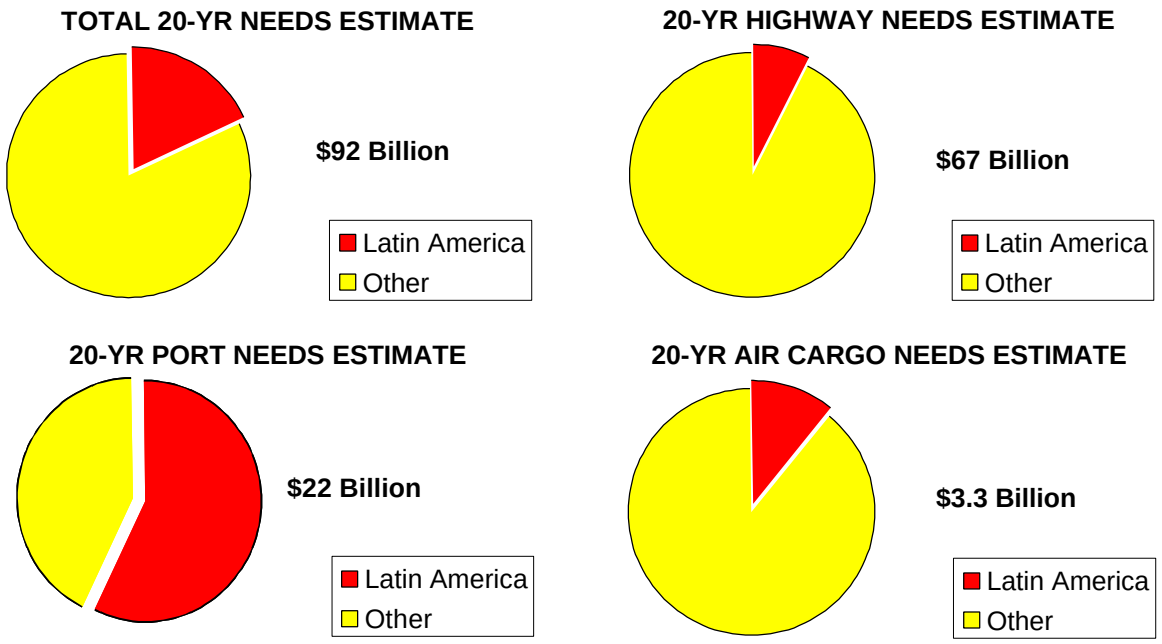
Total Investment Needs

Depicted in **Exhibit A-6** are various characteristics of public sector investment needs on an overall basis. These needs encompass the LATTS Strategic Port, Airport and Highway Systems. No needs are included for the LATTS Strategic

Rail System because they are almost exclusively the domain of the private sector and are not directly germane to public investment strategies. Nevertheless, the rail system and its freight transportation role and performance characteristics does influence, to a degree, public sector investment strategies for other modes, particularly highways.

Investment needs on the LATTS Strategic Transportation System were found to be as follows:

Exhibit A-6
20 YEAR NEEDS ESTIMATES



- Total needs amount to $92 billion over the 20-year period.
  - Of this amount, $18 billion, or 20 percent of the total, are the direct result of Latin American traffic.
  - The vast majority of total needs (80 percent) are required to serve personal travel and non-Latin American freight flows.
  - Given this relationship and the nature of the LATTS Strategic Transportation System, investments aimed at serving growing trade flows with Latin America will also have a very substantial impact upon serving overall transportation needs within the Alliance Region.

- Twenty-year port needs amount to $22 billion.
  - This represents 24 percent of the total for all needs on the LATTS Strategic Transportation System.

- Of the port total, the majority (57 percent) is related to trade with Latin America. This reflects the importance of the Alliance Region's ports to Latin America trade flows.

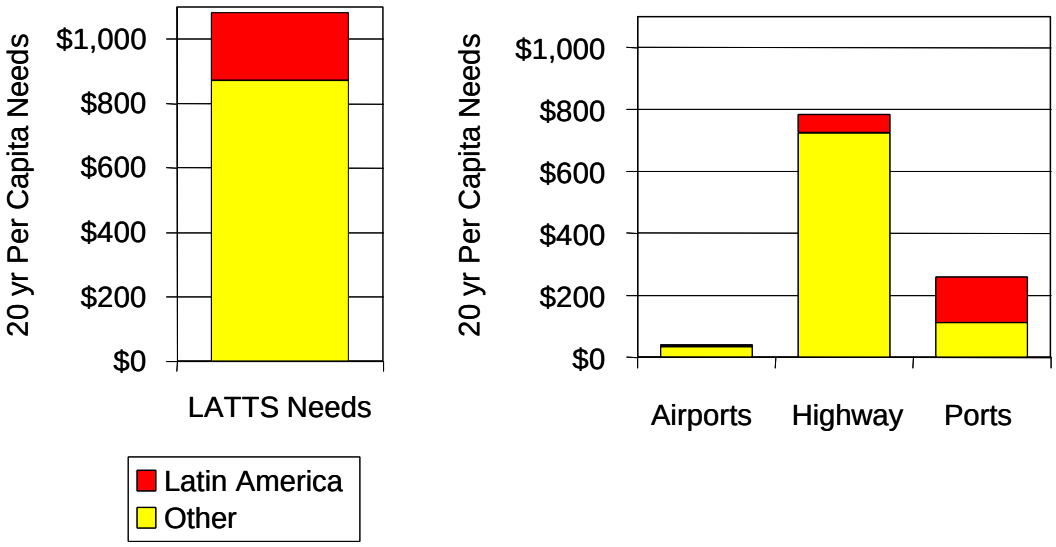
- Air cargo needs of the LATTS Strategic Airport System amount to $3.3 billion.
  - This is the smallest of the three modal components, constituting only 4 percent of the total.
  - Of the air cargo total, only 12 percent is directly related to Latin American trade flows.
  - The vast majority of total needs (88 percent) are a result of air cargo needs associated with other international and domestic flows.

- Needs for the LATTS Strategic Highway System total $67 billion over the 20-year analysis period.
  - Highway needs are the largest component of total needs of the three modes at 72 percent.
  - Nevertheless, only 8 percent of the total needs of the LATTS Strategic Highway System is directly related to trade with Latin America.
  - On the other hand, some 92 percent of the needs of the LATTS Strategic Highway System are attributable to traffic flows which are not associated with Latin American trade flows.

Investment Needs Per Capita

The $92 billion in needs for the LATTS Strategic Transportation System clearly is a hefty amount. However, when viewed in terms of per capita investment needs, it takes on a different perspective, as depicted in **Exhibit A-7**. For this presentation, per capita estimates were based on regionwide population (1998).

Exhibit A-7
PER CAPITA LATTS SYSTEM NEEDS ESTIMATES
20 Year Total

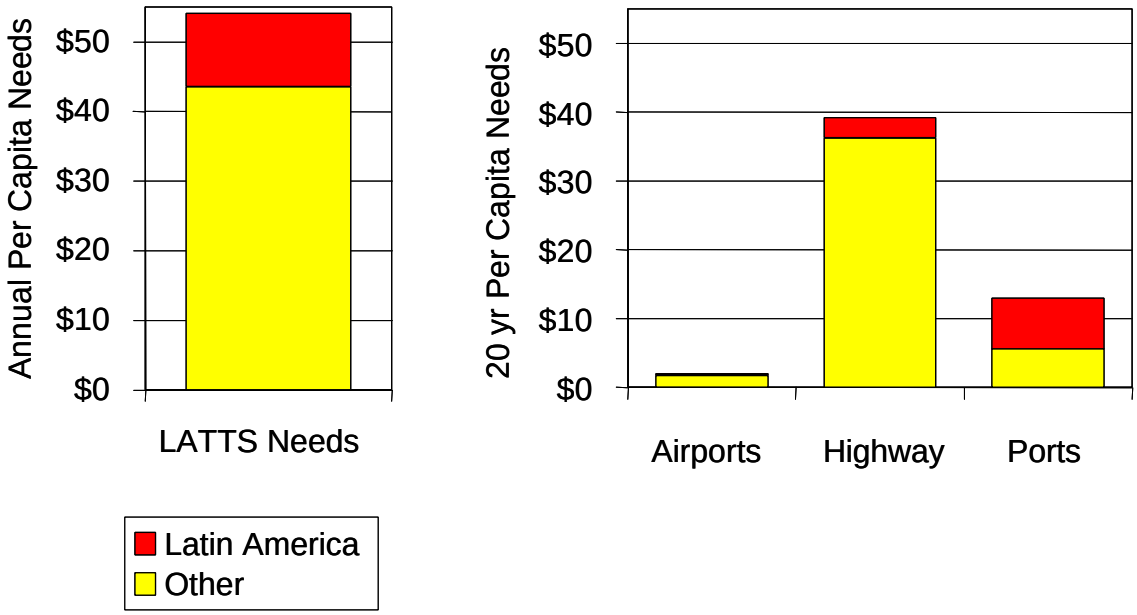


- Total needs of $92 billion equate to $1,082 per person over 20-years.
- The Latin American component of total needs amount to $211 per capita, or only 20 percent of the total.
- Per capita needs are significantly higher for the highway component, amounting to $783 over 20-years.
- Port per capita needs for the 20-years amount to $260.
- By far the smallest per capita needs by mode is for airport cargo facilities at $39.

The total 20-year need values are converted to annual amounts in **Exhibit A-8**.

- On an annual basis, per capita needs of the LATTS Strategic Transportation System amount to $54.
- Of this total, only $11 is related to Latin America trade flows.
- Annual highway needs amount to $39 per capita.
- Ports have annual needs of $13 per person.
- Only $2 per person per year is needed for air cargo flows.

Exhibit A-8
PER CAPITA LATTS SYSTEM NEEDS ESTIMATES
Annual per Capital Average

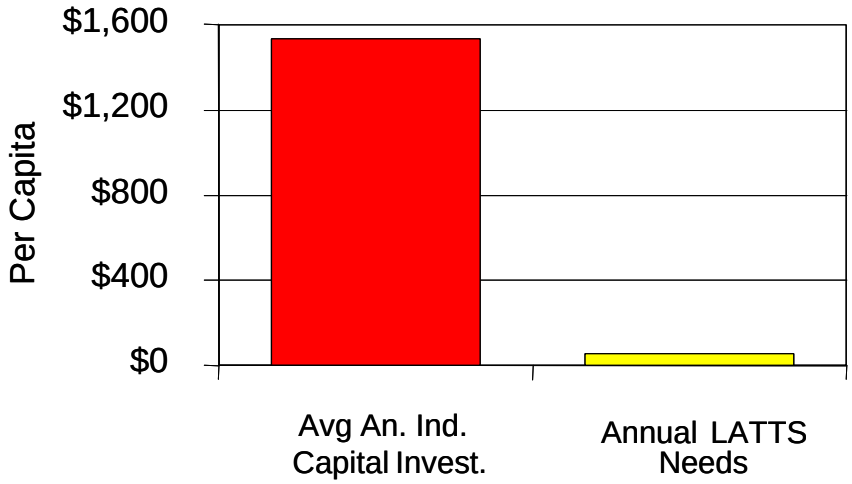


Comparison with Industrial Capital Investments

Industry clearly has a major dependence upon the transportation system to transport raw materials, intermediate and finished goods. Despite this heavy dependence, industrial capital investments are far greater than transportation investment needs.

As noted in **Exhibit A-9**, investment in 1998 by private industry (in South Carolina) equated to more than $1,500 per capita. As already emphasized, only $52 per capita is required annually for the LATTS Strategic Transportation System.

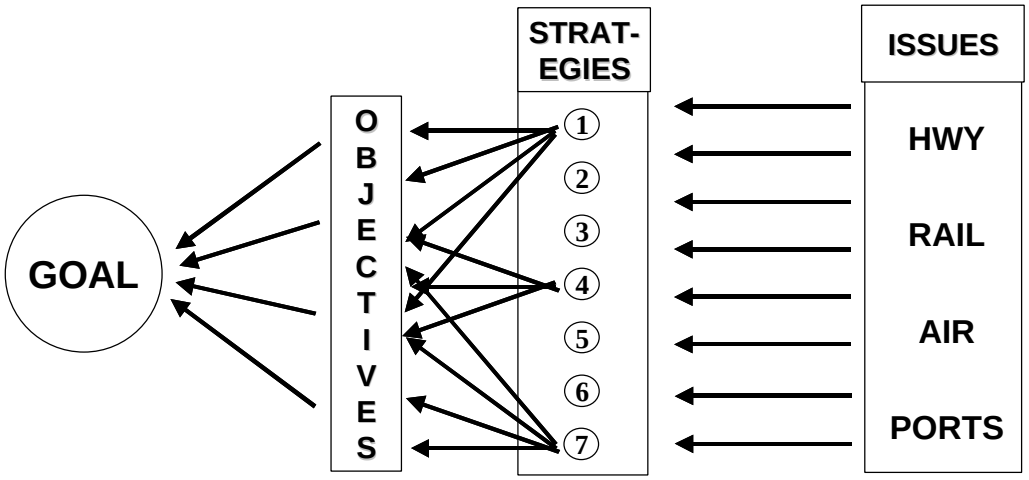
Exhibit A-9
LATTS SYSTEM NEEDS vs INDUSTRIAL CAPITAL INVESTMENT
Annual per Capita Average



INVESTMENT STRATEGIES (SECTION E)

Development of investment strategies for the LATTS Alliance followed an orderly and structured process. The diagram presented in **Exhibit A-10** depicts the principal elements of the approach.

Exhibit A-10
INVESTMENT STRATEGY OVERVIEW



Goal and Objectives

The goal of the Latin American Trade and Transportation Study framed the goal which the investment strategies are intended to support. The overall goal may be summarized as follows.

Goal *– Support economic development through improved transportation for trade.*

Seven objectives were defined to support achievement of the LATTS goal. They related to the following topics (and are further discussed in Section E).

1. Regional Competitiveness
2. Freight Mobility
3. Interconnected Multimodal System
4. Transportation Efficiency
5. Environment
6. Safety
7. National Security

General Strategies

The strategic initiatives which evolved from these evaluations and assessments resulted in the identification of a series of basic strategies that will aid the Alliance in achieving its goal and the supporting objectives. The strategies generally fall into the following categories:

- **Utilization of Existing Infrastructure** – Because of scarce resources, it is essential that the existing transportation infrastructure be utilized in the most effective and efficient manner. Strategies designed to achieve optimal utilization primarily will support the LATTS objectives regarding regional competitiveness, freight mobility, efficiency and national security.

- **Add Physical Infrastructure** – In some cases, even the optimal use of existing infrastructure will not obviate the need to add capacity and connectivity to the transportation system. Accordingly, prudent investments in new physical infrastructure clearly will be required. Strategies involving additional infrastructure will support the LATTS objectives regarding regional competitiveness, freight mobility, interconnected multimodal system, efficiency, safety and national security.

- **Increase Operating Throughput** – Strategies to increase operating throughput overlap and are significantly interrelated to some of the other strategic initiatives discussed herein. In combination, implementation of these initiatives will ensure that the LATTS Strategic Transportation System is capable of accommodating the expected increases in trade with Latin America as well as the other transportation demands that are placed upon the system. Initiatives designed to increase throughput capacity will support LATTS objectives regarding regional competitiveness, freight mobility, interconnected multimodal system, efficiency and national security.

- **Corridor Approach for Investing** – Study analyses have documented a pattern of freight movements which often involve significant corridor volumes. Concentration of investments in major corridors will have a major impact upon the achievement of LATTS objectives regarding regional competitiveness, freight mobility, interconnected multimodal system, efficiency, safety and national security.

- **Agile Freight Operations** – The LATTS Strategic Transportation System must be able to cope with major surges in traffic flows and with a variety of cargo handling and transportation requirements. Enhancement of the agility of the system to adapt to these circumstances will support LATTS objectives regarding regional competitiveness, freight mobility, interconnected multimodal system, efficiency and national security (including military deployments).

- **Improved Clearance Processes at Gateways** – A major challenge confronting the freight industry is to optimally improve clearance processes at gateways such as customs inspection stations and cargo delivery through freight terminal gates. These initiatives will support LATTS objectives regarding regional competitiveness, freight mobility, efficiency, and national security.

- **Attention to Connections** – Another major challenge is the facilitation of freight movements between freight terminals and mainline facilities.

Strategies which address the needs of intermodal connectors will support LATTS objectives regarding regional competitiveness, freight mobility, interconnected multimodal system, efficiency, environment, safety and national security.

- **Encourage Technology** – Transportation technological advances often have a significant impact in terms of productivity gains. Initiatives designed to get optimal productivity through technology will support LATTS objectives regarding regional competitiveness, freight mobility, interconnected multimodal system, efficiency, environment, safety and national security.

- **Information Integration** – Improvements in communication and data interchange within the freight industry will support LATTS objectives regarding regional competitiveness, freight mobility, interconnected multimodal system, efficiency and natural security.

- **ITS Applications** – Strategies to employ Intelligent Transportation Systems (ITS) are interrelated and overlapping with other strategies which focus upon better use of existing infrastructure, increased throughput capability, agile freight operations and improved clearance processes at gateways. ITS strategies will support LATTS objectives regarding regional competitiveness, freight mobility, interconnected multimodal system, efficiency, safety and national security.

- **Increase Public Awareness** – Achievement of the LATTS goal and objectives is, in large measure, dependent upon public and political support. Only with this support will it be possible to implement the strategic initiatives which are proposed by this study. In effect, public awareness initiatives will be supportive of all of the LATTS objectives.

- **Improve Institutional Relationships** – Formation of the Southeastern Transportation Alliance for purposes of conducting the Latin America Trade and Transportation Study illustrates the benefits that can be achieved by enhanced institutional relationships. Additional initiatives to improve institutional relationships within the governmental domain will support all of the LATTS objectives.

- **Partnerships** – In addition to improved relationships between governmental institutions, there is increasing awareness of the need for partnerships between public and private interests. This is particularly true regarding the freight industry which is largely dominated by the private sector. Nevertheless, the public sector plays a major role in the provision, maintenance and operation of significant portions of the freight transportation system. Partnerships which enhance the interrelationships between the public and private sectors will be supportive of all of the LATTS objectives.

- **Improve Freight Profile** – In recent times, freight transportation has achieved greater visibility within governmental transportation agencies. This higher profile is warranted by the importance of freight transportation in the economic viability of communities, states, the Alliance Region and the nation as a whole. Accordingly, initiatives are needed to raise the profile of freight within transportation planning activities and investment decisions. Initiatives which increase the visibility and profile of freight will be supportive of all of the LATTS objectives.

Discussions in Section E present a series of more specific strategic initiatives which broadly encompass the categories of strategies summarized above.

SECTION B
INTERNATIONAL TRADE AND ECONOMIC DEVELOPMENT OPPORTUNITIES

A major undertaking of LATTS was the performance of a macro-scale study regarding the characteristics of existing trade patterns, particularly as they relate to Latin America and the members of the Southeastern Transportation Alliance. This was followed by another major undertaking which produced forecasts of future international trade volumes. Additionally, analyses were performed regarding tourism, business and service travel. Analyses also were undertaken to identify the economic impact upon the Alliance resulting from increased trade opportunities with Latin America.

HISTORICAL AND CURRENT TRADE PATTERNS

In response to a number of factors, Latin America is experiencing unprecedented economic growth. Study analyses revealed that:

- There is a sustained pattern of growth in trade between Latin America and the United States.
  - In recent times, the growth rate in trade has escalated above historical patterns.

- For a number of reasons, including its advantageous geographical relationship to Latin America, trade between the United States and Latin America tends to gateway in the Alliance Region (i.e., enter or leave the United States through the Region).
  - 86 percent of Latin America imports into the United States enter through the Alliance Region.
  - 71 percent of all U.S. exports to Latin America depart through the Alliance Region.

- Of the total Latin American trade gatewaying in the Region, 80 percent of the tonnage and 60 percent of the commodity value was seaborne trade.

- Trade crossing the Texas/Mexico border accounts for 20 percent of the tonnage and 38 percent of the value of gateway traffic.

- In relative terms, the smallest component of trade with Latin America enters or leaves the United States by air. Nevertheless, airborne freight is a very important element for certain commodities.

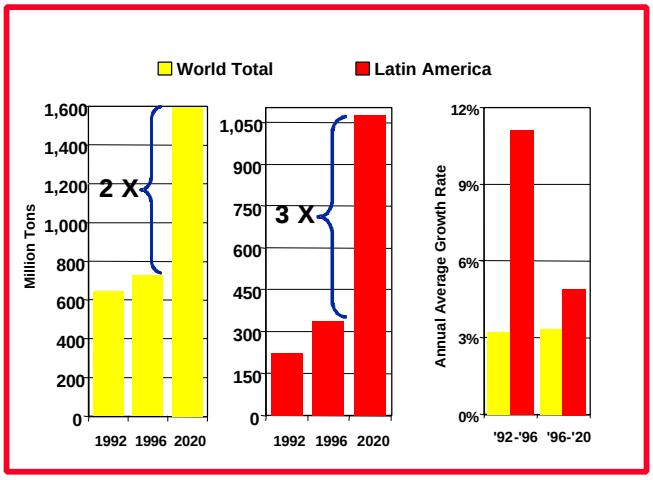
Trade Forecasts

Forecasts developed by the study clearly show that trade with Latin America will be even greater in the future, in both relative and absolute terms.

- As noted in **Exhibit B-1**, total international trade by the Alliance Region is expected to double by the year 2020.

- The Latin American component of total international trade is expected to triple during this time span.

Exhibit B-1
ALLIANCE TRADE GROWTH TRENDS: FORECASTS



These "Base Case" forecasts assume a continuation of recent trends and conditions until 2020. Nevertheless, there are significant events which could result in a "High Case" scenario. These events could include:

- Increased liberalization of trade, e.g. a Western Hemisphere Free Trade Agreement,

- Higher economic growth trends for Latin America and/or the United States, and

- Changes in U. S. policies regarding Cuba.

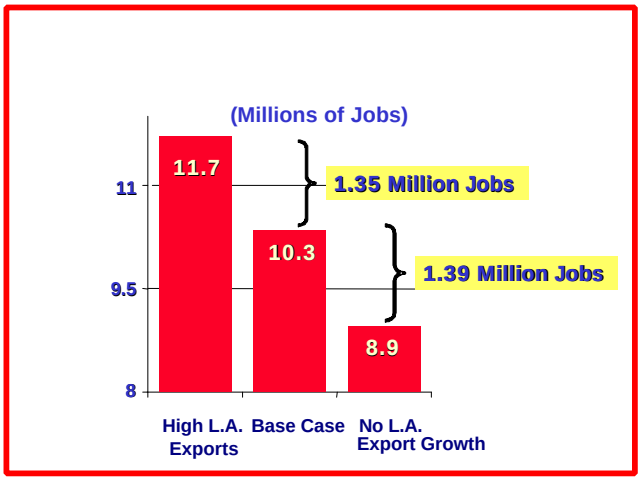
Under a "High Case" scenario, the volume of trade with Latin America through Southeast Alliance gateways is forecast to increase to 1.1 billion metric tons, more than 22 percent higher than the "Base Case" forecast for 2020.

Economic Development Impacts

Trade with Latin America leads to additional jobs for the people of the Southeast Alliance. Given the region's position in the Western Hemisphere's economy, these jobs are likely to be created in value-added industries and in the higher wage occupations within those industries. Using a system of

macroeconomic models, simulations have been undertaken to predict the impact of Latin American trade on the Alliance. Levels of Alliance employment were compared for the "Base Case" and the "High Case." To demonstrate the importance of Latin American trade upon job formation in the Alliance Region, these analyses also produced an estimate of employment levels if there were no growth in trade with Latin America. Results of these analyses are depicted in **Exhibit B-2**.

Exhibit B-2
CHANGE IN ALLIANCE EMPLOYMENT FROM 2000 TO 2020



- The "Base Case" growth scenario will result in 1.39 million additional jobs, i.e. jobs that are created through increased trade with Latin America under the "Base Case" assumptions.

- If the "High Case" growth scenario is realized, an additional 1.35 million jobs will be created in the Alliance Region.
  - That is, under the "High Case" growth scenario, there will be an additional 2.74 million jobs in the Alliance Region which are attributable to increased trade with Latin America.

SECTION B1
EXISTING TRADE FLOWS

Development of the information discussed in this report section was substantially completed during 1999 and the resulting database reflects the information available as of that time.

TRADE DATABASE

This component of the LATTS project, which had as its purpose the identification of current trade patterns between the United States (individual Alliance states, the Alliance Region and other U.S. regions) and Latin America, required the assembly of the LATTS trade database. This constituted a significant challenge because LATTS was the first known study to attempt to link international trade data with domestic production and consumption data. This process involved allocating international trade passing through international gateways (ports, airports and border posts) to individual U.S. states and Bureau of Economic Analysis (BEA) zones. For example, tracing the trade route of a widget exported through a Florida port to Brazil from Tennessee.

Different commodity and trade databases address different components of the commodity flow path. Some address the international segment – from a port to a country – while others address the domestic portion – from Tennessee to Florida. To assemble a master database that actually addresses the entire trade path required matching a variety of databases.

The major challenge was to link international trade databases with the domestic commodity flow databases, specifically for trade between the U.S. and Latin America which passes through (i.e., gateways in) the Alliance, including trade which originates and terminates within the Alliance. Because of their specific natures, linking the databases required a great deal of experience and knowledge in this specific field. At the very least, the databases and models used for this task are all similar in the sense that they contain economic and trade indicators for specific jurisdictions – states, counties, BEA's, countries – by industry and commodity group – for the past, present and future – for different modes of transportation. But that is where the commonality ends. The data characteristics vary from database to database. For example, some databases report data at a state level while others report at a BEA or county level. They also report data at different commodity detail levels. And a certain commodity/industry grouping in one database may not include the same mix of industries as a similar grouping in another database. Also, some of the databases used to define the domestic routing of commodities contained both international and domestic flows in an aggregate form, hence requiring alternative methods of identifying the international component within aggregate domestic flows.

Consequently, this effort required more than merely "cutting and dicing" data taken off the shelf and then producing reports. At the very least, it required a

great deal of data processing, an understanding of how the specific databases vary, the expertise to untangle data mismatches, and the capacity to assemble a larger customized database. The results of this effort provided the basis for this section of the report.

THREE INTERNATIONAL TRADE COMPONENTS

There are three international trade components (see **Exhibit B1-1**) for which data was collected, each from different sources:

- International seaborne trade;
  Source: Journal of Commerce's Port Import Export Reporting Service ("PIERS").

- International cross-border trade with Mexico;
  Source: Bureau of Transportation Statistics' Transborder Surface Freight Database.

- International air cargo trade;
  Sources: U.S. imports and exports for selected airport codes, Department of Commerce, Bureau of the Census; and Trade with U.S. Possessions, Annual EA695, Department of Commerce, Bureau of the Census.

Exhibit B1-1
THREE INTERNATIONAL TRADE COMPONENTS

For all three of these categories, the data addresses the flow for trade through U.S. gateways (seaports, border posts and airports) where international shipments are cleared. During the clearance process, a range of information about the shipments is collected, the most useful and accurate of which is information about the nature of the shipment as well as the international origin/destination. This information was used to trace the international trade patterns for individual industry sectors.

Also collected during the clearance process, specifically for the seatrade and cross-border trade, is information about the U.S. shipper/receiver, including their domestic location. Conceptually, this information about the domestic origin/destination could be useful in tracing international trade domestically, to and from U.S. locations of origin and destination. However, this domestic data component was found to have a significantly high level of error. For example, shippers commonly identify the address of the respective company headquarters as the point of origin/destination, rather than the actual production plant. Grain from Iowa shipped down the Mississippi River system through the port of New Orleans to Brazil may actually be shown as being shipped from New York where the shipper was headquartered. In other cases, no address is provided in this database. Although this problem of arbitrary reporting was not universal to all industry sectors, it was found that these international databases could not be used alone to accurately trace the domestic routing of international trade. Hence, an approach was undertaken which involved supplementing domestic reporting components of the international trade databases with other data sources, namely:

- Reebie TRANSEARCH data.
- 1993 Commodity Flow Survey, Department of Commerce/Bureau of the Census.
- Standard & Poor's DRI U.S. Regional Economic Service.

All three of these data sources were used to help define the domestic production and consumption and related flow patterns for commodities which were characteristic of Latin American trade. It is important to note that while the international trade routing portion (between ports/airports/border-posts and foreign origin/destinations) was based primarily upon shipper declarations, the domestic routing portion, though somewhat based upon declarations where available, was supplemented by other data sources and models. The method of supplementing the declarations of domestic origins/destinations identified the most plausible domestic routing and allocation of international trade. To accomplish this, the domestic allocation process went through a series of progressive adjustments and refinements. For example, one of the early observations made during internal reviews was that the domestic allocation process had a bias toward the gateway states. In other words, the gateway states were shown to produce/consume an unusually high percentage of the trade passing through them. For some sectors like petroleum (crude & refined) which is shipped primarily through ports in Texas and Louisiana, the largest share was shown to be predominantly produced and consumed in those two states. This is actually plausible since these two states have a strong local base in those industries. However, in general, especially for merchandise and

industrial goods, the gateway state bias was beyond plausible. Hence, DRI's U.S. Regional Economic Service was used in combination with Reebie's TRANSEARCH data and the 1993 Commodity Flow Survey data, to adjust for the bias.

LATTS TRADE DATABASE

One of the challenges of undertaking a study of this nature was the sheer magnitude of data which was analyzed. At the database level, LATTS studied trade between 112 specific U.S. entities (76 Alliance state BEA's, Puerto Rico, and 35 non-Alliance states) and 23 foreign entities (19 Latin American, and 4 other world regions), through 101 gateways (ports/border-posts/states), for 32 different commodity groups, by 3 international modes and 6 domestic modes, over a space of 5 previous years (1992-1996). From a mathematical standpoint, the combinations ran into the millions, making it very impractical to report findings at this level of detail.

Hence, for purposes of discussing trade patterns in this report, the U.S. was broken into five major regions; the Alliance, the Southwest, the Northwest, the Central and the North Atlantic states. The states included in each region are shown in **Exhibit B1-2**. The non-Alliance states were addressed on a regional basis, while the trade patterns for each of the Alliance states and Puerto Rico were identified individually.

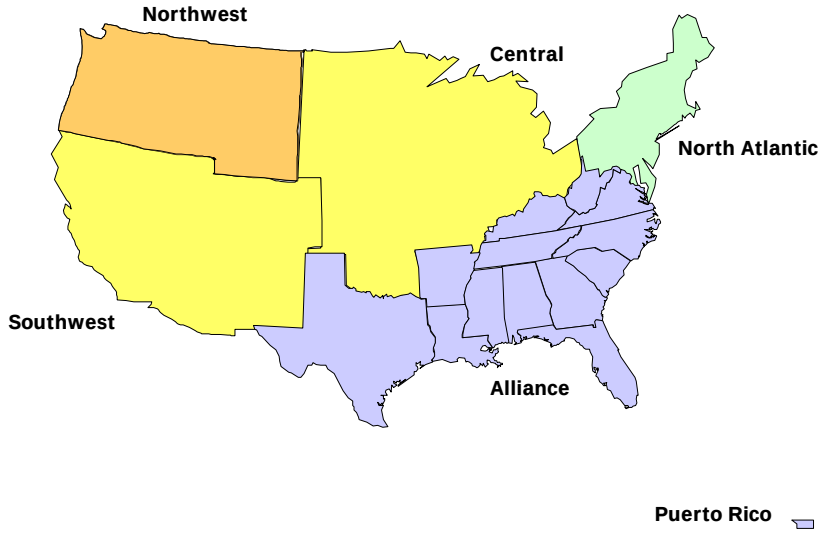
In a similar manner, Latin America was grouped into 19 individual entities, the majority of which are individual countries, while several of the smaller countries were combined into groups, as shown in **Exhibit B1-3**.

In addition to the 19 Latin American data regions shown above, there are four additional international data regions for which the database identified trade with the U.S.: Asia, Europe, Canada and the Rest of World. However, in this report, to simplify the task of reporting non-Latin American international trade, these four regions were combined into a single Rest of World category.

COMMODITY SECTORS

For this study, the Standard Transportation Commodity Code (STCC) classification system was used, specifically at the 2-digit level. **Exhibit B1-4** lists the commodities and their associated codes. In addition, for presentation purposes broader classifications are shown below. These classifications are intended to simulate material handling needs.

Exhibit B1-2
U.S. REGIONS FOR THE LATTS TRADE DATABASE



Northwest	Southwest	Central	North Atlantic	Alliance
Washington	California	North Dakota	Maine	Texas
Oregon	Nevada	South Dakota	New Hampshire	Arkansas
Idaho	Utah	Nebraska	Vermont	Louisiana
Montana	Colorado	Kansas	Massachusetts	Mississippi
Wyoming	Arizona	Oklahoma	Connecticut	Alabama
	New Mexico	Minnesota	Rhode Island	Georgia
		Iowa	New York	Florida
		Missouri	New Jersey	Kentucky
		Wisconsin	Pennsylvania	Tennessee
		Illinois	Maryland	South Carolina
		Michigan	Delaware	North Carolina
		Indiana		W. Virginia
		Ohio		Virginia
				Puerto Rico

Exhibit B1-3
LATIN AMERICAN DATA REGIONS

Exhibit B1-4
TWO DIGIT STCC COMMODITY GROUPS

LATTS Commodity Group	STCC2 Code	Commodity Description
Crude & Refined Resources	13	Crude Petroleum Or Natural Gas
	29	Petroleum Or Coal Products
Agricultural & Natural Resources	01	Farm Products
	08	Forest Products
	09	Fresh Fish Or Marine Products
	10	Metallic Ores
	11	Coal
	14	Nonmetallic Minerals
Primary Manufactured	27	Printed Matter
	28	Chemicals Or Allied Products
	32	Clay, Concrete,Glass Or Stone
	33	Primary Metal Products
Manufactured	19	Ordnance Or Accessories
	20	Food Or Kindred Products
	21	Tobacco Products
	22	Textile Mill Products
	23	Apparel Or Related Products
	24	Lumber Or Wood Products
	25	Furniture Or Fixtures
	26	Pulp, Paper Or Allied Products
	30	Rubber Or Misc Plastics
	31	Leather Or Leather Products
	34	Fabricated Metal Products
	35	Machinery
	36	Electrical Equipment
	37	Transportation Equipment
	38	Instrum, Photo Equip, Optical Eq
	39	Misc Manufacturing Products
Miscellaneous & Unknown	99	Unknown
	40	Waste Or Scrap Materials
	41	Misc Freight Shipments
	46	Misc Mixed Shipments

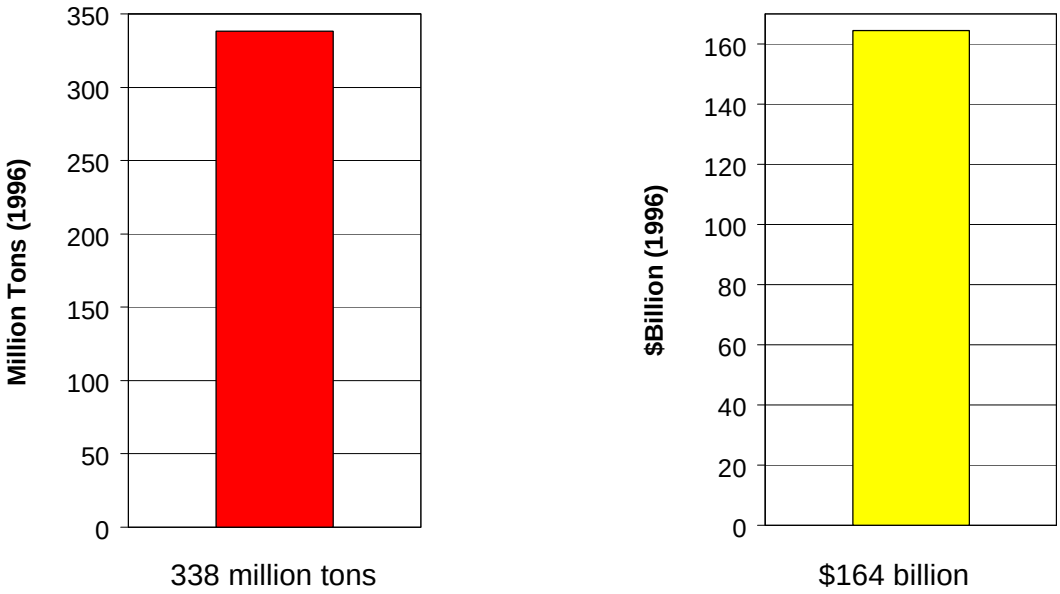
TRADE VOLUME MEASURES: TONNAGE VERSUS VALUE

The ultimate infrastructure investment strategies developed by this study were based, in part, on anticipated volumes of future trade with Latin America. The most useful measure in terms of identifying capital facilities and equipment needs associated with accommodating such trade is in terms of tons. For example, an annual tonnage throughput estimate of a certain commodity sector is useful in estimating the level of facilities and equipment to handle such throughput over the course of a year. Hence, the majority of the analysis in this report is in terms of tons (metric). However from a reporting standpoint, this presents a problem of bias toward bulk commodity sectors, specifically in the case of sea trade where the mix of commodities is dominated by bulk commodities (crude petroleum, grain, coal, etc). This skews the data toward trading partners, U.S. gateways, U.S. origins/destination and inland modes which are bulk intensive. Hence, the sea trade analysis in this report contains a 1996 dollar value based analysis to complement the tonnage analysis. On the other hand, the air cargo and cross-border Mexican trade components have a more diverse mix of commodities. Hence these categories were analyzed from a tonnage standpoint only.

TRADE SUMMARY

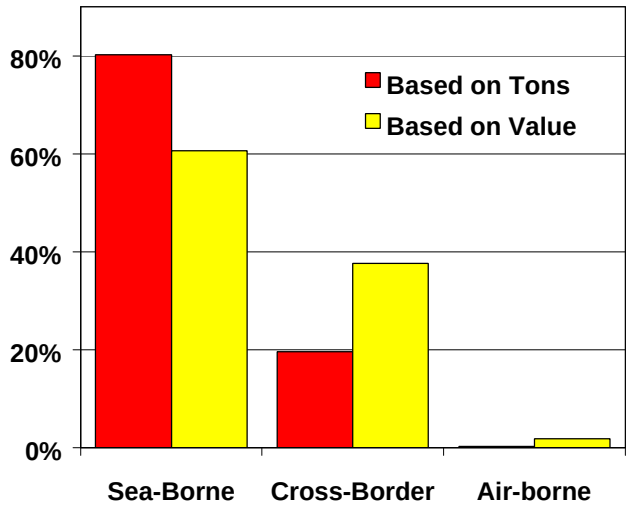
The total trade between the Southeastern Alliance and Latin America for 1996, measured in volume, was 338 million metric tons. In terms of value, trade between the two regions totaled $164 billion, as shown in **Exhibit B1-5**. Clearly, the trade relationship between the Alliance and Latin America is a substantial one—with implications for jobs, transportation infrastructure, and the general economies of both.

Exhibit B1-5
TOTAL ALLIANCE GATEWAY TRADE WITH LATIN AMERICA
Tons vs. Value (1996)



Measured by volume, gateway trade between the Alliance and Latin America is primarily transported by water, as depicted in **Exhibit B1-6**. In tons, 80% of trade is sea-borne, about 20% is cross-border, and only a small amount is carried by air. This volume of trade indicates that water related transportation infrastructure is crucial to growth in trade of bulk commodities between the regions.

Exhibit B1-6
TOTAL ALLIANCE GATEWAY TRADE WITH LATIN AMERICA – BY MODE



Measured in value, sea-borne trade is again the primary transport mode, but not by as large a margin. In dollars, 61% of trade is carried by water, 38% is cross-border, and about 2% is shipped by air.

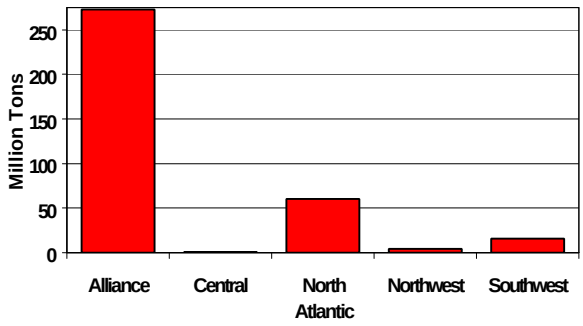
SEABORNE TRADE AND THE ALLIANCE REGION

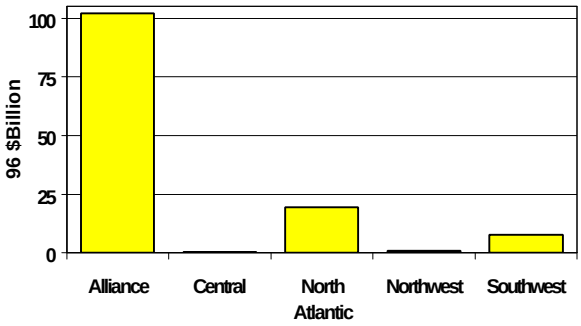
Various characteristics of seaborne trade as it relates to the Alliance Region are summarized below.

Alliance as the U.S. Gateway to Latin America

In terms of U.S. regions, the Alliance is the largest trading gateway with Latin America measured by tons and by value. The Alliance was the gateway for 273 million tons of seatrade with Latin America in 1996, while the next closest region was the North Atlantic with just under 60 million tons. In terms of value, the Alliance's seatrade with Latin America totaled nearly $102 billion followed by the North Atlantic with $19.5 billion (**Exhibit B1-7**).

Exhibit B1-7
THE ALLIANCE IS THE GATEWAY TO LATIN AMERICA
1996 TOTAL SEATRADE WITH LATIN AMERICA





Latin American vs. Rest of the World Trade

Not only is the Alliance Region the major U.S. gateway for Latin American trade, Latin America is an important seaborne trade market for the Alliance Region itself. During 1996, 41 percent (27.3 million tons) of the over 662 million tons in U.S. seaborne trade which gatewayed through the Alliance Region's ports, was Latin American trade.

In addition to being an important gateway for U.S. trade with Latin America, the Alliance Region is the origin and destination for a considerable share of trade with Latin America. In 1996, an estimated 236 million tons of Latin American sea trade originated or terminated in the Alliance Region, compared to 308 million to and from the rest of the world.

The relationship between flows which gateway in the Alliance Region and either originated or are destined for the Region is illustrated in **Exhibit B1-8**. More Latin American trade gatewayed through the Alliance Region's ports than actually originated and terminated in the Alliance Region. For Latin America exports, the Alliance Region's ports were the gateway for 59.3 million tons compared to 36.2 million tons which originated from the Alliance Region. For Latin American imports, the Alliance Region's ports were a gateway for 213 million tons compared with 200 million tons terminating in the Alliance Region.

Seaborne Exports vs. Imports

The relationship between exports and imports is reversed when seaborne trade is measured in value of goods rather than tonnage. The Alliance was the gateway for a total of $102 billion worth of trade between the U.S. and Latin America in 1996. Of that total, exports from the U.S. to Latin America through the Alliance totaled $52 billion worth of goods transported by sea. Imports into the U.S. from Latin America were at $49 billion in value, as depicted in **Exhibit B1-9.**

Exhibit B1-8
THE ALLIANCE REGION AS A GATEWAY AND ORIGIN/DESTINATION FOR SEABORNE TRADE

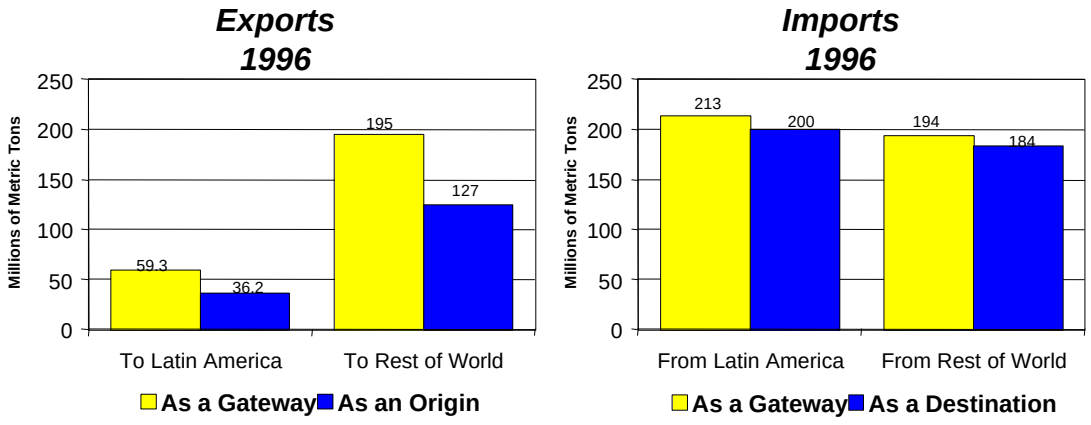
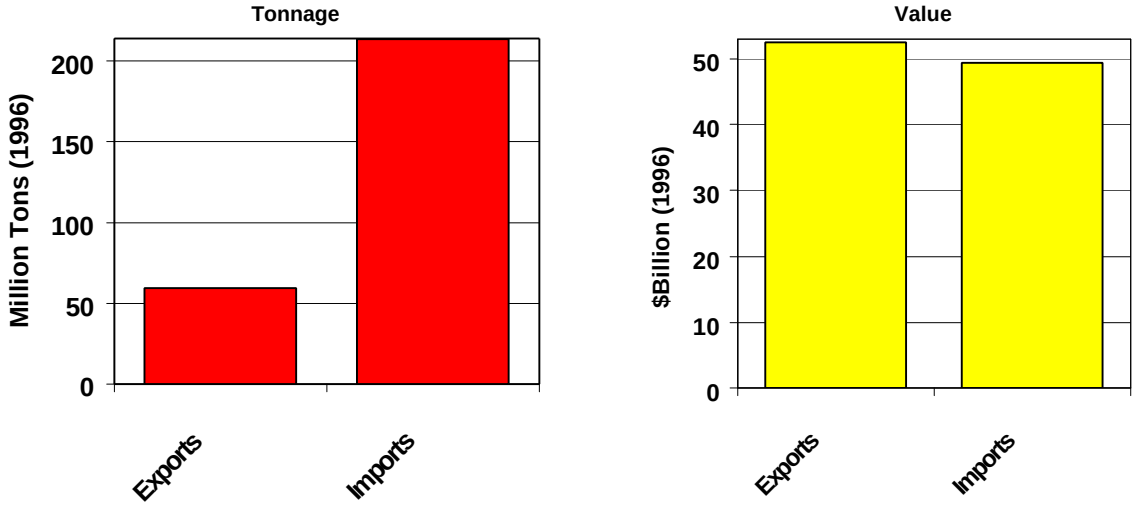


Exhibit B1-9
TOTAL ALLIANCE GATEWAY TRADE
1996 SEATRADE WITH LATIN AMERICA



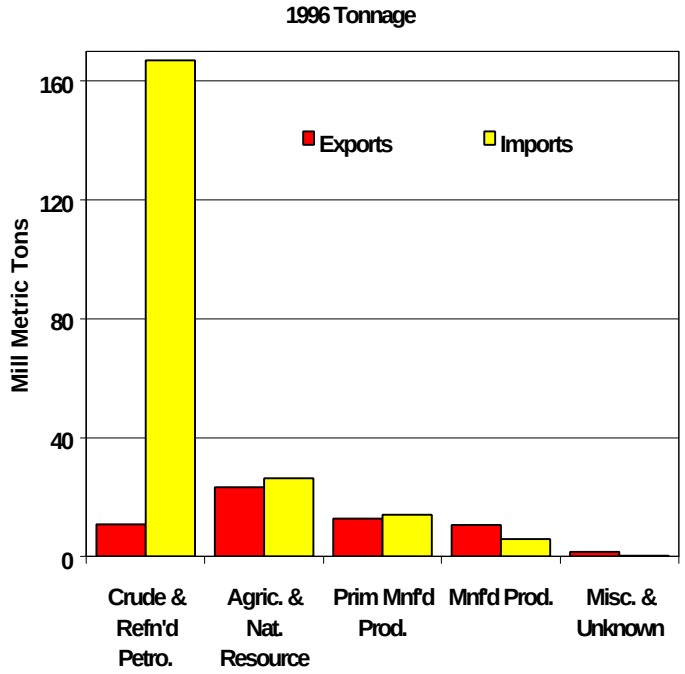
Seatrade Tonnage by Commodity Group

The largest Alliance gateway seatrade commodity group in terms of tonnage is Crude & Refined Petroleum, with 178 million tons in 1996. The U.S. sent 11 million tons of Crude & Refined Petroleum through the Alliance to Latin America, while 167 million tons were imported into the U.S. through Alliance gateways from Latin America (**Exhibit B1-10**). After Crude & Refined Petroleum, the largest volume commodity groups were as follows: Agricultural & Natural Resources, Primary Manufactured Products, Manufactured Products, and Miscellaneous and Unknown.

Agricultural & Natural Resources totaled 50 million tons of seatrade between the U.S. and Latin America in 1996 through the Alliance gateways. The U.S. exported approximately 23 million tons to Latin American nations by sea, while importing approximately 26 million tons from them using Alliance gateways.

Primary Manufactured Products trade using Alliance gateways amounted to 27 million tons—13 million tons of which was exported from the U.S. to Latin America, and 14 million tons were imported into the U.S. by sea. Over 16 million tons of seaborne Manufactured Products flowed through Alliance gateways. Exports from the U.S. to Latin America made up almost 11 million tons, while imports from Latin America totaled around 6 million tons. Finally, about 2 million tons of Miscellaneous & Unknown products were exported from the U.S. to Latin America via seatrade through Alliance gateways.

Exhibit B1-10
ALLIANCE SEATRADE WITH LATIN AMERICA
BY COMMODITY GROUP



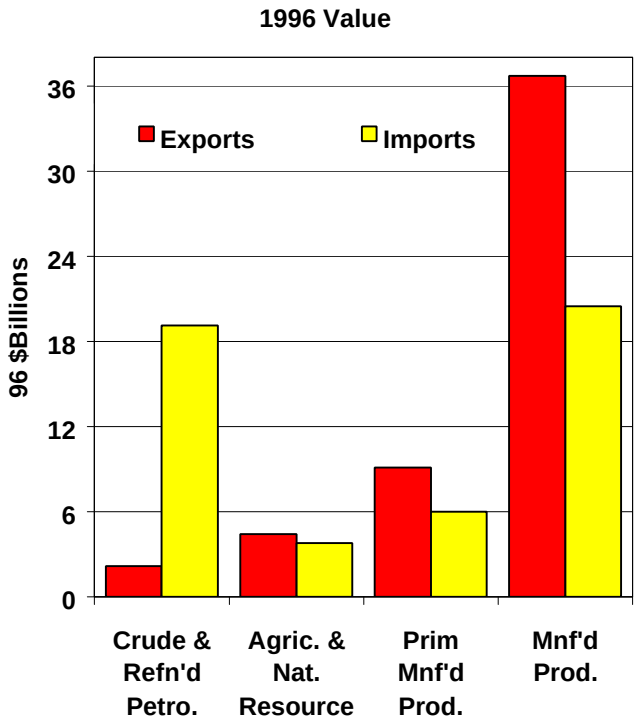
Seatrade Commodity Groups By Value

The gateway seatrade between the Alliance and Latin America, when measured in value, depicts an import/export relationship that is quite different from that shown by tonnages. In terms of value, the largest commodity group is Manufactured Products, with $57 billion in trade between the U.S. and Latin America using the Alliance as a gateway. Of that amount, $37 billion is accounted for by exports to Latin America from the U.S. (**Exhibit B1-11**).

Crude & Refined Petroleum follows Manufactured Products at $21 billion total, $19 billion of which is imported into the U.S. from Latin America. Primary Manufactured Products account for $15 billion, $9 billion of which is exported from the U.S. Another $8 billion comes from Agricultural & Natural Resources, roughly half being traded in each direction.

Combining the Primary Manufactured & Manufactured commodities, the U.S. exports $46 billion of $72 billion of the total trade occurring in those two commodity groups.

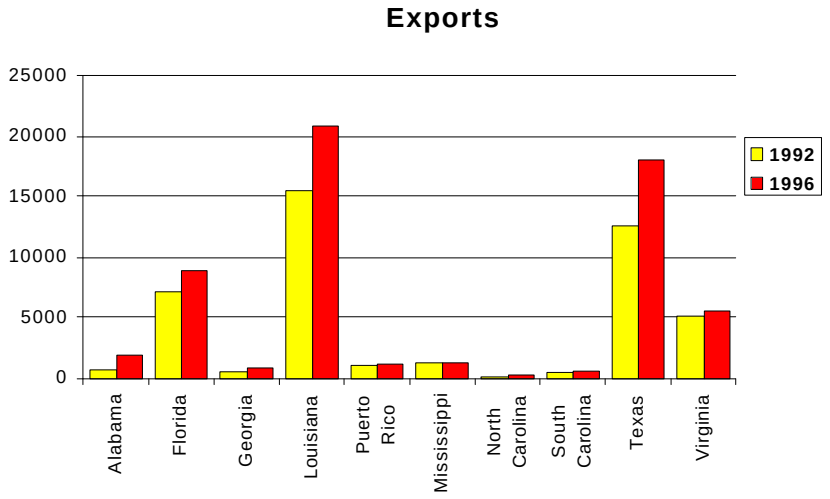
Exhibit B1-11
ALLIANCE SEATRADE WITH LATIN AMERICA
BY COMMODITY GROUP

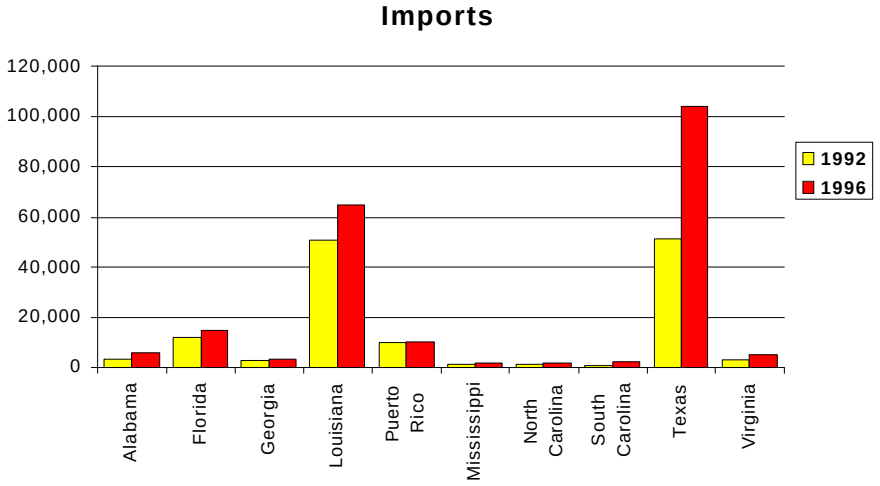


Gateway States

Ten of the Alliance members have coastal ports and hence are defined as gateway states. There are big differences in the volumes of Latin American trade moving through different gateway states. Texas and Louisiana are by far the big players for imports, with Texas in 1996 at over twice Louisiana's volume. Moreover, Texas has also been growing most rapidly, not only in absolute terms, but in percentage terms as well. These two states are followed by Florida and, more distantly, by Alabama and Virginia. The same states stand out in exports as well, although Virginia is not far behind Florida, Louisiana and Texas are about even, and Alabama is less distinguished from the rest of the pack (**Exhibit B1-12**).

Exhibit B1-12
ALLIANCE GATEWAY STATES FOR LATIN AMERICAN SEATRADE
(Thousands of Tons)





The distribution of gateway seatrade varies significantly based on the mix of commodities, primarily due to the materials handling needs of various commodities. For example, bulk commodities such as farm products and coal require different materials handling equipment (silos, conveyors, ship loaders, etc.) than containerized commodities (gantry cranes, stackers, carriers, etc.), or liquid bulk commodities (storage tanks, pipelines, etc.). Moreover, ports tend to specialize in specific materials handling equipment and capacities, and hence attract specific commodity mixes consistent with their materials handling.

The following four exhibits (**Exhibits B1-13** through **B1-16**) show the 1996 tonnage distribution of Latin American Seatrade across the Alliance port gateways for four commodity groups: crude and refined petroleum products, agriculture and mined products, primary manufactured products, and manufactured commodities. Although there are some exceptions, crude and refined products tend to be of a liquid bulk nature, agriculture and mined product tend to be of a bulk nature, primary manufactured products tend to be of a bulk and/or break-bulk nature and manufactured goods tend to be containerizable, although there are some exceptions to that rule. It is clear from these maps that the distribution of Latin American trade varies by commodity group, primarily due to the port materials handling capabilities, as well as other factors such as market access, etc.

Exhibit B1-13
ALLIANCE PORT VOLUMES FOR LATIN AMERICAN TRADE
CRUDE AND REFINED PETROLEUM PRODUCTS

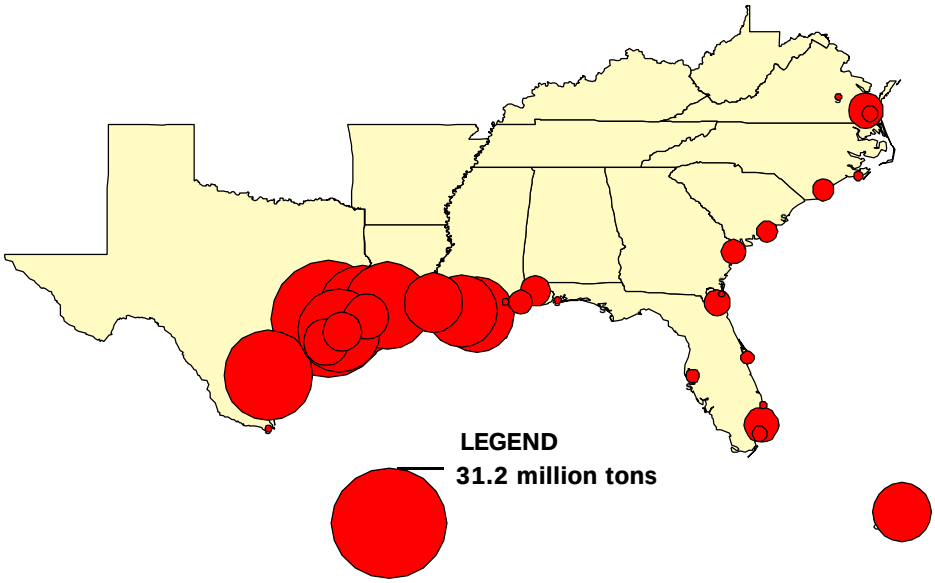


Exhibit B1-14
ALLIANCE PORT VOLUMES FOR LATIN AMERICAN TRADE
AGRICULTURAL AND MINED PRODUCTS

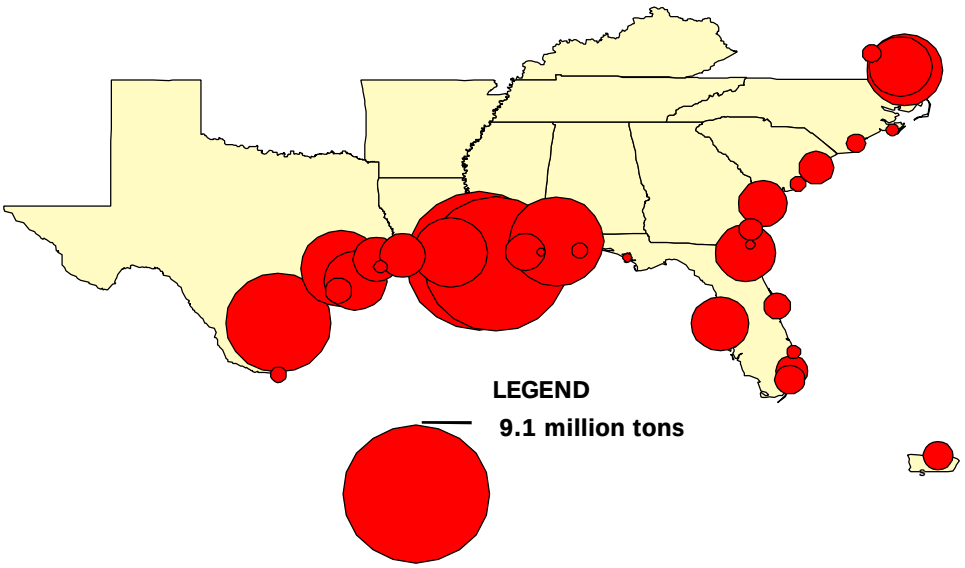


Exhibit B1-15
ALLIANCE PORT VOLUMES FOR LATIN AMERICAN TRADE
MANUFACTURED PRODUCTS

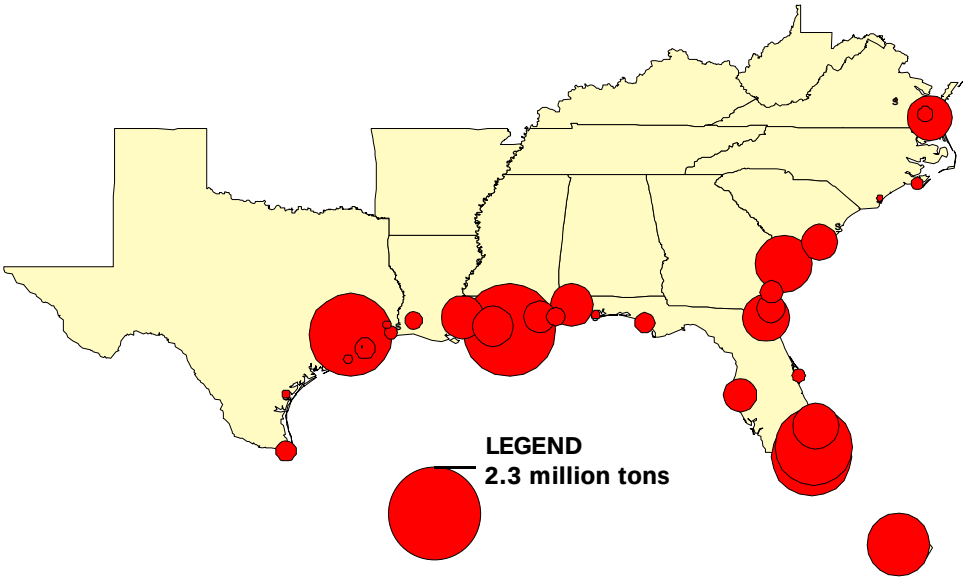
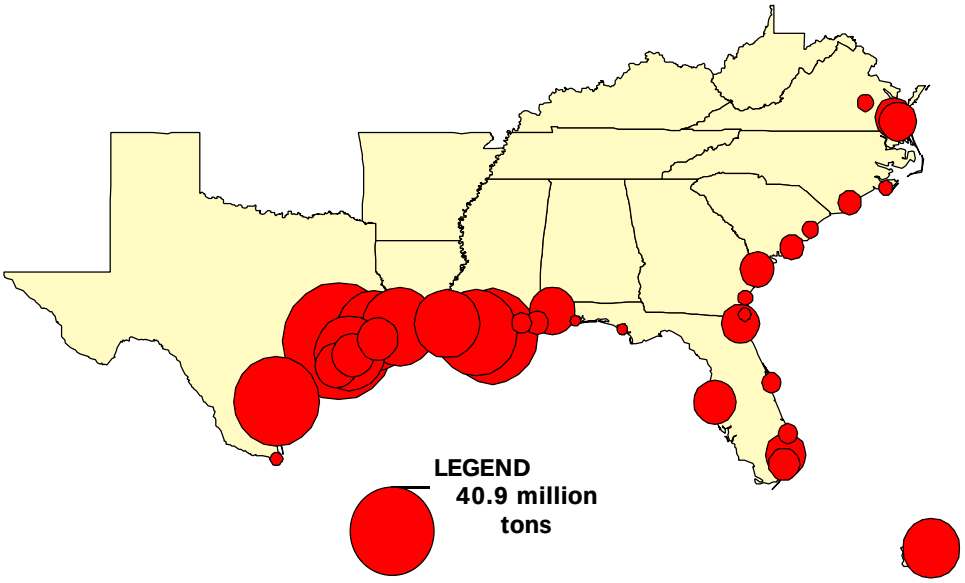


Exhibit B1-16
ALLIANCE PORT TRAFFIC 1996 – LATIN AMERICAN TRADE
All Commodities – Tons



Much like all other rankings, the gateway rankings are skewed as a result of the high tonnage volumes for crude and refined petroleum products; Texas and Louisiana are shown to dominate Latin American gateway sea trade (**Exhibits B1-17** and **B1-18**). However, from a value standpoint, other Alliance states have a more prominent role, especially when the data regarding crude and refined petroleum products is excluded.

Exhibit B1-17
ALLIANCE GATEWAY STATES FOR LATIN AMERICAN SEA TRADE
1996 Tons vs. Value

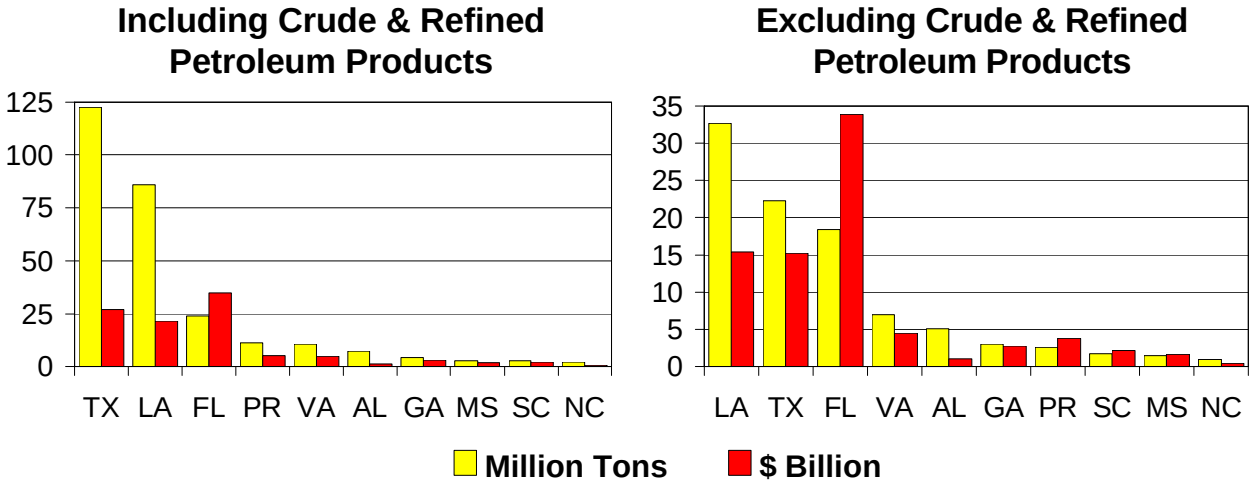
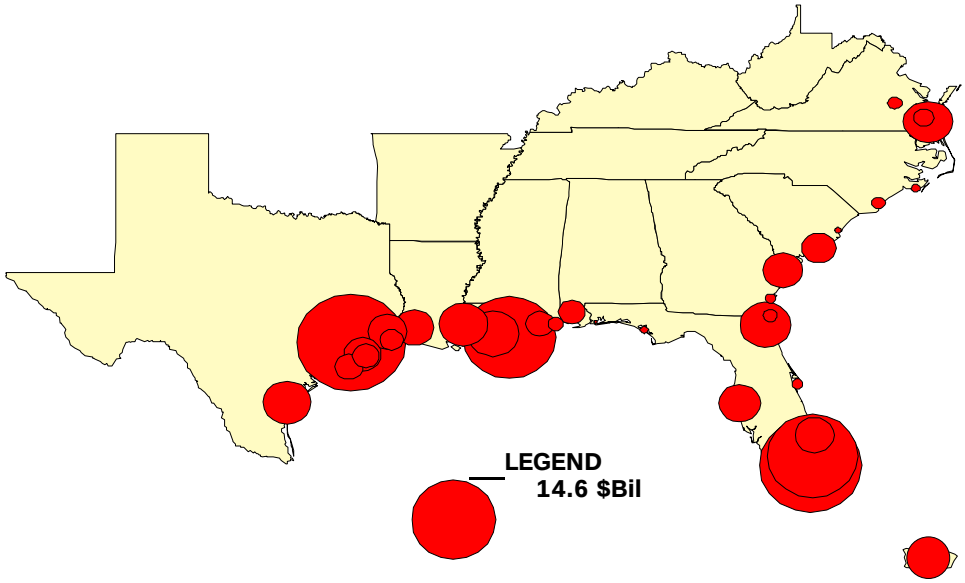


Exhibit B1-18
ALLIANCE PORT TRAFFIC
1996 – LATIN AMERICAN TRADE
All Commodities – Value



U.S. Origins and Destinations by Commodity Group

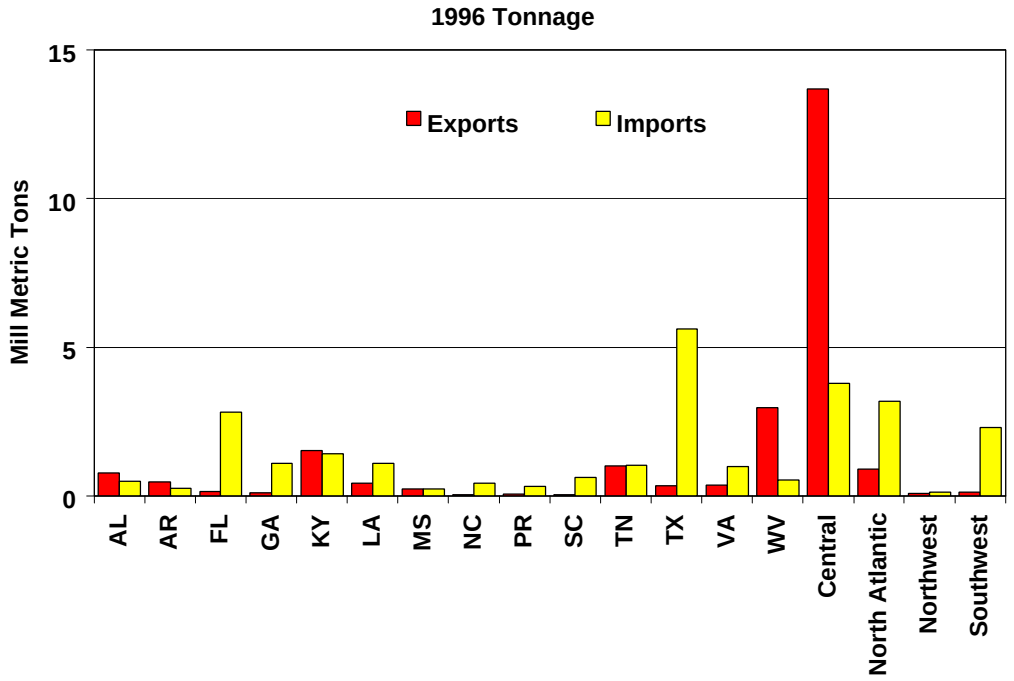
The distribution pattern for different commodity groups varies, due to differences in production and consumption patterns of various U.S. regions.

Agricultural & Mining Products

The U.S. Origin/Destinations gatewaying Agricultural & Mining Products through the Alliance are led by the Central region of the country. The Central region is the origin for 13.7 million tons of Agricultural & Mining Products using Alliance gateways to Latin America. That region is destination for 3.8 million tons of Agricultural & Mining Products from Latin America. The value measurement of trade between the Central region and Latin America is in line with the tonnage measurement--$3.2 Billion of exports originating in the Central region, and $0.35 billion of imports from Latin America. (**Exhibit B1-19**)

The next largest origin/destination for Latin American trade is Texas, followed by the North Atlantic region. Texas is the destination for 5.6 million tons of Agricultural & Mining Products gatewaying in the Alliance from Latin America, and the originating point for 0.3 million tons sent to Latin America. In terms of value, this is $0.55 billion in imports and $0.05 billion in exports to the region.

Exhibit B1-19
U.S. ORIGIN/DESTINATIONS
AGRICULTURAL & MINING PRODUCTS



Primary Manufactured Products

The Primary Manufactured Product category is very different in its origin/destination profile. Texas is the largest origin/destination point for trade with Latin America in this commodity group, followed by Florida, Louisiana, and the Central and North Atlantic regions. Texas is the originating point for over 4 million tons of exports to Latin America, and the destination for over 2 million tons. The next closest exporters are the North Atlantic and Central regions, with 1.75 million and 1.7 million tons, respectively. Florida and Louisiana each import more Primary Manufactured Products from Latin America than Texas, as destinations for 3.0 and 2.2 million tons. (**Exhibit B1-20**)

Manufactured Products

Manufactured Products trade is led by the Central region, followed by Florida and the North Atlantic region. The central region was the origin for exports that totaled 2.2 million tons through Alliance gateways in 1996, while the region was the destination for 0.7 million tons. Florida followed with 1.8 million tons exported, and 0.6 million tons imported. The North Atlantic was the origin for 1.2 million tons of exports and the destination for 0.9 million tons of manufactured products. (**Exhibit B1-21**)

Exhibit B1-20
U.S. ORIGIN/DESTINATIONS
PRIMARY MANUFACTURED PRODUCTS

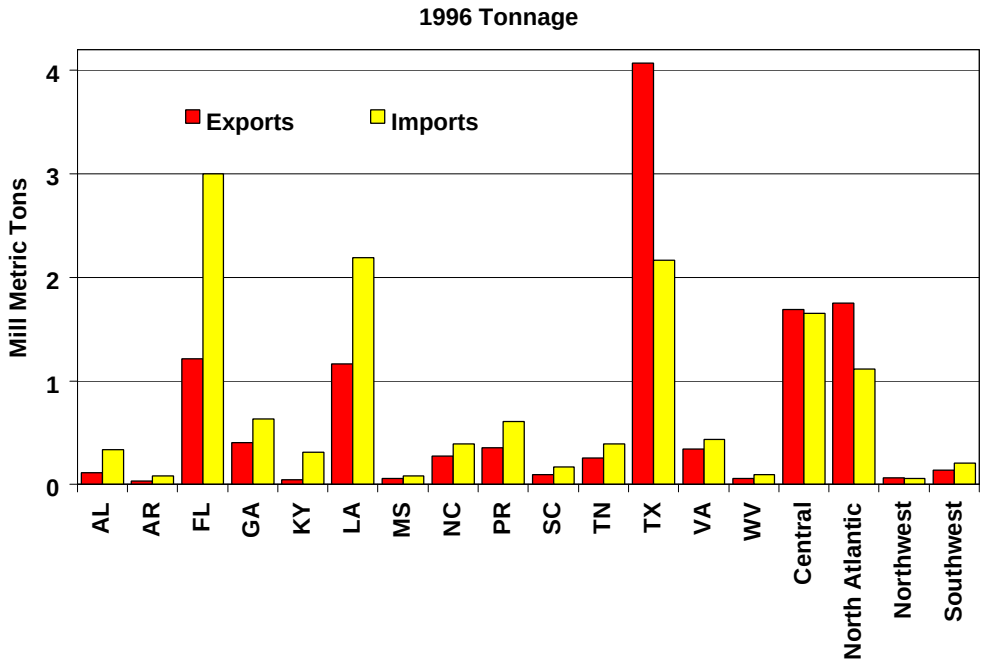
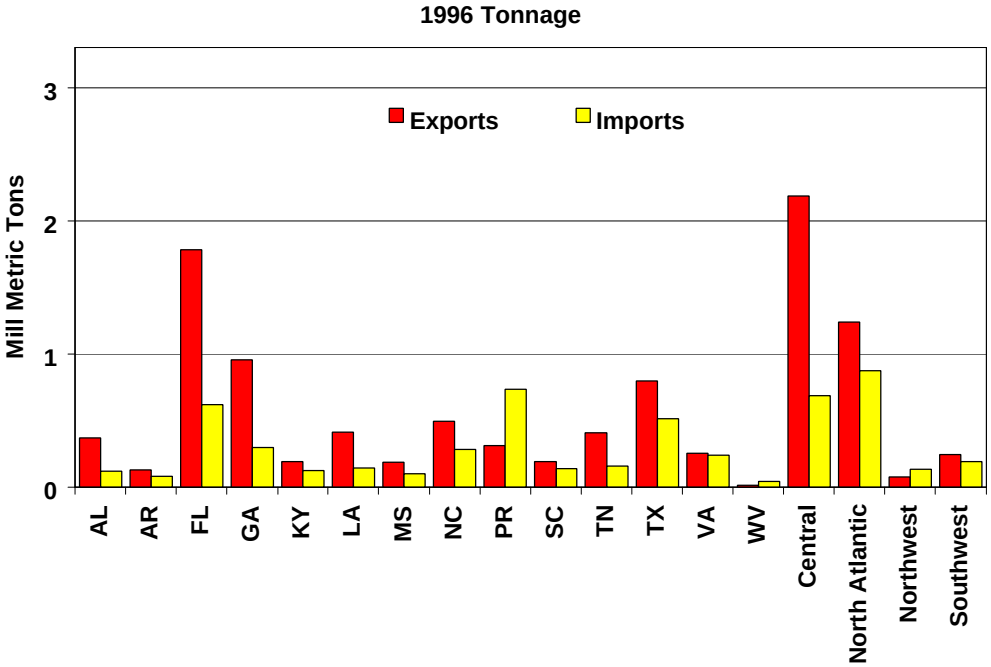


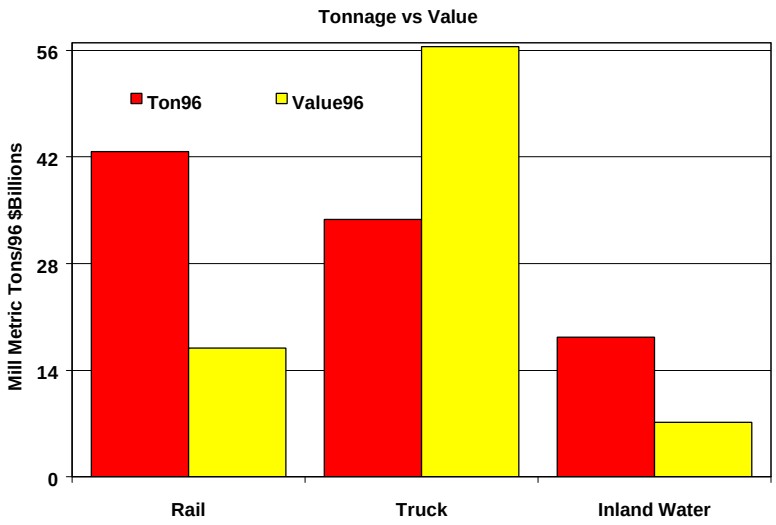
Exhibit B1-21
U.S. ORIGIN/DESTINATIONS
MANUFACTURED PRODUCTS



Inland Modal Choices for Alliance Seatrade

While the origin/destination pattern summarized above influences inland modal choices, the ranking of inland mode choice also varies depending upon the measure (weight or value) of trade used. In terms of weight, rail was the leading modal choice, followed by truck and inland water. Rail carried a total of 42.6 million tons of seatrade Alliance gateway seatrade in 1996, while trucks transported 33.8 million tons and inland water carried 18.3 million tons. Measured in value, truck-borne trade totaled $56.4 billion, followed by rail at $16.9 billion and inland water at $7.1 billion. (**Exhibit B1-22)**

Exhibit B1-22
1996 ALLIANCE SEATRADE
INLAND MODAL CHOICES



This distribution again emphasizes the importance of high value trade between the Alliance and Latin America. Trucks, while not carrying the level of tonnage that rail handles, are handling the most valuable goods traded with Latin America through Alliance gateways. This illustrates the crucial role played by interstates and other roadways in the Alliance-Latin American trade relationship.

Latin America Trading Partners for Sea Trade

The same seven countries or groups of countries appear at the top of both import and exports lists of primary Latin American trading partners for waterborne traffic through Alliance ports, although their rankings differ between exports and imports. The seven are Brazil; Colombia; Mexico; Venezuela; Jamaica and the Bahamas; Other Caribbean Islands; and Other Central American countries.

With respect to goods imported through Alliance gateway ports, in 1996, 94.0% of all imports that came from Latin America originated in one of the top seven.

The top two, Mexico and Venezuela, together originated 65.6%, and each of these percentages has been quite steady since 1992.

Companion figures for exports show less concentration. The top seven together accounted for 77.1% of Alliance gateway exports in 1996, little changed from the 78.4% in 1992. For exports, throughout the five-year period the top two trading partners were Mexico and Brazil, with Brazil leading Mexico until 1996. Together, the two nations received 39.6% of 1996 waterborne exports, up from 33.1% in 1995. Both the 1996 increase in the two-country share and Mexico's first place ranking are substantially due to a 60% surge in exports to Mexico. It is necessary to include four trading partners to account for at least half of exports. The group of Other Central American countries resides in third place throughout the five years, with fourth place variously occupied by Colombia, Jamaica and the Bahamas, and Venezuela.

ALLIANCE REGION AIR CARGO TRADE

Over the last half century it has become increasingly cost-effective to ship a wide variety of goods by air—especially those goods with a high value relative to weight. This trend has had a profound effect on the development of global, regional and national production networks. For example, many plant managers can use air transport to provide cost-effective just-in-time delivery of parts or products to customers or production partners in different countries and even continents. These products range from parts for computers, telecommunications equipment and motor vehicles to high-value cosmetics and apparel to fresh seafood, fruit and flowers.

The United States is a key player in the global production/consumption networks for many of these products and has experienced strong growth in airborne trade. Over the 1992-1996 period, international airborne commodity trade grew at an average annual rate of 9.0% for outbound flows and 10.3% for inbound flows. These growth rates are significantly higher than the growth rates for waterborne trade of 1.0% for outbound flows and 4.7% for inbound flows.

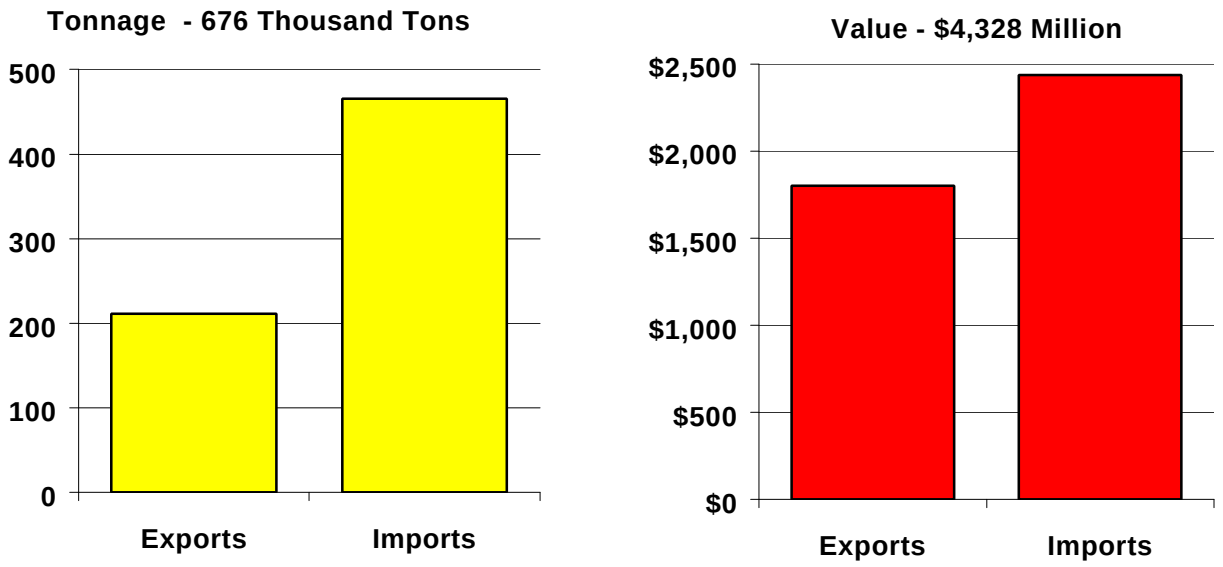
The largest destination of U.S. airborne exports is Asia (36% of 1996 exports), followed by Europe (36%), Latin America (17%) and Canada (7%). Asia and Canada were the fastest growing destinations of U.S. airborne exports with annual average 1992-96 growth rates of 15.7% and 17.4% respectively. Airborne exports to Latin America and Europe each experienced significantly lower growth rates of about 5%. The largest source of U.S. airborne imports is Asia (41% of 1996 imports), followed by Europe (34%) and Latin America (21%). Imports from Latin America grew at an average annual rate of 7.6% over the 1992 to 1996 period while all other regions had growth rates in the range of 10-12% per year.

U.S. Air Cargo Trade With Latin America

U.S. air cargo trade with Latin America totaled 676 thousand tons in 1996. This volume represented a total value of over $4.3 billion in total trade. Of this, 211,000 tons of air cargo trade was exported to Latin America from the U.S.,

while another 465,000 tons were imported to the U.S. (**Exhibit B1-23**). On the value side, $1.8 billion worth of air cargo was exported from the U.S., while $2.4 billion worth was imported.

Exhibit B1-23
U.S. AIR CARGO TRADE WITH LATIN AMERICA



Air Cargo Commodity Groups

As discussed, the characteristics of various commodity groups influences the extent to which air freight is or is not an appropriate modal choice.

When viewed on a tonnage basis (see **Exhibit B1-24**), Farm Products are by far the predominant commodity group. Fresh Fish and Other Marine Products rank second, followed in sequence by Apparel, Machinery (excluding Electrical), and Electrical Machinery.

The pattern of leading Latin American air cargo commodity groups differs when viewed on the basis of value (see **Exhibit B1-25**). The Apparel group is the leading group, followed by Electrical Machinery and Machinery (excluding Electrical). Farm Products, the leading air cargo commodity group on the basis of tonnage, is not even within the five highest ranked commodity groups when measured in terms of value.

Exhibit B1-24
KEY AIR CARGO COMMODITIES – LATIN AMERICAN TRADE

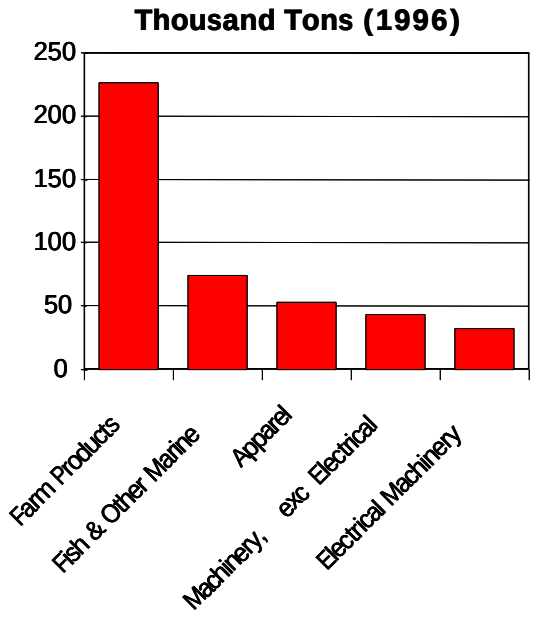
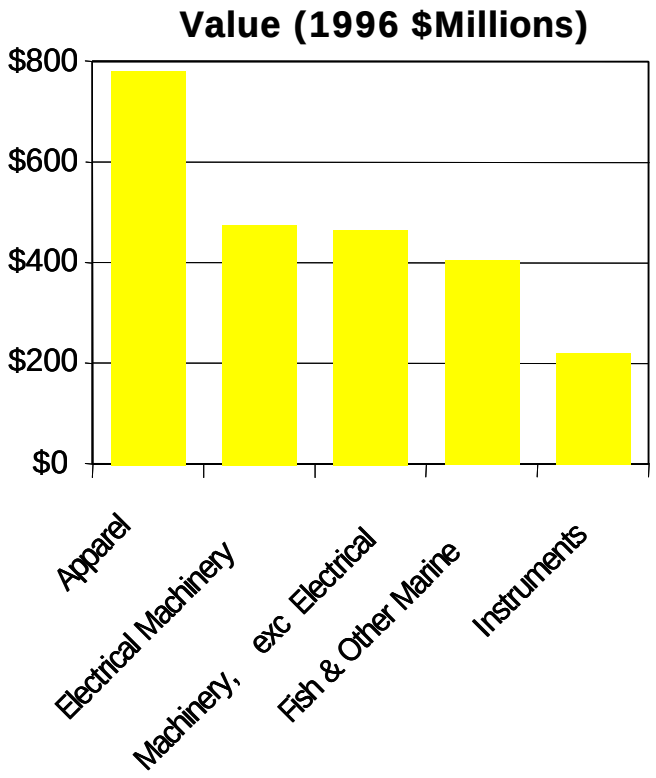


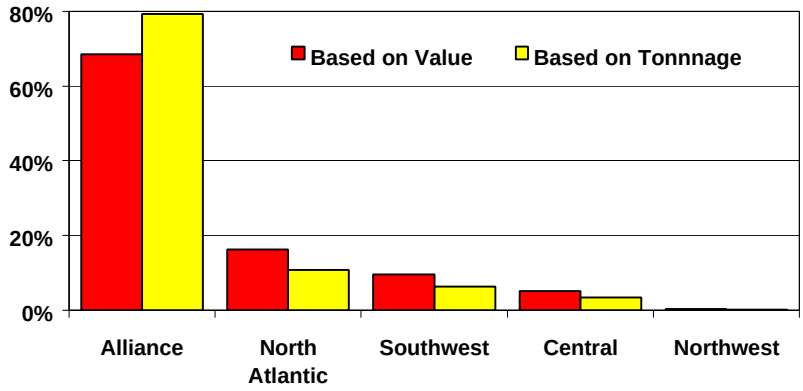
Exhibit B1-25
KEY AIR CARGO COMMODITIES – LATIN AMERICAN TRADE



Gateway Regions for Air Cargo Trade

The Alliance is the leading gateway region for air cargo trade with Latin America, both in terms of tonnage and value. Based on tonnage, the Alliance is the gateway for over 79% of U.S. air cargo trade with Latin America (**Exhibit B1-26**). The next closest regions are the North Atlantic and the Southwest with 10.8% and 6.3%, respectively. In terms of value, the Alliance is the gateway for 68.5% of air cargo trade with Latin America, followed again by the North Atlantic and Southwest with 16.3% and 9.6%.

Exhibit B1-26
GATEWAY REGIONS FOR 1996 AIR CARGO TRADE WITH LATIN AMERICA



Air Cargo Trade by Alliance Gateway States

Air cargo gateways in the Alliance are led by Florida, which handled 488 thousand tons in 1996 (**Exhibit B1-27**). In the next tier, Puerto Rico was the gateway for 16,000 tons, followed by Tennessee (9,000 tons), Texas (8,000 tons), and North Carolina (7,000 tons).

U.S. Origin and Destination Air Cargo Trade

The Alliance is also the leading origin and destination for trade with Latin America in terms of both tonnage and value (**Exhibit B1-28**). In terms of tonnage, the Alliance is the origin or destination for 37% of U.S. air cargo trade with Latin America. The North Atlantic, Central, and Southwest regions follow with 27%, 19%, and 16%, respectively. In terms of value, the Alliance is the origin or destination for 40% of air cargo trade with Latin America, again followed by the North Atlantic (27%), Central (17%), and Southwest (15%).

Exhibit B1-27
1996 AIR CARGO TRADE WITH LATIN AMERICA
ALLIANCE GATEWAY STATES

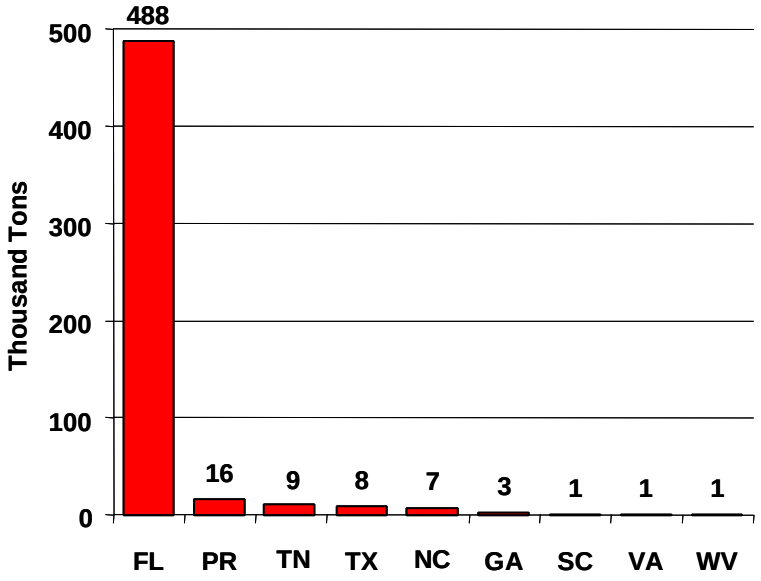
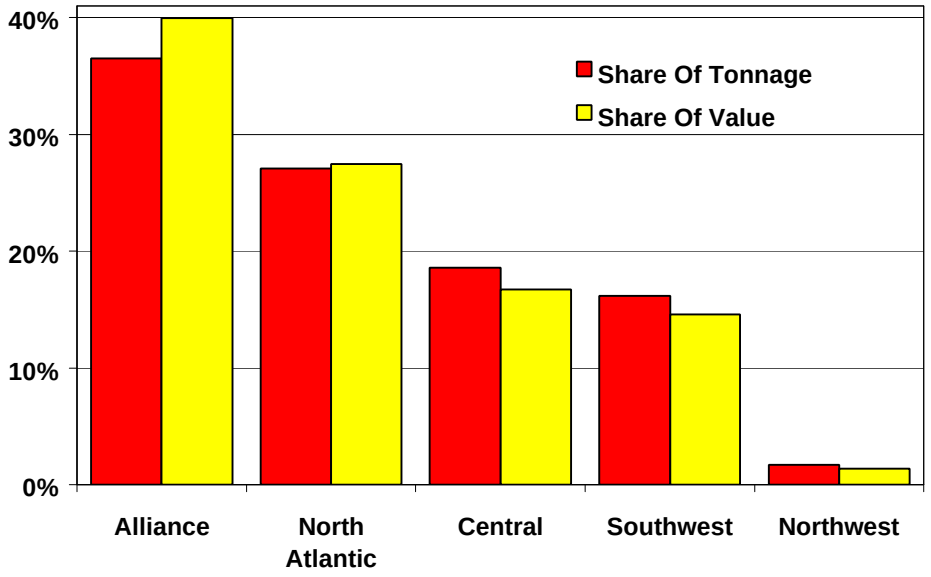


Exhibit B1-28
U.S. ORIGINS & DESTINATIONS
1996 AIR CARGO TRADE WITH LATIN AMERICA



Alliance's Air Cargo Trading Partners

Exhibit B1-29 (following page) depicts the Alliance's air cargo trade relationships with Latin American countries. In terms of tonnage, Colombia is the leading trade partner at nearly 170,000 tons. Other Central American countries are next with just over 75,000 tons. Chile, Brazil, and Ecuador follow with 61,000 tons, 42,000 tons, and 39,000 tons, respectively.

In terms of value, Other Central American countries lead with $569 million of air cargo trade with the Alliance. The next tier consists of: Columbia ($519 million), Brazil ($400 million), the Dominican Republic ($288 million), and Chile ($218 million).

ALLIANCE REGION CROSS-BORDER TRADE WITH MEXICO

Another component of Latin American trade is cross-border trade with Mexico through the border states of Texas, Arizona, New Mexico and California. Mexico is an important cross-border trade market for the Alliance, both in terms of the Alliance (Texas) as a gateway to Mexico, and in terms of the Alliance's own trade with Mexico.

CROSS-BORDER TRADE COMMODITY GROUPS

Shown in **Exhibit B1-30** is the pattern of leading cross-border trade commodity groups based upon tonnage. As depicted, Non-Metallic Minerals is the leading commodity group, followed by the Stone, Clay, Glass and Concrete group. Farm Products and Metallic Ores are the third and fourth leading commodity groups based upon tonnage.

Exhibit B1-30
KEY CROSS-BORDER COMMODITIES – LATIN AMERICAN TRADE

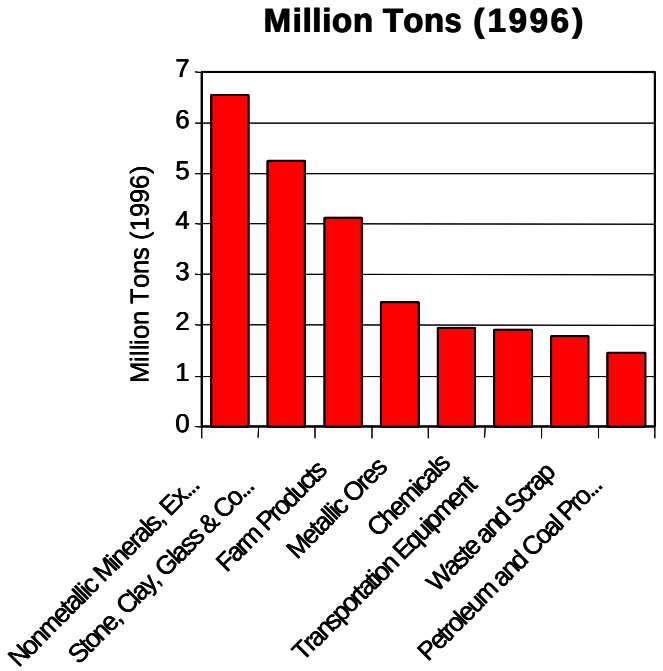
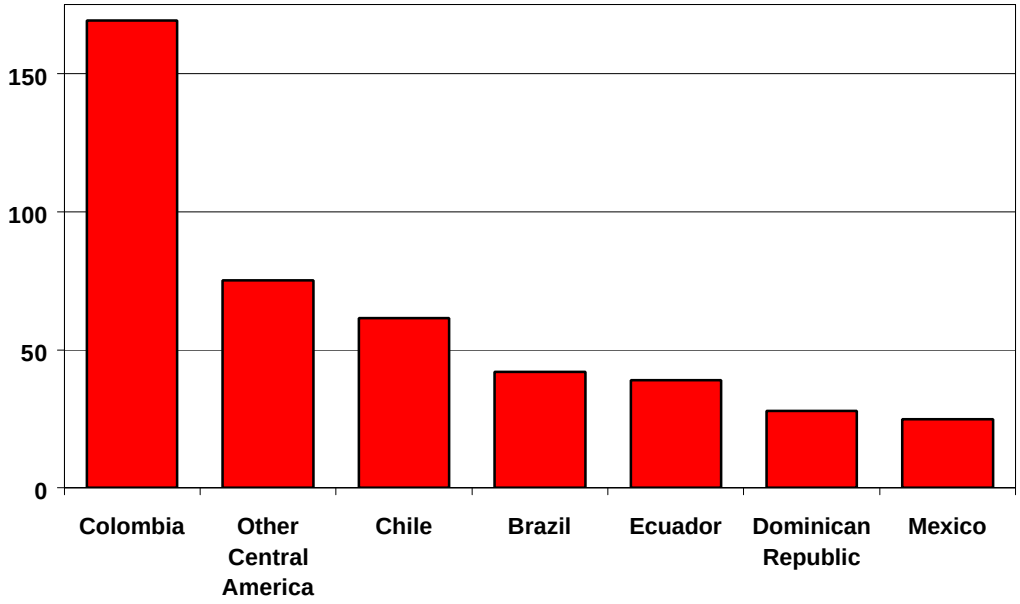
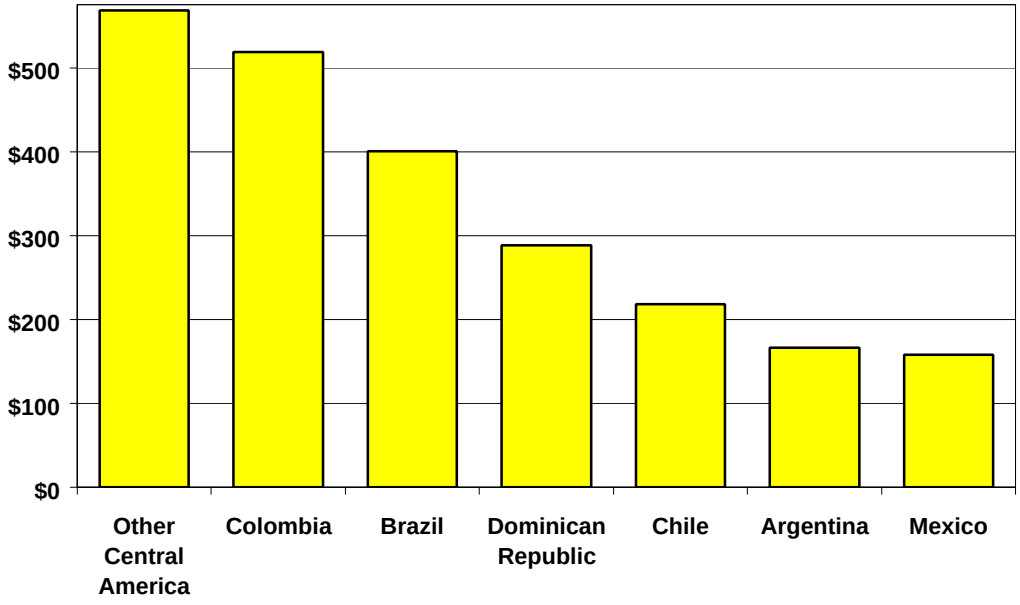


Exhibit B1-29
ALLIANCE'S AIR CARGO TRADING PARTNERS (TOP 80%)
1,000's Tons (1996)

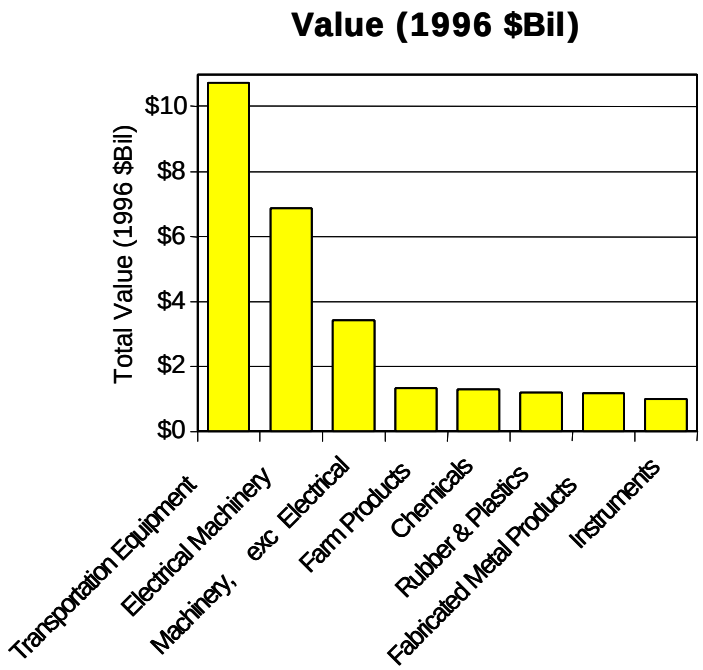


Value (1996 $ Millions)



Due to the characteristics of the various commodity groups, the pattern of leading cross-border trade commodities is quite different when measured in terms of value. **Exhibit B1-31** shows that the cross-border trade commodity group with the highest value is Transportation Equipment, followed by Electrical Machinery and Machinery (excluding Electrical).

Exhibit B1-31
KEY CROSS-BORDER COMMODITIES – LATIN AMERICAN TRADE



Alliance as a Cross-border Trade Gateway

During 1996, 87.5 million tons in surface trade crossed the border between the U.S. and Mexico, of which 50 million tons were exports and 37.4 million were imports (**Exhibit B1-32**). Of this trade, over 75 percent gatewayed through Texas, 39.4 million tons in exports and 27 million tons in imports.

Alliance as an Origin/Destination

Not only is the Alliance the major gateway for cross-border trade, it is also the major origin/destination for this trade. Of the U.S. total cross-border trade of 87.5 million tons, 46.7 percent either originated or terminated in the Alliance. The Alliance's cross-border trade comprised 24.6 million tons of exports and 16.3 tons of imports (**Exhibit B1-33**).

Exhibit B1-32
1996 SURFACE CROSS-BORDER TRADE WITH MEXICO
U.S. Gateways

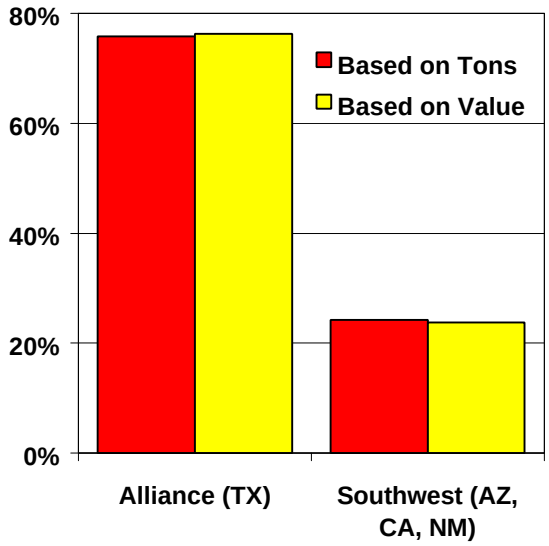
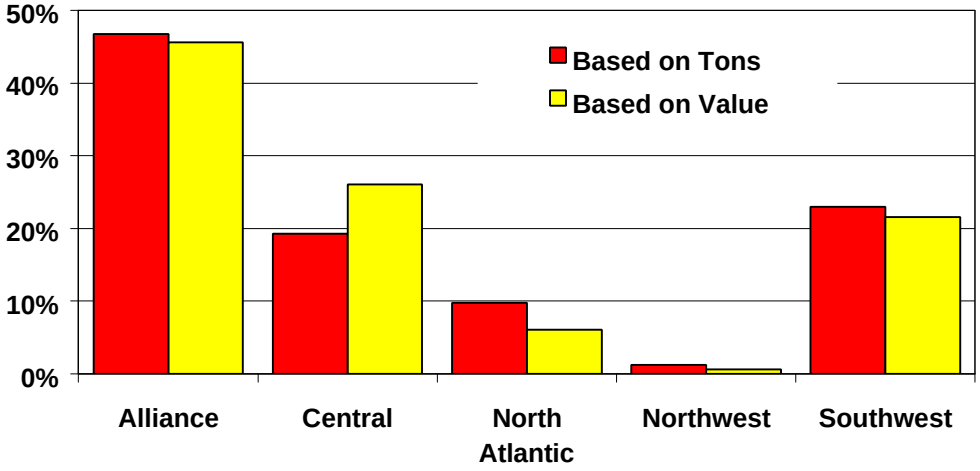


Exhibit B1-33
1996 SURFACE CROSS-BORDER TRADE WITH MEXICO
U.S. Origin & Destination



SECTION B2
LATIN AMERICAN TRADE FORECASTS

Latin America offers tremendous opportunity as a source of new inbound and outbound trade growth for the Alliance Region and the rest of the country. The objective of the LATTS trade forecast analyses was to characterize the size and composition of these trade flows and to give some indication of how much bigger they could become by the year 2020. The forecasts produced by LATTS are for trade flowing through the gateways of the Southeastern Alliance Region, between the U.S. and Latin America, Asia, Europe, and the rest of the world. In keeping with the focus of this study, the greatest detail is available for Latin America.

Two scenarios were adopted for purposes of these analyses.

- The "Base Case" forecast assumed a continuation of recent trends and conditions until 2020.

- The "High Case" assumed that significant events could occur which would result in even greater trade with Latin America. These events could include:
  - Increased liberalization of trade, e.g., a Western Hemisphere Free Trade Agreement.
  - Higher economic growth trends for Latin America and/or the United States.
  - Changes in U.S. policies regarding trade with Cuba.

BASE CASE TRADE FORECAST

The Base Case forecast for trade flows between the United States, world regions, and Latin American countries used in this study is consistent with Standard & Poor's DRI's global economic outlook as of the Spring of 1998.

The Base Case outlook forecast inbound and outbound trade flows, in metric tons, by water, cross-border, and air for STCC based commodities. The trade flows were generated for Latin American countries and regions, and several other world regions both to and from the Southeastern Alliance gateways. To ensure a comprehensive measure of trade volumes handled at U.S. gateways, in-transit flows were also forecast at the same level of detail as the domestic flows.

A key source of information used in developing these forecasts was the DRI/Mercer World Sea Trade Service (WSTS). This service provides invaluable information to managers of international shipping services, port and transportation planners, governments and government agencies, and port authorities and other organizations whose futures are tied to the patterns of international trade.

WSTS integrates DRI's world trade databases and economic and trade models with Mercer's long-standing experience in world primary- and liner- shipping markets, to produce detailed historical data and forecasts of cargo movements for major trade routes around the world. The service is updated quarterly and summary results are published along with articles of interest in the World Sea Trade Service Review. The forecast used for this study was prepared in the first quarter of 1998.

The commodity set reported by WSTS was correlated with the STCC commodities used in this study. WSTS directly forecasts trade with Brazil, Argentina, and Mexico. For the other countries, specific forecasts were developed. The trade forecasts for these countries are consistent, on a regional basis, with the WSTS outlook for the Other Caribbean Nations, Western Latin America Countries, and Other Eastern Latin American Countries. Country specific forecasts were developed based on national differences in export, import, and GDP forecasts for each country relative to the WSTS region to which it belongs. All other countries and region's waterborne trade flows were derived directly from WSTS.

WSTS was used to forecast waterborne trade flows. Air and cross-border transportation flow forecasts were developed based on three factors:

- The waterborne forecast for the commodity corridor;
- The observed difference (1992 to 1996) between air/cross-border and waterborne trade growth trends for a commodity;
- A time trend that reduces the influence of the observed difference in trade growth by mode of transport as the forecast progresses.

This approach based air and cross-border commodity corridor flows on the waterborne forecasts. It also preserved observed shifts in modal shares but prevented them from changing too radically from current patterns by 2020. Goods not currently moving by a given mode in a specific commodity corridor were not predicted to move by that mode over the forecast interval.

Latin America in World Context

These analyses revealed that Latin America will remain the largest regional destination and origin for Southeastern Alliance gateway trade over the forecast period. By 2020, U.S. exports to Latin America through the Southeastern Alliance will be 341 million metric tons (MT), while imports will be 590 million MT. More than half of imports by volume will be crude oil. Total imports excluding crude oil will be 257 million MT in 2020. Regional comparisons of trade volume in 2020 are displayed in **Exhibit B2-1** and **B2-2**.

Latin American trade through the Southeastern Alliance gateways will also experience the fastest growth among world regions. Average annual growth

rates of exports will be 5.3% from 1996-2020, while imports will grow at a rate of

Exhibit B2-1
SOUTHEASTERN ALLIANCE GATEWAY BASE CASE FORECAST IN 2020

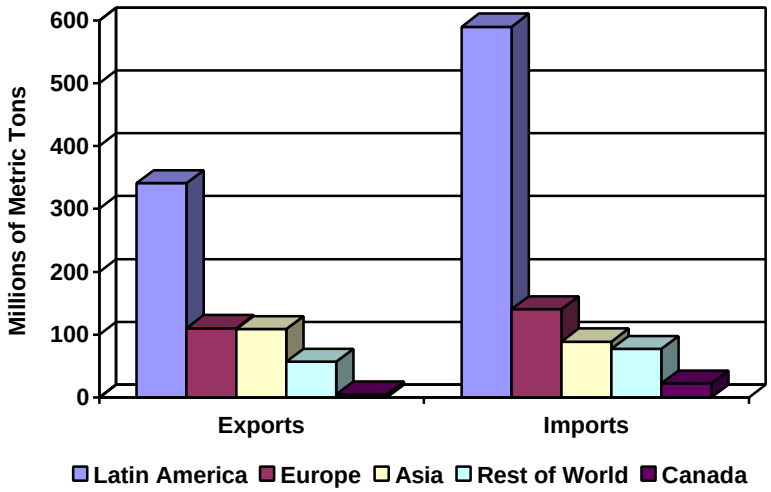
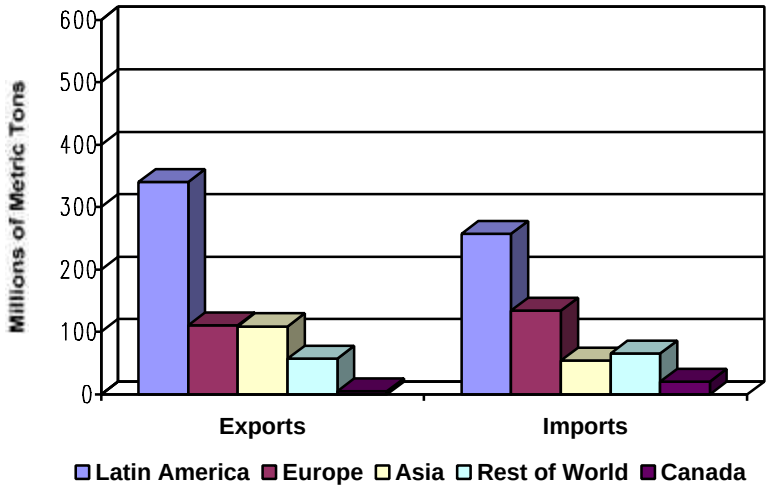


Exhibit B2-2
SOUTHEASTERN ALLIANCE GATEWAY BASE CASE FORECAST IN 2020
EXCLUDING CRUDE OIL AND NATURAL GAS



3.8% per year. Excluding oil, however, Latin America drops to second place in growth rates, at an annual rate of growth of 4.0%. Total Asian imports through the Southeastern Alliance are forecast to decline at a rate of 4.0% per year, as oil sources switch from Asia to Latin America. Growth in Asian imports excluding oil were forecast to grow at a rate of 4.8%. The fastest growth in volume imports excluding oil will occur from Europe, at 7.1% from 1996-2020.

Trade Overview

The distribution of trade forecast for 2020 resembles the situation in 1996. As can be seen in **Exhibit B2-3**, Mexico will continue to account for the majority of U.S. exports to Latin America through the Southeastern Alliance gateways. In fact, its share of exports will rise from 52% in 1996 to 63% in 2020. Brazil will remain the second largest destination for exports. Colombia, with a rapid annual average growth rate of 5.7% through 1996-2020, will account for the third largest share of exports in 2020.

There will be a shift in the dominant mode of transportation of goods to Latin America. In 1996, seaborne trade represented nearly 60% of exports. By 2020, because of the rapid growth in exports to Mexico, cross-border trade will account for 56% of exports, and water-borne exports will fall to 44%. While airborne exports will remain a small share of exports by volume, their growth will be extremely rapid—over 10% annually. Over the next 24 years, the total volume of airborne exports will rocket from 163,600 MT to 1.6 million MT.

Differentials in commodity rates of growth will also cause a shift in international transportation modes. A summary of the commodity forecast is displayed in **Exhibit B2-4**.

By volume, the largest commodity group exported in 2020 will continue to be primary goods. However, exports of manufactured goods will grow so rapidly that their volume will nearly equal that of primary manufactured exports by 2020. In all, total volume of exports to Latin America will be 3.4 times as large in 2020 as in 1996. Manufactured export volumes, in contrast, will be more than 5 times greater in the same period. **Exhibit B2-5** graphically displays the growth of the basic commodity exports.

As in 1996, Mexico will continue to dominate imports from Latin America in 2020 as well, accounting for 48% of import volume. The relative ranking of other countries will remain similar, with a few notable exceptions. As noted in **Exhibit B2-6**, imports from the group Other Caribbean Islands are forecast to actually decrease. This is primarily due to a decline of imports of petroleum products from this region. Imports from the Bahamas and Jamaica are also forecast to decline, as imports of metallic ores fall from this region. On the other hand, imports from Chile are expected to grow more rapidly than all other countries, with an average annual growth rate of 7.3% over the 1996-2020 period.

Exhibit B2-3
SOUTHEASTERN ALLIANCE GATEWAY EXPORTS TO LATIN AMERICA
BASE CASE FORECAST, METRIC TONS

Destination	1996	2010	2020	Average Annual Growth 92-96	Average Annual Growth 96-20
Latin America	**98,885,602**	**217,039,012**	**340,912,256**	**8.8%**	**5.3%**
Argentina	2,268,525	5,542,469	8,725,506	15.2%	5.8%
Bahamas & Jamaica	4,126,036	5,401,815	6,365,710	1.9%	1.8%
Bolivia	31,092	61,525	94,338	16.9%	4.7%
Brazil	10,851,376	16,862,942	24,394,136	6.8%	3.4%
Chile	2,686,576	4,722,995	7,572,099	16.7%	4.4%
Colombia	4,530,075	8,910,818	17,033,362	15.5%	5.7%
Cuba	61,305	68,192	89,000	8.4%	1.6%
Dominican Republic	2,550,369	5,103,361	7,302,893	4.1%	4.5%
Ecuador	1,187,841	2,272,223	3,721,449	12.3%	4.9%
Guyana, Suriname, French Guiana	592,974	1,272,611	1,774,079	1.4%	4.7%
Haiti	768,262	1,418,995	1,812,349	12.0%	3.6%
Mexico	51,707,658	132,077,557	215,114,496	11.4%	6.1%
Panama	1,753,150	2,675,329	3,804,070	2.0%	3.3%
Paraguay	69,359	168,112	273,157	29.3%	5.9%
Peru	1,561,749	3,098,856	5,138,733	8.9%	5.1%
Uruguay	236,985	376,747	575,924	11.7%	3.8%
Venezuela	4,238,707	10,614,734	16,632,803	- 1.9%	5.9%
Other Caribbean Islands	3,369,017	5,274,853	6,794,218	4.4%	3.0%
Other Central America	6,294,550	11,114,865	13,693,941	4.7%	3.3%

Exhibit B2-4
SOUTHEASTERN ALLIANCE GATEWAY EXPORTS TO LATIN AMERICA
BASE CASE FORECAST, METRIC TONS

Commodity	1996	2010	2020	Average Annual Growth 92-96	Average Annual Growth 96-20
Total All Commodities	**98,885,602**	**217,039,012**	**340,912,256**	**8.8%**	**5.3%**
Manufactured Commodities	21,052,288	59,829,933	106,138,559	4.2%	7.0%
Primary Commodities	41,714,220	82,966,092	126,340,816	10.9%	4.7%
Primary Manufactured Commodities	36,034,944	73,354,067	107,543,909	9.3%	4.7%
Crude Oil and Natural Gas	84,152	888,913	888,970	53.9%	10.3%

Exhibit B2-5
SOUTHEASTERN ALLIANCE GATEWAY EXPORTS TO LATIN AMERICA
BASE CASE FORECAST -- 1992-2020

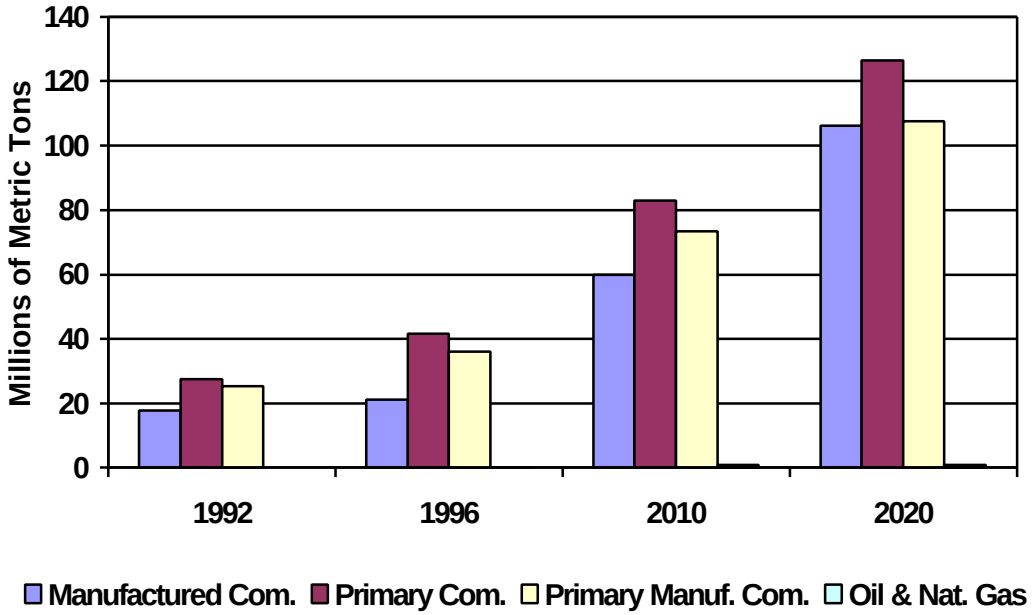


Exhibit B2-6
SOUTHEASTERN ALLIANCE GATEWAY IMPORTS FROM LATIN AMERICA
BASE CASE FORECAST, METRIC TONS

Origin	1996	2010	2020	Average Annual Growth 92-96	Average Annual Growth 96-20
Latin America	**241,036,076**	**403,853,781**	**590,229,000**	**12.2%**	**3.8%**
Argentina	3,433,814	4,326,016	6,348,379	12.0%	2.6%
Bahamas & Jamaica	8,164,104	4,692,026	4,891,365	- 3.8%	- 2.1%
Bolivia	56,289	138,821	256,369	85.4%	6.5%
Brazil	11,299,131	22,403,666	34,791,506	20.1%	4.8%
Chile	1,397,031	3,959,407	7,506,106	13.5%	7.3%
Colombia	15,413,035	26,799,795	42,281,612	13.1%	4.3%
Cuba	9,159	9,243	12,683	10.7%	1.4%
Dominican Republic	718,346	1,428,517	2,098,862	6.2%	4.6%
Ecuador	4,707,453	7,301,977	10,245,129	27.4%	3.3%
Guyana, Suriname, French Guiana	1,651,698	2,009,073	2,356,077	- 0.4%	1.5%
Haiti	30,617	55,348	73,786	- 4.2%	3.7%
Mexico	98,536,416	190,323,710	285,924,105	16.3%	4.5%
Panama	408,345	428,576	605,720	7.8%	1.7%
Paraguay	38,673	84,208	145,294	120.4%	5.7%
Peru	1,210,074	2,085,349	2,960,689	19.9%	3.8%
Uruguay	63,971	94,128	134,188	23.3%	3.1%
Venezuela	66,346,218	120,512,557	169,336,895	9.1%	4.0%
Other Caribbean Islands	23,311,279	10,665,924	12,198,010	11.3%	- 2.7%
Other Central America	4,240,433	6,535,422	8,062,217	2.7%	2.7%

In 1996, U.S. imports from Latin America were overwhelmingly seaborne, both including and excluding crude oil imports. As with exports, imports by cross-border and air transportation will grow much more rapidly than water, at 6.2% and 6.5% respectively. Excluding oil imports, the share of trade that is waterborne will fall from 72.8% in 1996 to 55.2% in 2020, while cross-border imports will rise from 26.8% to 44.2% of total imports. In other words, cross-border imports are expected to rise to more than 4 times current levels under the Base Case forecast. Air imports also will rise by more than 4 times current levels, from 372,000 MT to 1.69 million MT in 24 years.

Commodity forecasts are displayed in **Exhibit B2-7** and **Exhibit B2-8**. The share of crude oil in Latin American imports will fall slightly by 2020, accounting for 56% in that year. Manufactured commodities will again experience the fastest growth under the Base Case forecast, rising at an annual average rate of 7.3%. In total, import volumes are expected to be 2.4 times higher in 2020 than in 1996. Manufactured imports are forecast to be 5.5 times higher in the same time frame.

Exhibit B2-7
SOUTHEASTERN ALLIANCE GATEWAY IMPORTS FROM LATIN AMERICA
BASE CASE FORECAST, METRIC TONS

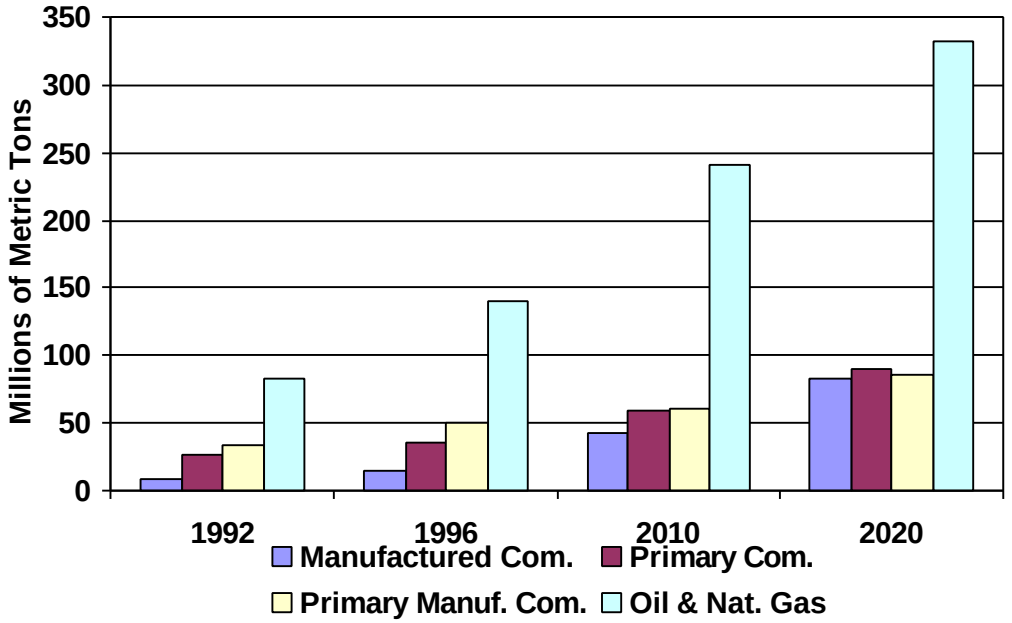
Commodity	1996	2010	2020	Average Annual Growth 92-96	Average Annual Growth 96-20
Total All Commodities	**241,036,076**	**403,853,781**	**590,229,000**	**12.2%**	**3.8%**
Manufactured Commodities	15,186,956	43,244,039	83,046,906	14.1%	7.3%
Primary Commodities	34,894,318	59,360,811	89,410,202	7.4%	4.0%
Primary Manufactured Commodities	50,490,101	60,520,434	84,936,556	10.7%	2.2%
Crude Oil and Natural Gas	140,464,704	240,728,496	332,835,296	13.9%	3.7%

HIGH CASE TRADE FORECAST

A High Case forecast was developed to illustrate the impact of more favorable trade conditions in Latin America on trade flows with the United States. It is based on a scenario of fully liberalized trade and investment flows in the Western Hemisphere. While a certain degree of trade liberalization was assumed in the Base Case forecast, the High Case scenario incorporated a much more rapid and comprehensive move to free trade and investment.

High Case assumptions focused on the possible increase in both inbound and outbound traffic for each country and commodity. The increase was also assumed to depend on time. Trade liberalization was assumed to have an impact starting in the year 2000, becoming more pronounced in the second decade than the first.

Exhibit B2-8
SOUTHEASTERN ALLIANCE GATEWAY IMPORTS FROM LATIN AMERICA
BASE CASE FORECAST
1992-2020



Trade flows with Cuba were handled uniquely. The High Case assumed that trade with Cuba would have been normalized in the year 2000. Inbound and outbound trade flows were forecast to rise very rapidly from existing levels (on a per capita basis) to levels expected in countries with similar incomes, natural resources, and domestic demand conditions in the region. Cuba was also expected to benefit significantly from the return of offshore capital, which would be used to finance U.S. exports to Cuba.

Forecast Results

U.S. exports to Latin America through the Southeastern Alliance were forecast to grow at an annual rate of 6.6% under the full trade liberalization scenario. This is more than 25% faster than under the Base Case forecast. With High Case assumptions, the volume of exports in 2020 will be 34% higher than the 2020 volume under the Base Case. Latin American country and commodity details are shown in **Exhibit B2-9** and Exhibit **B2-10**.

Exhibit B2-9
SOUTHEASTERN ALLIANCE GATEWAY EXPORTS TO LATIN AMERICA
HIGH CASE FORECAST, METRIC TONS

Destination	1996	High: 2010	High: 2020	High: Average Annual Growth 96-20	% Difference from Base in 2020
Latin America	**98,885,602**	**249,281,819**	**457,267,948**	**6.6%**	**34.1%**
Argentina	2,268,525	6,451,018	12,776,155	7.5%	46.4%
Bahamas & Jamaica	4,126,036	6,007,563	8,356,961	3.0%	31.3%
Bolivia	31,092	69,762	129,420	6.1%	37.2%
Brazil	10,851,376	19,689,440	35,998,109	5.1%	47.6%
Chile	2,686,576	5,517,308	11,109,829	6.1%	46.7%
Colombia	4,530,075	9,516,832	20,195,985	6.4%	18.6%
Cuba	61,305	8,471,690	12,626,550	24.9%	14,087.1%
Dominican Republic	2,550,369	5,674,151	9,596,087	5.7%	31.4%
Ecuador	1,187,841	2,398,395	4,293,522	5.5%	15.4%
Guyana, Suriname, French Guiana	592,974	1,370,763	2,150,029	5.5%	21.2%
Haiti	768,262	1,526,234	2,202,128	4.5%	21.5%
Mexico	51,707,658	144,815,538	273,799,518	7.2%	27.3%
Panama	1,753,150	2,834,588	4,465,489	4.0%	17.4%
Paraguay	69,359	183,500	342,873	6.9%	25.5%
Peru	1,561,749	3,453,418	6,764,402	6.3%	31.6%
Uruguay	236,985	447,384	875,039	5.6%	51.9%
Venezuela	4,238,707	11,841,372	21,940,618	7.1%	31.9%
Other Caribbean Islands	3,369,017	6,118,502	9,826,480	4.6%	44.6%
Other Central America	6,294,550	12,894,362	19,818,748	4.9%	44.7%

Exhibit B2-10
SOUTHEASTERN ALLIANCE GATEWAY IMPORTS FROM LATIN AMERICA
HIGH CASE FORECAST, METRIC TONS

Origin	1996	High: 2010	High: 2020	High: Average Annual Growth 96-20	% Difference from Base in 2020
Latin America	**241,036,076**	**426,062,372**	**681,643,141**	**4.4%**	**15.5%**
Argentina	3,433,814	4,551,535	7,265,864	3.2%	14.5%
Bahamas & Jamaica	8,164,104	5,056,939	5,984,510	-1.3%	22.4%
Bolivia	56,289	150,838	330,281	7.7%	28.8%
Brazil	11,299,131	25,922,085	50,130,779	6.4%	44.1%
Chile	1,397,031	4,564,440	10,856,431	8.9%	44.6%
Colombia	15,413,035	27,006,005	43,132,040	4.4%	2.0%
Cuba	9,159	2,364,015	3,614,912	28.3%	28,402.3%
Dominican Republic	718,346	1,627,870	2,903,338	6.0%	38.3%
Ecuador	4,707,453	7,373,744	10,521,871	3.4%	2.7%
Guyana, Suriname, French Guiana	1,651,698	2,144,034	2,814,052	2.2%	19.4%
Haiti	30,617	60,593	93,217	4.8%	26.3%
Mexico	98,536,416	198,990,801	329,908,894	5.2%	15.4%
Panama	408,345	459,400	730,542	2.5%	20.6%
Paraguay	38,673	90,040	174,208	6.5%	19.9%
Peru	1,210,074	2,202,251	3,428,301	4.4%	15.8%
Uruguay	63,971	110,308	198,647	4.8%	48.0%
Venezuela	66,346,218	123,507,852	180,220,713	4.3%	6.4%
Other Caribbean Islands	23,311,279	12,120,897	17,039,397	-1.3%	39.7%
Other Central America	4,240,433	7,758,730	12,295,129	4.5%	52.5%

All countries will experience faster growth under the High Case scenario. The six countries expected to gain the most from liberalization will have the highest gain in volume in 2020. Cuba's exports are forecast to be notably higher under free trade assumptions. The forecast methodology for Cuba resulted in total trade volumes increasing by 15870% in 2020, compared to Base Case forecasts of virtually no trade between Cuba and the U.S.

Manufactured commodities will experience the fastest gain over the Base Case forecast. By 2020, volumes of manufactured exports are forecast to be 42% higher than under the Base Case. In fact, these goods are very nearly the largest exports by volume under this scenario. Food products, apparel, electrical machinery, instruments, and miscellaneous manufacturing all were forecast to be 50% higher in 2020 under the full trade liberalization assumptions.

Air shipments will experience the fastest growth. Although airborne flows will still be a minor share of total exports by volume, the amount shipped by air will be 52% higher in 2020 under the High Case scenario. Waterborne exports will experience rapid growth as well, rising 44% above Base Case levels. Cross-border exports will be 27% higher in 2020.

Exhibit B2-11 and **Exhibit B2-12** report High Case forecasts for imports. Imports from Latin America will grow at an annual rate of 4.4% under High Case assumptions, compared to 3.8% under Base Case assumptions. The total import volume will be 16% higher in 2020 than under Base Case trade forecasts. Cuba again was forecast to experience spectacular growth under trade liberalization with the U.S., with imports growing at 28% per year.

Manufactured commodities again are forecast to experience the fastest growth under full trade liberalization. Volumes of manufactured imports in 2020 will be 43% higher than under the Base Case forecast. Food products, apparel, tobacco products, and miscellaneous freight will gain the most under free trade with Latin America.

It was assumed that crude oil and natural gas imports to the U.S. will not change under the High Case scenario of trade liberalization. For this reason, there is no percentage difference between the High Case forecast and the Base Case forecast in 2020.

As with exports, imports of goods by air will gain the most under the High Case forecast, rising to a volume of imports 49% higher in 2020 than in the Base Case trade forecast. However, cross-border imports are expected to gain more than waterborne imports. This results because the import commodities that are expected to gain the most under free trade are different from the export commodities most affected.

Exhibit B2-11
SOUTHEASTERN ALLIANCE GATEWAY EXPORTS TO LATIN AMERICA
HIGH CASE FORECAST, METRIC TONS

Commodity	1996	High: 2010	High: 2020	High: Average Annual Growth 96-20	% Difference from Base in 2020
Total All Commodities	**98,885,602**	**249,281,819**	**457,267,948**	**6.6%**	**34.1%**
Manufactured Commodities	21,052,288	71,167,755	151,038,008	8.6%	42.3%
Primary Commodities	41,714,220	92,143,560	157,465,448	5.7%	24.6%
Primary Manufactured Commodities	36,034,944	84,992,684	147,628,568	6.1%	37.3%
Crude Oil and Natural Gas	84,152	977,820	1,135,919	11.5%	27.8%

Exhibit B2-12
SOUTHEASTERN ALLIANCE GATEWAY IMPORTS FROM LATIN AMERICA
HIGH CASE FORECAST, METRIC TONS

Commodity	1996	High: 2010	High: 2020	High: Average Annual Growth 96-20	% Difference from Base in 2020
Total All Commodities	**241,036,076**	**426,062,372**	**681,643,141**	**4.4%**	**15.5%**
Manufactured Commodities	15,186,956	51,190,560	118,890,149	9.0%	43.2%
Primary Commodities	34,894,318	65,850,808	116,402,988	5.2%	30.2%
Primary Manufactured Commodities	50,490,101	68,229,013	113,426,552	3.4%	33.5%
Crude Oil and Natural Gas	140,464,704	240,792,016	332,923,424	3.7%	0.0%

SENSITIVITY ANALYSIS

As discussed, the High Case illustrates the impact of more favorable trade conditions on Latin American trade flows with the United States. Three additional scenarios were generated to examine the impact of changing some of the parameters used to determine the High Case.

A brief economic rationale was developed to support each of the scenarios generated by this sensitivity analysis. The rationale were strictly for expositional purposes and were not intended to imply that a comprehensive analysis was undertaken regarding the impact of each scenario. The first scenario considered a less optimistic trade outlook for Brazil than was envisioned in the High Case. The second scenario assumed that trade liberalization efforts would be less effective than the High Case scenario, while the third scenario assumed that Latin American transportation infrastructure will not be improved as rapidly as in the High Case. It should be noted that all three simulations considered higher levels of trade activity than the Base Case but that the level of activity possible in the High Case was constrained in some way. Effects of these alternative scenarios on the trade forecasts are compared in **Exhibit B2-13** and **Exhibit B2-14**.

Exhibit B2-13
COMPARISON OF HIGH CASE SCENARIOS
SOUTHEASTERN ALLIANCE GATEWAY EXPORTS TO LATIN AMERICA

Commodity	Annual Average Growth 96-20				
	Base	High Case	Brazil Scenario	Liberalization Scenario	Infrastructure Scenario
Total All Commodities	**5.3%**	**6.6%**	**6.1%**	**6.2%**	**6.1%**
Manufactured Commodities	7.0%	8.6%	8.1%	8.2%	8.0%
Primary Commodities	4.7%	5.7%	5.2%	5.4%	5.3%
Primary Manufactured Commodities	4.7%	6.1%	5.6%	5.7%	5.5%
Crude Oil and Natural Gas	10.3%	11.5%	10.9%	11.5%	11.0%

Commodity	% Difference from Base in 2020				
	Base	High Case	Brazil Scenario	Liberalization Scenario	Infrastructure Scenario
Total All Commodities	**0.0%**	**34.1%**	**21.2%**	**23.9%**	**20.7%**
Manufactured Commodities	0.0%	42.3%	29.3%	30.7%	26.1%
Primary Commodities	0.0%	24.6%	12.0%	16.9%	14.9%
Primary Manufactured Commodities	0.0%	37.3%	24.1%	25.5%	22.3%
Crude Oil and Natural Gas	0.0%	27.8%	13.9%	27.8%	15.6%

Exhibit B2-14
COMPARISON OF HIGH CASE SCENARIOS
SOUTHEASTERN ALLIANCE IMPORTS FROM LATIN AMERICA

Commodity	Annual Average Growth 96-20				
	Base	High Case	Brazil Scenario	Liberalization Scenario	Infrastructure Scenario
Total All Commodities	**3.8%**	**4.4%**	**4.2%**	**4.2%**	**4.2%**
Containerizable Commodities	7.3%	9.0%	8.5%	8.5%	8.4%
Bulk Commodities	4.0%	5.2%	4.7%	4.8%	4.7%
Break Bulk Commodities	2.2%	3.4%	3.0%	3.1%	2.9%
Crude Oil and Natural Gas	3.7%	3.7%	3.7%	3.7%	3.7%

Commodity	% Difference from Base in 2020				
	Base	High Case	Brazil Scenario	Liberalization Scenario	Infrastructure Scenario
Total All Commodities	**0.0%**	**15.5%**	**9.8%**	**10.5%**	**9.0%**
Containerizable Commodities	0.0%	43.2%	29.4%	30.3%	25.8%
Bulk Commodities	0.0%	30.2%	17.7%	19.5%	17.1%
Break Bulk Commodities	0.0%	33.5%	20.5%	22.7%	19.0%
Crude Oil and Natural Gas	0.0%	0.0%	0.0%	0.0%	0.0%

Note: Due to the assumption that crude oil and natural gas imports will not change under trade liberalization, neither the High Case nor alternative scenario forecasts differ from the Base Case.

Weak Brazilian Growth

Brazil has the largest economy in Latin America. High Case forecasts for Brazil indicate the economy should grow at 4.1% between 1996 and 2020. Brazilian economic performance is not, however, assured and any number of factors could reduce this level of activity. Any reduction in Brazil's economic activity would have widespread repercussions for the other countries in the region. This first scenario examining the sensitivity of the High Case results assuming that a smaller increase in country specific trade activity would take place than what was embodied in the High Case outlook.

Slower economic activity in Brazil will drop U.S. exports to this region from 5.1% per year in the High Case, to 4.7% annually, while import growth will fall from 6.4% to 6.0%. Many of the other major economies in Latin America also will slow their growth in trade with the U.S., particularly Mercosur countries and Mexico. In all, exports to Latin America will slow from 6.6% annual growth to 6.1% annual growth, and imports from Latin America will drop from 4.4% to 4.2% per year. Compared to other alternative scenarios, the effect of this scenario is a moderate reduction from the High Case. The exception is exports of primary commodities; growth for this commodity group will be reduced the most under this scenario. Trade in 2020 will be only two-thirds the projected volumes traded under the High Case.

Slower Trade Liberalization

The efficacy of trade liberalization efforts in the region over the next decade will have a bearing on the volume of trade that can be expected in the High Case. This second scenario examined the sensitivity of the High Case results to less optimistic assumptions for trade liberalization in the region and considered a smaller increase in commodity specific trade activity than was embodied in the High Case outlook.

Of the three scenarios, slower trade liberalization will dim the High Case scenario the least. Exports will fall from 6.4% annual growth under the High Case to 6.2%, while import growth will fall from 4.4% to 4.32% per annum. All countries will experience slower growth rates under this alternative scenario.

Slower Transportation Infrastructure Improvement

The volume of trade expected in the High Case can only be supported if transportation infrastructure in Latin America is improved significantly. If these improvements are delayed, specifically the privatization of port and railroads in Mexico and Brazil, bottlenecks will develop and trade in that region will fail to live up to its potential. The final scenario examined the sensitivity of the High Case results to a less pronounced rise in the time trend influencing trade than was embodied in the High Case outlook.

The slower transportation infrastructure improvement in Latin American countries has the potential to dampen growth the most from High Case projections. Exports in 2020 will be only 20.7% higher than the Base Case,

compared to 34.1% in the High Case forecast. Imports will be only 9% higher in 2020, two-thirds of the High Case forecast of 15.5% above Base Case levels. Inadequate infrastructure in Latin American economies will slow average annual growth in trade in each of the major economies by at least 0.5% per year.

MAJOR FINDINGS

The following are the major findings that resulted from the trade forecast analyses.

- Mexico's importance as a trading partner in Latin America will increase over the 24 year analyses period – from 44% of Latin American trade in 1996 to 54% in 2020 under the Base Case forecast.

- Manufactured goods – which have the highest value per ton and are the most easily transported in containers – will experience the fastest growth in both exports and imports. Total tonnage transported through the Southeastern Alliance will grow to more than five times its current levels by 2020.

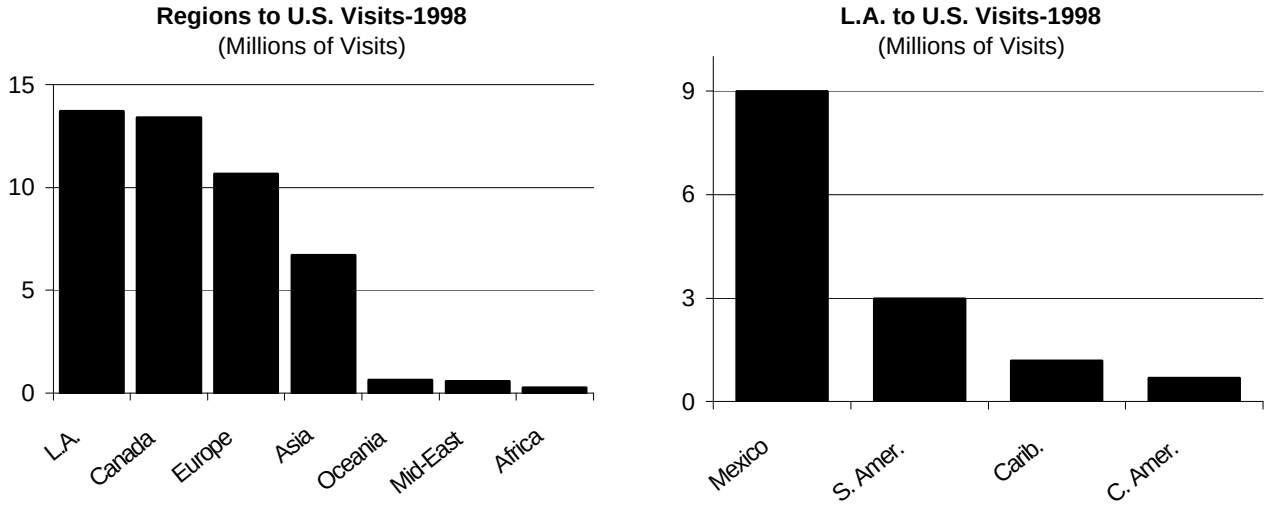
- Due to the rapid growth in trade with Mexico, land transportation will increase in the share of total trade from 20% in 1996 to 33% in 2020.

- Under a High Case trade forecast, the volume of trade to Latin America through the Southeastern Alliance gateways will increase to 1.1 billion metric tons in 2020, 22% more than the Base Case forecast for 2020.

LATIN AMERICAN TOURISM IN THE U.S.

Latin Americans visited the U.S. more than any other regional group in 1998 (**Exhibit B3-1**), with over 13 million visits, ahead of Canada and Europe. Tourist numbers from Mexico into the U.S. continued to rebound in 1998 as well, increasing by 10% and accounting for 9 million visits. Air travelers from Mexico increased by 9% for a total of 1.4 million visitors (Mexican air arrivals were the fifth largest market to the U.S.).

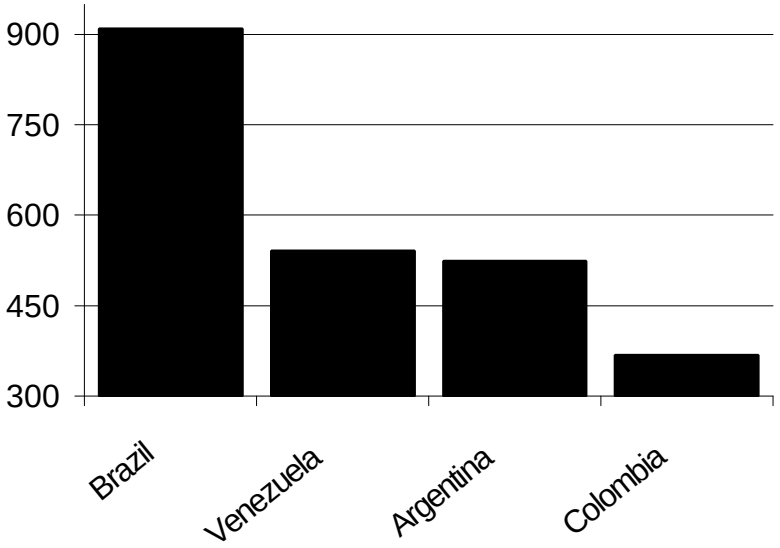
Exhibit B3-1
WORLD & LATIN AMERICAN VISITS TO THE U.S.



Source: Tourism Industries (TI)

South American visits—3 million total, a 4% increase—were higher than forecast in 1998, in spite of Brazil's economic trouble and weakened currency. Still over 900,000 Brazilians visited the U.S. in 1998, a 3% decrease from 1997, but not nearly as low as the anticipated 8% drop (**Exhibit B3-2**). Colombia and Venezuela each exceeded expected growth rates in visitation levels, up 16% and 11% respectively. Venezuela broke its 1982 record of 532,000 by sending 541,000 travelers to the U.S. in 1998. Additionally, Argentina's visitation increased by 4%.

Exhibit B3-2
SOUTH AMERICAN TO U.S. VISITS
(Thousands of Visits)



Source: Tourism Industries

Central American nations sent just under 700,000 visitors to the U.S. in 1998, up by 24%. The strongest growth came from Guatemala (22%), Costa Rica (19%), and El Salvador (46%). Lagging was the Caribbean region, down by 2% in 1998. However, the islands were still credited with about 1.2 million arrivals to the U.S.

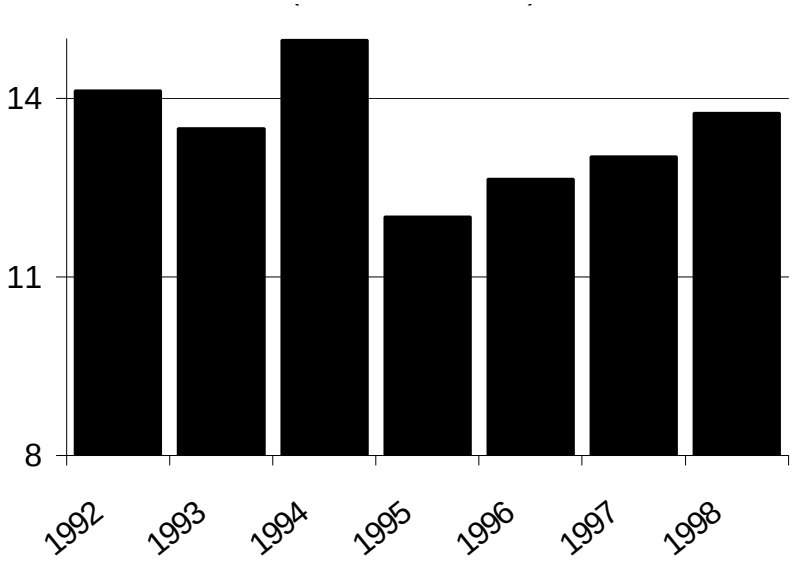
1990's Latin American Tourism in the U.S.

Historically, Latin Americans have visited the U.S. by the millions. From 1992 – 1998, the region sent at least twelve million travelers each year, peaking in 1994 at just under 15 million (**Exhibit B3-3**). After a dip in 1995 (during and immediately following Mexico's currency crisis), visits expanded once again to just under 14 million.

Tourism as an American Export

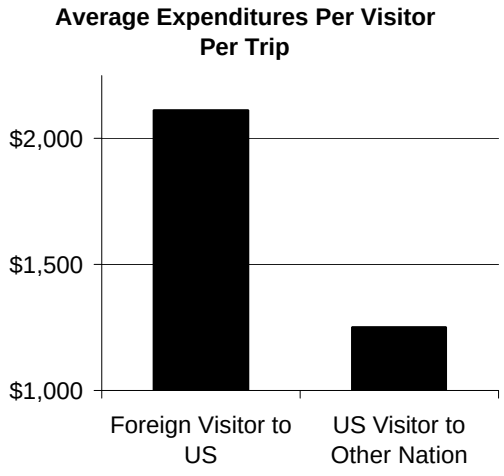
The U.S. is by far the leading country in travel receipts/travel exports. Of all world travel receipts, the U.S. took in 16%. International travelers spend at least two times more in the U.S. than in any other nation. International travel is ranked ahead of agriculture, chemicals, and motor vehicles on the list of U.S. exports. In contrast with many other trade categories, the U.S. has enjoyed a travel surplus for the past ten years (a surplus meaning that international visitors spent more in the U.S. than U.S. travelers spent elsewhere). This surplus was at $19 billion in 1998 even with a downturn in total arrivals to the U.S. **Exhibit B3-4** depicts the average expenditures of American travelers to other nations versus foreign travelers in the U.S., and provides a breakdown of which items foreign travelers spend their money on in the States.

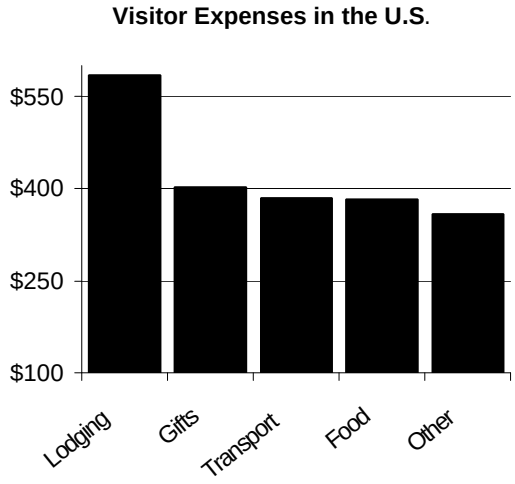
Exhibit B3-3
L.A. TO U.S. VISITS-HISTORICAL
(Millions of Visits)



Source: Tourism Industries

Exhibit B3-4
VISITOR EXPENDITURES





Source: Tourism Industries

Foreign visitors tend to spend the most on lodging while in the U.S., paying more than $550 per visitor per trip. While in the U.S., foreigners also spend around $400 per trip on each of four categories - gifts and souvenirs, transportation while in the U.S., food, and other items. Expenses while in America average about $2100 per visitor per trip for visitors, while Americans spend $1255 per visitor per trip abroad.

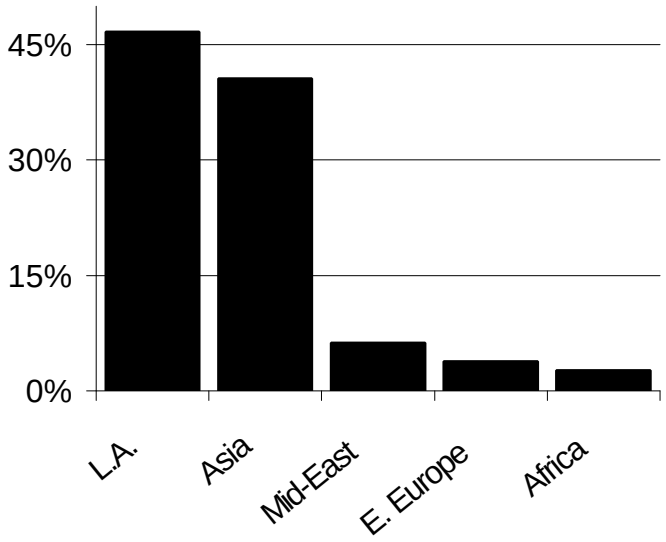
These numbers bode well for the U.S.' tourism market, and point toward strong travel-related markets. The Southeastern Alliance states, in particular, can benefit from such strong tourism numbers. The hotel/motel, restaurant, travel, and retail industries in Southeastern tourist destinations have enjoyed—and will likely continue to enjoy—great success as a result of international visitor spending.

LATIN AMERICAN TOURISTS AND THE SOUTHEASTERN ALLIANCE

Developing Regions' Travel to the Southeast

Having reviewed the state of the overall U.S. tourism industry, it is appropriate to consider the Southeastern Alliance specifically, and its relationship to Latin America. While Europeans make up by far a large majority of international travelers to the U.S. and the Southeast, an examination of the contribution of *developing regions* to travel in the Southeast shows that Latin America is the leader. As a percentage of developing regions' travelers, Latin America makes up over 45% (**Exhibit B3-5**). That is, after Western Europe and Canada, Latin America sends more visitors to the Alliance than any other area of the world, including the large Asian contingent.

Exhibit B3-5
SHARE OF DEVELOPING REGIONS' TRAVEL TO SE ALLIANCE

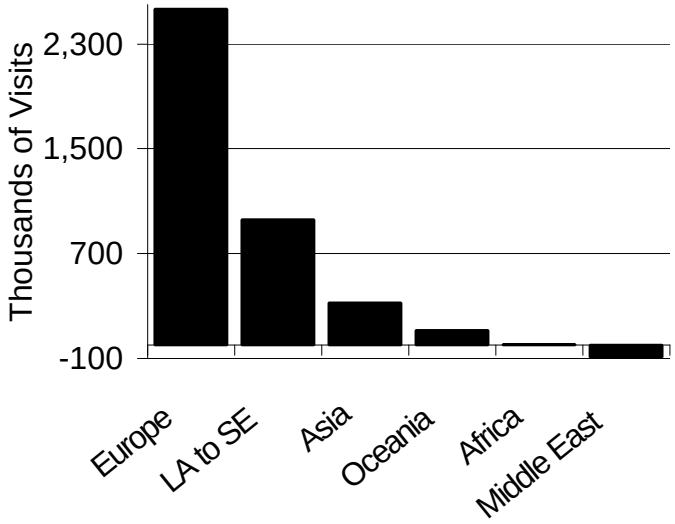


Source: Tourism Industries

The Balance of Visits

Like the U.S. as a whole, the Southeastern Alliance states enjoy a large positive balance of trade in tourism with every region of the world except the Middle East. Again, Europe represents far and away the largest travel surplus for the Alliance, but Latin American visits to the Southeast outnumbered Southeastern visits to Latin America by nearly one million in 1996 (**Exhibit B3-6**). Tourism Industries and U.S. Customs data indicate that this relationship has been the norm for many years—the Southeast Alliance is a very attractive destination for international travelers.

Exhibit B3-6
BALANCE OF VISITS-SE ALLIANCE vs. REGIONS 1996



Source: Tourism Industries

International Travelers to the SE Alliance

Tourism Industries, a division of the U.S. Department of Commerce, tracks the activities and interests of international travelers to the U.S. through its "Survey of International Air Travelers." Utilizing the survey results along with Customs international travel estimates, much can be learned about visitors to the Southeast Alliance. Information such as:

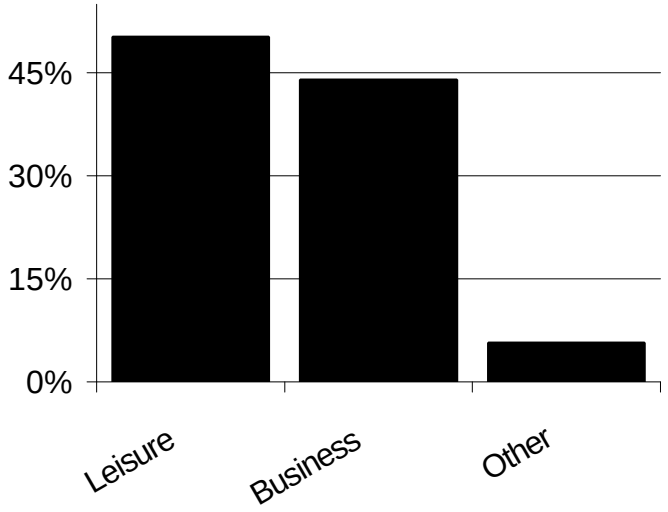
- The reason individuals are traveling (i.e., business, leisure, etc.)
- Which destinations people plan to visit
- Activities they plan to take part in (shopping, dining in restaurants, etc.)
- Occupation of visitors

By analyzing this information, a profile of the types of people travelling from Latin America to the Southeast can be developed. With the knowledge of the characteristics of their typical visitor, the Alliance may better be able to position itself as an international destination, particularly with Latin American travelers.

Main Purpose of Travel

When asked their main purpose of travelling to the Southeast, the majority (50.2%) of international travelers reported leisure activities—vacation or visiting family and friends—as their reason for travelling. The other major category of travel purpose was business and conventions at 44% (**Exhibit B3-7**).

Exhibit B3-7
MAIN PURPOSE OF TRIP – TRAVELERS TO SE ALLIANCE

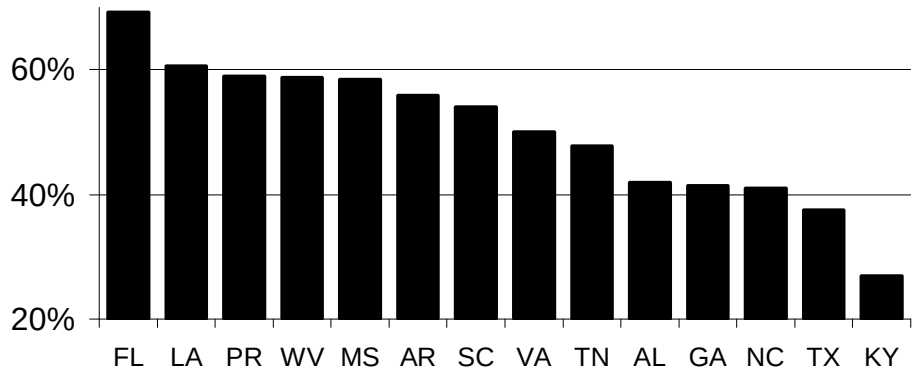


Source: Tourism Industries

Latin American Leisure Travelers

Within the Alliance states, there are some interesting comparisons that can be made regarding purpose of trip to a particular state**.** **Exhibit B3-8** presents estimates of the percentage of travelers stating leisure as their primary travel purpose in each of the fourteen Southeast Alliance states. As one might expect, visitors to Florida reported leisure travel at a significantly higher rate than any other (69%), followed by Louisiana and Puerto Rico.

Exhibit B3-8
PERCENTAGE PRIMARY PURPOSE - LEISURE

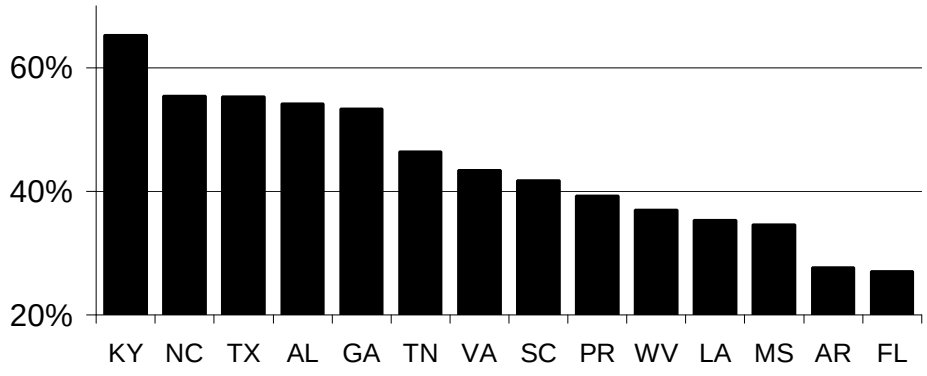


Source: Tourism Industries

Latin American Business Travelers

Alliance visitors' business travel percentages were highest in Kentucky, North Carolina, and Texas. The percentage of international travelers citing business as their main purpose was 65% in Kentucky, and 55% in North Carolina and Texas. Given the high percentage of leisure travelers, it is not surprising that Florida was a business destination for only 27% of its visitors (**Exhibit B3-9**).

Exhibit B3-9
PERCENTAGE PRIMARY PURPOSE - BUSINESS

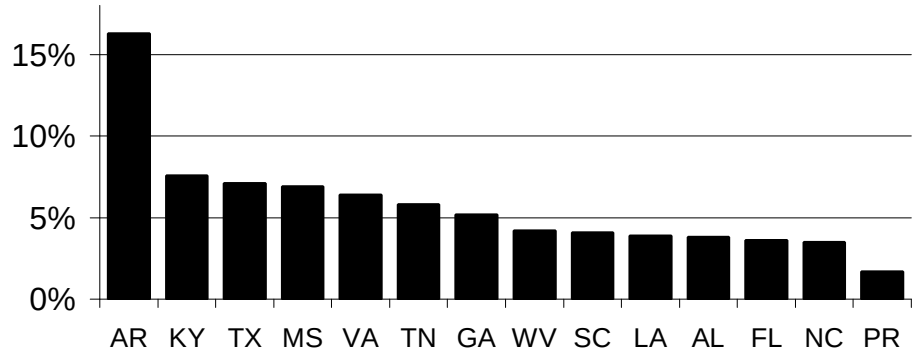


Source: Tourism Industries

Other Purpose Travelers

The Other Purpose category, consisting of study/teaching, government/military, religious, and health reasons, made up for the smallest portion of international visitors to Southeast Alliance states, with Arkansas the only state where these purposes constituted over 10% of travelers (**Exhibit B3-10**).

Exhibit B3-10
PERCENTAGE PRIMARY PURPOSE - OTHER



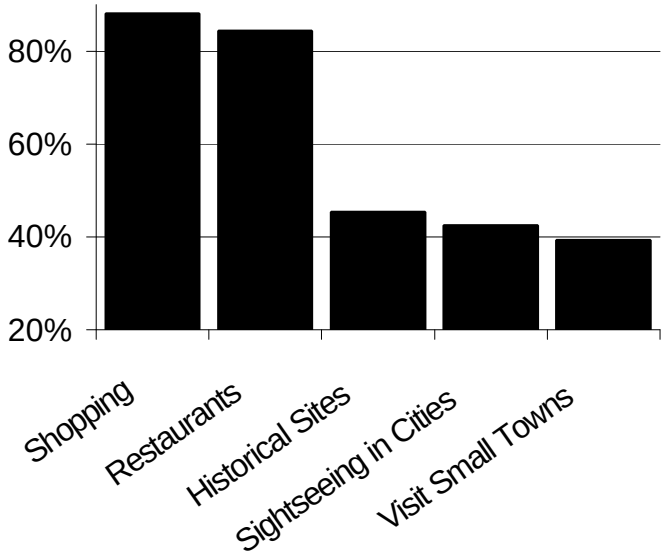
Source: Tourism Industries

The Tourism and Retail Trade Sector

From a broad perspective, these estimates provide an idea of what the majority of visitors might be interested in during their trip. But another category, Leisure Activities, focuses on the movements of travelers which may be of the most interest to the tourist industry in the Alliance. Visitors identified which types of leisure activities they took part in during their trip to an Alliance state (or states). Of the numerous potential categories, the top five are shown in **Exhibit B3-11**.

By far, retail shopping and dining in restaurants were the most commonly noted leisure activities. Nearly 90% of all international visitors to Southeast Alliance states reported that they had dined in restaurants and shopped in retail establishments.

Exhibit B3-11
SE VISITORS LEISURE ACTIVITIES

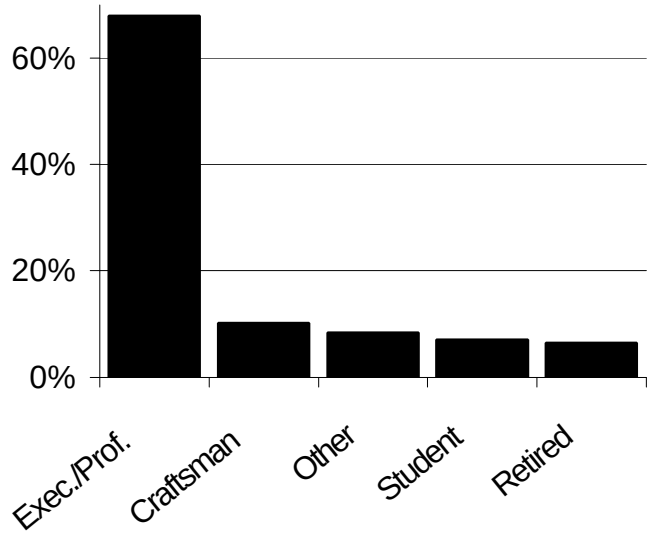


Source: Tourism Industries

Professional Demographics

Visitors to the Alliance are, by and large, Executives and Professionals. In fact, 68% of the region's international travelers come from the ranks of top level management or professional fields (**Exhibit B3-12**). Craftsmen, students, retirees, and others made up the remainder. The Alliance's tourism industries take advantage of this by targeting advertising to attract corporate travelers from the majority group of visitors, or to investigate the potential of improving markets such as retirees and others.

Exhibit B3-12
VISITOR OCCUPATIONS



Source: Tourism Industries

Nation of Residence

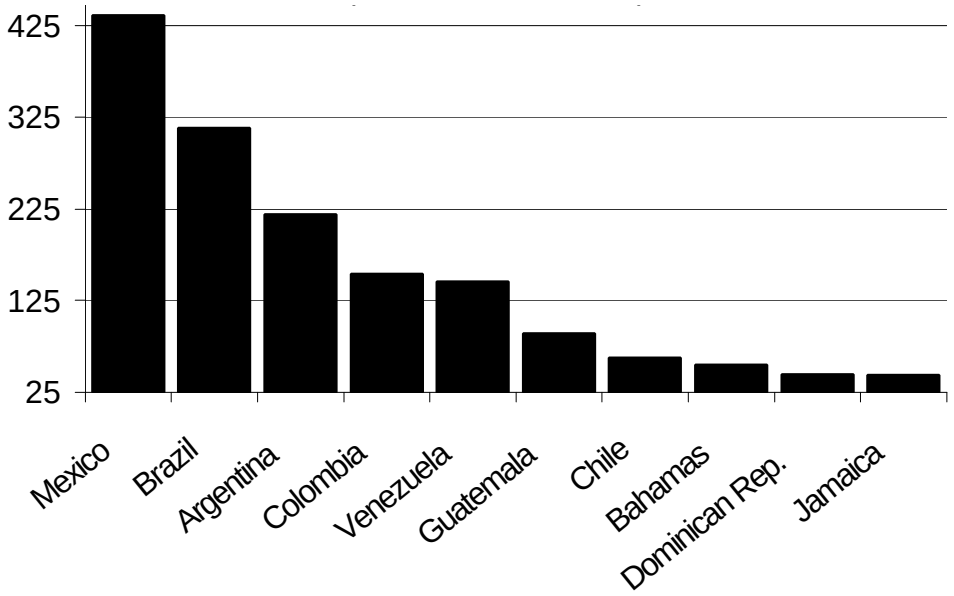
As was the case with the entire U.S., the Southeast Alliance draws the largest number of Latin American visits from Mexico. In 1996, over 425,000 visits were attributed to Mexico, followed by the South American nations of Brazil, Argentina, and Colombia (**Exhibit B3-13**). Mexico has of course become one of the U.S.' major trading partners since the advent of the North American Free Trade Agreement (NAFTA) in January of 1994, and this is evidenced strongly in the tourism trade from Mexico to the Southeastern Alliance.

BUSINESS AND SERVICES TRAVEL TO LATIN AMERICA

As Latin America grows economically and integrates advanced technologies into its culture, its countries will require the services of experienced firms to help smooth the transition. As a result, American professionals and technicians are working in nations south of the border more than ever. A particularly strong segment of trade between the U.S. and Central and South American partners is the Business Services category, which includes the professional services of consultants, engineers, telecommunications workers, and many others.

Nearly one out of every six Business Services dollars received by American companies in 1997 was spent by a Latin American company or government. Firms located in U.S. states have been sending their employees—ranging from high-level executives to technicians and craftsmen—to perform services in these nations in dramatically increasing numbers over the past decade.

Exhibit B3-13
TOP L.A. TRAVEL TO SE ALLIANCE-1996
(Thousands of Visits)



Source: Tourism Industries

INFRASTRUCTURE EXPANSION

While Latin America has increased its skill and technology base appreciably, in order to support the kinds of growth occurring there additional labor must be imported. Historically, developing nations have sought the services of international firms to accelerate the construction and expansion of infrastructure. Countries in regions such as Central and South America, Africa, and the Far East need improved communications, roads, and buildings before economic potential can be fully realized.

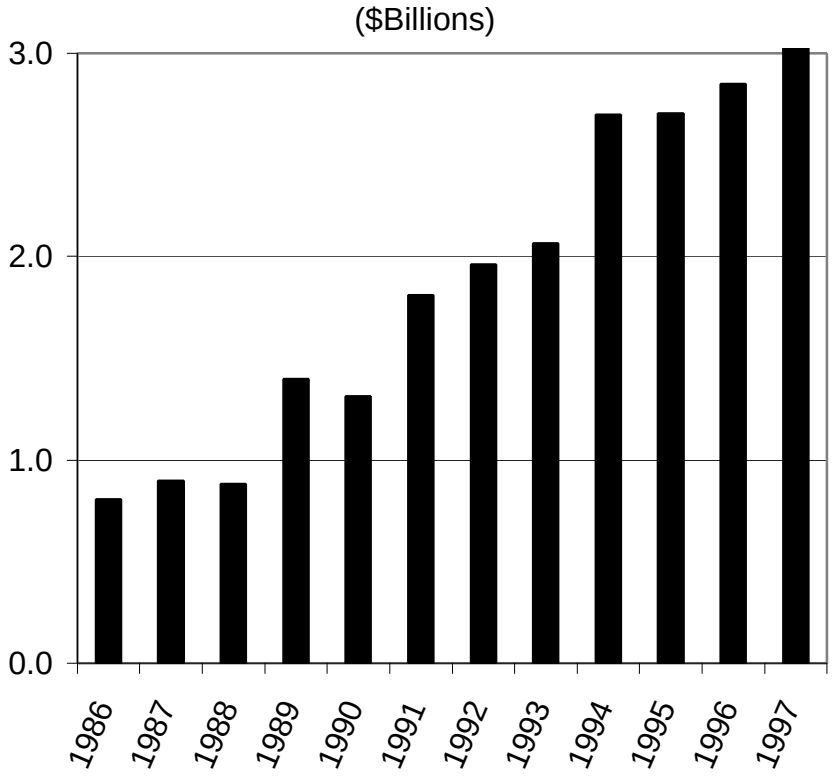
These infrastructure improvements are currently the driving force behind much of America's service exports. The two largest categories of services demand in Latin America are construction and equipment related. Architects, designers, and construction managers from the U.S. are involved in road construction as well as the design and build-up of industrial facilities. As producers purchase machinery and equipment, additional resources are required in the form of knowledgeable professionals who can aid in the installation, repair, and maintenance of the new capital stock.

BUSINESS SERVICES TRENDS AND DATA

Bureau of Economic Analysis (BEA) statistics provide a trade picture with respect to private services—particularly private business, professional, and technical services—that is emphatically in the favor of the U.S. Notably, business services receipts from Latin America have grown nearly every year since 1986, rising from

$807 million to over $3 billion in 1997 **(Exhibit B3-14**). This represents an average annual growth rate of about 25%.

Exhibit B3-14
U.S. SERVICES GROWTH IN LATIN AMERICA



Source: Bureau of Economic Analysis

MEXICO

In 1997, receipts from Mexico represented the largest portion of business service exports to Latin America, at $793 million. Our NAFTA partner to the south has been recovering steadily since the devaluation of the peso in 1995, which impacted Mexico's service imports adversely. The growing trade relationship with the U.S. and Canada continues to support the economy and drive demand for improved and expanded infrastructure.

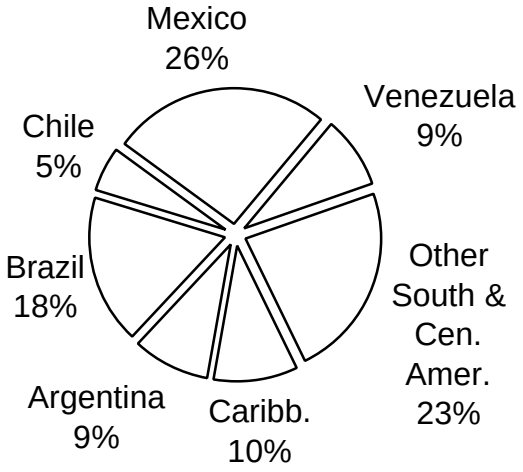
Mexico—one of the U.S.' top three trading partners internationally—spent $228 million on installation and maintenance of equipment in 1997, or 29% of its total business services purchased. Together with equipment maintenance, Mexico will likely continue to increase its purchases of construction, data, and other services.

Other Latin American Examples

The largest growth in services purchased from the U.S. has occurred in Brazil, Argentina, and Chile. Brazil, which imported $534 million in business and professional services in 1997, has increased its use of U.S. services by an average of 46% in the years 1986 – 1997. The market for business services in Argentina has grown about 44% per year in the same time span, reaching $282 million in 1997. Chile and Venezuela account for much of the remainder in services trade, at $162 and $264 million respectively in 1997.

Other Latin American nations are also investing heavily in American services (**Exhibit B3-15**). Venezuela paid $97 million for construction-related services from the U.S. in 1997, and Argentina spent $63 million on installation and maintenance of capital equipment.

Exhibit B3-15
1997 LATIN AMERICAN PURCHASES OF U.S. BUSINESS SERVICES



Source: Bureau of Economic Analysis

National Income Accounts Categories

"Business, Professional, and Technical Services" is one of several categories in the national income accounts for Private Services, each broken into receipts and payments. Categories for affiliated operations include those transactions that take place between U.S. parent companies and their affiliates abroad, and the transactions between foreign parent companies and their U.S. affiliates. There are also categories for unaffiliated businesses, including education, financial services, insurance, telecommunications, film & tape rentals, and other.

The Business Services category is broken down into several more detailed classifications. Each of these is listed by receipts and payments. The categories of Business Services are:

- Construction, Engineering, Architectural, and Mining
- Equipment Installation, Repair, and Maintenance
- Computer and Data Processing
- Consulting and Public Relations
- Research and Development
- Database and Information Services
- Legal Services
- Industrial Engineering
- Advertising

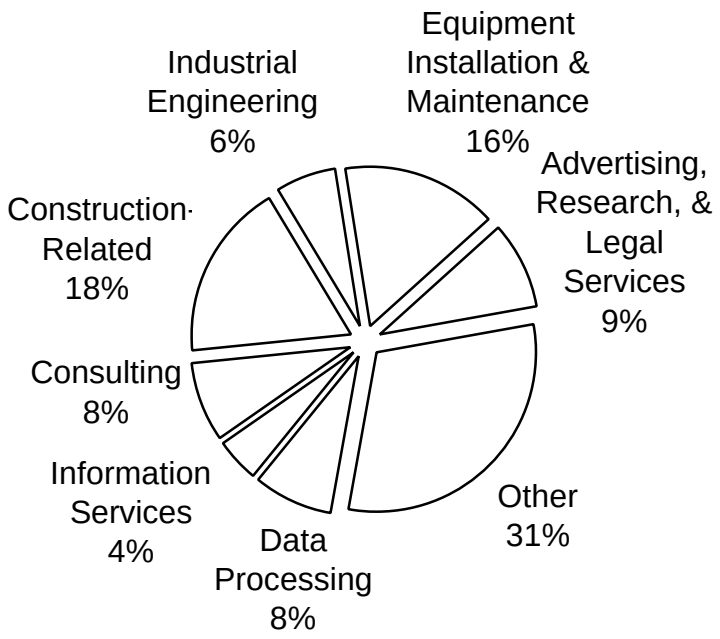
Business Services receipts from Latin American countries came largely from four categories. Construction, Engineering, Architecture, and Mining accounted for 18% of Business Services exports to the region in 1997. Installation, Maintenance, and Repair of Equipment followed with a 16% share, along with Management Consulting and Data Processing, each providing an 8% share.

The large proportion of receipts from these categories is not surprising, given the nature of growth occurring in these nations. As developing countries expand their economies, they necessarily must increase the level of capital stock (i.e., buildings, roads, equipment, etc.).

MANAGEMENT EXPERTISE

The Management Consulting and Data Processing categories are keys to the facilitation of development (**Exhibit B3-16**). As a group of developing nations, Latin America has not progressed to the point of having an experienced—or technologically advanced—labor pool. In order to plan for the future and manage change, these countries have tapped into the U.S.' management consulting industry. This has been particularly true in Brazil, where Management Consulting receipts to U.S. firms made up 13% of Business Services—Brazilian companies spent $69 million dollars on consulting and public relations services from America in 1997 alone. Brazil's services market was also heavily invested in Data Processing services (17% of all professional services purchased by Brazil from the U.S.)—spending over $90 million in 1997.

Exhibit B3-16
1997 U.S. BUSINESS SERVICES DEMAND IN LATIN AMERICA



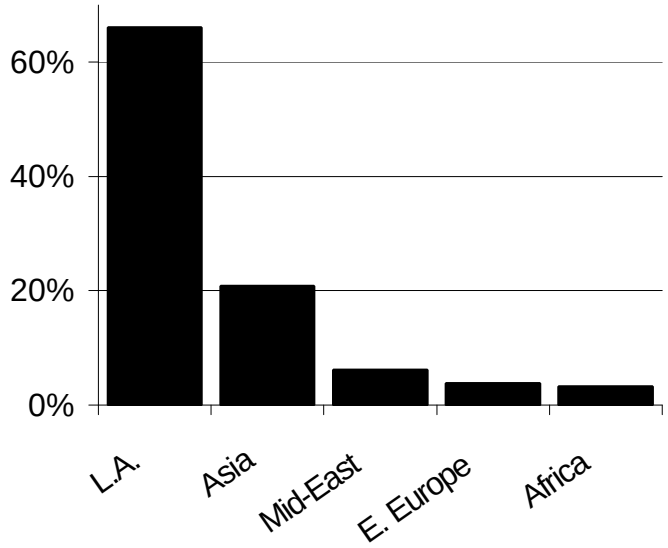
Source: Bureau of Economic Analysis

Clearly, professionals from a variety of American services industries are expending a great deal of effort in the nations of Latin America, and bringing in significant receipts. As this region continues to grow, the demand for their services can be expected to do likewise. To meet the needs of capital stock expansion, technological advancement, and growth management, U.S. firms will necessarily play a large role in Central and South American business for the foreseeable future.

SOUTHEASTERN ALLIANCE TRAVEL TO DEVELOPING REGIONS

In terms of visits to developing regions, Alliance travelers go to Latin America more than any other area. Percentage-wise, 66% of American visits to developing nations are to Latin America, with the next closest region being Asia at 21% (**Exhibit B3-17**). Given the Services Trade data provided by the BEA, and these estimates from Tourism Industries, it can be supposed that a great deal of business services travel is bound for developing regions such as Latin America.

Exhibit B3-17
SHARE OF ALLIANCE TRAVEL TO DEVELOPING REGIONS



Source: Tourism Industries

Purpose of Southeastern Alliance Travel

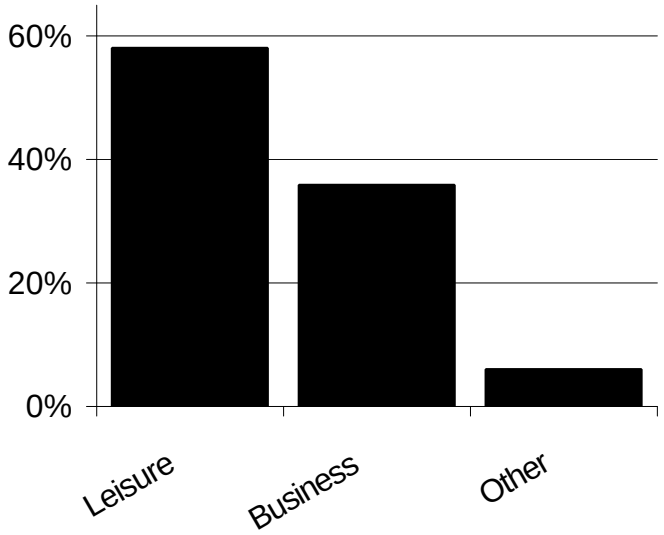
Travelers from the Southeastern Alliance states reported that the main purpose of their visit was business 36% of the time, leisure about 58% of the time, and 6% for other reasons (**Exhibit B3-18**). In 1996, an estimated 960,000 business visits went from the Alliance to Latin America. This represents an increase of over 100,000 visits from 1993. (**Exhibit B3-19**)

Business travelers from the Southeastern Alliance varied by percent from particular states. The majority of travelers from Arkansas (53%) reported business travel as the main purpose of their trip, followed by Louisiana (43%) and Mississippi (40%) (**Exhibit B3-20**). Beyond those states, every other member of the Alliance sent at least 25% of its international visitors for business purposes.

INTERNATIONAL LEISURE TRAVEL FROM THE SOUTHEAST

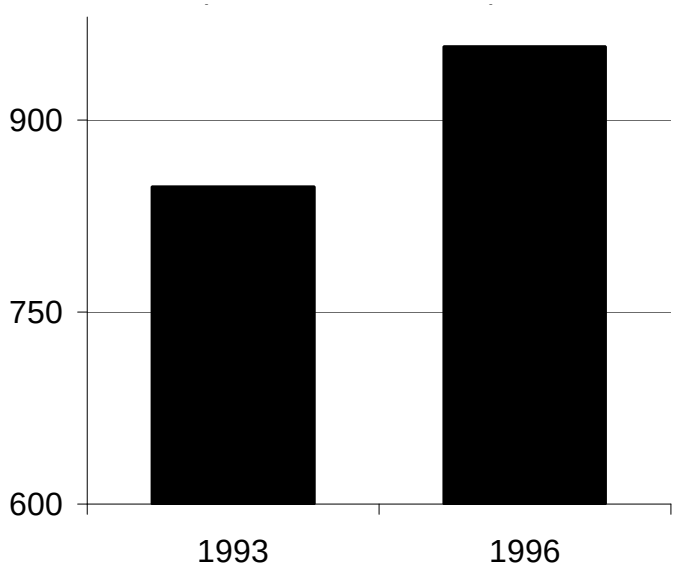
There is somewhat less variance between the states where leisure travel percentages are concerned. West Virginia and South Carolina had the highest percentages of leisure travelers on international trips, with 71 and 66 percent, respectively (**Exhibit B3-21**). The remainder of the Alliance ranged from 40 – 65%.

Exhibit B3-18
ALLIANCE TRAVELERS' MAIN PURPOSE OF VISIT



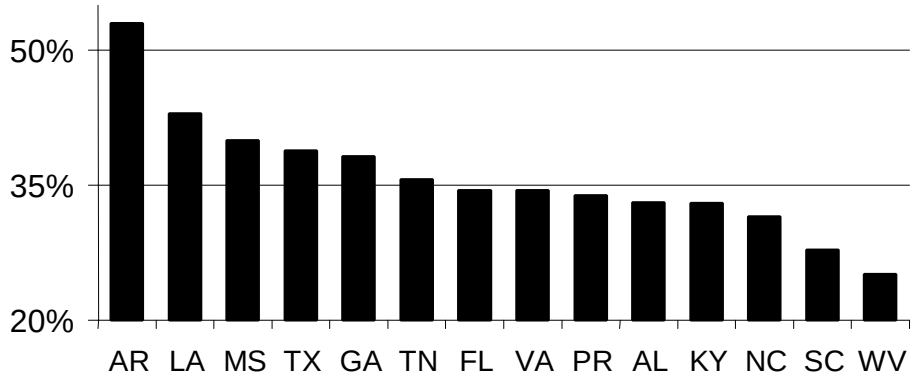
Source: Tourism Industries

Exhibit B3-19
SE BUSINESS TRAVEL TO LATIN AMERICA
(Thousands of Visits)



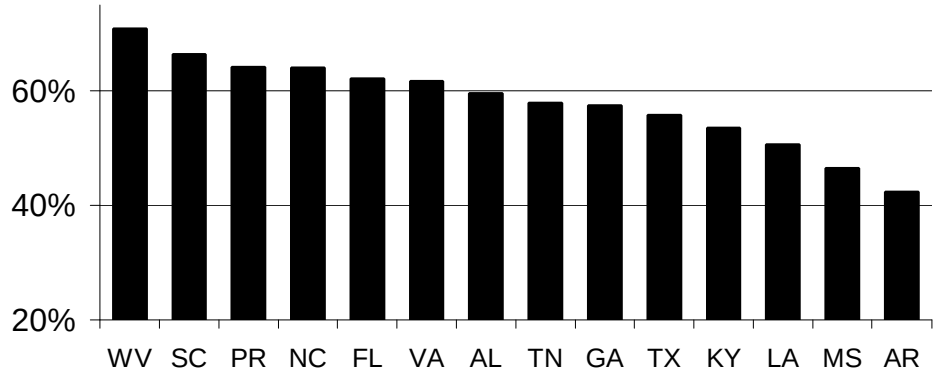
Source: Tourism Industries

Exhibit B3-20
PERCENT OF SE TRAVELERS ON BUSINESS



Source: Tourism Industries

Exhibit B3-21
PERCENT OF SE TRAVELERS FOR LEISURE

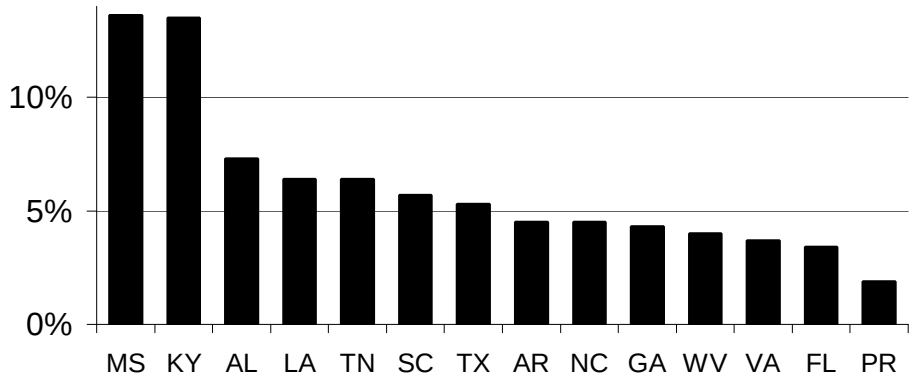


Source: Tourism Industries

Other Purpose Travelers

The remainder of Alliance international visits were reported as being for other purposes. Again, this amounts to a small minority of travelers. Mississippi and Kentucky, at about 13%, had the highest percentage of "other" purpose visits (**Exhibit B3-22**).

Exhibit B3-22
PERCENT OF SE TRAVELERS FOR OTHER PURPOSE

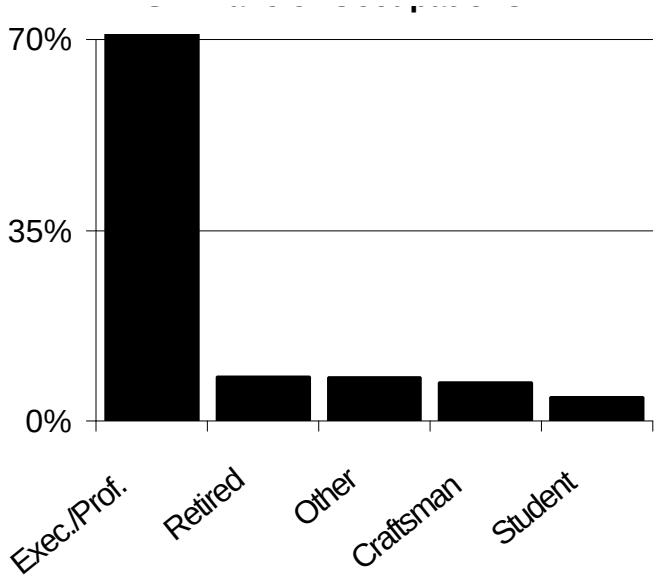


Source: Tourism Industries

ALLIANCE TRAVELERS' OCCUPATIONAL PROFILE

Most of the Alliance's international travelers reported that their occupation was Executive or Professional level. Over 72% of Southeastern international air passengers fall into this category, followed distantly by retirees, craftsmen, students, and others (**Exhibit B3-23**). Given that such a large percentage of passengers are executives and professionals, and that a substantial percentage are on business trips, a possibility is that Alliance businesses are sending a great deal of high-skilled, highly-paid labor to Latin America. This is consistent with the BEA statistics and the U.S.' surplus in Business Services trade.

Exhibit B3-23
SE TRAVELER OCCUPATIONS

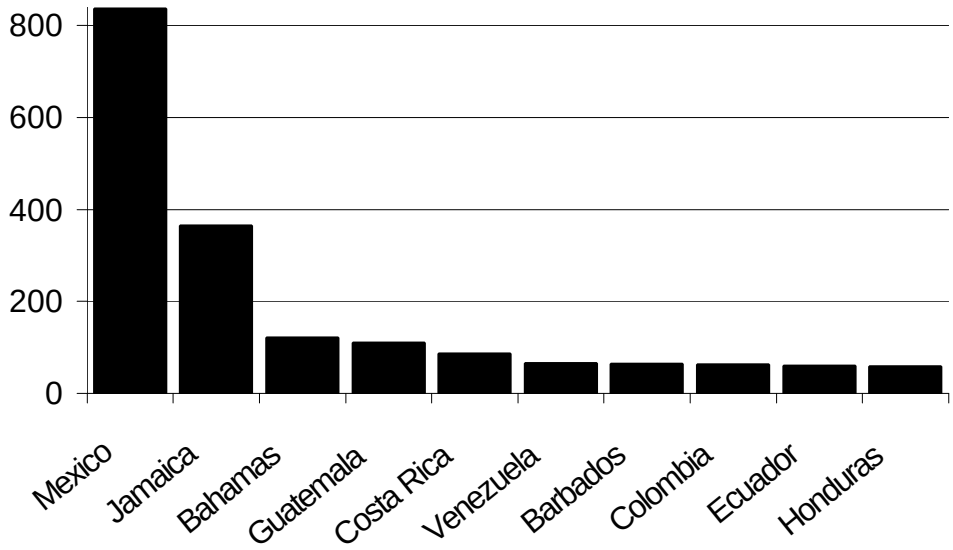


Source: Tourism Industries

Primary Destinations of SE Travel

For reasons of geography and economy, by far the largest number of Alliance residents travel to Mexico as a Latin American destination. In 1996, Mexico led Latin America countries with over 800,000 Southeastern Alliance visits (**Exhibit B3-24**).

Exhibit B3-24
TOP L.A. DESTINATIONS OF SE ALLIANCE-1996
(Thousands of Visits)



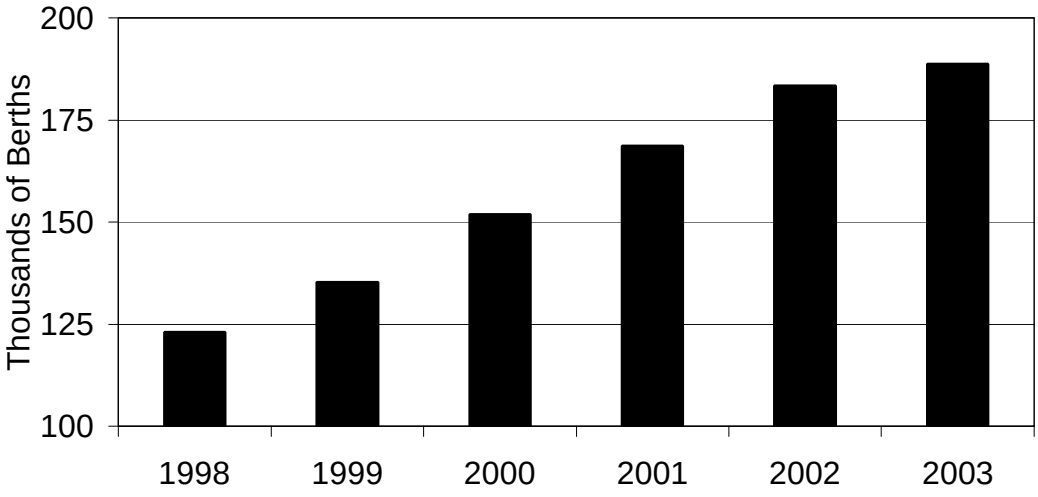
Source: Tourism Industries

CRUISE INDUSTRY

The *Cruise Industry News 1999 Annual* describes 1998 as "the best year the industry has ever had." The top cruise line companies are remarkably strong financially, with market power and economies of scale on their side. Given these factors, cruise lines can control prices to a greater degree than ever before. Being able to control price is crucial to controlling cabin bookings. By lowering or raising prices, cruise lines can push demand up or down in efforts to maintain full ships (Cruise Industry News).

As the North American market for cruising grows, so will the fleet of ships. The 1999 North American cruise fleet was estimated to include 127 ships, and is expected to grow to 163 ships by 2003. This represents an increase in berths from 135,000 to nearly 190,000 (**Exhibit B3-25**).

Exhibit B3-25
INCREASE IN NORTH AMERICAN CRUISE BERTHS



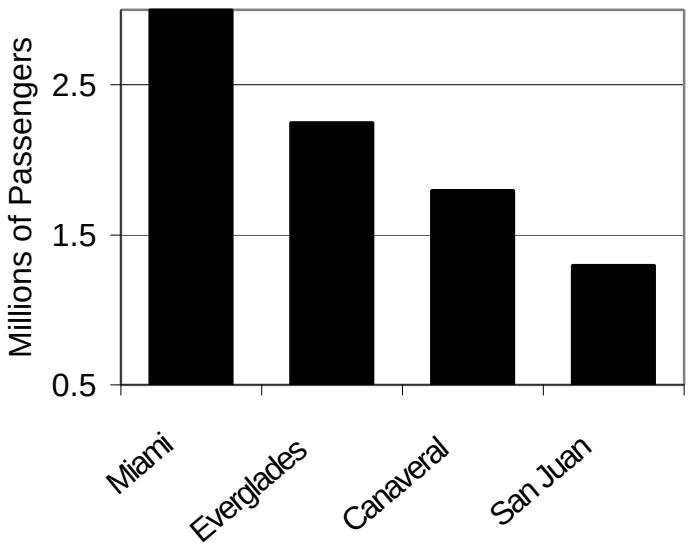
Source: Cruise Industry News

SOUTHERN CRUISE PORTS

The cruise industry has grown steadily in recent years, and is projected to continue to serve millions of North American passengers in the future. The three busiest cruise ports in the United States are located in Florida: Port of Miami served 3 million passengers in 1998, Port Everglades 2.25 million, and Port Canaveral 1.8 million. San Juan, Puerto Rico's port was fourth in North American passengers with 1.3 million. (**Exhibit B3-26**) New Orleans, Tampa, and Newport News (VA) also have busy cruise services. Port of Houston, Port Manatee (Tampa area), and Key West serve cruise ships, though Key West is strictly a port-of-call (meaning ships dock for a brief time and depart, not usually taking on new passengers). Other southern port cities, including Charleston

(SC), Jacksonville (FL), and Gulfport (MS), hope to attract more cruise business in the near future.

Exhibit B3-26
TOP NORTH AMERICAN CRUISE PORTS



Source: Cruise Industry News

CHARACTERISTICS AFFECTING CRUISE PORT SUCCESS

In order for a cruise port to be successful, certain attributes should be in place in the port city. These include:

- Port must be within a reasonable distance of cruise destinations;
- Extensive airline service must be available;
- The surrounding area should offer local complementary attractions;
- The metropolitan area must provide a significant population base; and
- The port's physical attributes must be appropriate to cruise ships.

Cruise Destinations

Most busy cruise ports and their surrounding areas have several of the above features in common. One of these is proximity to cruise destinations of interest. The port must be located such that several attractive ports-of-call are within a few days' cruising distance. The reason for this is that the largest segment of the cruise passenger market prefers cruises of between two and seven days. Ten-day, two week, and even longer cruises are available, but are not nearly as popular as the shorter trips. For this reason, most cruise lines choose to operate out of ports that allow for flexible scheduling of several ports-of-call.

Port Calls

Largely because of geography, U.S. ports located in the Gulf of Mexico send cruises to the Western Caribbean and Mexico, including: Playa del Carmen, Cozumel, Grand Cayman, and Cancun. Ports located on the Atlantic are home to ships that visit more eastern destinations such as: the Bahamas, Bermuda, Puerto Rico, and the U.S. Virgin Islands (**Exhibit B3-27**). This distribution of cruise itineraries supports the logic of cruise ports locating within a reasonable cruising distance of ports-of-call. When departing from the Tampa or New Orleans area, the Western Caribbean logically provides a ship's destinations. Ships leaving Miami and Port Everglades are best able to visit Eastern Caribbean islands.

Airline Service and Arrival Modes

Also of importance to cruise ports and cruise lines is accessibility to passengers, particularly by air and highway. There are two primary types of cruise passengers in terms of travel to departure ports—"drive-ins" and "fly-ins." Both are important to cruise line operators, so accommodations must be available so that either mode may be reasonably utilized. This means that cruise ports that are to be successful must be relatively close to an airport with extensive major carrier service. Also, passengers who wish to drive to a port from surrounding cities and states must have direct interstate and highway routes to travel, and ample parking facilities available upon arrival.

Local Complementary Attractions

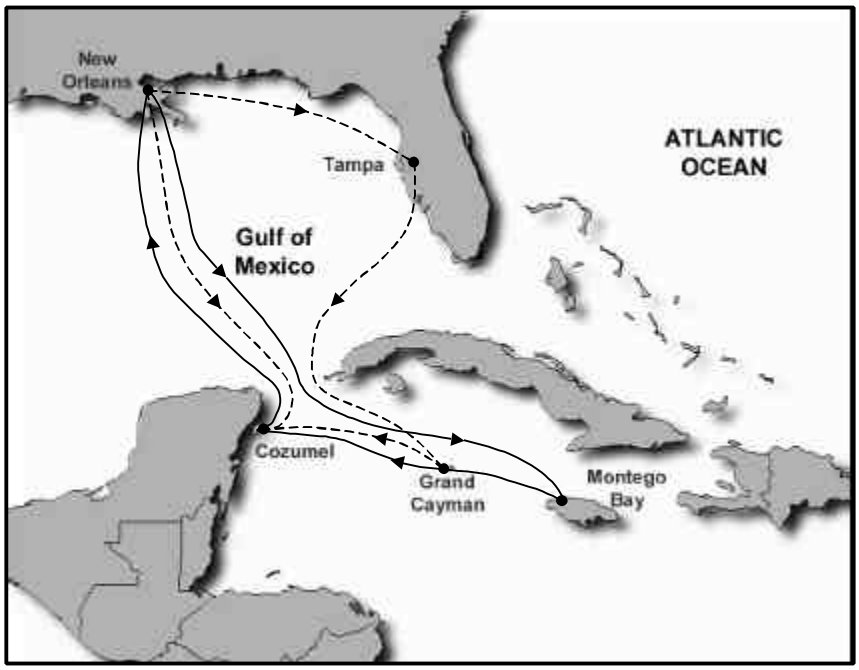
Port cities with local complementary attractions are more likely to be successful in arranging for cruise ships to set up a homeport or port-of-call. There are a couple of reasons for this. First, many vacation packages include days in the port city just before or after a cruise.

Secondly, a city with attractions apart from cruising will be more likely to generate visits by vacationers who may potentially become cruise passengers. For instance, New Orleans offers a wide variety of activities to tourists and is a destination in its own right. Therefore, it meets the criterion of having local complementary attractions—many passengers come to New Orleans for a number of days prior to embarkation, or remain in New Orleans after disembarking. This makes it more viable in the eyes of cruise lines.

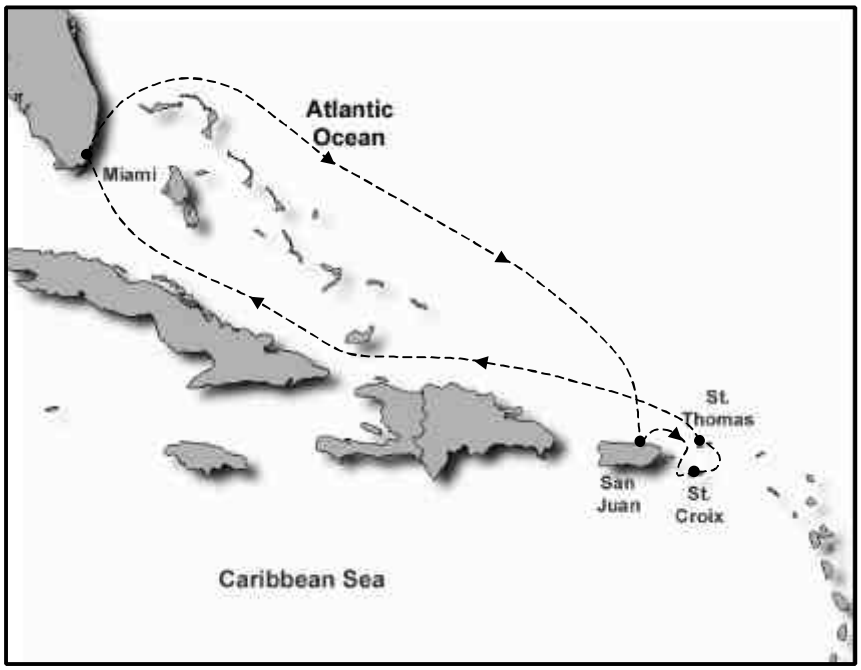
U.S. Ports of Call

In fact, New Orleans is one of only a handful of U.S. cities that can claim to be a genuine port-of-call for cruises calling from other domestic ports. Key West, Boston, and New York City are among the other ports that attract cruise ship calls. The reason for this is that tourist attractions are more numerous and readily available from ships in port than in many other cities. This is not to say that other port cities do not have local attractions—Miami, Port Everglades, Port Canaveral, and Port of Tampa, to name a few, all have wonderful local destinations including:

Exhibit B3-27
EXAMPLE CRUISE ROUTES AND PORTS OF CALL



Western Caribbean Cruise Route Examples



Eastern Caribbean Cruise Route Example

Source: Carnival Cruise Lines

- Beaches
- Natural beauty and wildlife
- Theme parks
- Professional sports

METROPOLITAN POPULATION

A local population base is also an asset for a cruise port's surrounding areas. Having a significant population base provides a ready market from which to draw cruise customers. Moreover, port facilities require a labor pool from which to employ local staff, such as sales people, customer service, dockworkers, maintenance technicians, and a variety of other positions. Cities with large populations are more likely to have such labor resources. Additionally, a large population usually assures the presence of other services and capabilities, such as airports, roads, hotels, restaurants, etc. that are important to cruise travelers.

Infrastructure

Finally, the physical characteristics of the port itself are obviously of paramount importance—if the proper infrastructure is not in place, a port simply cannot serve cruise ships. The two most basic factors associated with port operations are water depth and height restrictions (primarily due to existing bridges). In spite of the gigantic size of many cruise ships, they generally only require between 27 and 30 feet of water to operate safely. However, because most of the boat is above water, height clearance prevents some ships from getting into certain ports, as many cruise vessels are 150 to 200 feet tall. (**Exhibit B3-28**)

Exhibit B3-28
MAJOR SOUTHEASTERN PORT FACILITIES

	Cruise Ship Berths/Terminals	Water Depth
Miami	12	25-42 ft
Everglades	10	31-44 ft
Canaveral	7	39 ft
San Juan	9	19-35 ft

Challenges to Establishing a Cruise Port

For ports to add berths to accommodate cruise ships, they occasionally must dig deeper channels and docking areas. This results in further obstacles associated with changes to the environment: damage must be minimized, and the appropriate permits and right-of-way are often difficult to acquire. Assuming water depth and bridge heights are not problematic, ports must still provide a great deal of infrastructure to support cruise activity. Though dimensions vary widely, today's ships often need in the neighborhood of 1,000 feet of dock length. Docks must meet a variety of specifications, including height, width, and length of ships to be berthed. In addition to docking facilities, ports must provide adequate

parking garage space, comfortable passenger terminals, and roadways and infrastructure through the port itself.

Scheduling and Logistics

With a few of exceptions, cruises depart and return on Friday, Saturday, or Sunday. Because of this, most U.S. cruise ports have excess ship berths during the other days of the week, with few vacancies on weekends. The other side of the equation, though, is that port space in some of the small island destinations is scarce and highly valued during the weekdays (when cruise ships are making calls). On weekends, these same ports are often empty because the ships have returned to homeports in the U.S. to disembark and embark passengers.

Capital Investment

The addition of a new berth space for a cruise ship is a costly undertaking. Port operators estimate $3 to $4 million for the construction of wharf (dock) facilities, $10 to $20 million for a state of the art terminal, $5 to $10 million for a parking garage, and $5 to $10 million for new roadways and infrastructure. Of course these figures vary from project to project, and do not include costs of maintenance or dredging and digging in a harbor, but the capital costs alone for a top of the line cruise ship berth and facility could be as much as $40 to $50 million.

SOUTHEASTERN ALLIANCE CRUISE GROWTH

Many of the North American cities with the greatest potential for increasing their cruise business are located within the Southeastern Alliance (**Exhibit B3-29**). While the Alliance already claims the busiest American cruise ports, it also encompasses the majority of future growth ports for the cruise industry in North America as forecast by *Cruise Industry News Annual 1999.* Nine of the fourteen North American ports expected to expand their scopes of services are located in Alliance states, indicating not only the current strength of the cruise industry in the Southeast, but also its strong projected future position.

Exhibit B3-29
PROJECTED NORTH AMERICAN CRUISE GROWTH PORTS

1)	**Port of Palm Beach, FL**	8)	**Houston, TX**
2)	**Port of Mobile, AL**	9)	**Port Manatee, FL**
3)	**Charleston, SC**	10)	**Gulfport, MS**
4)	Philadelphia, PA	11)	Port of Halifax, CN
5)	Port of Seattle, WA	12)	San Francisco, CA
6)	Port of Quebec City, CN	13)	**Corpus Christi, TX**
7)	Hampton Roads, VA	14)	**Port of New Orleans, LA**

Note: Ports in bold type are included in the LATTS Strategic Port System discussed in Section C1.

SECTION B4
ECONOMIC DEVELOPMENT IMPACT OF LATIN AMERICAN TRADE

The effect of Latin American trade on the Southeastern Alliance's economic development will be significant. In turn, the growth of trade between Latin America and the Southeastern U.S. will have profound effects on the transportation infrastructure—and therefore economic development in general—of the Region. The increase in freight traffic will directly impact ports, highways, railways, and airports.

A large majority of the world's economies have liberalized trade policies in an effort to counteract the stifling effects of past protectionist attitudes. As free trade agreements like North American Free Trade Agreement (NAFTA) and General Agreement on Tariffs and Trade (GATT) accelerate international trade in the Western Hemisphere, the Southeastern Alliance states need strategies not only to capitalize on trade but also to ensure that needed infrastructure is in place. Even a large, developed economy such as that of the Alliance must be prepared to accommodate increased trade in order for its citizens to benefit optimally from international market opportunities.

In the interest of furthering the economies of Alliance states, policymakers should be familiar with the global marketplace as it applies to their Region. Of particular importance are three key relationships:

- The Southeastern Alliance's profile as a U.S. economic region
- International trade relationships, and how they are expected to change
- Alternative trade scenarios, and projected impacts on Southeast domestic employment and productivity

SUMMARY OF ECONOMIC DEVELOPMENT IMPACTS

The Southeastern Alliance states, taken as a group, had the largest combined Real Gross State Product (GSP) of any area of the U.S. At over $2 trillion, the Alliance's GSP was considerably larger than that of the North Atlantic, Central, Southwest, and Northwest (**Exhibit B4-1**).

As a percentage of the U.S.' total real GDP, the Southeastern Alliance made up about 29%, with the next closest region being the North Atlantic with 24% of the total (**Exhibit B4-2**). These facts indicate the standing of the Southeastern Alliance as a potent economic entity in its own right. While the Region is not at the top of every single growth category, the volume of production accounted for by Alliance states makes it a powerful international player.

Exhibit B4-1
REAL GSP OF U.S. REGIONS – 1997
(Billions $'92)

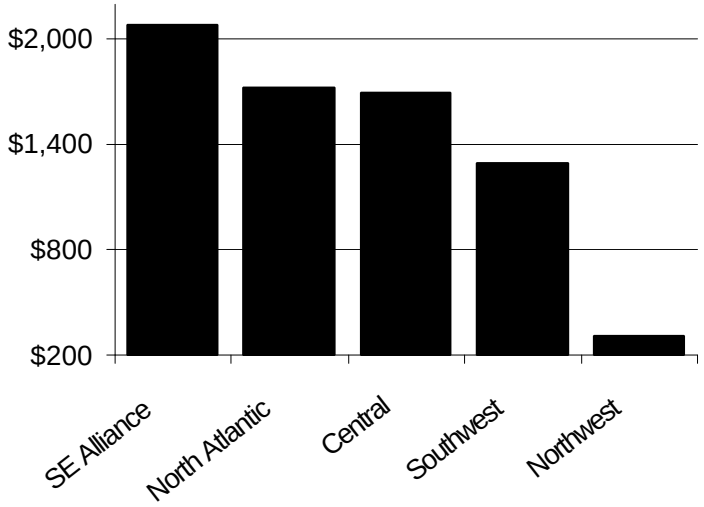
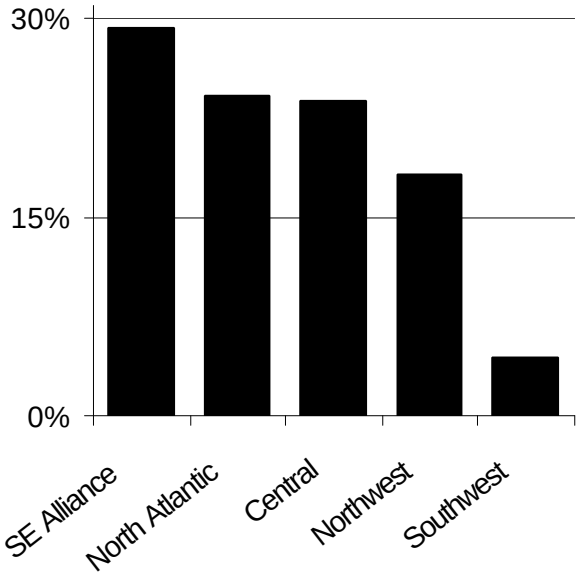
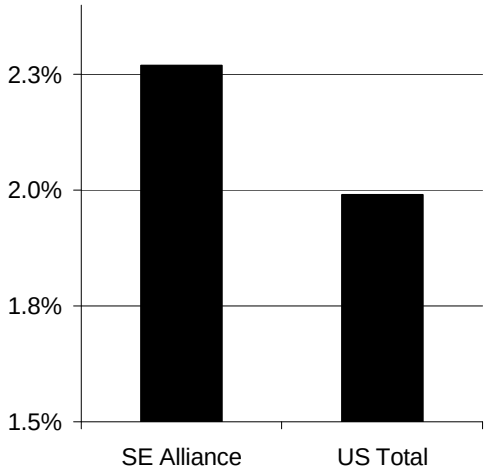


Exhibit B4-2
PERCENT OF U.S. GDP – 1997



In terms of GSP growth, Alliance states are forecast to grow at an impressive rate—one that is notably above the U.S. Total GDP growth (**Exhibit B4-3**). This is an indication that not only is the Southeast a large and prosperous region in terms of annual production, but the Region's productivity is also growing faster than most of the remainder of the nation.

Exhibit B4-3
GSP ANNUAL PROJECTED GROWTH, 1997-2020



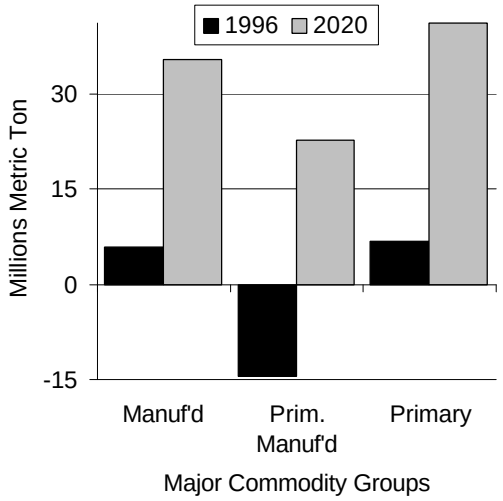
The combination of a large developed regional economy with projected growth higher than the remainder of the nation makes the Southeastern Alliance an attractive trade partner for Latin American nations hoping to sustain and improve their positions as developing national economies. Such nations can realize substantial gains from trading with Alliance members who provide markets for goods as well as sources of capital investment dollars.

Summary of Trade Relationships

A key determinant of the Southeastern Alliance's ability to maintain the momentum of the current cycle of economic development will be its ability to develop a strong and constructive role in the ongoing integration of the Western Hemisphere's economy. The Alliance's trade relationships with Latin America provide insights into the role that it may play over the next couple of decades, particularly when looking at projections of future trade balances.

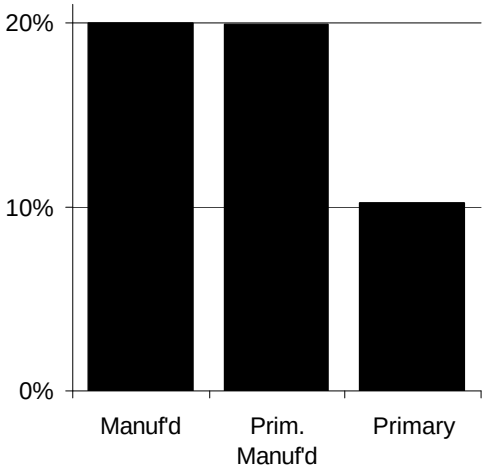
There are many product categories in which the Southeastern Alliance will either increase an already positive trade balance or convert a negative balance into a positive one. While negative trade balances in oil, gas, and other natural resources are unlikely to diminish, the Alliance stands to improve its position considerably in the trade of Manufactured, Primary Manufactured, and Primary Commodities between now and 2020 (**Exhibit B4-4**).

Exhibit B4-4
ALLIANCE TRADE BALANCES WITH LATIN AMERICA



The projections for trade relationships with Latin America in the early 21st century suggest annual improvements in each of these commodity groups of between ten to twenty percent (**Exhibit B4-5**). Given this type of annual growth in trade balances, the Southeastern Alliance clearly stands to profit from growth in international trade. Again, growth in trade and trade balances adds emphasis to the necessity of evaluating and upgrading trade infrastructure throughout the Region.

Exhibit B4-5
PROJECTED ANNUAL CHANGE IN TRADE BALANCES
1996 – 2020



Summary of Economic Impacts of Trade with Latin America

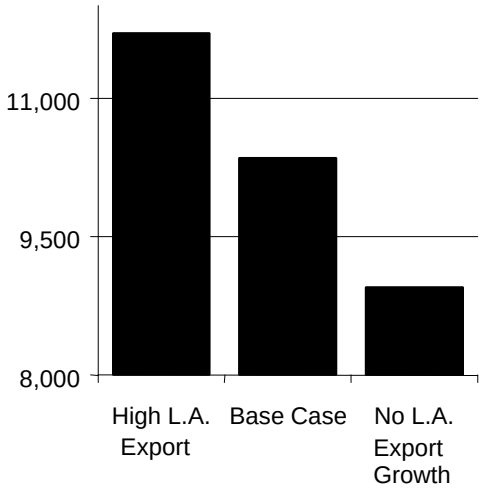
Trade with Latin America leads to additional jobs for the people of the Southeastern Alliance. Given the Region's position in the Western Hemisphere's economy, these jobs are likely to be created in value-added industries and in the higher wage occupations within those industries. Using a system of macroeconomic models, simulations were undertaken to predict the impact of Latin American trade on the Alliance. By choosing some potential scenarios for trade, levels of Southeastern Region employment were compared for different trade schemes.

Three of these scenarios were:

- Base Case – predicts employment if current trade conditions with Latin America are maintained in future years
- High Case – reflects the possibility of exports to Latin America increasing a great deal in coming years
- No Exports – depicts employment levels if there were no Southeastern exports to Latin America (a proxy for no trade)

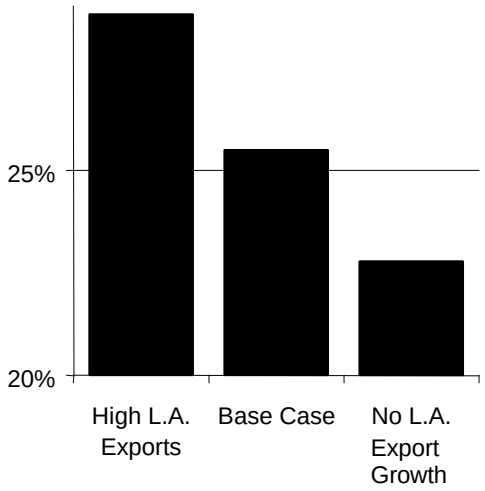
In the Base Case scenario, employment was predicted to increase by 10 million jobs between 2000 and 2020. That is, assuming current trade and economic growth continues, there will be 10 million additional jobs in the Southeastern Alliance states. In the High Case, employment will go up by 11.7 million jobs. Finally, if there was no growth in exports to Latin America from the Alliance, then employment growth would amount to just under 9 million (**Exhibit B4-6**).

Exhibit B4-6
CHANGE IN ALLIANCE EMPLOYMENT - FROM 2000 TO 2020
(Thousands of Jobs)



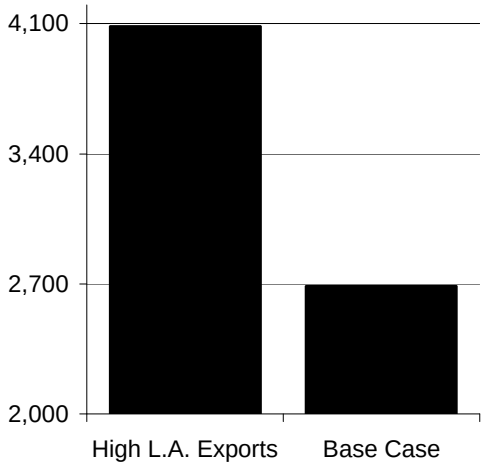
In each case, these changes represent significant growth percentages over the year 2000 prediction (**Exhibit B4-7**).

Exhibit B4-7
PERCENTAGE CHANGE IN EMPLOYMENT, 2020 VS. 2000



The High Case scenario represents notably stronger job creation, though, and the No Exports scenario would yield 2.7 million fewer jobs than the Base Case (**Exhibit B4-8**).

Exhibit B4-8
JOB GROWTH DIFFERENCE OVER "NO EXPORT" SCENARIO
(Thousands of New Jobs)



ECONOMIC DEVELOPMENT IMPLICATIONS

The focus of LATTS was the impact that Latin American trade growth will have on the transportation infrastructure of the Southeastern Alliance Region. As has been described in other components of this study, the increase in the volume of freight traffic associated with U.S./Latin American trade will directly affect the Region's ports, highways, railways and airports.

Trade with Latin America also has broader implications for the overall path of the Region's economic development. The purpose of this component of the study was to:

- provide estimates of the economic impact that Latin American trade might have on the Southeastern Alliance,
- consider the issue of balance of trade, and
- identify business opportunities that arise from the commodity flow forecast.

Economic Context

The importance of the role of trade in economic development has undergone a major transformation in Latin America and other parts of the developing world. In over three-quarters of the world's developing economies, substantial trade liberalization programs are now being implemented as a means of accelerating economic growth in explicit recognition of the failure of protectionist trade policies to deliver economic prosperity. Many of the remaining developing countries have also begun the process of discarding existing trade-impairing policies as part of an effort to liberalize their economies.

Even in developed economies with large domestic markets such as the Southeastern Alliance, the linkage between trade and rising living standards is becoming increasingly clear to broad segments of the population. The people of the Southeastern Alliance Region need to make important strategic choices to ensure sustainable development and increased opportunities for its citizens. A key success factor will be the ability to understand and capitalize on the Region's position in the global trade environment. These choices will necessarily be undertaken in a rapidly changing international arena characterized by:

- **A More Complex Global Marketplace**: Over the last decade demands for both more sophisticated consumer products and high-technology capital goods have risen while heavy industries have declined. The number of competitors in the global marketplace has increased, and intra-Asian trade is now larger in volume than Asian trade with America or Europe.

- **Emerging New Industrial Patterns**: Around the world, traditional vertically organized industry patterns are being replaced by network arrangements among firms. These new arrangements have increased the importance of industrial concentrations, local suppliers, and international distribution networks in determining industry and trade performance.

- **Shortening Product Lifecycles**: The nature of technological innovation and consumer demand has created an environment for new products whose lifecycles are relatively shorter than before. This has forced producers to remain competitive through heightened applications, innovation and quick responses to consumer demands.

- **Changing Requirements for Economic Infrastructure**: Where once basic human resource and physical infrastructure development was sufficient to compete as an industrial economy, new needs have emerged as a result of product advances made by industrial leaders. An increasingly wider array of occupational skills is now required to compete effectively. Attention to global technology developments is necessary to avoid being left behind by industry-destroying innovations. Similarly, information technology and logistics have become part of the basic framework for industrial development.

- **New Patterns of Geographic Division of Labor**: With agreements such as NAFTA, the Common Market, the Association of South East Asia (ASEAN), the Latin American Free Trade Agreement (LAFTA), countries around the world are increasingly reaching across-borders to develop competitive advantages by leveraging the differences in wage rates, technology development and industry capabilities.

- **A New Global Trading Regime**: An entirely new international order imposed by the demands of a new formalized regime governed by the World Trade Organization will influence how countries re-structure their governing methods, enact new legislation, and build relationships based on new trading requirements.

The Southeastern Alliance has a fast growing and dynamic economy that is highly suited to develop a strong position in this new global trading environment. A well-developed basic infrastructure is required which supports a strong set of advanced infrastructure elements such as a well-educated workforce, communications and access to advanced technology. The Region's geographic position and the history of its people make it well positioned to take the best advantage of the division of labor patterns that exist within the Americas. This position is based on the clear understanding that while Latin America offers elements of both market opportunity and competition, it is most helpful to think of it as a partner to work with to develop a mutually beneficial role within the emerging trading bloc of the Americas.

Economic Summary

Exhibit B4-9 presents the basic key performance indicators for the Southeastern Alliance, its member jurisdictions as well as the other regions of the United States. Relative performance of the Alliance versus the U.S. average is plotted in **Exhibit B4-10**. Real Gross State Product in the Southeastern Alliance Region will grow at 2.3% annually, and employment at 1.2%, both above the national average over the 1997-2020 forecast horizon.

The growth in Real Gross State Product in the Southeastern Alliance, at 2.3% annually, rivals the fastest growing (2.5%) Southwest region. Employment in the Southeastern Alliance will grow at 1.2% over the 1997-2020 forecast period, again lagging the Southwest and slightly below the Northwest. The Southeastern Alliance Region is very competitive in terms of business costs and other important elements of a positive business environment. As with many areas, a shortage of skilled labor in the Region is currently limiting its ability to develop the fast growing high-tech industries. However, this is a challenge that is actively being addressed by both business and political leaders in the Region.

Growth forecasts for the member jurisdictions will, for the most part, reflect past economic success, with Texas, Florida, Virginia, and North Carolina leading the way on the mainland. Puerto Rico, however, will achieve the fastest real GSP growth in the Region.

Economic Outlook

The Southeastern Alliance Region has experienced above average growth in recent years, outperforming its northern neighbors, but unable to keep up with the runaway pace of western regions. Texas and Florida led the Region in job growth in 1997, with 4.2% and 4.0% respectively. On the other side of the spectrum, Mississippi and West Virginia lagged behind with growth of 1.6% and 1.5% each, well behind the national average of 2.6%.

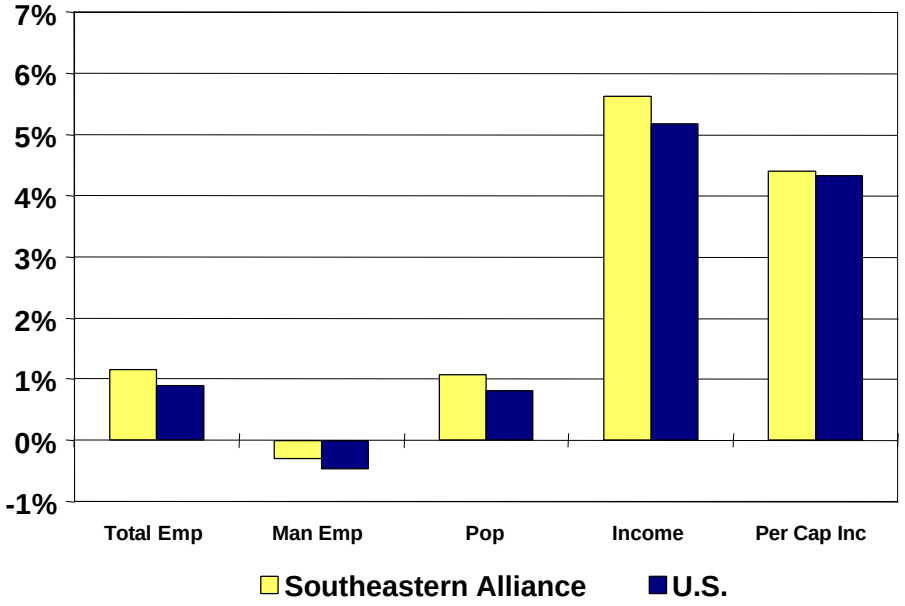
Over the forecast period 1997-2020, these trends will continue, with the Southeastern Alliance achieving above average annual growth in employment and real gross state product, but not as fast as the Northwest and Southwest region. Within the Southeastern Alliance, the growth patterns are consistent through employment, population, and real GSP. Eight of the Region's states will grow faster than the national average, while the other six will lag. Florida and Texas will lead the Region in GSP and employment growth. Florida's rapid population growth will contribute to achieving the highest employment growth rate over the forecast period, while Texas will retain the lead in real GSP growth. These growth trends are especially impressive considering that these states also have by far the largest bases of employment and GSP in the Region.

Exhibit B4-9
ECONOMIC PERFORMANCE INDICATORS

	Average Annual Growth, 1997-2020						
	Real GSP (Bil. 92$)	Population (Millions)	Employment (Thous.)	Manufacturing Emp. (Thous.)	Services Emp. (Thous.)	Personal Inc. (Bil. current $)	Per Capita Income (current $)
Alabama	1.62%	0.47%	0.51%	-0.62%	1.53%	4.90%	4.40%
Arkansas	2.12%	0.83%	0.90%	-0.05%	1.89%	5.45%	4.58%
Florida	2.63%	1.52%	1.73%	0.14%	2.50%	6.18%	4.59%
Georgia	2.17%	1.17%	1.19%	-0.41%	2.23%	5.67%	4.45%
Kentucky	1.77%	0.49%	0.54%	-0.60%	1.52%	4.88%	4.37%
Louisiana	1.66%	0.33%	0.47%	-0.13%	1.24%	4.76%	4.41%
Mississippi	1.64%	0.36%	0.42%	-0.61%	1.39%	4.96%	4.59%
North Carolina	2.31%	1.23%	1.21%	-0.52%	2.56%	5.68%	4.40%
Puerto Rico *	3.18%	0.44%	---	---	---	---	5.89%
South Carolina	2.16%	1.07%	1.08%	-0.63%	2.35%	5.75%	4.63%
Tennessee	1.88%	0.64%	0.72%	-0.45%	1.68%	5.22%	4.54%
Texas	2.65%	1.35%	1.41%	0.07%	2.35%	5.83%	4.42%
Virginia	2.06%	1.01%	1.08%	-0.25%	1.98%	5.42%	4.37%
West Virginia	1.43%	0.29%	0.39%	-0.24%	1.17%	4.97%	4.66%
Southeast Alliance	2.27%	1.08%	1.16%	-0.29%	2.16%	5.63%	4.50%
North Atlantic	1.48%	0.30%	0.44%	-0.89%	1.19%	4.65%	4.36%
Central	1.69%	0.41%	0.51%	-0.58%	1.41%	4.67%	4.33%
Northwest	2.24%	1.14%	1.20%	-0.28%	2.17%	5.42%	4.23%
Southwest	2.47%	1.35%	1.44%	-0.10%	2.33%	5.72%	4.31%
US Totals	1.99%	0.82%	0.90%	-0.47%	1.79%	5.18%	4.33%

**Although Puerto Rico is shown here for comparison, it is not included in the Southeastern Alliance or U.S. totals, since the data was incomplete.*

Exhibit B4-10
RELATIVE PERFORMANCE
(Annual Average Growth, 1997-2020)



Industrial Patterns

A favorable development has been the Region's increasing industrial diversity. Employment gains in the electronics and automotive industries are counterbalancing job losses in the textile, apparel, tobacco, and pharmaceutical industries.

The share of manufacturing employment in the Southeastern Alliance is on par with the national proportion. While employment in this sector will fall, as in the rest of the nation, the losses will not be as severe as in the North Atlantic or Central Regions. The service sector will be the most dynamic in employment growth over the next two decades, buoyed by rapidly growing high-technology industries. The development of the Research Triangle in North Carolina will spur service employment growth to the highest rate in the Southeastern Alliance, at 2.6% per year.

The oil price slump of the mid-1980s dealt a heavy blow to Louisiana and Texas. Nevertheless, strong oil prices in the mid-1990s allowed a revival in energy-related industries. Recent technological advances have lowered exploration and extraction costs, allowing oil producers to remain profitable.

Competitive Forces

The Southeastern Alliance's comparatively strong economic growth is sustained by a strong influx of people. Net migration to the South has been very high over the past five years, with Florida, Texas, Georgia, and North Carolina attracting the most residents. A slight moderation is expected over the next few years, before the retirement of baby boomers starts a new wave of in-migration in the next century. Rapid population gains have resulted in overcrowding of schools and congestion of the Region's transportation infrastructure. In many urban areas, water and air pollution are emerging as serious concerns.

Despite steady in-migrations, labor shortages (especially in high-skilled jobs) are constraining growth and putting upward pressure on wages. Low educational attainments are a limiting factor for many of the Southeastern Alliance states. It is of course encouraging that many business and political leaders understand that the emerging drivers of the economy, high-technology industries, require a highly-trained work force. Current concerns about labor and skill shortages are certainly pressing but they are also a function of success.

All of the Southeastern Alliance states have a per capita income growth rate above the national average. However, this mirrors the picture of low per capita income levels; all SE states are below the national average. Indeed, the Southeastern Alliance average per capita income in 1997 was the lowest among the regions. At the same time, low wages and business costs in the Southeastern Alliance are an attraction to companies. Many states also have incentive programs to attract key industries to locate within their borders.

CLUSTERS AND ECONOMIC DEVELOPMENT

The strength of a region's industry clusters and their ability to generate a strong and growing inflow of export earnings are a key determinant of success.

Clusters are groups of similar businesses that are important to a regional economy because, unlike single companies or plants, together they create more jobs and are better able to adapt to market changes over time. The "clustering effect" happens when many similar firms and their suppliers locate near each other in and around a region. This clustering results in the growth of a specialized set of capabilities—skills, technologies, business services—that is more than the sum of its parts. Successful regional economies are able to provide the businesses in its clusters with advantages in inputs that other competing regions are not able to provide.

Successful clusters are also well positioned in terms of the international distribution of labor. They are based on strong foundations within their own regions but also have strong and complementary linkages with suppliers and markets in other regions. The strength of these linkages effectively determines the level and nature of the region's trade with the rest of the world. In the context of Southeastern Alliance trade with Latin America these linkages are of particular importance.

The clusters of the Southeastern Alliance and the success they have in export markets will play a key role in making its economy more dynamic and adaptable. A strong economic infrastructure creates a more dynamic economy and attracts investment, which in turn leads to improvements in infrastructure and stronger clusters. Each element of this "virtuous cycle" supports the other elements (see **Exhibit B4-11**).

HEMISPHERIC INTEGRATION: A LOOK AT TRADE BALANCES

A key determinant of the Southeastern Alliance's ability to provide continued momentum to its current virtuous cycle of economic development will be its ability to develop a strong and constructive role in the ongoing economic integration of the Western Hemisphere's economy. A common means of evaluating the extent of integration and the benefits of trade is trade balance analysis. While it is important not to draw too many conclusions from such analysis, it is still a helpful way to illustrate the Southeast's role with respect to Latin American trade.

As can be seen in **Exhibit B4-12**, the Southeastern Alliance has a large negative oil and gas trade balance with Latin America. This negative balance is of course primarily a function of large oil and gas resource endowments in Latin America and geographic proximity to a large center of energy and feedstock demand in the Southeast. Similar reasons lie behind the negative trade balances in metallic ores, non-metallic ores, primary metal products, stone, clay and glass and petroleum and coal products. Latin America has large endowments of metallic ores which can be cost effectively transported to the

Exhibit B4-11
THE VIRTUOUS CYCLE OF ECONOMIC DEVELOPMENT

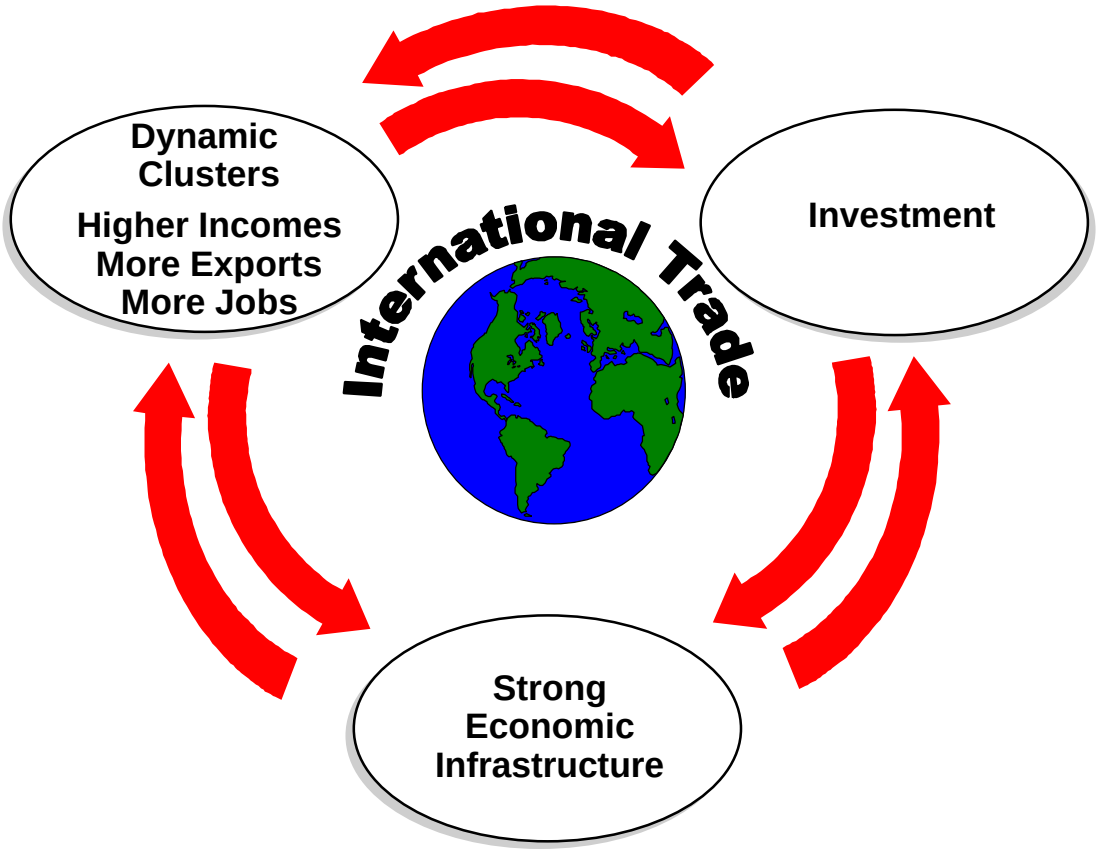


Exhibit B4-12
BALANCE OF TRADE BY COMMODITY: 1996

Commodity	Southeast Alliance Gateway Exports 1996 (MT)	Southeast Alliance Gateway Imports 1996 (MT)	Southeast Alliance Gateway Trade Balance 1996 (MT)
Total All Commodities	**99,009,351**	**241,093,596**	**-142,084,245**
Manufactured Commodities	21,153,234	15,242,930	5,910,304
Primary Commodities	41,714,215	34,894,324	6,819,891
Primary Manufactured Commodities	36,057,747	50,491,652	-14,433,905
Crude Oil and Natural Gas	84,152	140,464,700	-140,380,548
01-Farm Products	23,754,336	5,129,903	18,624,432
08-Forest Products	483,387	234,498	248,888
09-Fresh Fish & Other Marine Products	10,450	176,065	-165,616
10-Metallic Ores	488,186	16,165,245	-15,677,058
11-Coal	7,046,525	1,993,569	5,052,956
14-Nonmetallic Minerals, Exc Fuels	9,931,334	11,195,040	-1,263,707
19-Ordnance and Accessories	2,262	1,229	1,033
20-Food and Kindred Products	5,400,769	3,290,285	2,110,484
21-Tobacco Products	28,076	147,779	-119,703
22-Textile Mill Products	452,914	188,438	264,476
23-Apparel	437,758	544,885	-107,127
24-Lumber and Wood	1,625,164	2,019,248	-394,084
25-Furniture and Fixtures	177,208	273,873	-96,665
26-Pulp and Paper	2,857,580	434,653	2,422,927
27-Printed Matter	333,961	190,406	143,555
28-Chemicals	14,651,670	7,204,978	7,446,691
29-Petroleum and Coal Products	14,285,030	26,728,666	-12,443,637
30-Rubber & Plastics	848,287	276,665	571,623
31-Leather	42,486	80,994	-38,508
32-Stone, Clay, Glass & Concrete	5,593,638	10,370,195	-4,776,558
33-Primary Metal Products	1,527,421	6,187,812	-4,660,391
34-Fabricated Metal Products	1,361,092	989,493	371,599
35-Machinery, exc Electrical	1,385,372	590,768	794,604
36-Electrical Machinery	1,076,982	910,036	166,947
37-Transportation Equipment	1,245,102	2,505,575	-1,260,473
38-Instruments	111,885	72,992	38,893
39-Misc Manufacturing	109,732	62,478	47,254
40-Waste and Scrap	2,336,735	1,690,089	646,646
41-Misc Freight	29,868	3,580	26,288
46-Misc Mixed Shipments	33	12	21
Unknown	1,289,959	969,449	320,510

Southeast for processing into more value-added products. The oil and gas stocks in Latin America give some advantage to the production of oil and gas products from this resource for use in the Southeast.

The key point is that these large negative balances are not in any sense “bad” for the Southeast. They merely indicate the logical outcome of specific natural resource endowments. Similarly, the large positive coal balance for the Southeast is simply a factor of strong resource endowments that are located near efficient Southeast Atlantic ports. In addition, the Region’s forestry industry has become a world leader in the production of softwood fiber that gives it strong advantages in the Latin American market.

The Southeastern Alliance’s agrifood cluster (farm and food products) has a strong positive trade balance with Latin America. This is certainly partly a

function of resource endowments that permit efficient production of wheat, corn and other grains that are in demand in Latin America. However, of increasing importance, is the Southeast's capability of producing high-value added food products that will become increasingly in demand as Latin American per capita income levels rise. In many cases these southbound food products will require special transportation infrastructure to ensure their delivery to consumers in a way that maintains their value-added market position.

The leadership position of the Region's chemical cluster is also demonstrated by the trade balances. The Region's ability to produce basic and more value-added chemicals at low costs makes the Latin American market a promising market.

Some of the positive and negative industry trade balances should be considered in pairs. For example, the positive Textile Mill Products balance is a logical complement to the negative Apparel balance. High value-added textiles and clothing components are produced in the Southeast. These are shipped to Latin America for lower labor cost assembly into apparel, some of which is then shipped back to the Southeast. These pairs of commodity flows are indicative of the success that the Southeast will have in many industries – providing the higher value-added manufactured inputs as well as key design, marketing and R&D inputs to a wider chain of production that includes final assembly in Latin America. This final assembly often takes place in Latin America due to wage cost differentials, but it can also occur there due to reasons of market proximity. Especially in large markets such as Brazil, local assembly will make sense as a means of ensuring the ability to quickly and flexibly respond to changing local market conditions.

Over the next 25 years, the negative trade balance is set to shrink. As can be seen in, **Exhibit B4-13** the overall trade deficit will fall from 42% of total trade (in metric ton terms) to 28% of total trade. Important contributors to this improvement in the overall trade balance include: Nonmetallic Minerals, Waste and Scrap, Petroleum and Coal Products, Transportation Equipment, Misc Manufacturing, Chemicals, Stone, Clay, Glass and Concrete, Electrical Machinery and Food and Kindred Products.

The trade balance will not uniformly improve over the next 25 years. The general trend is for Latin America to experience increased success in a number of industries in which lower labor costs or favorable natural resource endowments play an important role. The following are the most important commodities that will see a deterioration in the Alliance gateway trade balance with Latin America: Apparel, Instruments, Furniture and Fixtures, Printed Matter, Coal, Lumber and Wood, Rubber & Plastics, Fabricated Metal Products, Pulp and Paper, and Farm Products.

Exhibit B4-13
BALANCE OF TRADE BY COMMODITY: 1996 AND 2020

Commodity	Southeast Alliance Gateway Trade Balance 1996 (MT)	Balance as % of total trade (%)	Southeast Alliance Gateway Trade Balance 2020 (MT)	Balance as % of total trade (%)
Total All Commodities	**-142,084,245**	**-42%**	**-295,870,472**	**-28%**
Manufactured Commodities	5,910,304	16%	35,419,054	16%
Primary Commodities	6,819,891	9%	40,949,308	17%
Primary Manufactured Commodities	-14,433,905	-17%	22,509,125	10%
Crude Oil and Natural Gas	-140,380,548	-100%	-394,747,945	-100%
01-Farm Products	18,624,432	64%	41,780,790	48%
08-Forest Products	248,888	35%	2,991,043	59%
09-Fresh Fish & Other Marine Products	-165,616	-89%	-539,538	-85%
10-Metallic Ores	-15,677,058	-94%	-47,107,244	-88%
11-Coal	5,052,956	56%	6,239,114	22%
14-Nonmetallic Minerals, Exc Fuels	-1,263,707	-6%	37,585,132	59%
19-Ordnance and Accessories	1,033	30%	-461	-6%
20-Food and Kindred Products	2,110,484	24%	10,863,417	40%
21-Tobacco Products	-119,703	-68%	-54,348	-12%
22-Textile Mill Products	264,476	41%	1,419,983	41%
23-Apparel	-107,127	-11%	-3,619,075	-53%
24-Lumber and Wood	-394,084	-11%	-12,109,190	-43%
25-Furniture and Fixtures	-96,665	-21%	-1,531,451	-57%
26-Pulp and Paper	2,422,927	74%	9,165,242	52%
27-Printed Matter	143,555	27%	-171,433	-8%
28-Chemicals	7,446,691	34%	42,661,521	56%
29-Petroleum and Coal Products	-12,443,637	-30%	7,063,501	11%
30-Rubber & Plastics	571,623	51%	2,271,465	21%
31-Leather	-38,508	-31%	-254,751	-43%
32-Stone, Clay, Glass & Concrete	-4,776,558	-30%	-4,282,370	-10%
33-Primary Metal Products	-4,660,391	-60%	-22,933,511	-59%
34-Fabricated Metal Products	371,599	16%	-1,673,671	-9%
35-Machinery, exc Electrical	794,604	40%	7,232,109	47%
36-Electrical Machinery	166,947	8%	4,203,859	26%
37-Transportation Equipment	-1,260,473	-34%	372,784	1%
38-Instruments	38,893	21%	-218,286	-17%
39-Misc Manufacturing	47,254	27%	352,047	53%
40-Waste and Scrap	646,646	16%	15,129,485	73%
41-Misc Freight	26,288	79%	107,763	86%
46-Misc Mixed Shipments	21	47%	26	100%
Unknown	320,510	14%	3,933,546	66%

ECONOMIC IMPACT

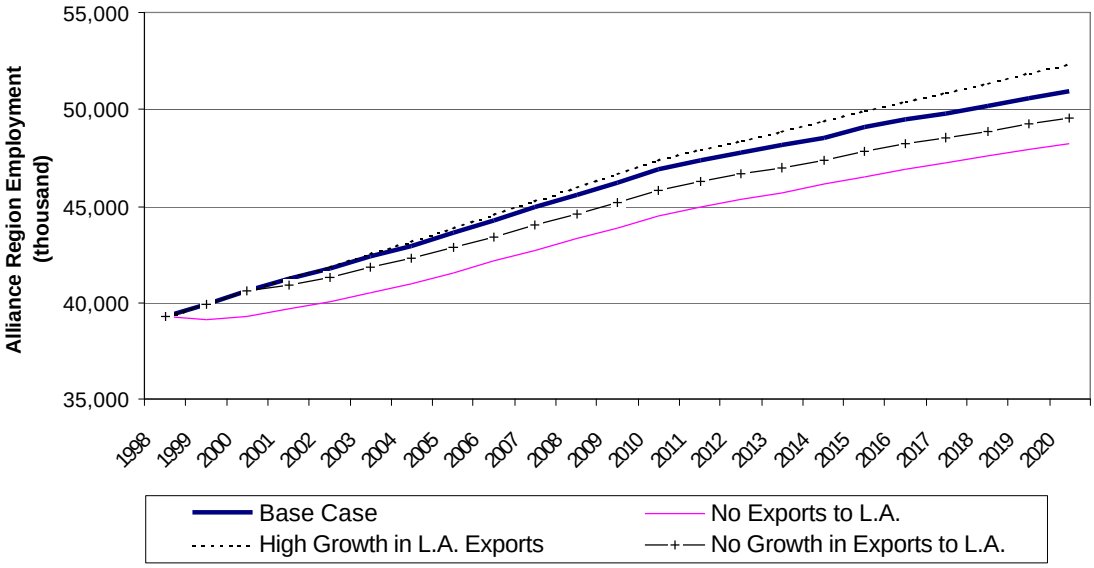
Trade with Latin America generates jobs for the people of the Southeastern Alliance. Furthermore, the Region's position in the hemispheric economy means that jobs created will be in the more value-added industries and in the higher wage occupations employed within those industries. While this should be clear from simple analysis of the trade figures, a quantitative analysis was undertaken to provide a clear estimate of the benefits generated by exports to Latin America. For this analysis, a system of U.S. state and regional macroeconomic models was used to undertake two simulations which explore the impact of Latin American trade on the Alliance Region.

The key findings were that nearly 1.3 million of the Alliance Region's jobs are currently supported by exports to Latin America. Strong growth in exports to

Latin America over the 25 year analysis period will generate an additional 1.4 million jobs. In terms of economic output, growth in exports to Latin America will generate an additional $105 billion (1992 $) of Real Gross Regional Product – roughly equal to the current output of Louisiana.

Exhibit B4-14 illustrates some of these impacts on non-farm employment in the Region. The "Base-Case" scenario is for the level of employment in the Region over the 25 year analysis period which incorporates the export growth forecast in this study. The "No-Growth" level of employment shows the impact of a complete absence of Latin American export growth. The more extreme "No-Export" situation shows the impact of Latin American exports falling to zero. The "High-Growth" scenario shows how a higher growth forecast of exports to Latin America would affect employment in the Region.

Exhibit B4-14
ALLIANCE REGION NON-FARM EMPLOYMENT



No Latin American Exports Scenario

The first simulation was based on the question: What if exports to Latin America did not exist? This involved assumptions that allowed for the removal of current and forecast Latin American trade from the Southeastern Alliance's economy. The results from this analysis were then used to determine the number of jobs that are and will be supported by Latin American exports.

As can be seen in **Exhibit B4-15**, by 2020 there will be 2.7 million jobs dependent on exports to Latin America. Without these exports, employment would be lower by 5.3%, real Gross Regional Product would be 5.3% lower and state and local taxes would be 5.7% lower. Looking over the shorter-term, the results show that in the year 2000, Latin American trade will be supporting 1.29 million jobs in the Region and generating $5.2 billion (1992 $) in state and local taxes.

Exhibit B4-15
IMPACT OF LATIN AMERICA TRADE ON THE SOUTHEASTERN ALLIANCE
What if there were no exports to Latin America?

	2000	2005	2010	2015	2020
Total Nonfarm Employment (thousands of jobs)					
Base Case	40,583.77	43,604.58	46,869.14	49,049.88	50,932.59
"No L.A. exports" Alternative	39,290.45	41,555.09	44,509.87	46,542.07	48,244.15
Difference	-1,293.32	-2,049.49	-2,359.27	-2,507.82	-2,688.44
%Difference	-3.2	-4.7	-5.0	-5.1	-5.3
Real Personal Income ($billions)					
Base Case	1,937.22	2,225.40	2,581.84	2,946.39	3,353.67
"No L.A. exports" Alternative	1,881.51	2,108.87	2,434.16	2,777.82	3,159.20
Difference	-55.70	-116.53	-147.68	-168.57	-194.48
%Difference	-2.9	-5.2	-5.7	-5.7	-5.8
Real Gross Regional Product ($billions)					
Base Case	2,251.20	2,572.36	2,914.61	3,173.81	3,393.71
"No L.A. exports" Alternative	2,175.10	2,448.42	2,764.75	3,009.04	3,212.66
Difference	-76.10	-123.94	-149.86	-164.76	-181.05
%Difference	-3.4	-4.8	-5.1	-5.2	-5.3
State and Local Taxes ($billions)					
Base Case	182.67	209.12	236.77	264.08	291.89
"No L.A. exports" Alternative	177.44	198.25	223.35	249.14	275.17
Difference	-5.23	-10.87	-13.41	-14.94	-16.72
%Difference	-2.9	-5.2	-5.7	-5.7	-5.7

The impact of exports to Latin America is distributed unevenly across the Region. As is shown in **Exhibit B4-16**, states such as Texas, Louisiana and Kentucky would see the greatest percentage decrease in their economic output if there were no exports to Latin America. Economic output in states such as Virginia, North Carolina, Georgia and Arkansas are relatively less dependent on exports to Latin America.

High Latin American Exports Scenario

The second simulation was based on the question: What if the High Trade scenario came to pass? This simulation involved increasing exports to Latin America by the amount identified in the "High Trade forecast scenario." The results were expressed in terms of incremental jobs, output, income, and taxes attributed to this additional growth.

As can be seen **in Exhibit B4-17**, by 2020 the High Trade scenario would have generated 1.4 million new jobs and 8.4 billion (1992 $) in state and local government taxes – an increase of 2.7% and 2.9% respectively over the Base Case. Much of the economic pay-off of the High Trade scenario will happen over the longer term, but this profile is roughly in-line with the growth profile of the trade scenario itself.

Exhibit B4-16
EXPORTS TO LATIN AMERICA: IMPACT ON REAL GROSS REGIONAL PRODUCT IN 2020

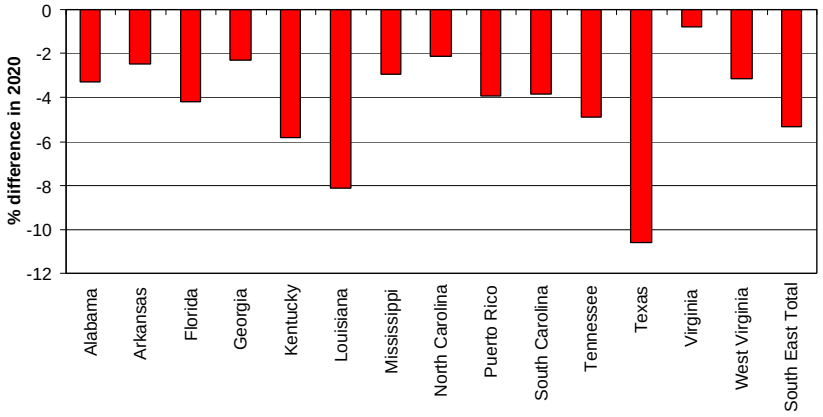


Exhibit B4-17
IMPACT OF HIGH TRADE SCENARIO ON THE SOUTHEAST ALLIANCE REGION
What if the High Trade scenario came to pass?

	2000	2005	2010	2015	2020
Total Nonfarm Employment (thousands of jobs)					
Base Case	40,583.77	43,604.58	46,869.14	49,049.88	50,932.59
"High L.A. exports" Alternative	40,630.26	43,845.51	47,377.72	49,936.46	52,333.12
Difference	46.49	240.93	508.57	886.58	1,400.53
%Difference	0.1	0.6	1.1	1.8	2.7
Real Personal Income ($billions)					
Base Case	1,937.22	2,225.40	2,581.84	2,946.39	3,353.67
"High L.A. exports" Alternative	1,939.00	2,237.38	2,611.16	3,002.96	3,451.69
Difference	1.79	11.98	29.32	56.57	98.02
%Difference	0.1	0.5	1.1	1.9	2.9
Real Gross Regional Product ($billions)					
Base Case	2,251.20	2,572.36	2,914.61	3,173.81	3,393.71
"High L.A. exports" Alternative	2,253.89	2,586.81	2,946.21	3,230.91	3,486.16
Difference	2.69	14.45	31.60	57.10	92.46
%Difference	0.1	0.6	1.1	1.8	2.7
State and Local Taxes ($billions)					
Base Case	182.67	209.12	236.77	264.08	291.89
"High L.A. exports" Alternative	182.84	210.24	239.44	269.10	300.31
Difference	0.17	1.12	2.67	5.02	8.43
%Difference	0.1	0.5	1.1	1.9	2.9

SECTION B5
INTERNATIONAL TRADE AGREEMENTS AND BARRIERS

As noted in Section B2, the LATTS High Case forecast of international trade was based, in part; upon a scenario that assumes fully liberalized trade and investment flows in the Western Hemisphere. This report section provides a context for the scenario by:

- Examining the history of trade agreements and how they are evolving from being purely preferential toward being less restrictive;
- Discussing the different trade barriers which are used by countries to protect specific domestic sectors; and
- Identifying specific trade barriers across Latin American countries overall, and for specific commodity groups.

TRADE BARRIERS

A number of trade barriers have been employed in order to protect industries, to raise revenue, and to counter the barriers erected by other foreign countries. These barriers create a distortion of relative prices across countries and, consequently, distort individual consumption patterns and lower individual welfare. A general discussion of these barriers and their consequences is provided below.

Tariffs

Tariffs have been a means of protecting domestic industries and creating revenue for centuries. A tariff is really nothing more than a tax placed on goods imported into a country. In the early years of the U.S., tariffs were the main source of revenue for the Federal government and continued to be an important source of revenue up until the 1930's. Today, the average tariff rates across goods and across countries are between 10 and 15 percent and are not a significant source of revenue for most countries (Rajapatirana, 1994b). However, tariffs still present a significant barrier to trade among nations.

By placing a tax on imported goods, a tariff raises the price of goods and allows certain domestic producers to produce at higher levels. In doing so, resources may be diverted away from industries for which a country has a competitive advantage to industries for which the country does not have a competitive advantage. Diversion of resources creates higher prices and lower quality for goods that are produced domestically. Therefore, a tradeoff exists between saving jobs in specific industries versus the welfare of consumers.

Quotas

A quota, also referred to as a quantitative restriction, is a policy tool to restrict trade by placing a ceiling on the amount of a product that can be imported during a given period. As a result, the restriction will create artificially high prices on goods and reduce the amount of competition within that industry. A variation of the quota system is a voluntary export restrictions (VER). Under VER, an exporting country is asked to restrict their exports under the threat of explicit restrictions and trade barriers.

In general, the goods that have quotas placed against them are goods that the country does not have a competitive advantage in and yet they produce them. Because the country does not have a competitive advantage in the goods, the cost of producing the goods will be higher than the cost of other countries, and therefore, the selling price will be higher than the world price of the goods. In the end, consumers are the ones who suffer the consequences by paying higher prices for the goods that have restrictions placed on it.

Duties

A duty is a tax imposed on imported goods by the customs authority. It is often applied as an ad valorem tax and is either based upon the value of the good or the weight or quantity of the good. A duty has a similar effect as a tariff in that it raises the price of imports and distorts the relative price of goods and consumption patterns. Therefore, duties create a consumer welfare loss.

Exchange Rate Controls

Many third world countries try to be protective of their unstable and struggling economies. Therefore, they want to be self-reliant as much as possible to encourage their domestic industries. In an attempt to protect their domestic industries, third world countries will often create exchange rate barriers to reduce the influx of foreign currency, which reduces the ability of a country to purchase imports. Consequently, residents will be forced to purchase goods from domestic producers which creates an artificially diversified domestic economy that produces a number of goods for which the country does not have a competitive advantage. As a result, consumers will have to pay a higher price on goods and services and resources will be diverted away from industries for which they have a competitive advantage (Gwartney and Stroup, 1995).

Dumping Policy

Dumping occurs when a producer sells a product in a foreign market at prices below that of their own domestic market. Dumping could be just a strategy of a producer (predatory dumping practices), or it could be the result of foreign government subsidies. This will not only enable a domestic producer to crack the foreign market, it may, eventually, drive out competition in that foreign market.

Subsidies

Subsidies come in the form of grants, concessionary loans, loan guarantees, and tax credits that are provided by a government to provide financial benefits on the production, manufacturing, and distribution of goods or services to foreign markets. Once again, these subsidies distort the relative price of goods and distort individual consumption patterns. Furthermore, it is an anti-competitive practice that restricts the ability of foreign producers to compete in a worldwide market. Subsidies have been widely used in the agriculture industry.

Fair Trade Practices

Policies that are recognized as countervailing polices of trade can become protectionary policies as well. Trade policies such as anti-dumping, safeguards, and countervailing duties can be used to restrict trade and actually hurt free trade when these techniques are abused. When one country tries to retaliate against another country by using these policies, they can also create an escalating trading war that hurts consumers and producers of each country.

Price Bands

Many countries use what is referred to as “price bands” to restrict the importation of agriculture products. Price band is a policy instituted by the government that calculates the price range of a product from a time series analysis of international prices for that product. For example, a government may examine the prices of a product for a 60 month time period. Out of these prices, a portion of the highest and lowest prices will be eliminated. The remaining highs and lows establishes the price band. Imports entering within the price rage are assessed a standard tariff rate. Imports entering above that price range are assessed a lower tariff rate, while imports entering below that market rate are assessed a very high tariff rate. Therefore, if a particular country has low prices for a good because of excessive supply, their goods will have a higher tariff rate assessed to the product.

Other Barriers

While there has been a decline in tariff rates across countries, a number of other barriers have often taken the place of the tariff. These barriers include licensing requirements[1], government procurement practices[2], technical standards[3], and domestic-content rules[4]. In addition, a government can also

[1] Often, a country can require a license, which is a property right to export to a country. The country will only issue so many licenses and they are then bought and sold among producers who want to export to the country.

[2] For government contracts, domestic producers are often given preferential treatment.

[3] This could include pollution standards, safety standards, measurement standards, and health standards.

make the custom system complex and burdensome to hinder imports. Like any other barrier, these requirements reduce the level of competition within a market and artificially create higher prices that reduces the welfare of the consumers.

MOTIVATION FOR THE FREE TRADE MOVEMENT

This review does not argue either for or against free trade. Instead, the review attempts to identify whether the "free trade wheel" is indeed in motion, driven fundamentally by decades of trade negotiations and agreements which as a whole tend towards being freer and more open.

Supporters of freer trade argue that it allows individuals the liberty to buy and sell goods and services from a worldwide market, and that (most) all countries will improve their quality of life when participating in trade that is without restrictions. Free trade allows people to make consumption decisions that maximize their welfare: restricted trade does not allow that freedom. In other words, when there is free trade, individuals are free to choose the least cost alternative, and hence, improve individual welfare.

Free trade also enhances production efficiency by allowing countries, or sectors within, to specialize in the production of goods in which they have a comparative advantage. A comparative advantage results from different countries having different endowments in factors of production. For example, if a country has abundant supply of coal, while another country has a highly technical labor force, each country should specialize in the production of goods which matches their resource pool. So in this case, the first country ideally should specialize in the production of coal and energy, while the second country should specialize in goods that require a technical labor force.

By specializing in goods in which the country has a particularly competitive advantage, those goods can be produced at a lower cost than when the goods are produced by all countries. In doing so, all participants in trade can enjoy goods at a lower cost, higher quality, and increased quantity than if they were produced by all countries.

This is in line with the tendency for industries to increasingly rely on globally integrated supply chains, whereby the production and distribution of goods is done through a chain of suppliers located across several international borders. To remain competitive, parts and components are produced by suppliers which specialize in certain production factors. Moreover, these specialists tend to be located where their process receives the greatest comparative advantage. For example, labor-intensive processes (like simple assembly, or sewing) gravitate to areas where labor is relatively cost effective. On the other hand, capital-intensive processes tend to gravitate to areas where labor costs are relatively higher.

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[4] A domestic content rule requires a certain portion of a product to be made domestically. This tactic is often used by the automobile industry within the U.S..

Naturally free trade also leads to industrial shifts whereby low wage jobs move to lower cost locations. Not everyone is convinced yet that all laid off employees can effectively improve their skills and move into sectors (processes) which have a comparative domestic advantage. However, a landmark study in 1984[5] showed that the cost of saving jobs by restricting trade (higher cost of goods) was greater than the income generated by the saved jobs. The study found that tariffs saved over 116,000 jobs in the apparel industry. However, the cost of saving each job was over $45,000 while the average earning of the jobs was just under $7,000.[6] Therefore, for every dollar saved in earnings, there was $6.80 lost in an increase the cost of goods. Other examples are provided in **Exhibit B5-1**. In **Exhibit B5-2**, the increase in prices of different goods is highlighted.

Exhibit B5-1
COST OF PROTECTING JOBS

Product	Number of Jobs Protected	Average Earnings	Cost Per Job	Ratio of Cost to Earnings
Citizen's band transceivers	587	$8,500	$85,539	10.1
Apparel	116,188	6,669	45,549	6.8
Footwear	21,000	8,340	77,714	9.3
Carbon Steel	20,000	24,329	85,272	3.5
Autos	58,000	23,566	85,400	3.6

In 1980 dollars

Exhibit B5-2
IMPACT OF TRADE BARRIERS ON PRICES

Item	1985 Free Market Price	1985 Price with Trade Restraints
Blue Jeans	$14.50	$18.00
Rubber Boots	10.00	12.00
Vinyl Purse	10.00	12.00
Leather Purse	40.00	44.00
Box of Candy	2.00	5.00
Automobile	7,500.00	10,000.00

Source: Gary Clyde Hufbauer, Diane T. Berliner, and Kimberly Ann Elliot, Trade Protection in the United States: 31 Case Studies (Washington, DC: Institute for International Economics, 1986); Clyde Farnsworth, "Trying to Shield Injured American Industries," *New York Times*, January 18, 1987.

[5] Source: Keith E. Maskus, "Rising Protectionism and U.S. International Trade Policy," Federal Reserve Bank of Kansas City, Economic Review (July/August 1984), pp. 3-17.
[6] In 1980 dollars.

IMPACT OF TRADE AGREEMENTS ON GLOBAL TRADE

Trade agreements have created an ever-shrinking world that has progressively been moving towards a global market. On a daily basis, U.S. consumers buy goods that are produced in places like China, Germany, and Brazil, while U.S. companies produce goods that are consumed by people in places like Australia, Mexico, and Russia. This increase in trade can be attributed to a number of factors including the reduction in the cost of communication and transportation, as well as other socioeconomic factors which have lead to higher worldwide disposable income. Another key factor is an almost century long series of continuously evolving international negotiations that have led to numerous agreements to reduce barriers to trade.

These trade agreements include both global and regional agreements. Examples of global agreements include the General Agreement on Tariffs and Trade (GATT) and the World Trade Organization (WTO). Examples of regional agreements include the Latin American Free Trade Agreement (LAFTA), the Andean Pact, the Central American Common Market (CACM), the European Economic Community (EC), the Association of South East Asia (ASEAN), and the North American Free Trade Agreement (NAFTA). These agreements have reduced trade barriers among member nations and directly led to an increase in volume of trade as displayed **in Exhibit B5-3**. Ultimately, the global economy is progressing towards conditions involving free movement of goods across-borders with less restrictions to what people can buy.

Exhibit B5-3
IMPACT OF GLOBAL TRADE NEGOTIATIONS ON TRADE
(Constant dollars)

Time Frame	Number of GATT Countries	Value of Trade Covered	Average Tariff*
Mid 1940's	23	$10 Billion	100%**
Mid 1980's	124	$755 Billion	5 %

Source: Compiled from "Evolution of Trade Treaties and Trade Creation: Lessons for Latin America."
** Average tariff for industrialized nations.*
*** Before GATT (1947).*

PRINCIPLES AND EVOLUTION OF TRADE AGREEMENTS

Over time, countries have realized the importance of trade and have pursued international agreements that have reduced the barriers to trade.[7] The pursuit of freer trade is often referred to as trade liberalization. Trade liberalization is

[7] For additional evidence on how trade barriers can affect economic growth, refer to Barro (1991), Gould, Ruffin, and Woodbridge (1993), Michaely, Papageogiou, and Choski (1991), and Gwartney, Block, and Lawson (1992).

the act of reducing trade barriers by reducing tariff rates, reducing quantitative restrictions, reducing the variance in protection across industries, and increasing the transparency of trade policy. These agreements have generally fallen into one of two categories (Rajapatirana, 1994b):

1. Equal Treatment
2. Preferential Treatment

The classification is based upon a principle referred to as the most favored nation (MFN) principle whereby any access to a domestic market given to one trading partner has to be extended to all countries. Under equal treatment, all countries are given access, while under preferential treatment, only certain countries are given access to a domestic market, while other countries are not. The principle is also applied in terms of the number of sectors involved. At the preferential extreme, a single sector or commodity is protected through agreement, while at the other extreme all goods are traded freely.

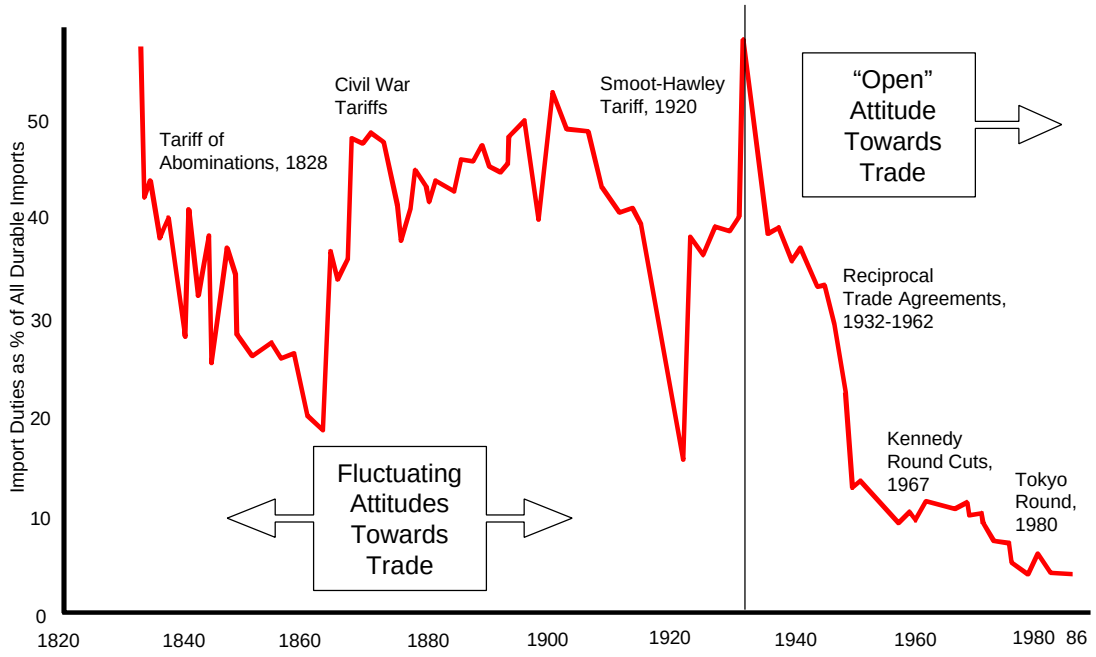
History of Agreements

In the mid 1800's, a number of regional agreements that provided preferential treatment for specific countries were made among European countries to reduced trade barriers. These agreements began the movement towards freer trade. Meanwhile, the U.S. had an inconsistent stance on free trade as a number of trade barriers were reduced and then reinstated. By the 1920's, the U.S. had a tariff rate as low as 20 percent, but in 1930, the U.S. had a radical shift in policy by instituting the Smoot Hawley tariff that significantly increased U.S. tariffs. Within a few short years, the U.S. recognized the harmful effects of this tariff and started to make international regional agreements (referred to as Reciprocal Trade Agreements) that provided preferential treatment to selected countries. In the course of the next 60 years, the U.S. entered a number of agreements that provided both preferential and equal treatment to world trading partners. Each of these trade agreements has made a significant contribution towards free trade through the reduction of trade barriers including tariff rates. **Exhibit B5-4** displays how tariffs have been reduced within the U.S. through the negotiation of numerous agreements. Many of these agreements are highlighted in the following pages.

General Agreement on Tariffs and Trade

An agreement that exemplifies equal treatment and the MFN principle is the General Agreement on Tariffs and Trade (GATT). A country that gains membership into GATT automatically gains access to the rest of the members of the world trading system on a MFN principle. The agreement creates an incentive for member countries to specialize in industries for which they have a competitive advantage, rather than specializing in industries they already have. In the end, and although not perfect, GATT has led to greater competition and reduced cost of production for industries across countries.

Exhibit B5-4
AVERAGE U.S. IMPORT DUTIES, 1820-1986



GATT was developed in the late 1940's and has evolved over the years with intense negotiations among member countries. Through GATT a number of changes in the world trading system occurred. At the forefront is the use of tariffs. At the outset of GATT, the average tariff rate was over 100 percent among industrialized countries (Edwards, 1994). By 1993, this rate had fallen to less than 5 percent among industrialized nations. This remarkable decrease has changed consumption patterns and the welfare of people across the world. Trade among countries have increased dramatically over the last several decades creating new business opportunities for companies and enhancing the standard of living across the world.

Regional Trade Agreements in the Western Hemisphere

During the same time that GATT was evolving, Regional Trade Agreements (RTAs) were forming. In general, the initiated RTAs did not adhere to the MFN principle and provided preferential treatment to an exclusive number of countries. These agreements were often formed among countries in close geographical proximity to one another. These RTAs were accepted under GATT through clauses with the rationale that RTAs were taking steps toward freer trade, even if it was not consistent with GATT and the MFN principle.

In the 60's, a number of RTAs were formed within the Western Hemisphere including the Central American Common Market (CACM), Latin American Free Trade Agreement (LAFTA), and the Andean Treaty (Rajapatirana, 1994b).

These agreements were pursued by Latin American countries with a hope of creating a larger economic region in which economies of scale could be obtained by producers. In many cases, these agreements included a complex system of regulations and were often done on a product-by-product basis. Consequently, these trade agreements ended up actually reducing the trade among the regional partners and isolating these countries from the international economy (Rajapatirana, 1994b).

By the 1980's, many of these original negotiated agreements were either abandoned or modified, while other RTAs were forming. This new generation of RTAs had a greater emphasis on trade liberalization. In other words, these RTAs were not developed to protect specific industries but rather to open new markets for industries. This trade liberalization was accompanied by monetary and fiscal reforms including a devaluation of exchange rates, reduction of fiscal deficits, deregulation and privatization of many public enterprises.

The agreements of the 80's included a modified CACM agreement, a modified Andean Treaty called the Andean Pact, the Mercosur agreement, the Caribbean Basin Act, G3 agreement, the Canada U.S. agreement (CUSFTA), and the North America Free Trade Association (NAFTA) (Rajapatirana, 1994b). Each of these agreements have had varying levels of success and have changed the way industries locate, import, and export. However, the agreements are not really free trade agreements, rather they are freer trade agreements. A Western Hemisphere trade agreement, such as the current Free Trade Area of The Americas (FTAA) initiative, would be a significant step towards free trade in the Americas.

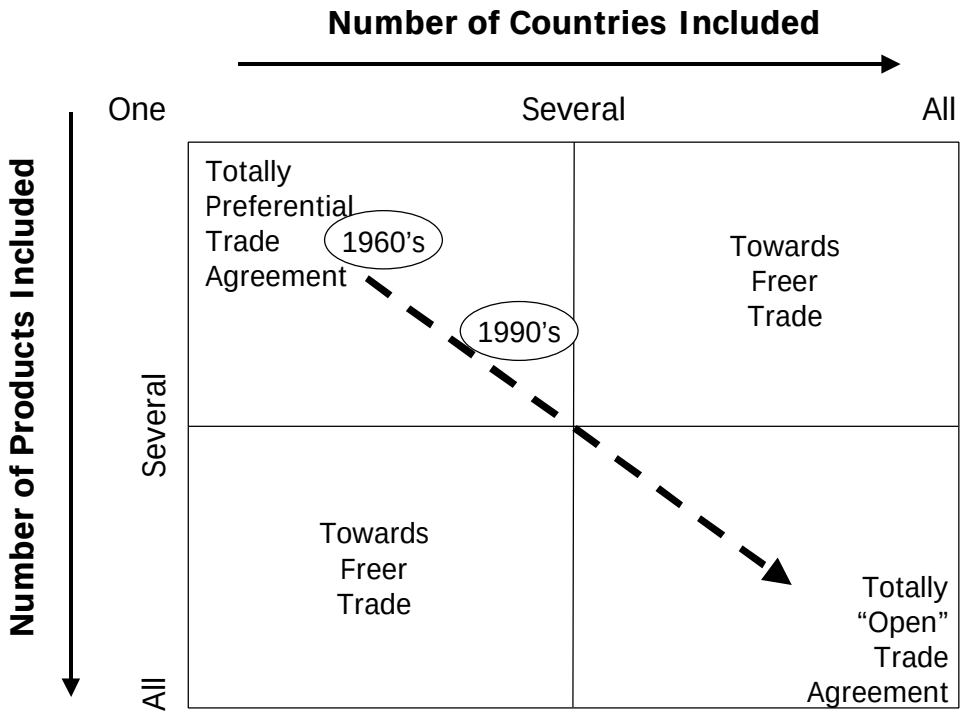
These agreements were more consistent with the MFN principle with greater access to the world market **Exhibit B5-5** illustrates the nature of trade agreements and the movement towards freer trade. The exhibit suggests that the market is moving towards greater and equal access for all countries. The evolution of these agreements are highlighted in the following discussion in which many of these agreements are described in more detail.

THE EVOLVING NATURE OF LATIN AMERICAN REGIONAL TRADE AGREEMENTS

Andean Community

The Andean Community was formed in 1969 and was formerly knows as the Andean Pact or Andean Group. The agreement is among the member countries of Bolivia, Columbia, Ecuador, Peru, and Venezuela that creates an economic region of over 75 million people and a combined GDP of $149 billion. During the late 80's and 90's, the Andean Community experienced tremendous success as intra-Andean trade increased by about 29 percent per year for the years 1990 through 1995 while maintaining a strong growth in exports to non-Andean countries. However, the growth that the group experienced in the mid 1990's has recently slowed down and the future success of the trade agreement may depend upon the developments of FTAA (INT, 1996).

Exhibit B5-5



Caribbean Community (Caricom)

Established in 1973 as successor to the Caribbean Free Trade Association, Caricom includes the countries of Antigua, Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Monsterrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad & Tobago. The economic region comprising these countries includes over 6 million people with a combined GDP of $28.6 billion with an average per capita income of over $4,930. Trade among the member countries has been growing at a rate of about 8 percent per year, while exports to the rest of the world has been growing at slower 5.5 percent. However, trade still only represents a rather small 13 percent of the total GDP among the member countries and indicates that there is room for further integration (INT, 1996).

Central American Common Market (CACM)

CACM was established in 1961 among the member countries of Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua. CACM has a total population of over 29 million people with a combined GDP of $93 billion with an average per capita income of $2,984. Intra-regional trade among the member countries accounts for 20 percent of total CACM exports with both exports and imports growing at a rather steady and strong pace (INT, 1996). The CACM also established common external tariff rates of 5-20 percent and has helped

promote trade with the U.S. During the early 90's, exports from the U.S. grew at an average annual rate of 60 percent (INT, 1996).

Common Market of the South (Mercosur)

Mercosur was established in 1991 among the member countries of Argentina, Brazil, Paraguay, and Uruguay with a total population of nearly 200 million people and a combined GDP of $1 trillion. While both imports and exports are growing at healthy rate, imports into the member countries have been growing at nearly three times the rate of total exports. Common External Tariff (CET) rates have been established which will place the average tariff rate at 10 percent. The CET rates have been applied to about 90 percent of the goods imported into these countries with each country having an exclusion list. Future agreements with Mexico, Chile and Bolivia are in the works. The sheer size and political clout these countries have among Latin American countries have made them important to future trade agreements (INT, 1996).

G-3

Venezuela and Columbia signed a free trade agreement with Mexico on June 13, 1994 that established the G-3 agreement. The G-3 agreement addresses a number of issues including the protection of intellectual property and the scope of the agreement is almost as comprehensive as the NAFTA agreement (INT, 1996).

North America Free Trade Agreement (NAFTA)

NAFTA was established in 1994 with the member countries of Canada, Mexico, and the U.S.. These three countries have a total population of nearly 400 million and combined GDP of $8.0 trillion with an average per capita GDP of about $20,560. Obviously, NAFTA is an important economic region for any further negotiation of free trade agreements. NAFTA is in the process of eliminating almost all tariffs and trade barriers on North American industrial and agriculture products traded between the member nations. In addition, NAFTA addresses environmental and working condition issues. NAFTA is a highly important economic region for any further negotiation of free trade agreements.

While the Mexican Peso crisis created some setbacks for trade among the countries, it has recovered nicely and has shown strong growth among member countries and to the rest of the world. In particular, trade has increased seven-fold between Mexico and Canada since 1990 (INT, 1996).

Free Trade Area of the Americas (FTAA)

This trend continues as a trade agreement among 34 countries in the America's, referred to as the "Free Trade Area of the Americas" (FTAA), is currently under negotiation. In the two summits that have been held so far for FTAA, heads of state of each participating country has pledged to increase market openness, strive for a balanced and comprehensive agreement on a number of issues including tariff and non-tariff barriers for agriculture, investments, intellectual

property rights, government procurement practices, technical barriers to trade, safeguards, rules of origin, anti-dumping and countervailing duties, and sanitary and phytosanitary standards and procedures. These 34 states have agreed to complete the FTAA agreement by the year 2005.

The FTAA would provide for free trade stretching from Alaska to Cape Horn. FTAA is generally supported by the people as a Wall Street Journal survey of the people of both the U.S and Latin American suggests that 80 percent of those polled in the U.S and the Latin America say they support free trade (Schumacker, 1998). However, there is less support of the finer details of the agreement. Despite this fact, the past agreements and the change of public opinion has created momentum for a Western Hemisphere agreement that would reduce the trade barriers between North America and Latin American.

Summary

Exhibit B5-6 summarizes the changes that have occurred to a number of Latin American countries over the last couple of decades due to the agreements. Through the table, it is evident that restrictions in the form of tariffs have fallen substantially in the last couple of decades. While tariffs are not the only trade restriction, it exemplifies what is happening to the barriers to trade in general.

Regional trade agreements have contributed to the rapid increase of trade for the Latin American countries. Total trade as a percentage of the region's GDP now equals 36 percent, up from 18 percent in 1986 (INP, 1996, p. 3). Much of this increase in trade also can be attributed to regional integration.

MOTIVATIONS FOR A WESTERN HEMISPHERE REGIONAL TRADE AGREEMENT

There are motivations and incentives for North American countries (U.S. and Canada) and South and Central American countries (Latin America) to pursue a WHRTA. First the motivations for Latin American countries are:

1. Expand Trade with the U.S. – A WHRTA would give member Latin American countries access to the lucrative U.S. market, thereby expanding trade. Latin American countries rely heavily on trade with the U.S.. (Rajapatirana, 1994b).

2. Increased Trade Creates Jobs – Member Latin American countries will experience an expansion in jobs and income through industrial expansion (Rajapatirana, 1994b).

3. Get a Jump on Asian Competition - Latin American countries have similar competitive advantages to Southeast Asia in terms of labor and input resources and, therefore, a WHRTA would allow the Latin American countries to be competitive with the counties of Southeast Asia (Rajapatirana, 1994b)

Exhibit B5-6
PRE AND POST REFORM TARIFF RATES

Country	Year Pre-Reform	Post-Reform	Average Unweighted Legal Tariff Rates Pre-Reform	Average Unweighted Legal Tariff Rates Post-Reform	Tariff Range Legal Tariff Rates Pre-Reform	Tariff Range Legal Tariff Rates Post-Reform
Argentina	1987	1991	42[a]	15	15-115[a]	5-22
Bolivia	1985	1991	12[b]	8	NA	5-10
Brazil	1987	1992	51	21	0-105	0-65
Chile	1984	1991	35	11	35	11
Columbia	1984	1992	61	12	0-220	5-20
Costa Rica	1985	1992	53[a]	15[a]	0-1,400[a]	5-20
Ecuador	1989	1992	37[a]	18	0-338[a]	2-25[e]
Guatemala	1985	1992	50[a]	15[a]	5-90	5-20
Honduras	1985	1992	41[a]	15[a, d]	5-90	5-20
Jamaica	1981	1991	NA	20	NA	0-45
Mexico	1985	1990	24[c]	13[c]	0-100	0-20
Paraguay	1988	1991	NA	16	NA	3-86
Peru	1988	1992	NA	17	0-120	5-25
Trinidad and Tobago	1989	1991	NA	41[a]	NA	0-103[a]
Uruguay	1987	1992	32	18	10-55	12-24
Venezuela	1989	1991	37	19	0-135	0-50

Source: Guasch and Rajapatirana.1994. *The Interface of Trade, Investment, and Competition Policies: Issues and Challenges for Latin America.* Working Paper, Washington D.C.: World Bank.

a Including tariff surcharges
b Import weighted average tariff
c Production weighted average
d Including tariff surcharges
e Ecuador also has a specific tariff of 40 percent on automobiles

4. Increased Investment and Technology Transfer – A WHRTA would increase the amount of investment attracted to these countries. Latin America is trying to recover from political instability, debt, and insufficient infrastructure. Through a trade agreement, greater investments into these countries may occur and create economic activity and greater stability through this direct investment (ECLA 1991).

5. Don't Want to Miss Out on Anything Big - NAFTA created preferential treatment to Mexico by the U.S. that may mean lost opportunities for other Latin American countries. Consequently, many Latin American countries are afraid of being left out in the cold from the recent NAFTA agreement and are expected to respond quickly to increased trade opportunities with the U.S. (Coes 1991).

6. It Has Worked Elsewhere - Asian countries have reduced their barriers and encouraged free trade.[8] Consequently, the Latin American countries are looking for similar type of success (Gwartney and Stroup, 1994).

7. Stronger Global Trade Leverage – A WHRTA agreement would allow a member Latin American country to have greater bargaining power than in a global trade bargaining like GATT (Rajapatirana, 1994b).

For Canada and the U.S., the incentive to join in such an agreement may not have the same explicit benefits that can be seen in the Latin American countries. However, the benefits are just as significant.

1. Larger Markets - A trade agreement that reduces the trade barriers would create a larger market for Canadian and U.S. producers (Edmund, Moomaw, Olson, 1994).

2. Lower Costs and Improved Efficiency- Inputs and components imported for the production of U.S. and Canadian goods could be significantly reduced will lower tariffs. Moreover, it would allow greater specialization for Canadian and U.S. companies. Producers could strategically locate plants across various countries to take advantage of comparative advantages across these countries. This would increase profits and increase overall production while reducing the cost of the goods in which they produce (Parkin, 1997).

3. Increased Welfare - Consumers would benefit through lower prices of goods which would increase their consumer surplus. Lower prices would mean that consumers would have an increase in disposable income that they could use for other goods. Increasing their bundle of goods would in turn mean that producers would have to produce more of all goods, which would mean an increase in employment (Gregory and Ruffin, 1989).

Obstacles

However, for a WHRTA to be reached, a number of obstacles would have to be addressed. Each country would have to deal with the political pressure of lobbyists which have strong arguments against a WHRTA. Politically powerful lobbyist such as labor unions, environmental groups, and other lobbying groups have well founded messages with a broad appeal that cannot be ignored. For example, specific industries will be hurt substantially. In one example, a study has projected that job losses may range from 72,000 to 255,000 over a 10 year period for the textile and apparel industry if complete trade liberalization would come about (GOA/GGD-94-83b 1994).[9] In addition, many in the U.S. are skeptical about the positive impacts that a free trade agreement with Latin America would have for the U.S.

[8] The late 1990's crisis in Asia is largely financial, rooted mainly in over speculation. Asian trade continues to flourish.

[9] However, for each apparel job protected, the cost to consumers is approximately $139,000 in higher apparel prices (Hufbauer and Elliot, 1994).

Their issues and concerns will have to be addressed and accommodated if a regional free trade agreement is to succeed. An article by Lawrence and Litan (1986) suggests that a successful trade agreement should phase out trade barriers over time and that individuals who are significantly hurt by free trade agreements should be provided trade adjustment assistance or financial compensation. Policy tools, such as "Fast Track," could be a significant step towards overcoming these internal politics in the U.S.. In addition to the internal political difficulties of each country, the logistics of gaining a mutual agreement among this many countries create another obstacle for a WHRTA.

Despite these perceived obstacles, momentum has been created for an RTA that includes both Latin American and North American countries that would be more inclusive in the industries that it would cover.

OTHER TRADE CONSTRAINTS

The preceding discussion focuses upon a host of trade-related measures which traditionally are employed by governments to protect industries, raise revenues and counter barriers imposed by other countries.

There are other things which also act as a deterrent to trade and, therefore, can be construed to be a "trade constraint or barrier." Examples are as follows:

- Aircraft landing right agreements constrain which international airlines can operate out of various airports.

- Trade lane protection laws such as the Jones Act limit the ability of foreign flag vessels to call at multiple U.S. ports.

- Trade embargoes, specifically the U.S. embargo on trade with Cuba, are a significant constraint.
  - The Helms-Burton Act, enacted in 1996, continued the embargo and gave U.S. individuals and companies the right to sue for property they lost when they fled Cuba following Fidel Castro's takeover in the early 1960s.
  - The U.S. is virtually alone in its embargo on trade with Cuba.

- Procedures and facilities at international border crossings hinder cross-border trade.
  - For U.S. exports, this involves both the Maquiladora trade just across the Mexican border as well as shipments to the Mexican interior.
  - NAFTA reduced some paperwork and opened up trade by reducing or eliminating certain duties.
  - Two programs are underway to make the necessary inspections less time-consuming and, in some cases, less damaging to vehicles and cargo. The North American Trade Automation Program is intended to facilitate information exchange and process automation. The Non-

Intrusive Inspection program is intended to allow more thorough inspections without the delays now caused by unloading of cargoes, etc.

- Physical facilities at border crossings sometimes are inadequate and the process to add facilities can be daunting. For example, to build a bridge across the Rio Grande can require filings with more than 25 government agencies in Mexico and the U.S.
- In the past, some freight trains have been backed up all the way to Kansas as they waited to squeeze through one-track border crossings.
- Mexican trucks entering the U.S. currently are limited to a narrow commercial strip along the border. While NAFTA provisions would have allowed Mexican carriers full access to Arizona, California, New Mexico and Texas beginning December 1995, the U.S. has delayed implementation, citing concerns about Mexican trucks failing to meet U.S. safety standards. Also, the Teamsters Union and the Owner-Operator Independent Drivers Association have aggressively opposed opening the border.
- Mexico has limited the opportunity of U.S. carriers to travel south of the border by banning 53-foot trailers except when used with the unconventional cab over tractor that is seldom utilized by U.S. truckers.

- Multi-shipping line partnerships and the emergence of large container vessels mean greater concentration of cargo at a small number of “hub” ports. In the absence of advance planning and congruent infrastructure improvements, hub ports will experience traffic congestion which will affect trade flows. Also, a feeder system and/or adequate intermodal connections will be required.

- While it is common practice in many foreign ports to operate on a 24-hour day, labor agreements in the U.S. restrict operating hours, thereby limiting the productivity, efficiency and capacity of U.S. ports.

- U.S. ports typically do not have dual-hoist cranes and existing cranes are not capable of the 18 container reach that is associated with ultra large container vessels.

- Although there is a significant move to privatize port operations in Latin America, resistance is encountered from port workers who fear the loss of their jobs. Current work rules guarantee them their jobs, whether there is work to be done or not. Rules which force port operators to employ more workers than they need drive up costs.

- Strikes have been held at some Latin American ports over matters such as more pay, better benefits, safer working conditions and job security in the face of coming modernization. This has led to virtual stoppage of cargo flows at times.

- Cargo security is a major issue that affects trade flows and increases the cost of insurance.

- For instance, the Maritime Security Council has reported a major problem of cargo being hijacked, stolen or otherwise taken illegally from U.S. waters or ports.
- Piracy is a reported problem in Latin America. Pirates have been know to buy cargo manifests from stevedores and the black market as a means of identifying the best targets. Stolen goods are sold on the black market, often to people who are appreciative of being able to buy imported goods at prices they can afford. Consequently, pirates are sometimes seen as "good" people.

- Transportation infrastructure in Latin America often is inefficient and inadequate. The move towards privatization is helping improve conditions. Nevertheless, it will take time for major improvements to be implemented.
- In the U.S., transportation infrastructure also has many challenges. The investment needs for facilities important to trade with Latin America require a large investment in the period to 2020, as noted in Section D of this report.
- Port expansion and channel deepening are problems at various locations in the Alliance Region.

- Likewise, improvements will be needed in the Region's airports if they are to cope with the increase in international trade flows which this study has forecast.

- Although an analysis of railroad improvements was not undertaken by the study because of the private-sector ownership of most railroads, constraints are apparent in the system of railroads that serve Latin American trade flows.
  - An example is the lack of vertical clearances to accommodate double stack containers such as on the Gulfport to Hattiesburg railroad.

- By far the greatest infrastructure needs identified by this study are for the Alliance Region's highways. If these highways are not adequate to handle traffic flows (both domestic and international), this will negatively impact the Region's trade opportunities with Latin America and other trading partners.

- U.S. environmental regulations limit opportunities to implement enhancements to the transportation system.

References

Barro, Robert. May 1991. *Economic Growth in a Cross Section of Countries*. Quarterly Journal of Economics pp 407-443.

Coes, Don V. 1991 *Trade Agreements in the Americas: Brazil*. Working Paper. University of New Mexico

ECLA. 1991. Latin American and Caribbean Trade and Investment Relations with the U.S. in the 1980s Santigo: U.N. Economic Commission for Latin America and the Caribbean.

Edgmund, Michael R., Moomwaw, Ronald L., Olson, Kent W. 1994. Economics and Contemporary Issues, 2nd ed. Forth Worth, TX: The Dryden Press.

Edwards, Sebastion. September 1993. *Openness, Trade Liberalization and Growth in Developing Countries.* Journal of Economic Literature, vol. 31, pp. 1358-1393.

Gould, David M, Ruffin Roy J., and Woodbridge, Graeme L. Fourth Quarter 1993. *The Theory and Practice of Free Trade.* Economic Review—Federal Reserve Bank of Dallas pp 1-16

General Accounting Office. 1994. The General Agreement on Tariffs and Trade: Uruguay Round Final Act Should Produce Overall U.S. Economic Gains GAO/GGD-94-83b.

General Accounting Office. 1994. Reports and Testimony: July 1994 GAO/OPA-94-10 p 27.

Gregory, Paul R. and Ruffin, Roy J. 1989. Basic Economics London: Scott, Forseman and Company.

Guasch, J. Luis, and Rajapatirana, Sarath. October 1994. *The Interface of Trade, Investment, and Competition Policies: Issues and Challenges for Latin America*. Working Paper. Washington, D.C.: World Bank.

Gwartney, James D., Block, Walter, and Lawson, Robert. 1992. *Measuring Economic Freedom* in Rating Global Economic Freedom edited by Easton Steven T. and Walker, Michael A. Vancouver, B.C: The Fraser Institute.

Gwartney, James D. and Stroup, Richard L. 1995. Economics: Private and Public Choice, 7th ed. Forth Worth, TX: The Dryden Press.

Hufbauer, Gary and Elliot, Kimberly. January 1993. Measuring the Costs of Protection in the United States Washington, D.C.: Institute for International Economics.

Lawrence, Robert Z. and Litan, Robert E. April 27, 1986 *Ending the 'Lunacy' of Trade Protection.* The New York Times.

Maskus, Keith E. July/August 1984. *Rising Protectionism and U.S. International Trade Policy*. Federal Bank of Kansas City, Economic Review, pp. 3-17.

Michaely, Michael, Papageorgiou, Demetris, and Choski, Armeane M. 1991. Liberalizing Foreign Trade: Lesson of Experience in the Developing World Cambridge, MA: Basil Blackwell.

Nogueira, Uziel. November 1997. *Mercosur: What comes next?* IDB America Vol. 34, No. 11 p. 3.

Parkin, Michael. 1997. Microeconomics, 3rd ed. New York: Addision-Wesley.

Rajaptirana, Sarath. 1993. *Latin American Trading Arrangements and GATT.* Working Paper. Washington, D.C.: World Bank.

Rajaptirana, Sarath. 1994. *The Evolution of Treaties and Trade Creation: Lessons for Latin America.* Working Paper. Washington, D.C.: World Bank.

Schumacher, Edward. April 16, 1998. *A Meeting of Minds, From Peoria to Patagonia*. Wall Street Journal.

SECTION B6
BUSINESS DEVELOPMENT OPPORTUNITIES

This study makes a clear case that the Alliance Region is the gateway for U.S. trade with Latin America, as well as to other global markets. Aside from the obvious strategic significance of the LATTS Transportation System to economic development and trade within the Alliance and elsewhere in the United States, this presents significant business opportunities for the Region.

As trade with Latin America and the rest of the world grows over the next twenty years, so will the amount of trade that passes through the Alliance Region. This trade passing through the Alliance presents a business development opportunity for the Region.

TARGET THE INCREMENTAL GROWTH COMPONENT

The Alliance is one of the fastest growing industrial regions in the nation. Lower production and investment costs, as well as other advantages, has resulted in a robust industrial and high tech investment climate in Alliance states. The incremental growth component (above current levels) in future trade passing through the Region represents additional production capacity that has not been invested (**Exhibit B6-1**). Because capital is free to flow to any location in the United States, the jobs and private investment dollars associated with additional trade can go anywhere in the U.S.. Although the forecasts produced by LATTS generally follow the same patterns as historical trade patterns[1], these patterns can change due to a variety of reasons, including trade policies, mode diversion polices, changes in transportation costs across modes, changes in production costs, or aggressive industrial recruitment programs (incentives).

This section of the report focuses on the growth component of the LATTS forecast to identify business development opportunities for the Region.

GROWTH IN EXPORTS PASSING THROUGH THE ALLIANCE REGION

Although any form of trade generally creates jobs and investment, exports present a rational business development target. Exports typically offer the greatest potential for job creation, particularly exports passing through the Region (pass-through exports) that are produced elsewhere in the U.S.

Alliance exports are expected to grow from a current level of approximately 290 million tons to 660 million tons in 2020, an increase of 370 million tons. This represents over $610 billion in value in 2020. (**Exhibit B6-2**)

[1] Changes in trade patterns for the LATTS forecasts (for Latin America and other World Regions) are based on economic based trends in domestic and international production and consumption. However, the LATTS forecasts were not reallocated among gateways (ports, airports, border-crossings) or among origins and destinations based on above-trend scenarios (e.g. due to wholesale mode shifts, trade policies, etc). The"High Trade" scenario is based on more aggressive assumptions about trends. Trade patterns were not reallocated.

Exhibit B6-1
INCREASE IN PASS-THROUGH TRADE REPRESENTS A BUSINESS OPPORTUNITY FOR THE ALLIANCE

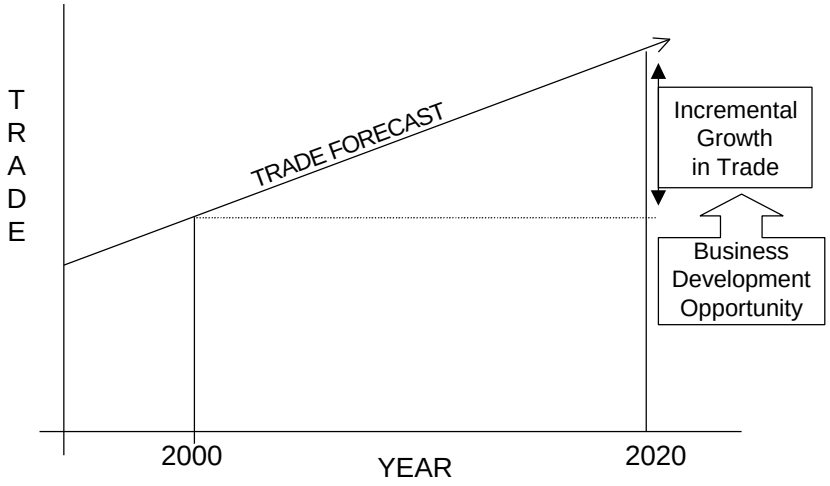
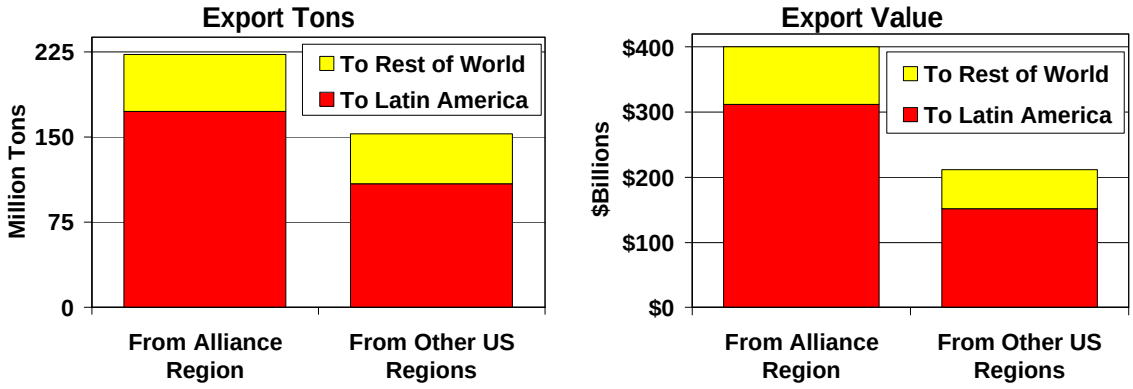


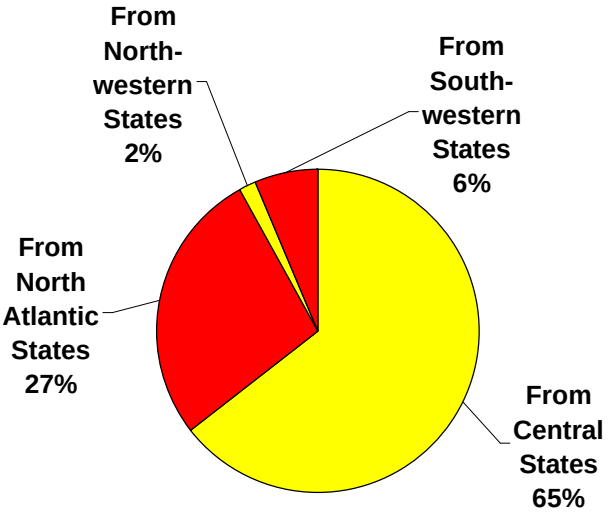
Exhibit B6-2
NET INCREASE IN FUTURE EXPORTS THROUGH THE ALLIANCE



Domestic Origin/Destinations

Based on current patterns, over forty percent of the increase in export tonnage (153 million tons) is expected to originate in other U.S. states, representing over $210 billion in export value passing through the Region. The majority (65%) of this pass-through export growth is from the Central States (Midwest). Another 27% is from the North Atlantic states (**Exhibit B6-3**).

Exhibit B6-3
ORIGIN OF EXPORTS FROM OUTSIDE THE ALLIANCE
(NET INCREASE IN FUTURE EXPORTS THROUGH THE ALLIANCE)

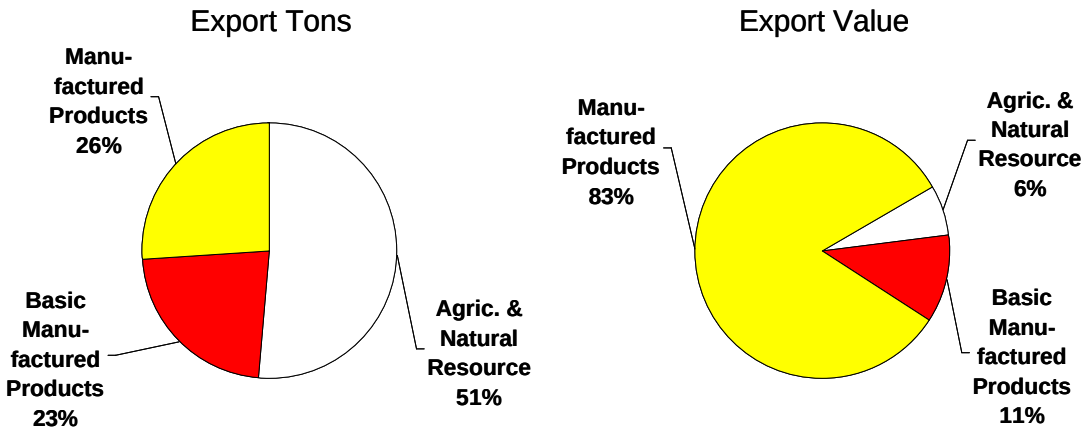


Export Sectors

An evaluation of the specific export sectors reveals that half of the tonnage (51%) of the pass-through export growth are agricultural and natural resource products (bulk products), specifically farm products (grain) and non-metallic minerals such as phosphates. The other half of the tonnage are expected to be basic manufactured products (chemicals) and manufactured products (food products, transportation equipment, machinery and industrial equipment, pulp and paper, electrical machinery, and fabricated metals, other). (**Exhibit B6-4**)

From a value standpoint, over 80% of the pass-through export growth component is expected to be manufactured products (machinery and industrial equipment, transportation equipment, electrical machinery, food products, rubber and plastics, fabricated metal products, instruments, and other). These types of exports are typically associated with high paying jobs.

Exhibit B6-4
MAJOR EXPORT SECTORS THAT PASS THROUGH THE ALLIANCE
(NET INCREASE IN FUTURE EXPORTS THROUGH THE ALLIANCE)

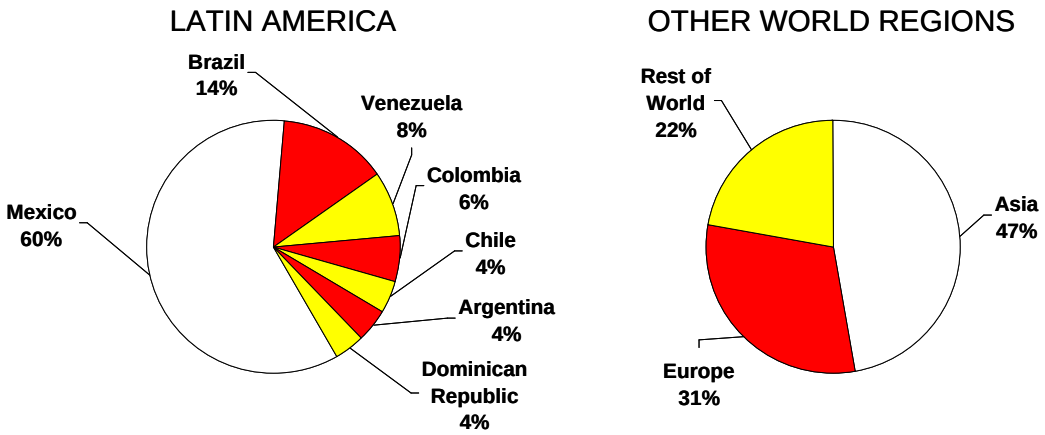


Eleven percent of the value of the pass-through export growth component are basic manufactured products (chemicals), and the remainder are agriculture and natural resource products (farm products, non-metallic minerals, metallic ores, forest products and coal).

Global Export Markets

It is forecast that over two-thirds of the growth in pass-through exports will be to Latin American, particularly Mexico, Brazil, Venezuela, Colombia, Chile and Argentina, with the remainder going to other global markets like Asia and Europe (**Exhibit B6-5**).

Exhibit B6-5
FOREIGN MARKETS FOR EXPORTS THAT PASS THROUGH THE ALLIANCE
(NET INCREASE IN FUTURE EXPORTS THROUGH THE ALLIANCE)



AN OPPORTUNITY FOR THE ALLIANCE

It is clear from the data that while half of the future growth in pass-through export tonnage is grain from the central region states (Midwest) and other bulk materials, a dominant share of the value of the pass-trough export growth are high value manufactured products, specifically manufactured (value-added) exports from the Central Region. While grain production is essentially a captive industry (not footloose), the value-added exports represent yet to be created jobs and private investment dollars that could well be attracted to the Alliance Region.

THE ALLIANCE NEEDS TO REMAIN COMPETITIVE

It is important to point out that the export forecasts for the Alliance Region (exports produced in the Region that are shipped through Alliance gateways) are comparable to the previously discussed pass-through exports – high value manufactured products. Moreover, the jobs and private investment associated with these exports have not yet been invested, despite being shown by the LATTS forecasts as being produced in this Region. The jobs and private investment dollars associated with additional trade can go anywhere in the U.S..

The Region's ability to actually attract the jobs and private investment dollars is based on its overall competitiveness. Competitiveness is a function of a variety of factors, one of which is transportation – multimodal transportation facilities (modal choice), transportation services (quality and reliability) and transportation costs. Developing and sustaining a reliable multimodal trade transportation system is a key step towards competing for the business opportunities outlined herein.

LATIN AMERICAN EXPORT MARKETS

Latin America offers significant export opportunities for the Alliance states. However, each Latin American country is unique. The following is a summary of economic highlights for specific Latin American countries. Further discussion of business opportunities with Latin American countries is contained in Appendix II.

- ***ARGENTINA***
  - Recent economic reforms have set the stage for stable economic growth in the medium term; real GDP growth will average 5.1% over the next 23 years.
  - With the highest nominal GDP per capita among Latin American countries and continued strong growth, Argentina has strong market potential.

- ***BAHAMAS/JAMAICA***
  - The combined economy of the Bahamas and Jamaica will grow at an annual average rate of 2.6% over the forecast period.

- ***BOLIVIA***
  - Economic reforms will enable Bolivia to achieve strong real GDP growth in the short term, after which it will moderate to an annual average growth rate of 5.1% over the forecast period.
  - Bolivia is one of the poorest countries in Latin America. Strong GDP per capita growth will begin to improve the situation.

- ***BRAZIL***
  - While economic stabilization has brought the economy under control and growing at just over 4%, it remains on uncertain foundations.
  - Brazil represents one of the largest Latin American markets, with one-third of Latin American population and over 20% of all Latin American trade.

- ***CHILE***
  - Chile is forecast to have the highest GDP growth rate among Latin American countries, at 5.6% annually through 2020.
  - Chile continues to expand trade liberalization

- ***COLOMBIA***
  - Colombia ranks second in real GDP growth in Latin America, averaging 5.3% through 1997-2020.
  - Membership in several trade agreements will support trade growth of 8.5% through the forecast period.

- ***CUBA***
  - Cuba is recovering from the deep recession induced by the loss of Soviet aid. Annual economic growth of 2.3% is expected over 1997-2020.
  - Tourism has become the most important sector in Cuba.
  - Exports are forecast to grow strongly as economic reform eases trading practices.

- ***DOMINICAN REPUBLIC***
  - Real GDP growth will average only 2.1% annually through 2020.
  - Extremely low incomes and a nominal GDP per capita growth that lags inflation limit consumer market potential.

- ***ECUADOR***
  - Economic concentration in natural resources and political instability limits growth to 3.9% through 2020.
  - With slow nominal GDP per capita growth and high inflation, GDP per capita levels will remain low.

- ***FRENCH GUIANA / GUYANA / SURINAME***
  - These three countries, dependent on agriculture and mining, will experience relatively slow economic growth over the LATTS forecast period.

- Evidence of French Guiana's French department status is seen in its high GDP per capita, while its neighbors are among the poorest in the region.

- ***HAITI***
  - Extreme poverty, lack of economic reforms, and political quagmires hold growth to an average 1.3% over the forecast period.
  - Haiti is dependent on imports of food and manufactures, two-thirds of which come from the U.S.

- ***MEXICO***
  - Mexico is almost completely recovered from the peso crisis in 1994, and economic and political practices position it for stable, sustainable growth in the future.
  - Mexico's membership in key trade agreements and rapid growth in trade will propel it to account for almost half of all trade in Latin America by 2020, more than double its share of population or real GDP.

- ***PANAMA***
  - Panama ranks fifth in economic growth among Latin American entities, with an average annual growth rate of 5.0%; however, this may be threatened by increasing political risks in the short term.
  - Panama has positioned itself as a key re-exporter of manufactured goods, pushing up nominal export growth to a leading rate of 12.6% per year.

- ***PARAGUAY***
  - Economic reforms and integration within Mercosur contribute to an average annual expansion of 4.9% in the economy.

- ***PERU***
  - Substantial improvements have been made in Peru's economic growth and inflation, but Peru still faces high medium-term risk to continued achievements.
  - Extremely slow growth in nominal GDP per capita will drop average income in Peru to fourteenth place in Latin America by 2020.

- ***URUGUAY***
  - Recent political and economic restructuring in Uruguay have brightened its economic outlook, for a forecast average of 4.5% in GDP growth over the next 23 years.
  - Nominal GDP growth per capita ranks fifth among Latin American entities, growing at a pace of 6.9%.

- ***VENEZUELA***
  - As Venezuela lags most other South American countries in economic liberalization, only moderate GDP growth, 4.2%, is forecast for the next 23 years.
  - Oil continues to dominate government revenues and exports.

- ***OTHER CARIBBEAN ECONOMIES***
  - Economic growth will continue at an annual average pace of 2.5% over 1997-2020.

- ***OTHER CENTRAL AMERICA ECONOMIES***
  - Combined, Central American countries have among the lowest GDP per capita levels in Latin America.
  - GDP growth is forecast at a slow pace of 1.7% over the forecast period.

SECTION C
LATTS STRATEGIC TRANSPORTATION SYSTEM

As discussed in Section B, the Alliance Region is the gateway for trade with Latin America. More trade with Latin America passes through the Alliance Region than through the rest of the United States combined. Over 70 percent of all U.S./Latin American trade through U.S. ports, more than 60 percent of all U.S./Latin American trade through U.S. airports, and over 75 percent of all U.S./Latin American trade through U.S. border posts use Alliance Region gateways.

The Alliance Region is the primary gateway for trade between itself and Latin America, as well as between the United States and Latin America. In other words, the Alliance Region's transportation system is strategically important for the entire national economy, specifically with regard to trade with Latin America.

It is expected that U.S. trade with Latin America will continue to grow, as will the amount of Latin American gateway trade through the Alliance Region.

LATTS STRATEGIC TRANSPORTATION SYSTEM

For that reason, the Alliance members identified a LATTS Strategic Transportation System that is critical to accommodating trade with Latin America. The Strategic System is not only important for trade, but also for carrying other freight and passenger traffic.

The challenge to the Alliance and, indeed, the Nation is to maintain and improve the Strategic System so that it can successfully accommodate growth in Latin American trade as well as growth in traffic as well.

A MULTIMODAL TRANSPORTATION SYSTEM

The LATTS Strategic Transportation System consists of all four modes typically used for freight transportation – waterports, railroads, airports and highways. Each mode plays an important role in trade and economic development.

For example, trucks, rail and inland waterways (barge) are critical for the bulk-oriented agriculture (grain, etc.) and natural resource (coal, ore, etc.) sectors (see **Exhibit C-1**). These commodities are inputs that drive value-added production in our domestic economy and economies abroad. A cost-effective and reliable bulk transport system is critical to Alliance-wide and National economic security.

In the middle of the value spectrum are basic manufactured products. These represent partially processed products which tend to be in a break-bulk or neo-bulk form. Due to their relative value-added nature and materials handling

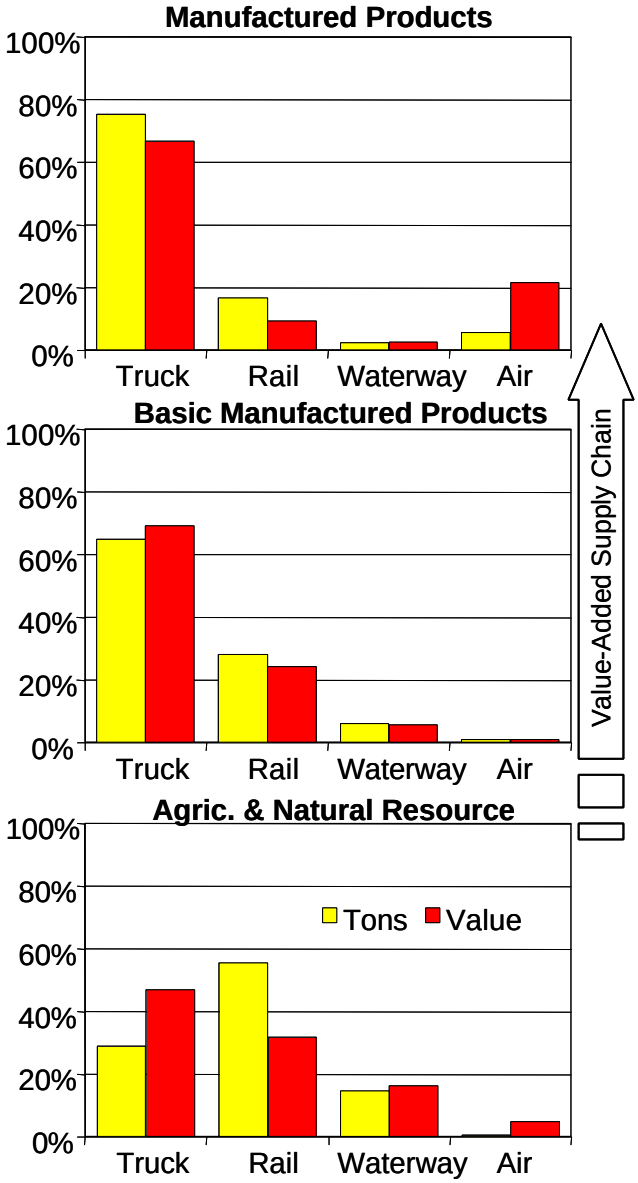
characteristics, trucking, specifically non-container, and rail are preferred modes for these commodities.

A cost-effective and reliable transport system for semi-processed products is critical to Alliance-wide and National economic security.

At the other end of the value spectrum are manufactured products which favor trucking, rail intermodal and air as the modes of choice. In fact, air cargo is especially critical for the manufacturing sectors which rely on this mode to move high value and time sensitive products and commodities.

From an economic development standpoint, the manufacturing sectors play a critical role in the Alliance and National economies in terms of providing higher skilled work opportunities. This translates to higher incomes and improved quality of life for the work force.

Exhibit C-1
MODAL CHOICES
FOR MAJOR SECTORS
Alliance Trade with Latin America



PROCESS FOR DEFINING THE LATTS STRATEGIC TRANSPORTATION SYSTEM

It was necessary that LATTS focus its analyses upon those transportation facilities that were most relevant to trade with Latin America. Therefore, a process was undertaken in which criteria were developed as a basis for identifying those facilities which either currently are of significant importance to Latin American trade flows or which could become significantly important. In adopting criteria, certain basic principles were observed as follows:

- The Strategic Transportation System should be consistent in scale with the regional character of the study and its strategic planning approach.

- Emphasis was placed on those transportation elements which were most significant regarding trade with Latin America. It was acknowledged that there were additional transportation elements that are of special importance to the economic well being of the Alliance members but which were not significant regarding Latin American trade. Even though there was a compelling rationale to focus LATTS upon only that part of the transportation system that plays a significant role in trade with Latin America, it also was determined that some facilities, especially important to Alliance members, would be included in the LATTS Strategic Transportation System regardless of whether they play a major role in Latin American trade.

- The LATTS analyses of the transportation system, of necessity, were conducted on a broad, regional, strategic scale. Site-specific analyses for individual facilities were not included in LATTS. Indeed, state level analyses were the major stratification adopted for results of the LATTS analyses.

SUMMARY FEATURES OF THE LATTS STRATEGIC TRANSPORTATION SYSTEM

The results of applying this process are presented in Sections C1: Ports, C2: Airports, C3: Railroads and C4: Highways which follow. The main features of the LATTS Strategic Transportation System are summarized as follows:

- Waterports
  - A total of 42 waterports within the Alliance Region were included in the Strategic Transportation System.
  - This included 31 coastal ports and 11 inland riverports.

- Airports
  - The Strategic Transportation System included 48 airports.
  - Of this total, 46 were existing facilities and two were proposed airports.

- Railroads
  - Some 22,285 miles of railroads were included in the Strategic Transportation System.

- Highways
  - The mainline portion of the LATTS Strategic Highway System totaled 22,859 miles.
  - Interstate highways comprised 14,602 miles (or nearly two-thirds) of the mainline portion of the system. Non-interstate facilities made up the remaining 8,257 miles.
  - The LATTS Strategic Highway System also included 123 individual intermodal connectors to waterports and airports.

SECTION C1
LATTS STRATEGIC PORT SYSTEM

The specific ports and marine facilities included in the LATTS Strategic Port System were identified through a process involving interactive consultations between each individual state and the consultant team. The LATTS Steering Committee, working through the LATTS Working Committee representatives, approved a series of criteria to help identify a network of marine facilities which became the focus of subsequent LATTS analyses and assessments.

PORT CRITERIA

The identification of waterports for this study included both seaports and riverports that were considered to be part of the Strategic Transportation System and which met the following criteria:

1. Include all National Highway System (NHS) waterports and complexes which meet the following:
   a) All NHS deep-waterports (channel depths of 35 feet or more).
   b) All NHS shallow-draft facilities that currently handle 500,000 tons of waterborne Latin American cargo annually.

2. Include any proposed waterports that the respective State/Commonwealth believes:
   a) Would meet the above criteria
   b) Are realistic proposals within the next 10-15 years
   (To be considered a realistic proposal, either State Legislation should have been introduced that provides project funding or a detailed implementation schedule or equivalent should have been adopted by a State/Commonwealth Agency).

3. Include the most significant waterport within any Alliance member that does not have a facility that meets the above “major gateway port” criteria.

4. Include those ports deemed to be of particular interest to each Alliance member (with each Alliance member being entitled to designate up to 5 facilities in whatever combination of transportation mode as the Alliance member felt best served their particular interests).

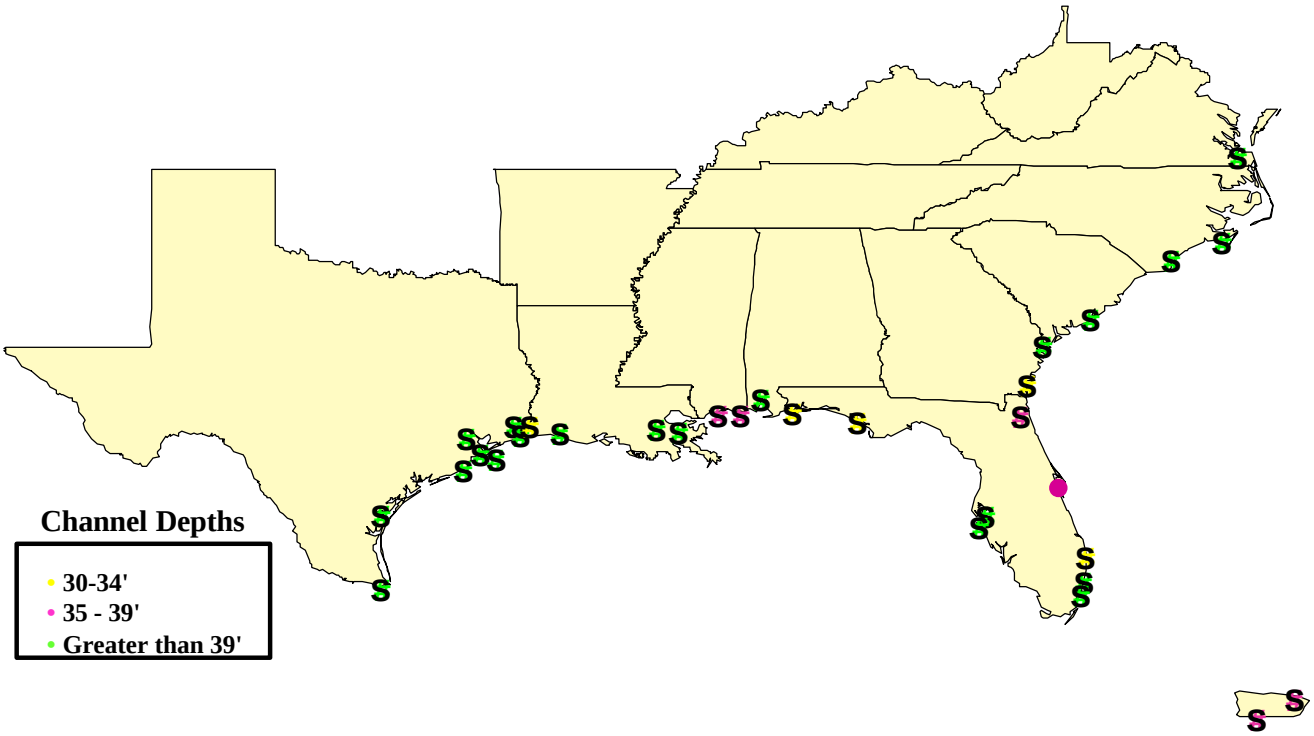
Deep-Water/Coastal Ports

Because significant portions of waterborne trade with Latin America involves the use of large ships, the LATTS Strategic Port System included all deep-waterports with channel depths of 35 feet or more.

Based on this criterion, 31 ports were evaluated to determine if they met the deep-waterport requirements. Ultimately, only 27 ports met the deep-waterport requirement as established for LATTS. However, the remaining four coastal ports

that were initially evaluated as deep-waterports were determined to meet or exceed the shallow draft facility requirements and they were included in the Strategic Port System on this basis. These 31 ports and their reported channel depths are listed in **Exhibit C1-1** (following page). A location map which also indicates channel depths is presented in **Exhibit C1-2**.

Exhibit C1-2
LATTS DEEP-WATERPORTS – LOCATION MAP



It should also be noted that a new deep-waterport, referred to as "Millennium Port," has been proposed at the mouth of the Mississippi River. The Millennium Port concept envisions moving the Port of New Orleans terminals a distance of 100 miles to the mouth of the Mississippi River. As of the time of these analyses, no State Legislation had been introduced that would provide project funding or a detailed implementation schedule, nor had an equivalent initiative been adopted by an appropriate State Agency. Even though the Millennium Port did not meet study criteria, it was included in the LATTS Strategic Port System because of its special interest to the state.

In recognition of their special interest to their respective states, three other coastal ports also were included in the LATTS Strategic Port System even though they did not meet study criteria. Port Bienville in Mississippi is an industrial park having limited shallow draft access (12 foot channel). In South Carolina, facilities at Georgetown and Port Royal are of special interest to the state.

Exhibit C1-1
DEEP-WATER/COASTAL PORTS AND CHANNEL DEPTHS
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State	Port	Depth (ft.)	Meets Depth Criterion
Alabama	Mobile	45’	Yes
Florida	Jacksonville Port Authority	38’	Yes
	Port of Miami	42’	Yes
	Port Everglades	47’	Yes
	Canaveral Port Authority	36’-39’	Yes
	Port Manatee	40’	Yes
	Tampa Port Authority	43’	Yes
	Port of Palm Beach District	33’	No
	Port of Panama City	32’	No
	Port of Pensacola	33’	No
Georgia	Port of Savannah	42’	Yes
	Port of Brunswick	30’	No
Louisiana	Lake Charles Harbor & Terminal District	40’	Yes
	Port of New Orleans	36’-45’	Yes
	Port of South Louisiana	45’	Yes
Mississippi	Port of Gulfport	36’	Yes
	Port of Pascagoula	38’	Yes
North Carolina	Port of Morehead City	45’	Yes
	Port of Wilmington	40’	Yes
Puerto Rico	Port of Ponce	35’	Yes
	Port of San Juan	35’	Yes
South Carolina	Charleston	42’-45’	Yes
Texas	Port of Beaumont	40’	Yes
	Port of Brownsville	42’	Yes
	Port of Corpus Christi	45’	Yes
	Port of Galveston	40’	Yes
	Port of Houston	36’-40’	Yes
	Port of Port Arthur	42’	Yes
	Port of Texas City	45’	Yes
	Port of Lavaca	36’	Yes
Virginia	Norfolk	50’	Yes

Shallow Draft/Inland Ports

Study criteria also provided for the inclusion of certain shallow-draft port facilities that were located within the LATTS Study Region. This criterion addressed those shallow draft ports which handle in excess of 500,000 tons annually of Latin American cargo. The rationale behind this criterion is that these are the types of facilities that play a significant role in Latin American trade, and thus should be an integral part of this study.

Identification of several of the shallow-draft port facilities required the use of the LATTS trade databases. Using these databases, the volumes of Latin American cargo handled at candidate shallow-draft ports were determined. Eleven shallow draft port facilities were examined on the basis of trade volumes.

A list of the shallow draft facilities evaluated thusly, is presented in **Exhibit C1-3**.

Exhibit C1-3
SHALLOW DRAFT PORT FACILITIES

State	Port Facility	Volume Range
Kentucky	Lyon County Riverport Authority	**>500,000 tons, as of 1996**
Tennessee	International Port of Memphis	
Arkansas	Little Rock Port Authority Port of Pine Bluff	**> 500,000 tons , 2020 (projected)**
Kentucky	Louisville-Jefferson Riverport Owensboro Riverport Authority	
Louisiana	St. Bernard Harbor & Terminal District Port of Greater Baton Rouge Port of Plaquemines Parish Port of Morgan City	
West Virginia	Jackson County Marine & Indust. Ctr.	

While a number of these facilities failed to meet the LATTS criterion based upon 1996 trade volumes, they were projected to exceed the prescribed threshold by the year 2020. It was determined that, based upon this potential, they should be included in the LATTS Strategic Port System.

In addition, because of their special importance to particular Alliance members, five other facilities were included. This includes inland riverport facilities at Ashland (KY), Richmond (VA), Huntington (WV) and Wierton (WV). Also, the “inland port” at Front Royal, VA was included even through it does not have port facilities, but instead operates as a remote freight handling facility for the Port of Norfolk. Similarly, even though it does not have port facilities, the intermodal rail yard at Ebony/Harvard (AR) was included because of its special importance to Arkansas as a major freight facility.

LATTS STRATEGIC PORT SYSTEM

As noted above, there were a number of ports which met the criteria for inclusion in the LATTS Strategic Port System. A number of other facilities were added by the liberal application of the criteria. Still others, which did not meet study criteria, were included because of their special importance to their respective Alliance members.

As a consequence of this approach, a total of 52 ports were included in the LATTS Strategic Port System. Of these, 35 were deep-water/coastal facilities while 17 were shallow-draft/inland facilities.

A complete list identifying all of the LATTS deep-water and shallow draft facilities that were included in the LATTS Strategic Port System is presented in **Exhibit C1-4** (following page).

Exhibit C1-5 identifies the location of the ports that were included in the LATTS Strategic Port System.

Exhibit C1-5
LATTS STRATEGIC PORT SYSTEM

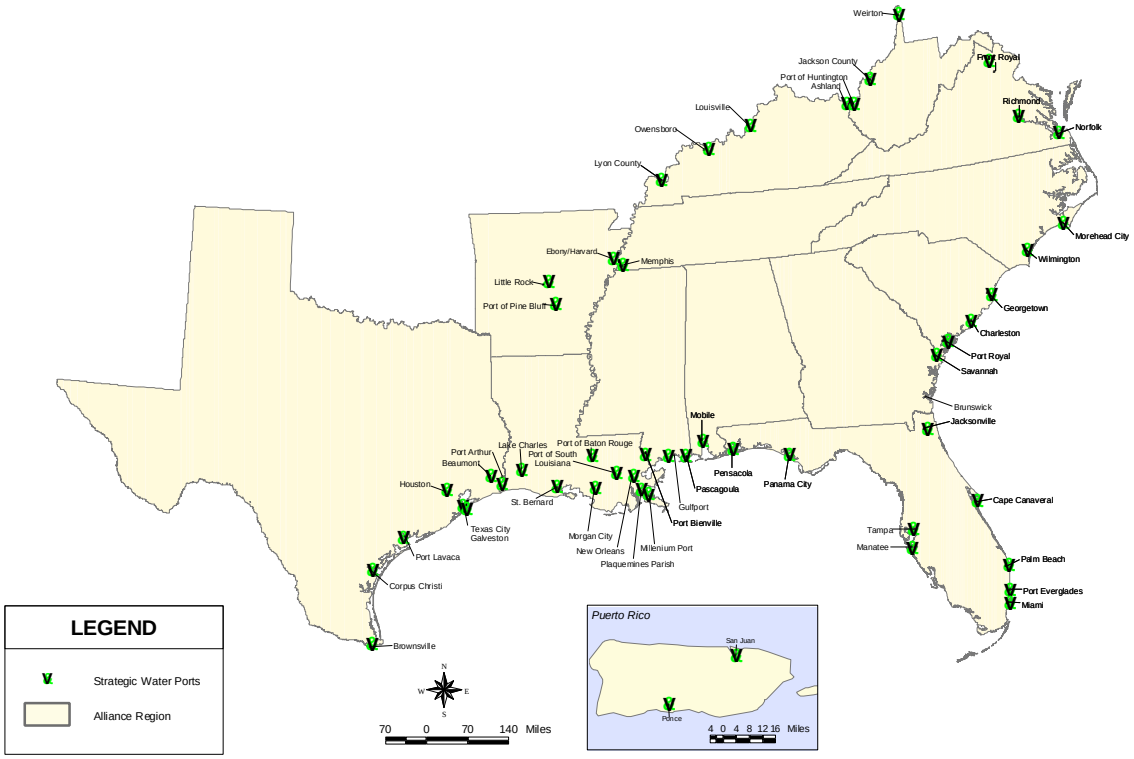


Exhibit C1-4
LATTS STRATEGIC PORT SYSTEM

STATE	PORT NAME
Alabama	Mobile
Arkansas	Little Rock Port Authority Port of Pine Bluff Ebony/Harvard
Florida	Jacksonville Port Authority Port of Miami Port Everglades Canaveral Port Authority Port Manatee Tampa Port Authority Port of Palm Beach District Port of Panama City Port of Pensacola
Georgia	Port of Savannah Port of Brunswick
Kentucky	Lyon County Riverport Auth. Louisville-Jefferson Riverport Owensboro Riverport Authority Ashland Riverport
Louisiana	Lake Charles Harbor & Terminal District St. Bernard Harbor & Terminal District Port of New Orleans Port of Greater Baton Rouge Port of Plaquemines Parish Port of South Louisiana Port of Morgan City Millennium Port
Mississippi	Port of Gulfport Port of Pascagoula Port of Bienville
North Carolina	Port of Moorhead City Port of Wilmington
Puerto Rico	Port of Ponce Port of San Juan
South Carolina	Charleston Georgetown Port Royal
Tennessee	International Port of Memphis
Texas	Port of Beaumont Port of Brownsville Port of Corpus Christi Port of Galveston Port of Houston Port of Port Arthur Port of Texas City Port of Lavaca
Virginia	Norfolk Richmond Front Royal
West Virginia	Jackson County Marine & Industrial Center Port of Huntington Wierton Riverport

SECTION C2
LATTS STRATEGIC AIRPORT SYSTEM

Within the Southeastern Transportation Alliance Region, there are approximately 126 airports that currently have scheduled commercial passenger and/or freight operations, and/or chartered services. There also are proposals to build several major new airport facilities.

The objectives of LATTS did not warrant analyses of all of these facilities because many of them are not relevant to the study's emphasis on trade with Latin America. Therefore, the airports involved in the LATTS Strategic Airports System were, in large measure, airports which either serve, or have the potential to serve, as a major gateway for Latin American trade. To ensure equable treatment of each Alliance member, at least one facility in each state was included in the LATTS Strategic Airport System.

The LATTS Steering Committee, working through the LATTS Working Committee representatives, approved a series of criteria to select strategic airports for the LATTS analysis. The LATTS Strategic Airport System is the result of applying these criteria in a systematic process.

AIRPORTS IDENTIFICATION PROCESS AND CRITERIA

The criteria used to identify airports which were included in the LATTS Strategic Airport System were as follows:

1. Include all airports that currently have non-stop flights to/from Latin America (passenger and/or cargo).

2. Include all existing airports that have physical features capable of serving long-stage flights by planes with heavy loads (fuel and cargo). This criterion was further defined to include airports which have a runway with a minimum length of 10,000 feet plus a secondary runway which is at least 80 percent of the primary runway length, plus have adequate open area, cargo handling facilities, is designated as a port of entry with U.S. Customs on-site, have a Foreign Trade Zone associated with it and/or have available land for industrial activities.

3. Include any proposed airports that the respective state/commonwealth believed (a) would meet the above criteria and (b) was a realistic proposal within the next 10-15 years. To be considered a realistic proposal, either state legislation should have been introduced which provides project funding or a detailed implementation schedule or equivalent should have been adopted by a state/commonwealth agency.

4. Include all airports that meet most of the criteria and only marginally fail to meet criteria for one or two others.

5. Include one airport for any state which does not have an airport that meets the above "major gateway airport criteria."

6. Include those airports deemed to be of particular interest to each Alliance member (with each Alliance member being entitled to designate up to 5 facilities in whatever combination of transportation mode as the Alliance member felt best served their particular interest).

Data were compiled from a number of sources concerning existing and proposed airports within the Region. These were the airports which were deemed to be particularly important in their respective state/commonwealth. However, not all of airports necessarily do or will play a major role regarding trade with Latin America, at least in the foreseeable future. The large number of airports in the database ensured that any reasonable candidate for inclusion in the LATTS Strategic Airport System would be addressed.

Satisfaction of Criteria

Using available information, an assessment was conducted in which each airport was compared with of the adopted criteria. The criteria used in this assessment focused on physical facilities, intermodal characteristics, and the existence of direct air services to Latin America.

Presented in **Exhibit C2-1** is a matrix which contains the results of this assessment. Fourteen airports currently have direct air service to/from Latin America. Based upon the adopted criteria, all of these airports were included in the LATTS Strategic Airport System.

Of the Alliance Region airports which do not have direct service to Latin America, 12 have runways of at least 10,000 feet. The 10,000 feet criterion was considered to be appropriate for study purposes because of aircraft characteristics, fuel and cargo loads, and the long stage lengths associated with flights to/from Latin America.

All 26 of the airports which either had direct service to Latin America or which had a primary runway length of at least 10,000 feet were included in the LATTS Strategic Airport System. In addition, seven airports were found to have features which nearly met study criteria. These airports also were included in the Strategic Airport System.

A further 15 airports also were included in recognition of their particular importance to the respective Alliance member. Two of these airports are proposed two new facilities.

Altogether, the LATTS Strategic Airport System includes 48 airports of which 46 are existing facilities.

Exhibit C2-1
SATISFACTION OF STRATEGIC AIRPORT SYSTEM CRITERIA

STATE	AIRPORTS THAT MEET OR EXCEED CRITERIA	AIRPORTS THAT NEARLY MEET CRITERIA	AIRPORTS THAT DEFINITELY DO NOT MEET CRITERIA
ALABAMA	BIRMINGHAM INT'L		
ALABAMA	HUNTSVILLE INT'L CARL T. JONES FIELD		
ALABAMA			**PROPOSED NEW AIRPORT**
ARKANSAS			NEW NW ARKANSAS REGIONAL (Fayettevile)
ARKANSAS			ADAMS FIELD (LITTLE ROCK NAT'L)
FLORIDA	DAYTONA BEACH INT'L		
FLORIDA	SOUTHWEST FLORIDA INT'L (Ft. Myers)		
FLORIDA	JACKSONVILLE INT'L		
FLORIDA	FORT LAUDERDALE - HOLLYWOOD INT'L		
FLORIDA		ORLANDO SANFORD INTL	
FLORIDA	MIAMI IMTERNATIONAL		
FLORIDA	ORLANDO INTL		
FLORIDA	TAMPA INTERNATIONAL		
FLORIDA			PENSACOLA REGIONAL
FLORIDA			PANAMA CITY-BAY COUNTY INTERNATIONAL
GEORGIA	W. B. HARTSFIELD ATLANTA INT'L		
KENTUCKY	LOUISVILLE INT'L		
KENTUCKY			BLUE GRASS (Lexington)
KENTUCKY	CINCINNATI/NORTHERN KENTUCKY		
LOUISIANA	NEW ORLEANS INT'L		
MISSISSIPPI		GULFPORT-BILOXI REGIONAL	
MISSISSIPPI			JACKSON INTERNATIONAL

Exhibit C2-1 (cont'd)
SATISFACTION OF STRATEGIC AIRPORT SYSTEM CRITERIA

STATE	AIRPORTS THAT MEET OR EXCEED CRITERIA	AIRPORTS THAT NEARLY MEET CRITERIA	AIRPORTS THAT DEFINITELY DO NOT MEET CRITERIA
NORTH CAROLINA	CHARLOTTE - DOUGLAS INT'L		
NORTH CAROLINA	PIEDMONT TRIAD INT'L (Greensboro)		
NORTH CAROLINA	RALEIGH - DURHAM INT'L		
NORTH CAROLINA			LAURIN-MAXTON
NORTH CAROLINA			NC GLOBAL AIR PARK (Kinston)
NORTH CAROLINA			NEW HANOVER INT'L
PUERTO RICO	RAFAEL HERNANDEZ (Aguadilla)		
PUERTO RICO	LUIS MUNOZ MARIN INT'L (San Juan)		
SOUTH CAROLINA		CHARLESTON AFB - INT'L	
SOUTH CAROLINA			COLUMBIA METROPOLITAN
SOUTH CAROLINA		GREENVILLE - SPARTANBURG	
TENNESSEE		MEMPHIS INT'L	
TENNESSEE	NASHVILLE INT'L		
TEXAS	AMARILLO INT'L		
TEXAS	DALLAS - FORT WORTH INT'L		
TEXAS	EL PASO INT'L		
TEXAS	HOUSTON INTERCONTINENTAL		
TEXAS	LUBBOCK INT'L		
TEXAS			SAN ANTONIO INT'L
TEXAS	AUSTIN-BERGSTROM INTERNATIONAL		
VIRGINIA	WASHINGTON DULLES INT'L		
VIRGINIA			NEWPORT NEWS - WILLIAMSBURG INT'L
VIRGINIA		NORFOLK INT'L	
VIRGINIA		RICHMOND INT'L	
WEST VIRGINIA			PROPOSED REGIONAL AIRPORT
WEST VIRGINIA			BENEDUM

LATTS STRATEGIC AIRPORTS

Alabama includes two LATTS airports that met or exceeded major criteria: Birmingham International and Huntsville International. Both existing airports have runways of 10,000 feet in length, and Huntsville International has direct service to Latin America. Birmingham Regional also was included in the LATTS analyses because of its special interest to the state.

Arkansas includes two LATTS airports: Little Rock National and Northwest Arkansas Regional. Neither of these airports met strategic criteria. Nevertheless, they were included because of their special importance to Arkansas.

Florida has seven existing airports that met or exceeded major criteria and one additional airport that nearly met criteria. Four airports have direct service to Latin America: Miami International, Tampa International, Orlando International, and Ft. Lauderdale-Hollywood International. Orlando Sanford International nearly met study criteria and was included in the Strategic Airport Study. Two additional airports, which did not meet study criteria, also were included because of their special interest to the state.

Georgia has one airport included in the LATTS Airport System: W.B. Hartsfield-Atlanta International. W.B. Hartsfield-Atlanta International airport met or exceeded major criteria and has direct air service to Latin America.

Kentucky has two airports in the LATTS Airport System that met or exceeded major criteria: Louisville International and Cincinnati/Northern Kentucky International. Both airports have runways of 10,000 feet in length. Louisville International has existing service to Latin America. One additional airport also included in the LATTS system is Blue Grass Airport, which did not meet strategic criteria but was included because of its importance to the Commonwealth of Kentucky.

Louisiana has one airport included in the LATTS Strategic Airport System: New Orleans International. New Orleans International exceeds major strategic criteria in that there is an existing runway greater than 10,000 feet in length and direct flights to Latin America.

Mississippi has two airports which were included in the LATTS Strategic System: Jackson International and Gulfport-Biloxi Regional. Gulfport-Biloxi nearly met major criteria. While Jackson International did not meet strategic system criteria, it was included because of its importance to the state.

North Carolina has six airports in the LATTS Strategic Airport System. These airports include Charlotte Douglas International, Raleigh-Durham International, Piedmont Triad International, North Carolina Global Transpark, New Hanover International and Laurinburg-Maxton airports. Of these airports, Charlotte Douglas, Piedmont Triad, and Raleigh-Durham met or exceeded major criteria, but only Piedmont Triad International has air service to Latin America. The North Carolina Global Transpark is currently under construction. With a planned

runway of 8,600 feet, this airport will not meet major criteria. New Hanover International and Laurinburg-Maxton Airport also failed to meet study criteria but they also were included because of their special interest to the state.

Puerto Rico includes two LATTS Strategic Airports: Luis Munoz Marin International and Rafael Hernandez airports. Both of these airports exceeded major criteria.

South Carolina includes three LATTS Strategic Airports. Charleston International and Greenville/Spartanburg Regional airports both nearly met strategic criteria. Columbia Metropolitan did not meet major criteria but was included in the LATTS system because of its importance to South Carolina.

Tennessee includes two strategic airports: Memphis International and Nashville International Airports. Nashville International currently has direct Latin American air service.

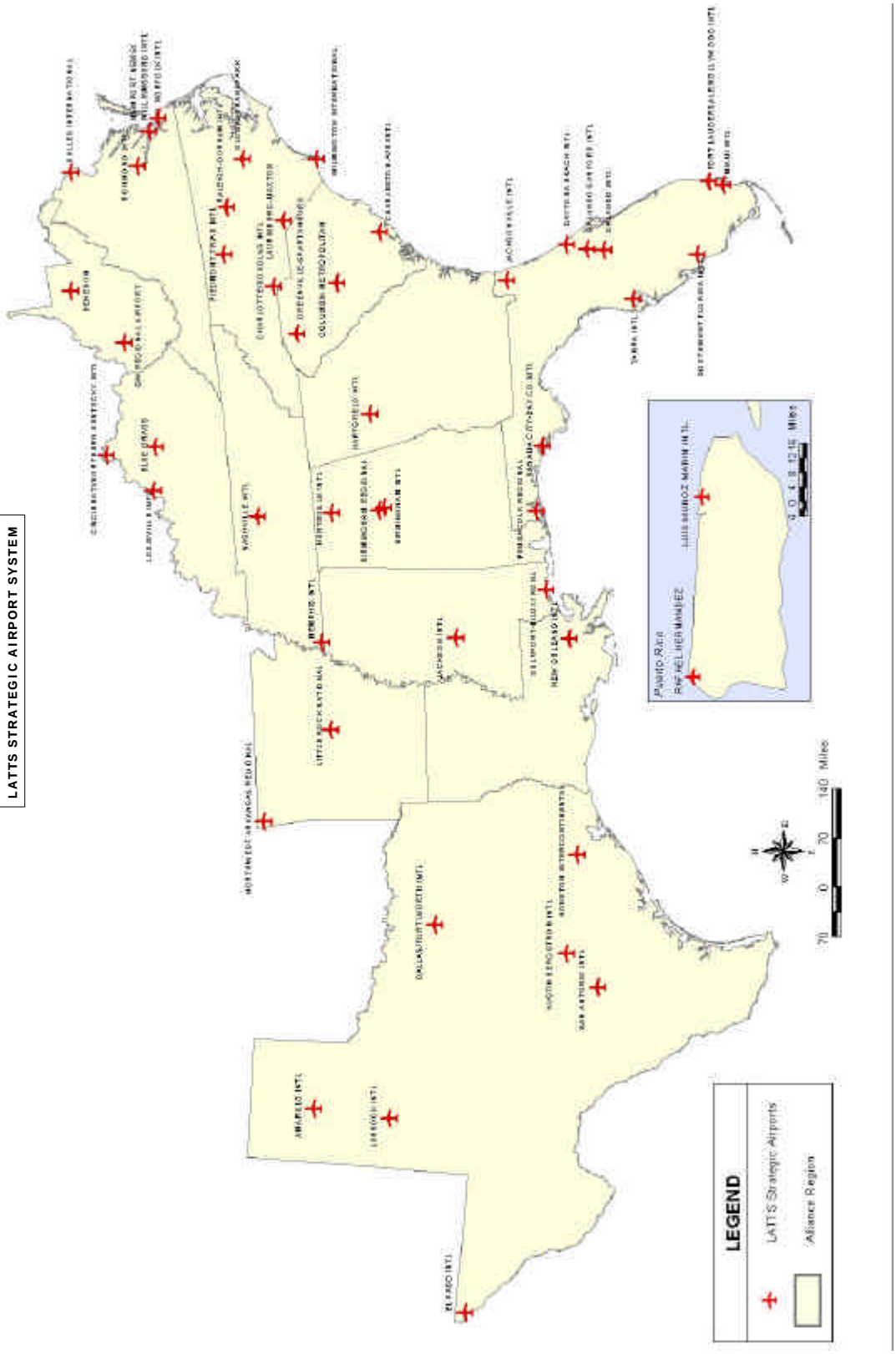
Texas includes six airports that met or exceeded major criteria: Dallas-Fort Worth International, Houston Intercontinental, Austin-Bergstrom International, Amarillo International, El Paso International, and Lubbock International. Four of the airports, Dallas-Fort Worth International, Houston Intercontinental, Lubbock International, and Amarillo International have direct service to Latin America. San Antonio International also was included because of its special interest to the state.

Virginia includes four airports in the LATTS Strategic Airport System. However, only Washington-Dulles International met or exceeded criteria. Richmond International and Norfolk International nearly met criteria. Newport News/Williamsburg International was included because of its special interest to the Commonwealth of Virginia.

West Virginia includes two airports in the LATTS Strategic System: Benedum Airport and the proposed Southwestern West Virginia Regional Airport. Both airports were included because of their importance to West Virginia.

The LATTS Strategic Airport System, comprising 46 existing airports and 2 proposed airports, is depicted in **Exhibit C2-2**.

Exhibit C2-2
LATTS STRATEGIC AIRPORT SYSTEM



SECTION C3
LATTS STRATEGIC RAIL SYSTEM

The LATTS Scope of Work foresaw a focus upon "… the mainline railroad system, plus major connections to port facilities." Thus, the analysis concentrated upon the principal system components with regard to Latin American trade flows. Based upon adopted criteria, evaluations were conducted to identify those rail facilities which were included in the LATTS Strategic Rail System.

SYSTEM DESIGNATION CRITERIA

Criteria were adopted for purposes of designating the LATTS Strategic Rail System. These criteria were as follows:

1. Include that portion of the rail system designated as Principal Railroad Lines by FRA which have annual freight volumes exceeding 20 million gross ton-miles per mile.

2. Include all STRACNET mainlines.

3. Include existing rail line connections to all those ports that are part of LATTS Strategic Transportation System.

4. Include existing rail lines which function as part of an inland port operation.

5. Include additional lines which were deemed to be of special interest to Alliance members.

The lines that met these criteria are shown on **Exhibit C3-1**.

While the system denoted in Exhibit C3-1 comprises the bulk of the Strategic Rail System that was examined by LATTS, additional investigations were conducted regarding rail traffic flows to determine the need for additional line segments to be included. A discussion of these analyses and the adjustments made in the LATTS Strategic Port System is contained in a subsequent section. A final Strategic Rail System is presented at the conclusion of this discussion.

Principal Railroad Lines

The Federal Railroad Administration (FRA) has defined a core rail system known as Principal Railroad Lines. These rail lines have the following attributes:

- Amtrak service
- National defense essential
- Annual freight volumes exceeding 20 million gross ton-miles per mile (MGTM/M)

Exhibit C3-1
INITIAL LATTS STRATEGIC RAIL SYSTEM

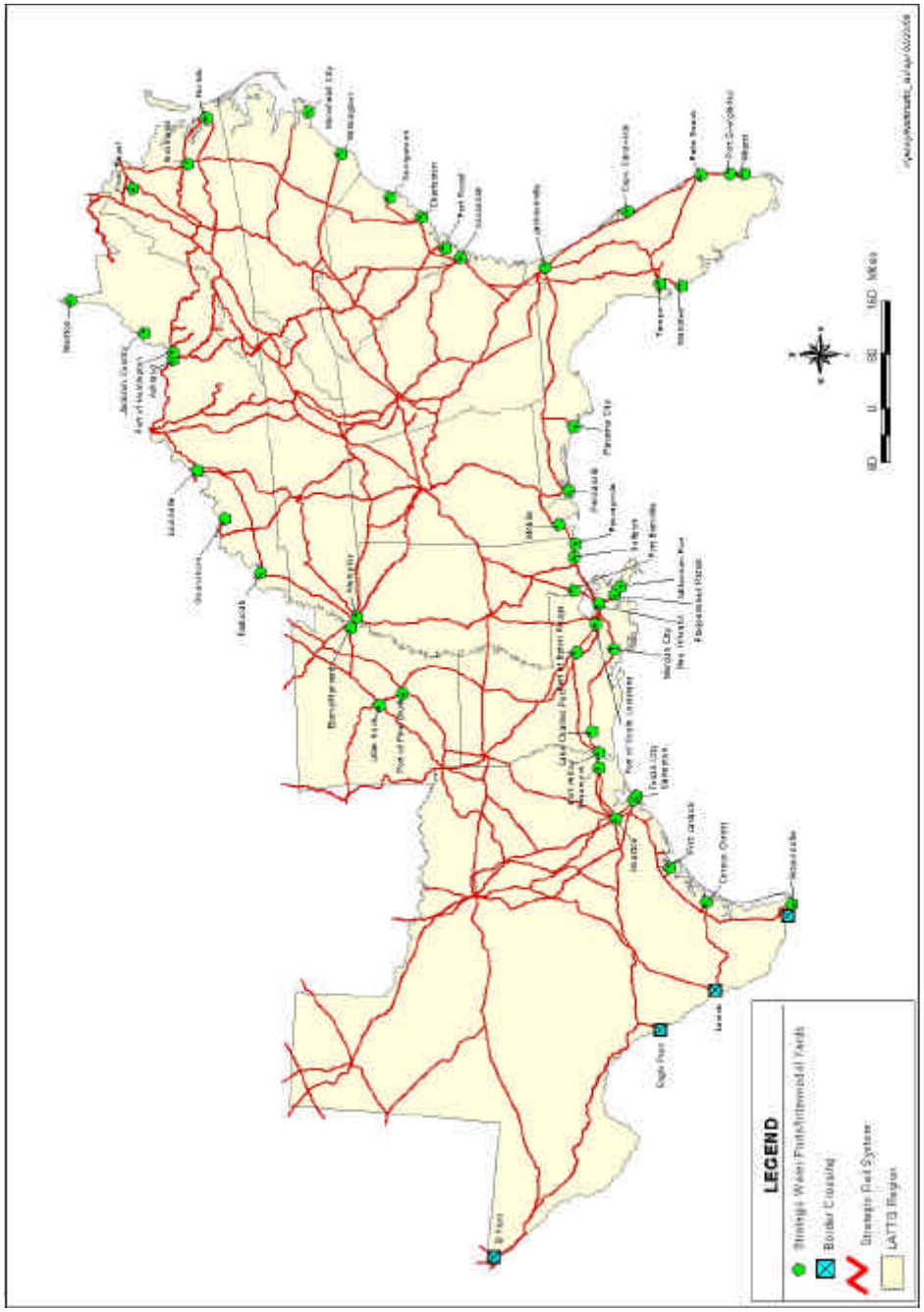


Exhibit C3-2 displays the Principal Rail Network as so defined.

Amtrak Lines

Because of their passenger orientation, LATTS is not concerned with Amtrak services. Nevertheless, it is typical that the criterion concerning freight volumes (discussed below) encompasses lines which also happen to provide Amtrak service. Segments of the Principal Railroad Lines system which met the freight volume criterion and which also accommodated Amtrak service were included in the LATTS Strategic Rail System. Nevertheless, their inclusion had nothing to do with Amtrak passenger services.

National Defense

An advantage of the Strategic Rail Corridor Network (STRACNET) is the ability of these lines to transport oversize (high/wide) loads. Therefore, STRACNET mainlines were included in the LATTS Strategic Transportation System even if they did not meet the freight volume criterion. However, connector lines from STRACNET mainlines to military facilities were not included since they are not relevant to Latin American trade.

20 MGTM/M

The freight volume criterion defines mainline railroads which are most important to the movement of freight. These mainlines were logical element for inclusion in the LATTS Strategic Transportation System.

Additional Rail Lines

In addition to the FRA's Principal Railroad Lines, other line segments were added to the LATTS Strategic Rail System even though they did not qualify under the system criteria presented earlier.

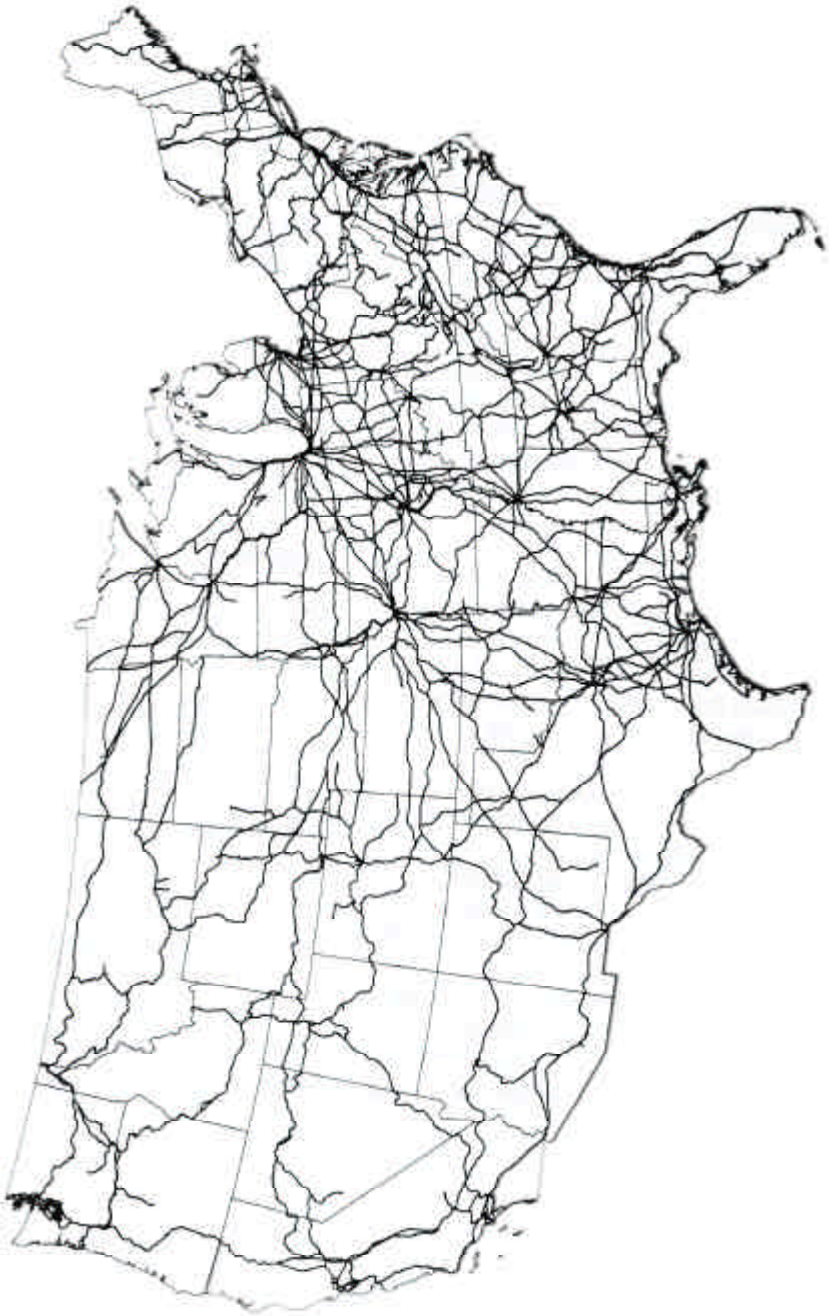
Intermodal Facilities

There are certain rail-highway intermodal facilities which function as off-dock facilities for waterports. This situation exists at Charleston, South Carolina and Miami, Florida, as well as other locations. These highway connections were considered to be part of the LATTS Strategic Transportation System, a matter discussed subsequently.

Also, there is the matter of "inland ports" for which rail provides all or a portion of the total movement from waterport to inland port. The Norfolk Southern Railway facility at Fort Royal, Virginia is an example of a "pure" inland port. These rail facilities were included in the LATTS Strategic Rail System.

Because of its importance to the state of Arkansas, the rail intermodal yard at Ebony/Harvard was included as a strategic port even though it does not have port facilities at the site (near the Port of Memphis). The rail components were included in the LATTS Strategic Rail System.

Exhibit C3-2
THE FEDERAL RAILROAD ADMINISTRATION PRINCIPAL RAIL NETWORK



Waterport Connections

In some instances, the freight mainlines in the Principal Railroad Line system may not include rail connections to the waterports which were included in the LATTS Strategic Transportation System. These connections were considered to be important within the focus of this study.

Alliance Member Additions

Each Alliance Member had the opportunity to review these criteria as it applied to their particular situation. In some cases, rail segments were added to the LATTS Strategic Rail System because of their special interest to Alliance members.

LATTS RAIL TRAFFIC

Rail traffic data were used to determine net increases in traffic between the base year (1996) and the forecast year (2020). The data contains two-way movements, i.e., that flowing both ways between origin- and-destination pairs.

RAIL TRAFFIC TYPES

Rail traffic was assigned to three categories – Seatrade carload, Seatrade intermodal, and cross-border. The Seatrade category consisted of both imports and exports and distinctions were made between intermodal (container) and those rail movements which would occur in rail cars, principally commodities in break-bulk and bulk form. There was no distinction in car type in the cross-border category.

TONNAGE

A summary of the LATTS rail traffic tonnage is the subject of **Exhibit C3-3**. As shown therein, cross-border traffic represents the fastest growing rail traffic segment and will be the largest segment in Year 2020 by far. It will be over twice as large as Seatrade carload traffic which was the largest in 1996. While intermodal tonnage is far smaller than the other two segments, it is much lighter (weight) per transportation unit. Therefore, its full impact is not truly reflected by tonnage.

Exhibit C3-3
LATTS RAIL TRAFFIC

Traffic Type	1996	2020	Increase	Percent Increase
	(million tons)			
Seatrade Carload	13.1	32.3	19.2	147
Seatrade Intermodal	1.2	6.0	4.8	400
Cross-border	10.7	63.3	52.6	492
Totals	25.0	101.6	76.6	

Data Reduction

Due to the multiplicity of all of the rail movements (multiple origin-destination pairs and associated flows), it was decided to reduce the data used in these analyses. This was done in a two-step process.

Location Consolidation

First, location-specific data, such as individual ports, were combined into regional or state groupings. An example is the South Florida ports of Miami, Everglades (Fort Lauderdale), and Palm Beach. A full listing of the consolidations is provided in **Exhibit C3-4**.

Data Screening

It was also decided to screen the data in an attempt to identify those rail traffic flows that were sizeable enough to potentially impact the rail system. Flows between origin and destination pairs were considered first. It was recognized, however, that dependence on this criterion alone might not result in adequate consideration of locations where a multitude of smaller flows might originate or terminate without the same origins or destinations at the other end of the move. Thus, it was decided to include a means of identifying these locations also, independent of the origin-destination pair determination.

Screening Criteria

Use of railroad facilities is typically measured in terms of tons or carloads, and rail line use in terms of gross ton-miles per mile (GTM/M), usually expressed in millions, or if the expression is reduced algebraically, simply gross tons. The gross ton includes the weight of the equipment as well as the lading and a proportional amount of locomotive tonnage.

A rail line which carries 5 MGTM/M in a year is considered to be on the dividing line between a light density line and a secondary main line. As used in the federal definition, a Class A mainline transports over 20 MGTM/M (used in large part to define the LATTS Strategic Rail System). The 5MGTM/M level is enough, however, to make a noticeable impact on a rail line. Thus, the net tonnage, i.e., the weight of the commodity being shipped, was converted to gross tonnage for purposes of measuring rail system impact and all origin-destination locations with over 5MGTM/M were noted.

Tonnage Conversion

Given that most rail cars weigh in the neighborhood of 30 tons and that many will move one way empty and, combined with an allowance for the weight of the locomotive units powering the train, a factor of 1.6 was selected to expand net tons to gross tons for carload traffic. The factor used for intermodal traffic was much larger, 4.0, as intermodal containers average 14 to15 tons per unit and not only does the weight of the car and locomotives have to be considered, but also the containers. The commodity-to-tare weight ratio is one of the largest disadvantages related to intermodal movements.

Exhibit C3-4
WATERPORT GROUPINGS

Group	Ports
North Carolina	Morehead City - Beaufort Wilmington
South Carolina	Georgetown Charleston Port Royal
South Florida	Palm Beach Port Everglades Miami
Florida Panhandle	Panama City Pensacola
Mississippi	Pascagoula Gulfport
Louisiana Southeast	Millenium Port Plaquemines Parish New Orleans Port of South Louisiana
Texas North	Port Arthur Beaumont
Texas North Central	Houston Texas City Galveston Freeport

Exhibit C3-5 reveals the threshold measures in terms of net tons which approximate the gross ton measures discussed above. Since cross-border flows are a mixture of carload and intermodal traffic, an average between the two was selected. Rail line thresholds were selected at 10 percent of those deemed appropriate for single locations (300,000 tons).

Exhibit C3-5
SCREENING CRITERIA

	Carload	Intermodal (million tons)	Cross Border
Locations	**3.0**	**1.0**	**2.0**
Flows	**0.3**	**0.1**	**0.2**

SIGNIFICANT TRAFFIC GENERATORS AND FLOWS

The threshold measures were applied to the database and the results graphically depicted nationwide on a series of maps. The maps depicting growth in trade (forecast year – base year) are presented and discussed in the following paragraphs.

Seatrade Carload Flows

Representing 25 percent of the forecast growth in Latin American rail traffic, Seatrade carload flows, as shown on **Exhibit C3-6**, are concentrated around Gulf Coast ports, especially in Southeast Louisiana on one end, and Midwestern and Mid-Atlantic states on the other. The traffic movements shown on the exhibit represent just over one half of all of those associated with LATTS Seatrade carloadings.

Exhibit C3-7 depicts rail flows for worldwide Seatrade through the LATTS ports. The principal flows are virtually the same as for Latin American trade, but with increased activity related to Florida and Texas ports. Additional activity generally occurs at all Alliance ports with growth in intrastate flows and beyond the Alliance Region principally to the Northeast.

Seatrade Carload Points

Exhibit C3-8 shows major rail traffic generation points for Latin American trade. The largest carload points are also located on the Gulf Coast. Gulf Coast ports account for more bulk trade with Latin America than do the Atlantic ports which tend to be more oriented to containers than bulk commodities. Outside the Alliance Region, the states of Minnesota, Illinois and Pennsylvania stand out.

Exhibit C3-6

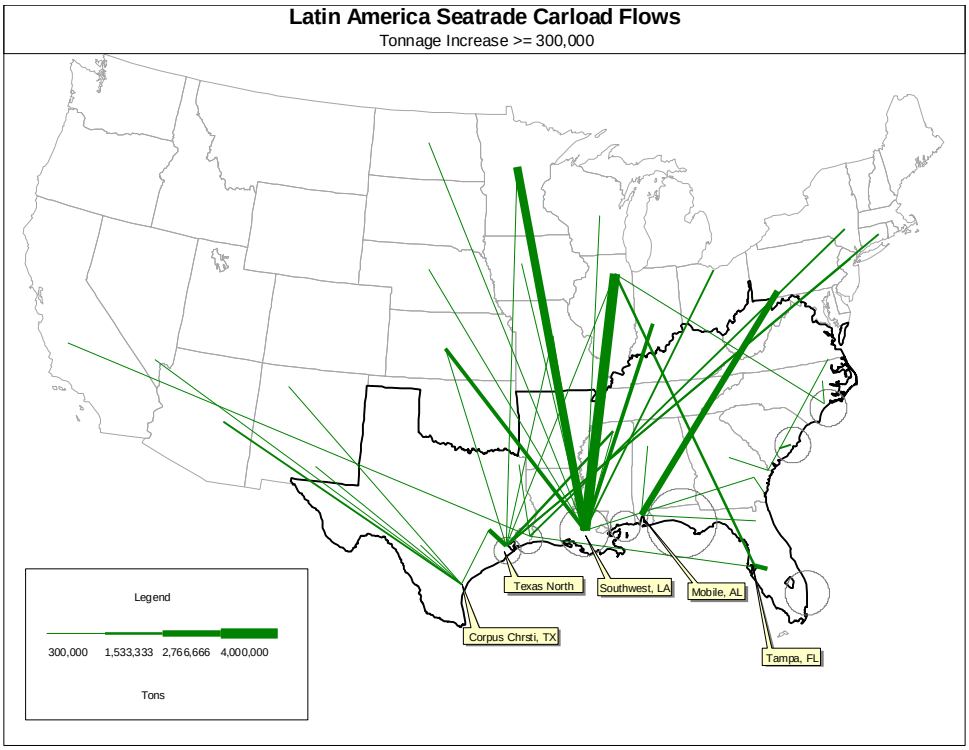


Exhibit C3-7

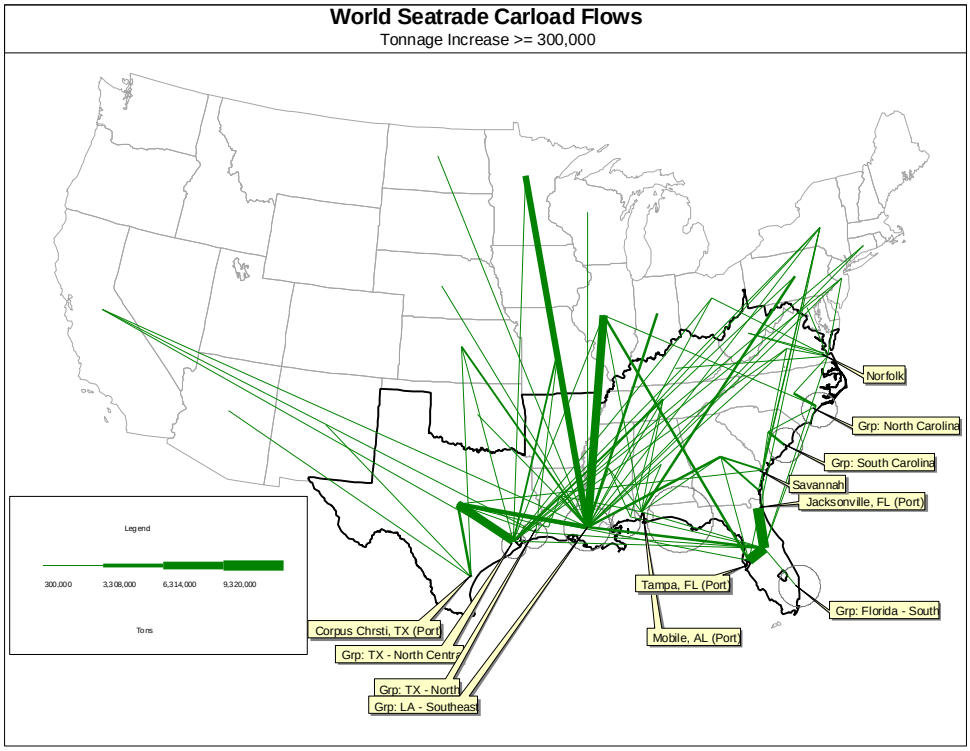
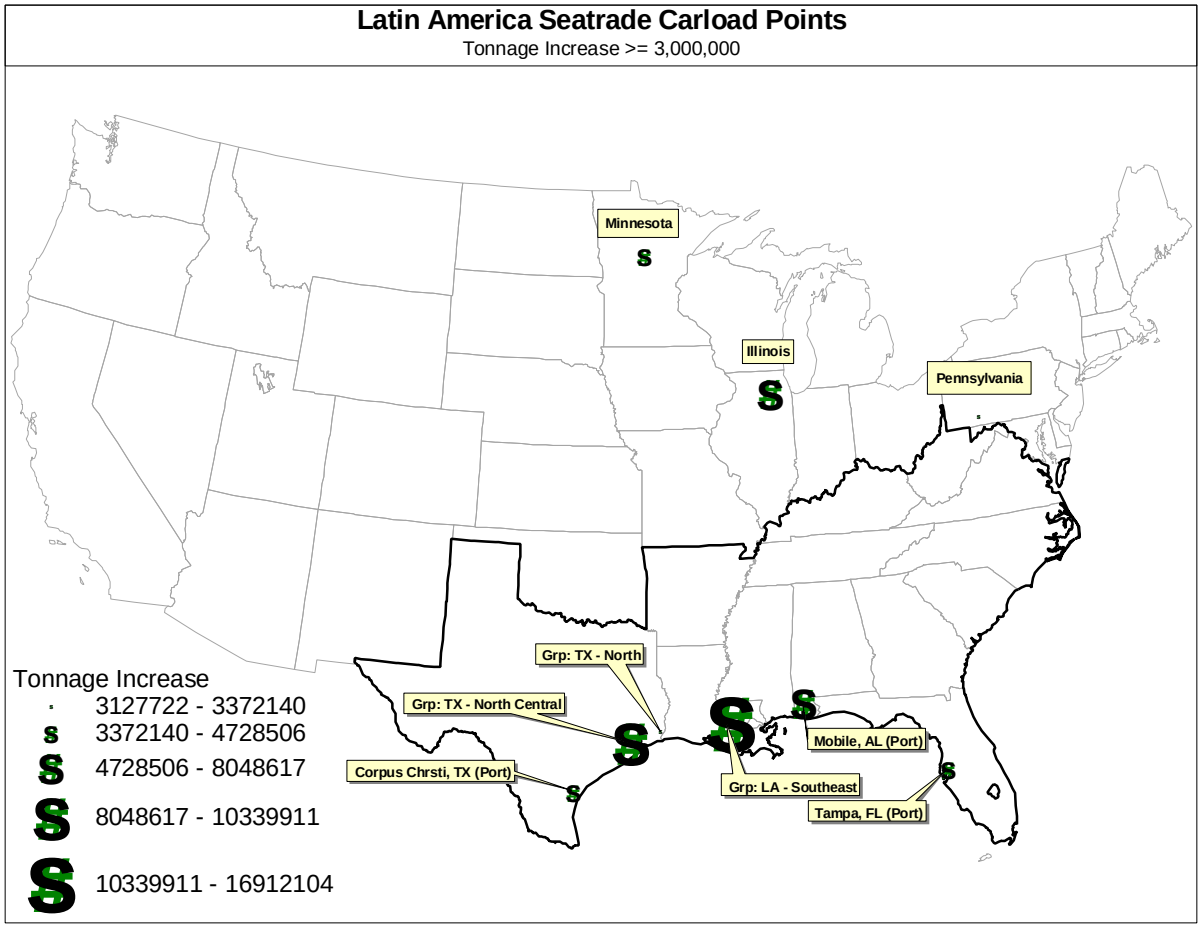


Exhibit C3-8



The additional activity resulting from worldwide trade is evident in **Exhibit C3-9**. The number of locations, both ports and interior points, increases dramatically. Note that much of the inland activity is also contained within the Alliance states.

Seatrade Intermodal Flows

Exhibit C3-10 depicts LATTS Seatrade rail intermodal flows. These flows are concentrated in Florida, North Central Texas and Norfolk, Virginia. The flows shown on the map represent 40 percent of the total LATTS-related intermodal flows. Hence, the remaining 60 percent of intermodal flows represent a larger spectrum of origin-destination pairs. While Midwestern states and California are among the major non-Alliance states, the interior of many Alliance states are also involved.

Exhibit C3-9

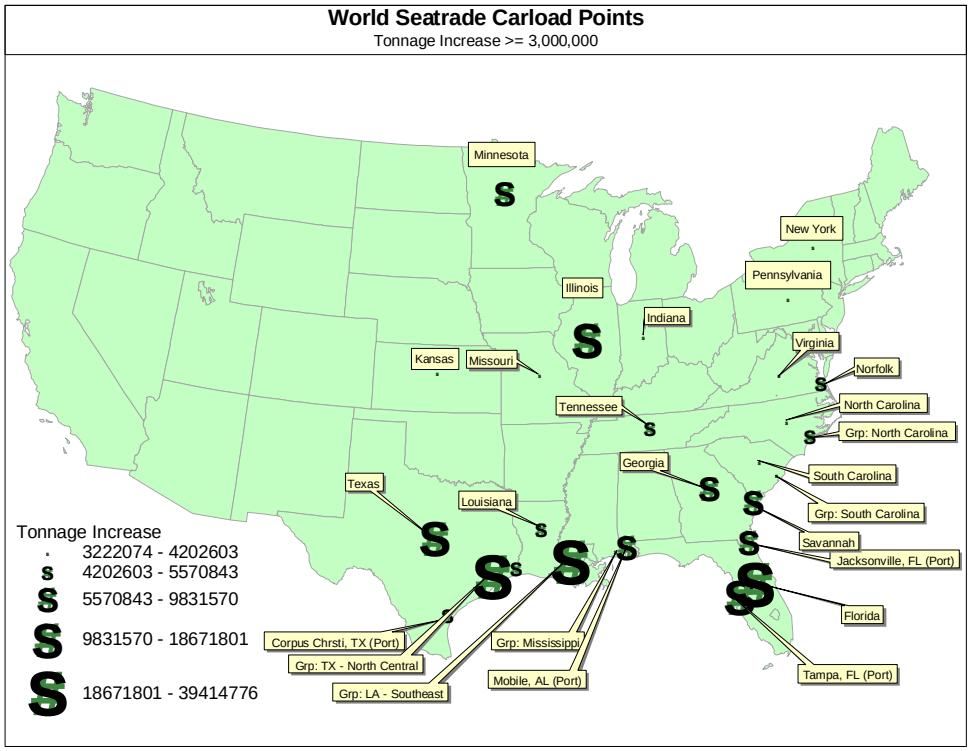
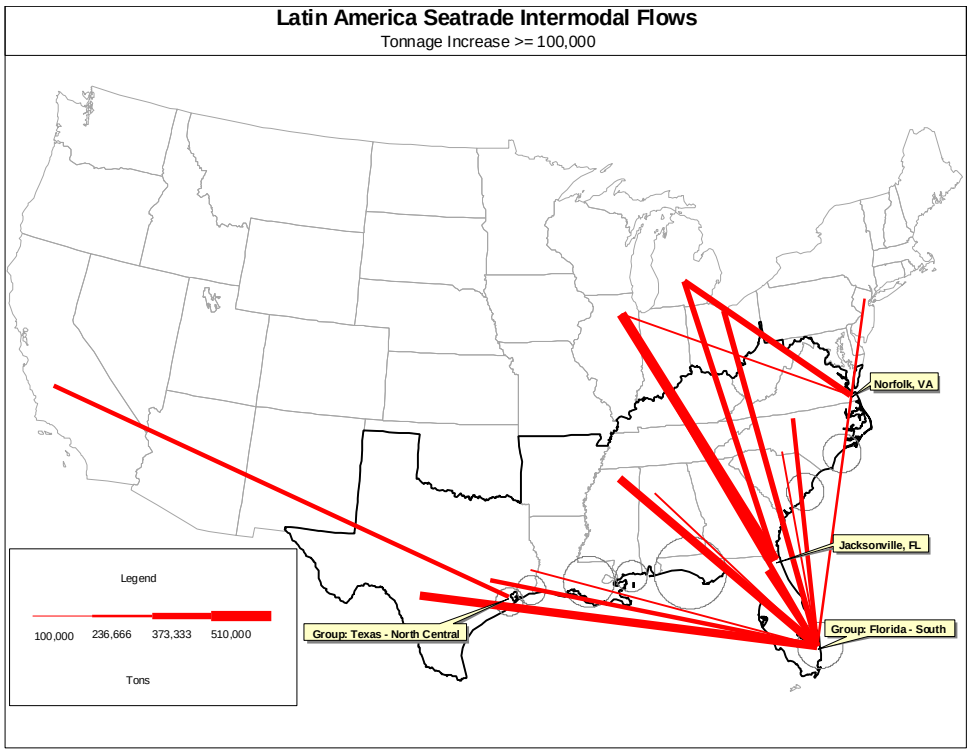
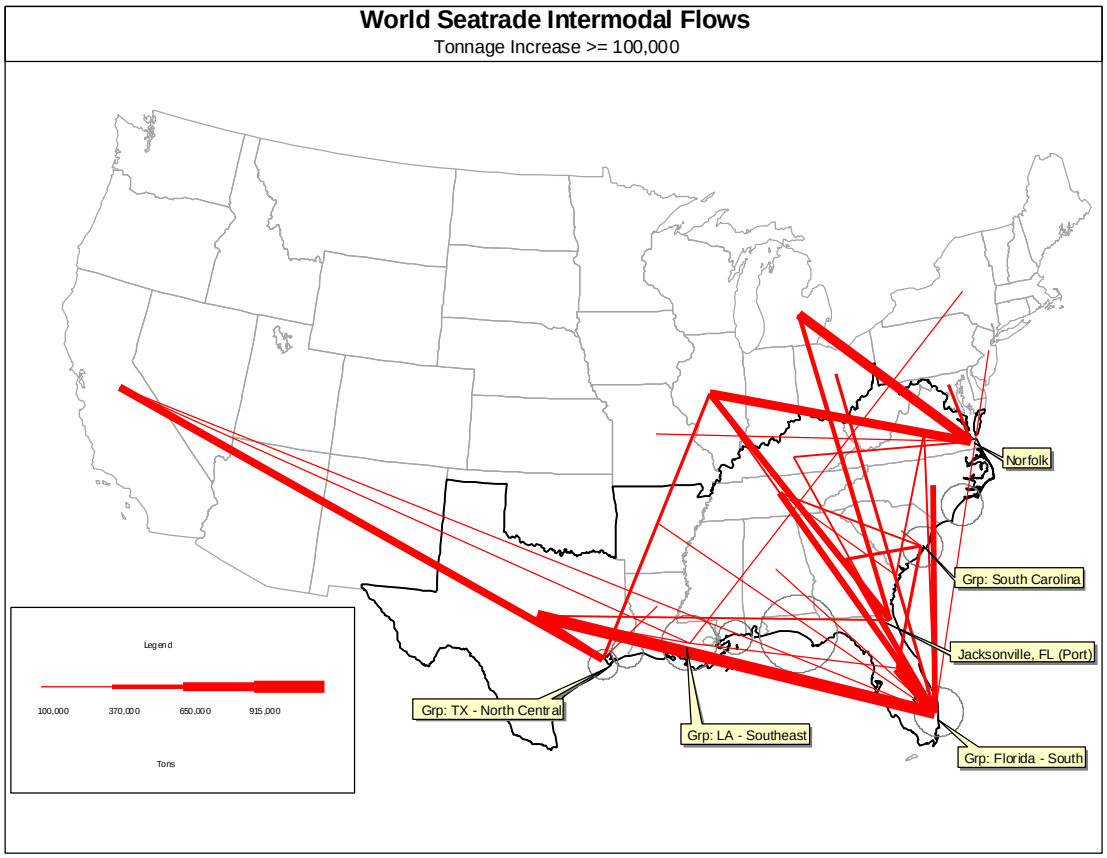


Exhibit C3-10



Consideration of worldwide flows in and out of Alliance ports, as shown on **Exhibit C3-11**, adds major movements from Texas to the Midwest, and Norfolk to Kentucky and Maryland. The South Carolina ports show up with flows to and from other LATTS states.

Exhibit C3-11



Seatrade Intermodal Points

Exhibit C3-12 identifies the major LATTS rail Seatrade intermodal points. The South Florida group of ports and Jacksonville, Florida are the only locales which met the screening criteria. This distinction is not that surprising given the location of these ports relative to Latin America. No locations beyond the Alliance Region met the criterion, demonstrating a lack of movement concentration.

The picture changed, however, when world trade was considered. As evident on **Exhibit C3-13**, South Carolina, Virginia and Texas ports, along with inland locations in Florida, Tennessee and Texas, show significant levels of activity.

Exhibit C3-12

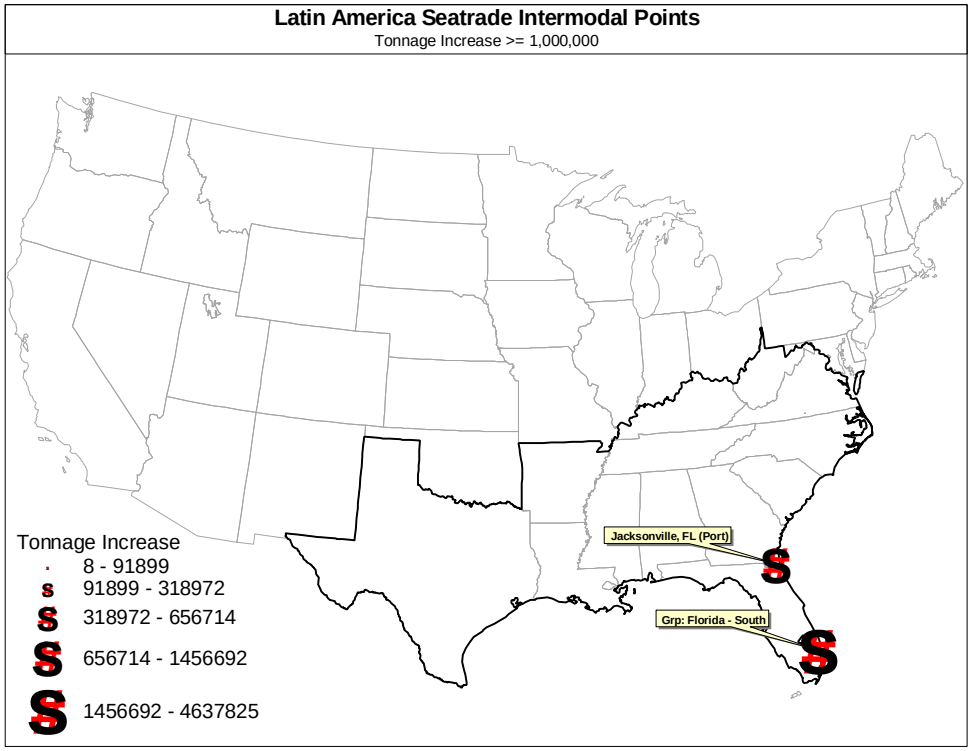
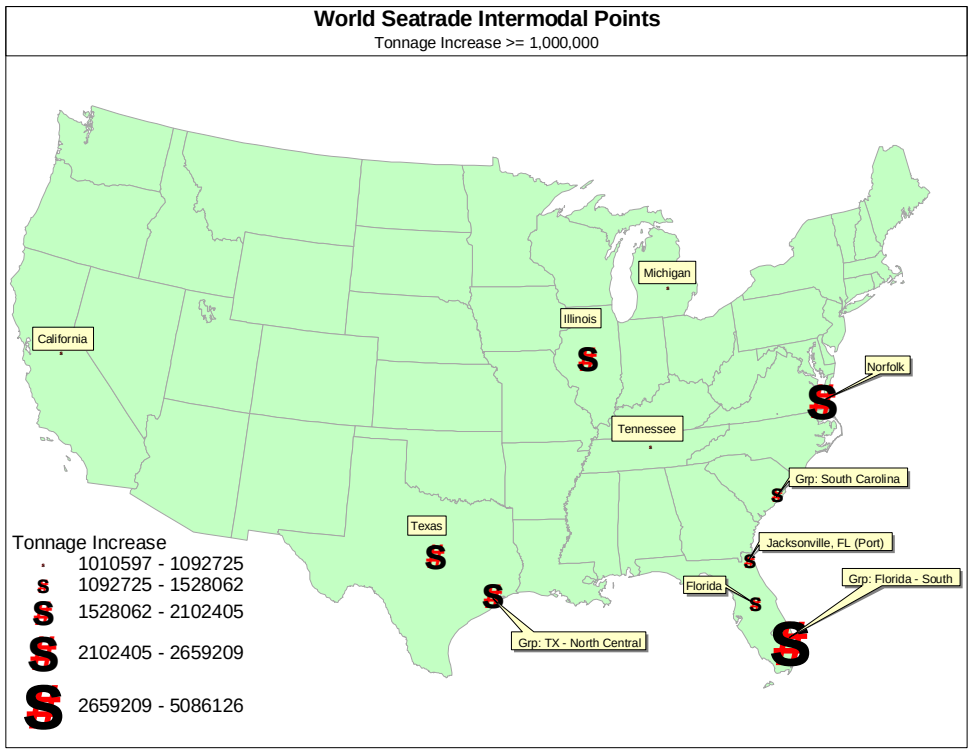


Exhibit C3-13



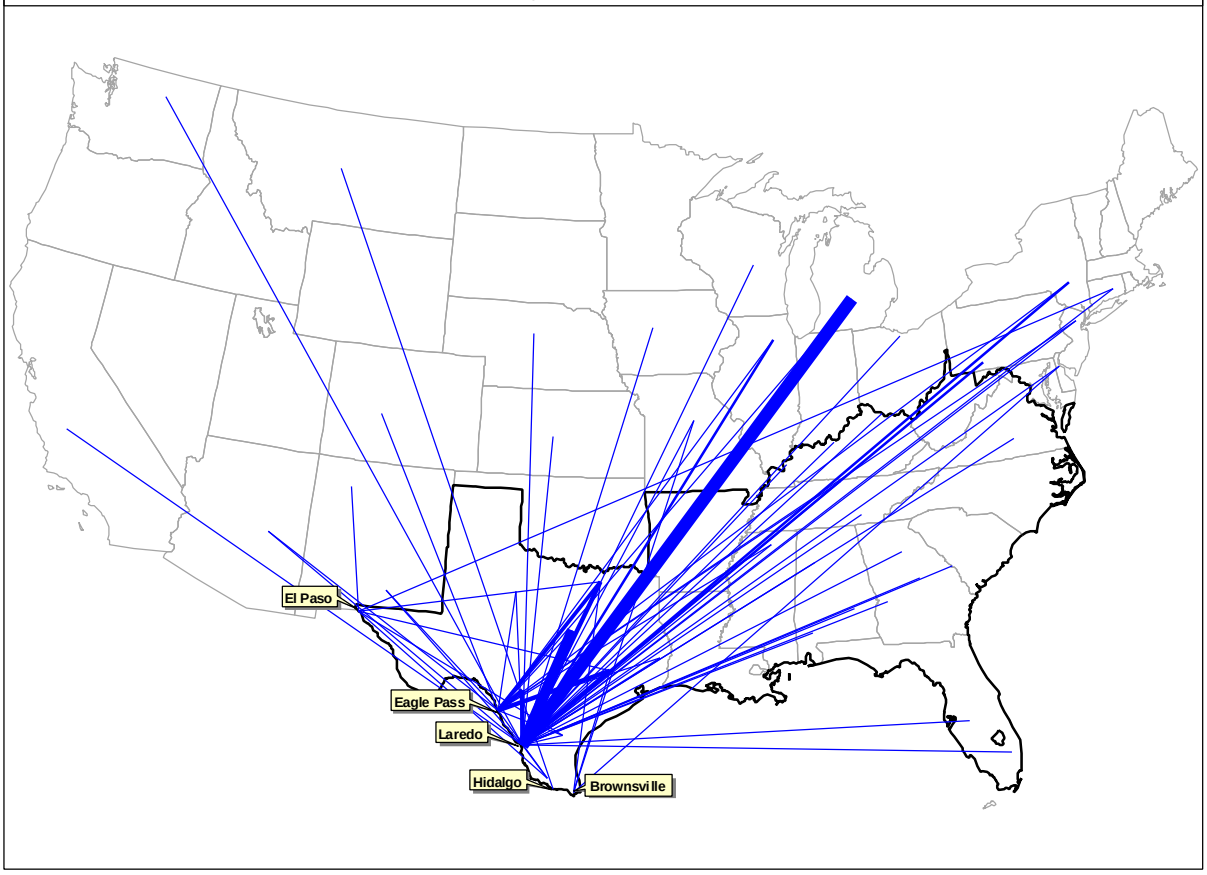
Cross-border Flows

As stated earlier, Texas is the only Alliance member that borders on Latin America and thus has the only ports of entry for land-based rail traffic. As shown on **Exhibit C3-14**, cross-border traffic movements of significance (70 percent of the total are represented on the exhibit) are more numerous and of a greater variety than the other two categories of rail movements. The dominant flows are to/from the Midwest and Northeast and internal to Texas. There is no distinction in cross-border flows between Latin American and worldwide traffic nor in carload vs. intermodal movements.

Exhibit C3-14

Mexico Cross Border Rail Flows (Carload and Intermodal)

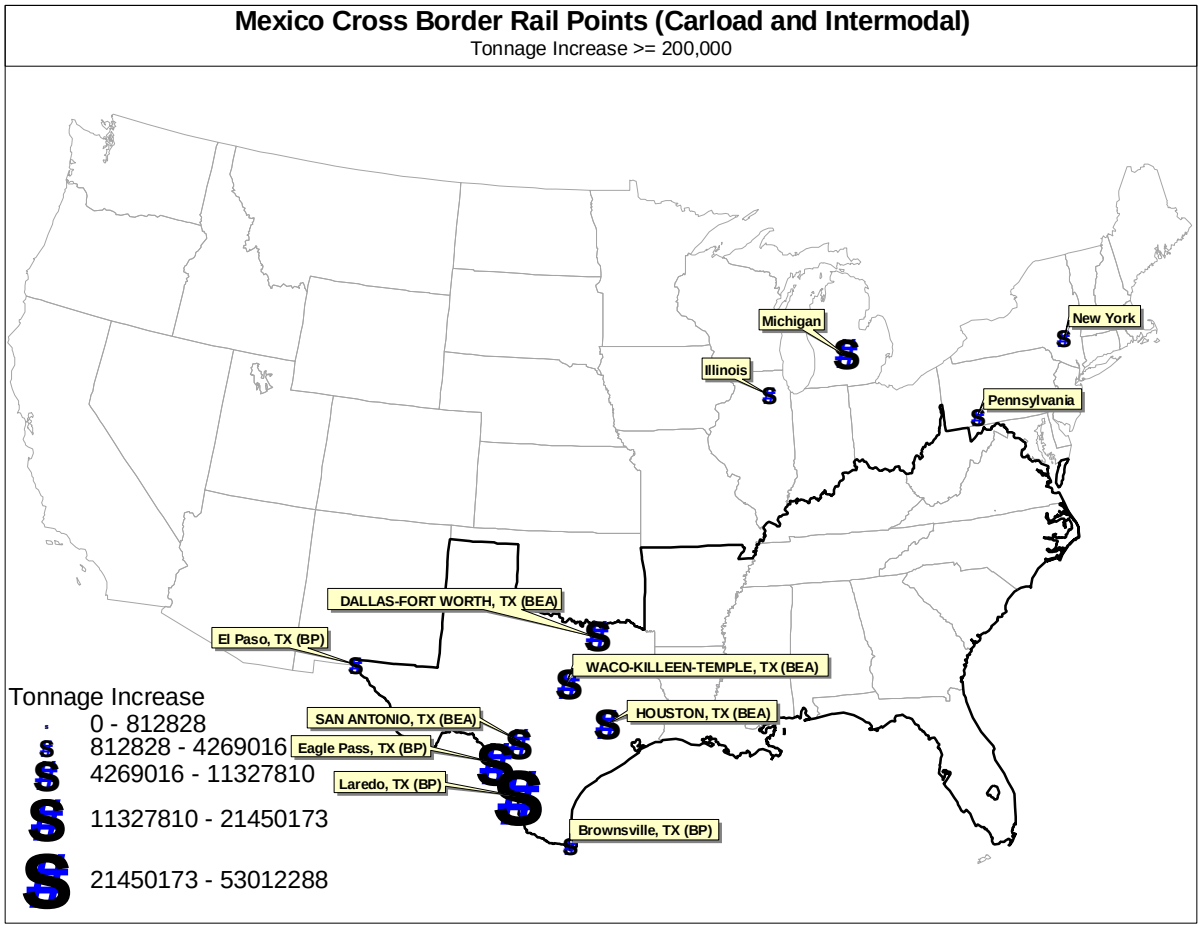
Tonnage Increase >= 200,000



Cross-border Points

There are four border crossings -- El Paso, Eagle Pass, Laredo and Brownsville – which met the adopted criterion. The inland points (see **Exhibit C3-15**) are equally split (4 each) between Texas and the non-LATTS states of Illinois, Michigan, Pennsylvania and New York.

Exhibit C3-15



Combined Flows

Exhibit C3-16 is a composite of all three categories of Latin American rail traffic flows. The flows which met the screening criteria are all presented in the same scale on a tonnage basis so they can be compared with each other. This task is complicated by the difference in tonnage per typical carload commodities as compared to intermodal units. Further complicating any assessment is the mixture of both types in the cross-border flows. The same pattern is evident when world trade through the seaports is added (see **Exhibit C3-17**).

Regardless, it is evident that the largest rail tonnage is comprised of cross-border traffic. The largest carload movements, in large part, are attributable to ports in the States of Texas and Louisiana. Intermodal flows are primarily to and from Florida.

Exhibit C3-16

Cross Border and Latin American Seatrade Carload and Intermodal Flows

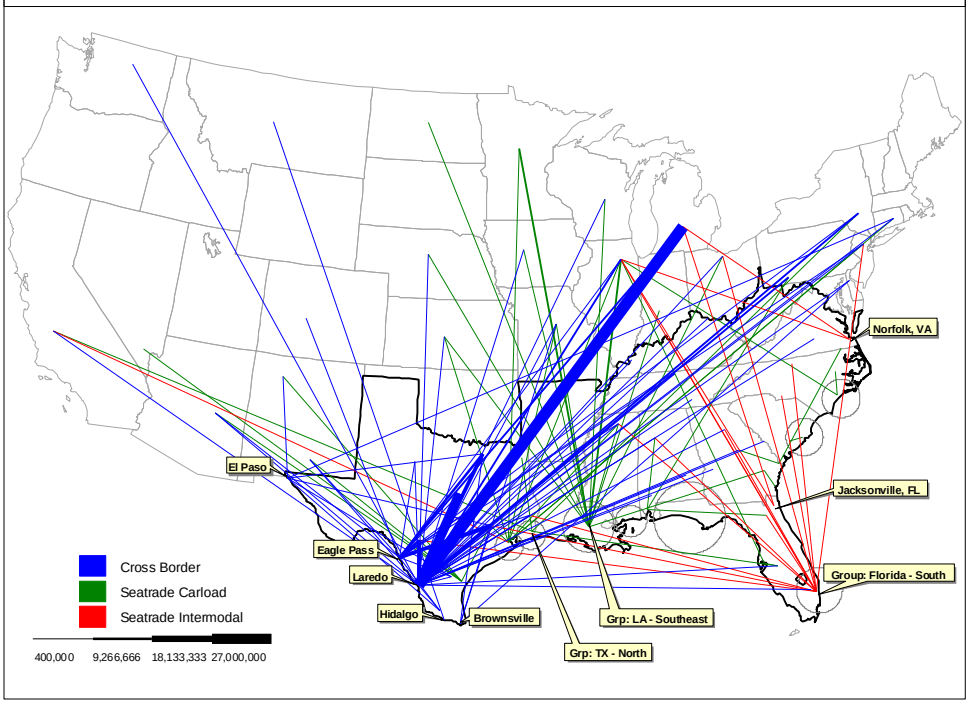
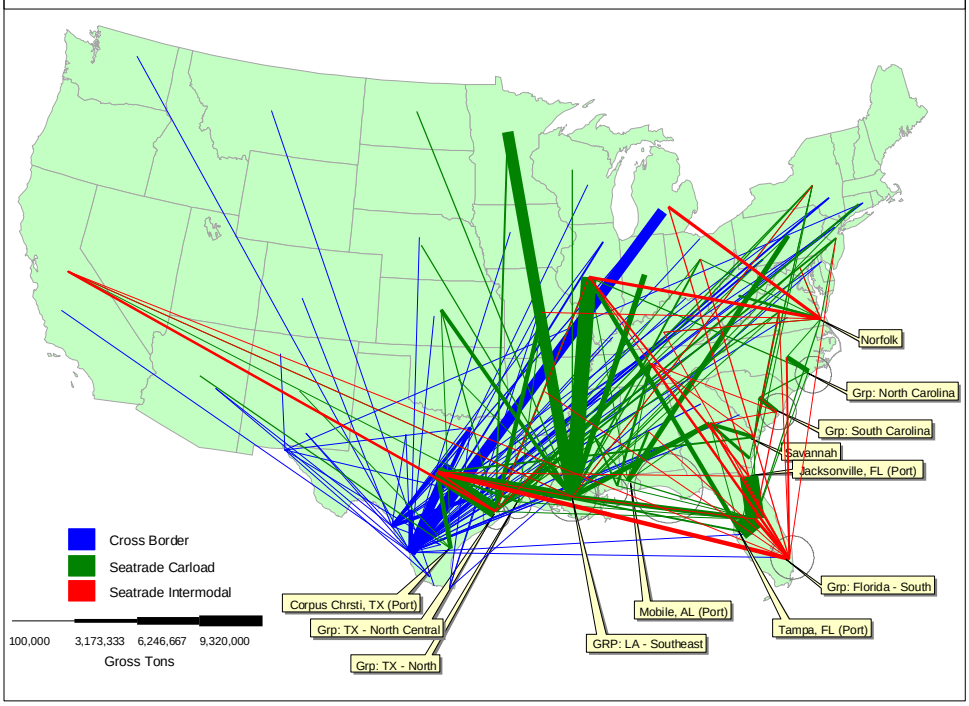


Exhibit C3-17

Cross Border and World Seatrade Carload and Intermodal Flows



Combined Points

Exhibit C3-18 is a composite of all cross-border, carload and intermodal Latin American traffic generation points. The majority of the locations which exceeded the established thresholds are located in Texas and are attributable to cross-border activity, including inland points, as well as Seatrade carload freight. Florida also has significant traffic levels at several locations due to Seatrade intermodal and carload activities. The Southeast Louisiana Group of Ports is the other major activity point in the Alliance Region. Outside the LATTS Region, the major locations lie in the Midwest and Northeast. The rail traffic associated with these areas is derived from waterport carload and cross-border activity.

Exhibit C3-18

Cross Border and Latin American Seatrade Carload and Intermodal Points

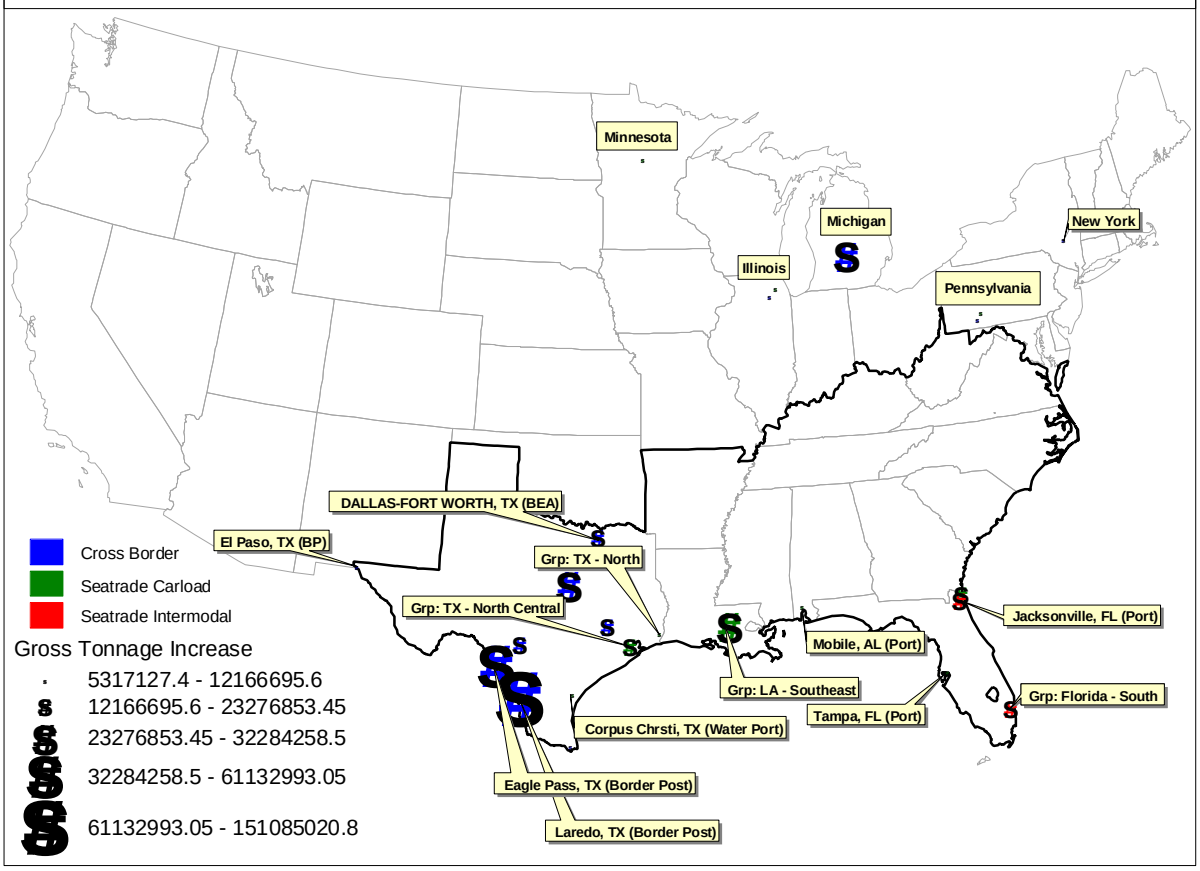
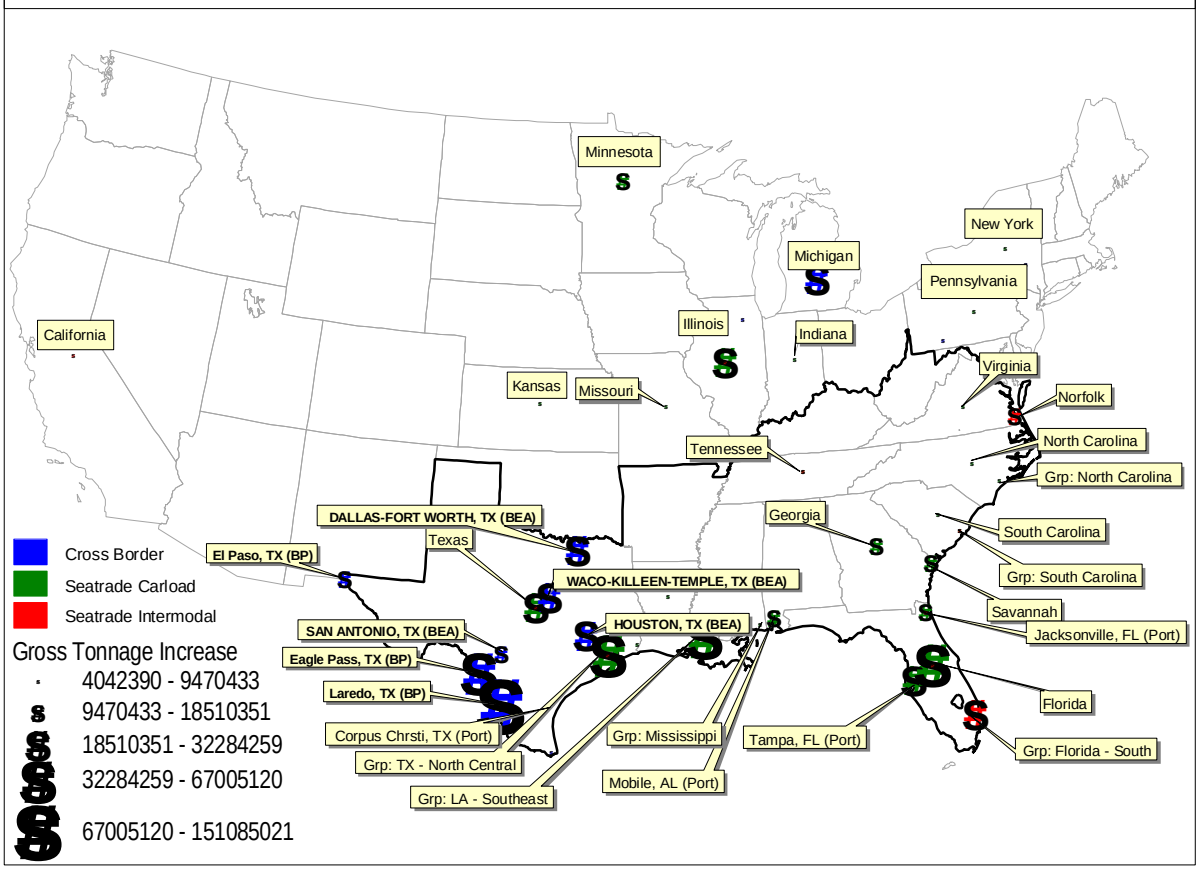


Exhibit C3-19 depicts the points of concentration considering worldwide trade. Additional Alliance and non-Alliance points are added in the depiction, but the major traffic generation centers remain the same, but with more activity.

Exhibit C3-19

Cross Border and World Seatrade Carload and Intermodal Points



RAIL SYSTEM IMPLICATIONS

The rail traffic concentrations provided insights regarding potential impacts on the LATTS Strategic Rail System. The growth in rail traffic in the last decade, combined with service problems related to recent mergers, have already created network congestion and revealed capacity constraints throughout the Alliance states.

The growth in rail traffic forecast for the Alliance states will exacerbate existing problems. Area-specific locations and flows were identified in the preceding discussion. Unlike highway trips which tend to take the path of least resistance and lend themselves to conventional traffic modeling techniques, rail traffic tends to move over the system of the originating carrier as far as possible or as

prescribed in railroad/shipper contracts. Therefore, as the LATTS traffic database is not railroad-specific, it is not possible to determine individual rail lines which would be used in areas served by more than one railroad. In fact, most of the locations and routes identified as potential problem areas in the review of rail traffic increases are served by more than one rail carrier.

Regardless, it is evident that the Strategic Rail System will be adversely impacted in certain locations. Texas, for example, especially as it relates to connections to border crossings, will need attention. Flows from Texas and selected Gulf ports to the Midwest and Northeast will also require attention. While multiple routes over several railroads may be available between some points, they are more limited at others. The east coast of Florida, for example, will undergo significant increases in intermodal traffic with few options.

STRATEGIC RAIL SYSTEM ADJUSTMENTS

While it was not possible as part of these analyses to focus upon individual rail lines, the Strategic Rail System shown on Exhibit C3-2 was re-examined using the results of the rail traffic analysis. After consideration of the forecast increased demand, additional segments were included in the system to enhance capacity and meet other needs that became evident during the system re-examination. The effort was conducted on a railroad-by-railroad basis.

Burlington Northern and Santa Fe

Two line segments were added to the BNSF (see **Exhibit C3-20**). The first is in Texas and runs from Somerville to Beaumont. This segment would add capacity for transcontinental traffic from the Southeast as well as bypass the Houston area. The second, from Columbus, Mississippi to Mobile, Alabama, (Kimbrough, Alabama to Mobile is via trackage rights over NS) would add capacity and direction alternatives for movements in and out of Mobile.

CSX Transportation

The additional CSXT segments, shown in **Exhibit C3-21**, serve two purposes. The first is to provide additional capacity along routes which could be subjected to major flows (Waycross, Georgia to Montgomery with a Bainbridge, Georgia to Tallahassee connection; and Montgomery to LaGrange, Georgia). The second is to fill in missing CSX intermodal system route connections (Augusta to Atlanta; Monroe, North Carolina to Charlotte; and Weldon, North Carolina to Norfolk).

Norfolk Southern

As shown **on Exhibit C3-22**, four NS route segments were added to the Strategic Rail System – Mobile to Birmingham, Macon to Birmingham, Charleston to Spartanburg, and Selma, North Carolina to Greensboro, North Carolina. The first segment provides additional capacity to the Port of Mobile. The second segment is an inactive line being reopened by NS as a bypass of Atlanta, a congested terminal. The third segment is part of the NS intermodal

Exhibit C3-20

Burlington Northern Santa Fe Rail Lines

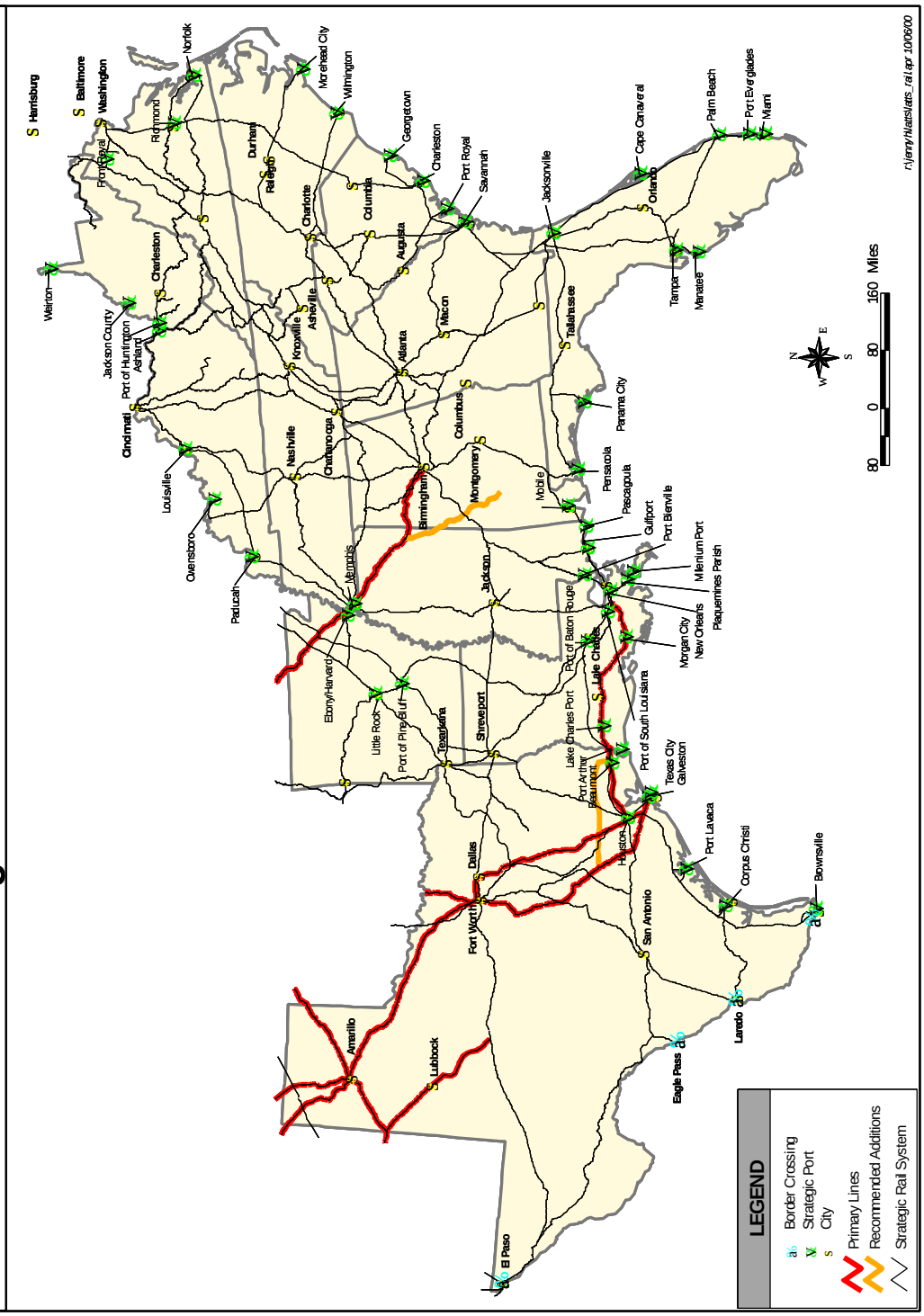


Exhibit C3-21

CSX Transportation Rail Lines

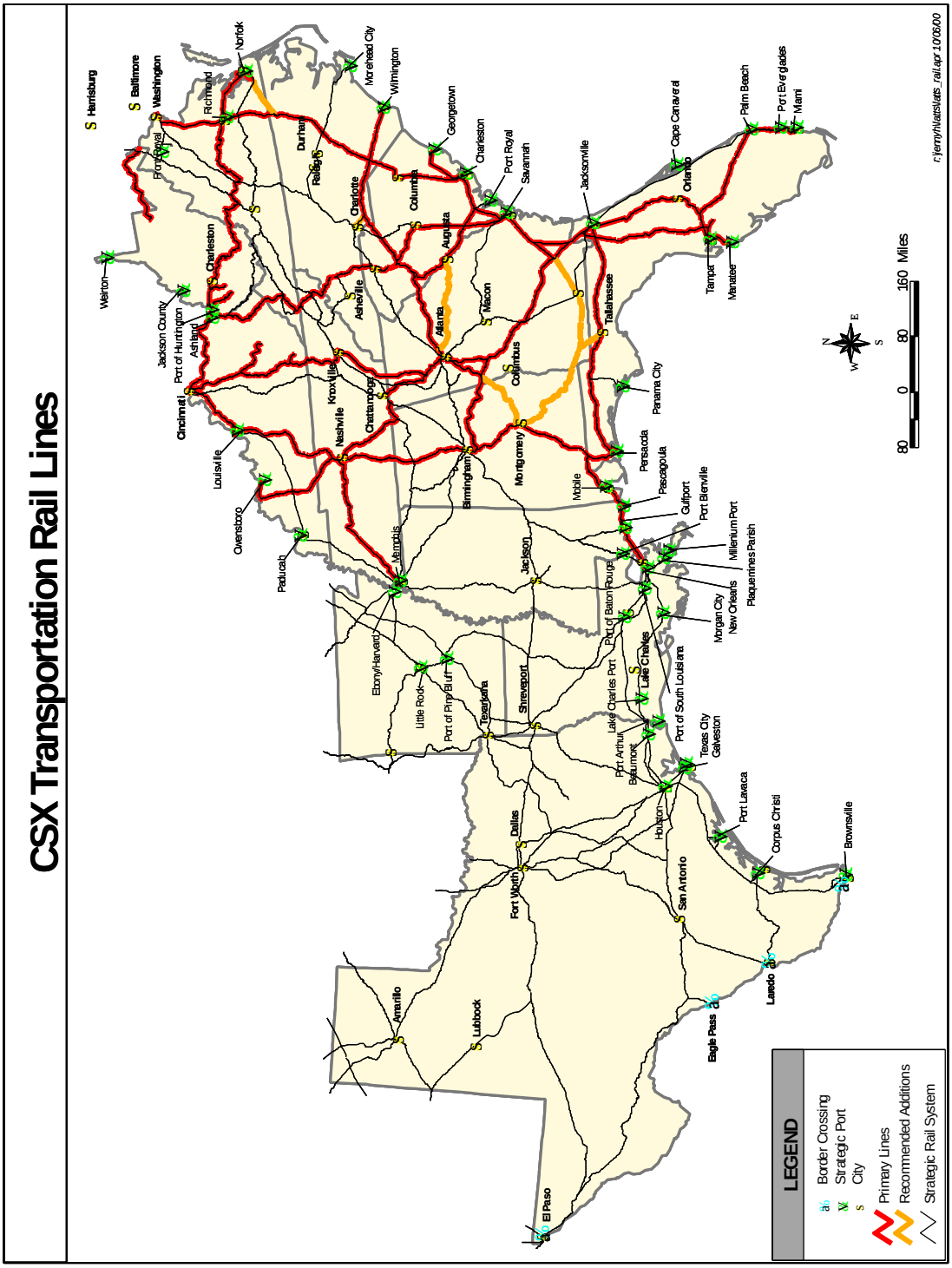
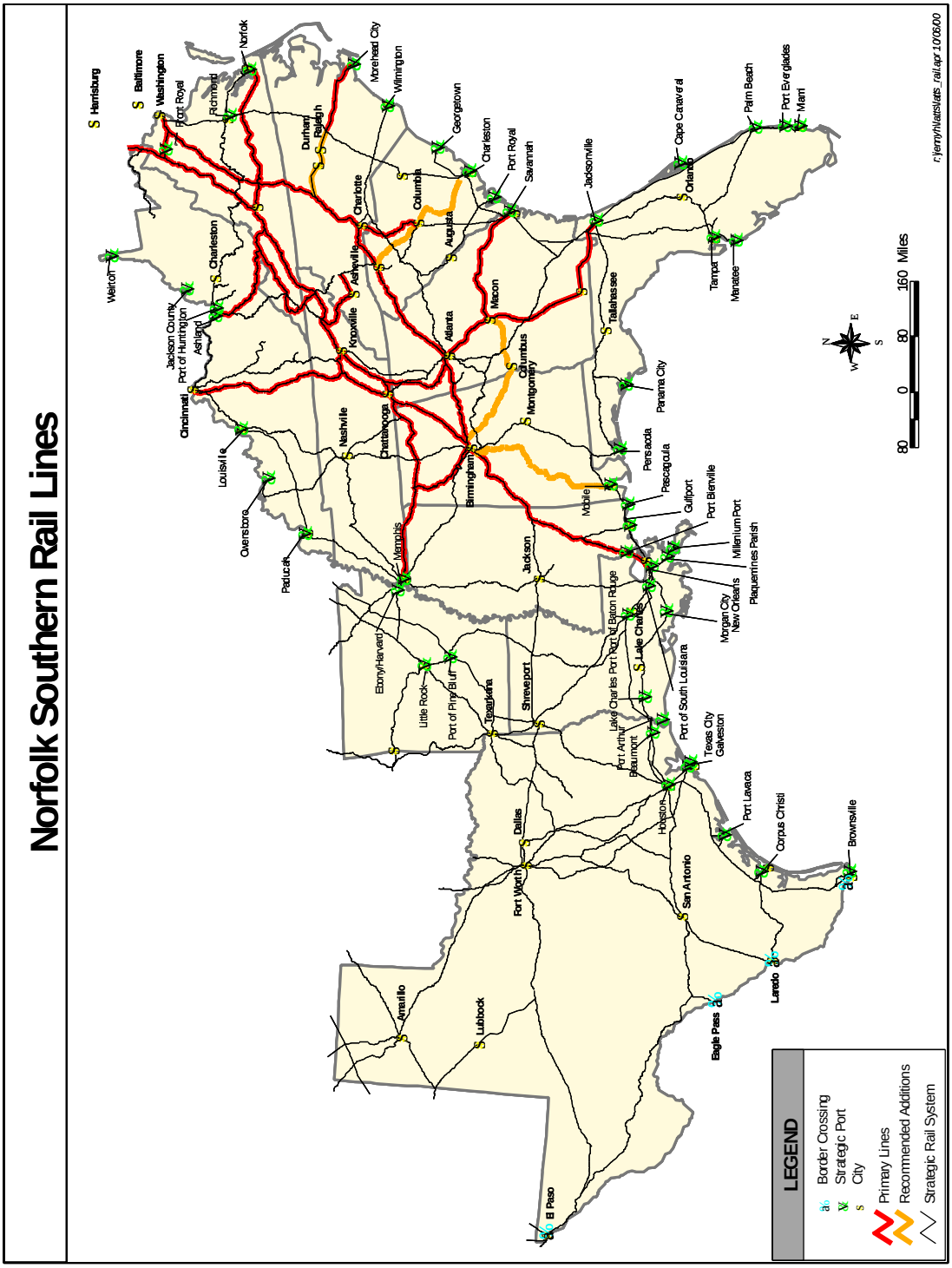


Exhibit C3-22

Norfolk Southern Rail Lines



system providing a connection with the Port of Charleston. The fourth segment was added at the request of the State of North Carolina as part of the state-owned North Carolina Railroad.

Union Pacific

Additions to the UP (see **Exhibit C3-23**) consist of two line segments in Texas -- Houston to Palestine, and Taylor to Palestine that are part of a directional operation (predominate one-way operation over paired lines). A third Texas line segment, Bloomington to Flatonia, over which the Texas Mexican has rights and uses to reach its sister railroad Kansas City Southern, completes a route to the border crossing at Laredo.

Other Railroads

Two other railroads have line segments that were added as components of the LATTS Strategic Rail System as illustrated on **Exhibit C3-24**. The addition just north of Corpus Christi is the same UP line that was just discussed for the TM of Kansas City Southern Industries. The two KCS lines running west and south of Shreveport complete connections for a joint KCS-NS intermodal service and Port Arthur, respectively. The Canadian National line (and trackage rights) from Jackson, Mississippi to Mobile provides an additional connection for the latter.

FINAL STRATEGIC RAIL SYSTEM

The final Strategic Rail System is presented in **Exhibit C3-25**. It incorporates the original designated lines and the supplements just discussed. The system is presented in such a fashion as to reveal the ownership (railroad) of each component.

The LATTS Strategic Rail System includes 22,285 miles of rail lines. Mileage by state is presented in **Exhibit C3-26**

Exhibit C3-23

Union Pacific Rail Lines

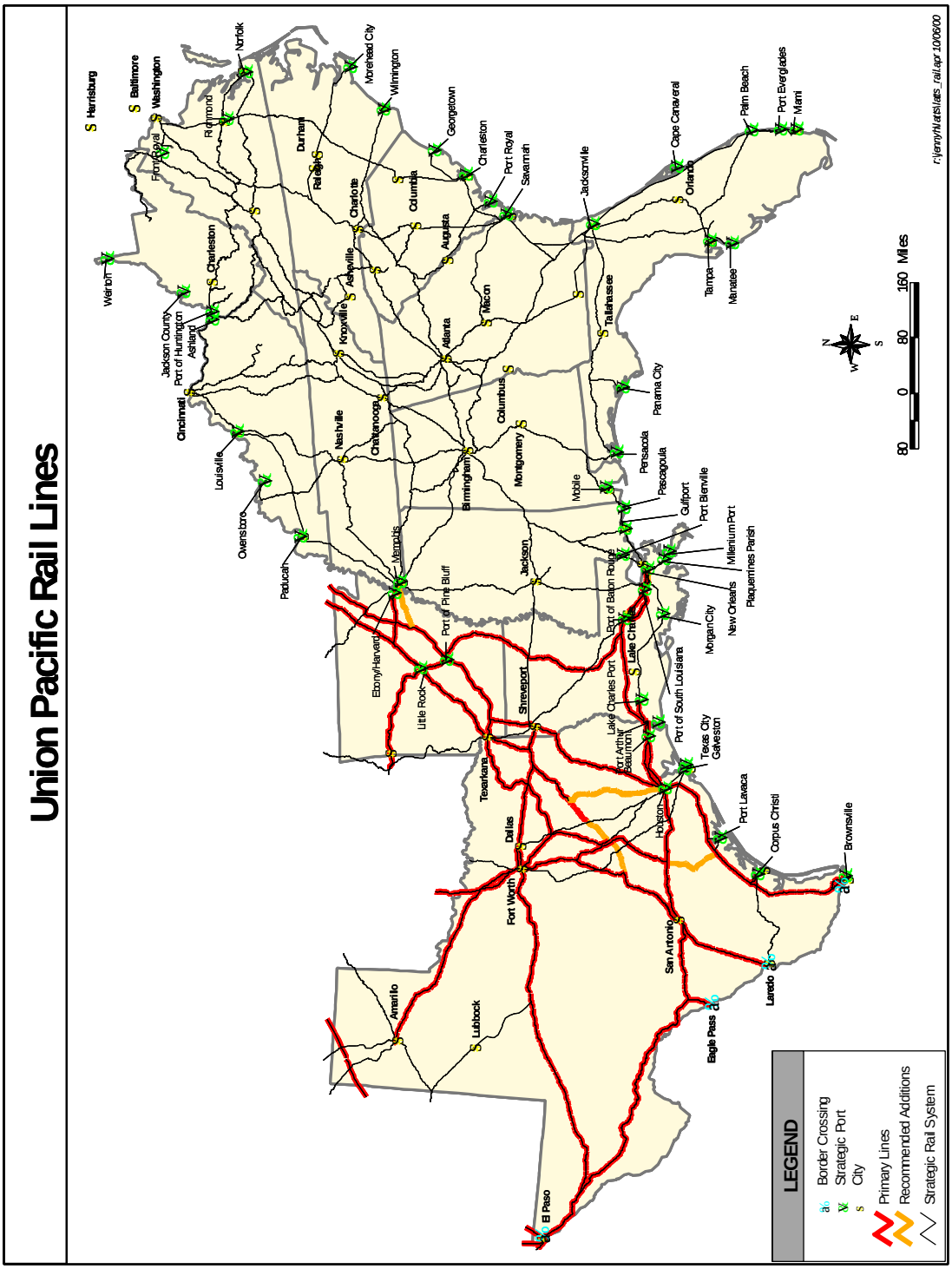


Exhibit C3-24

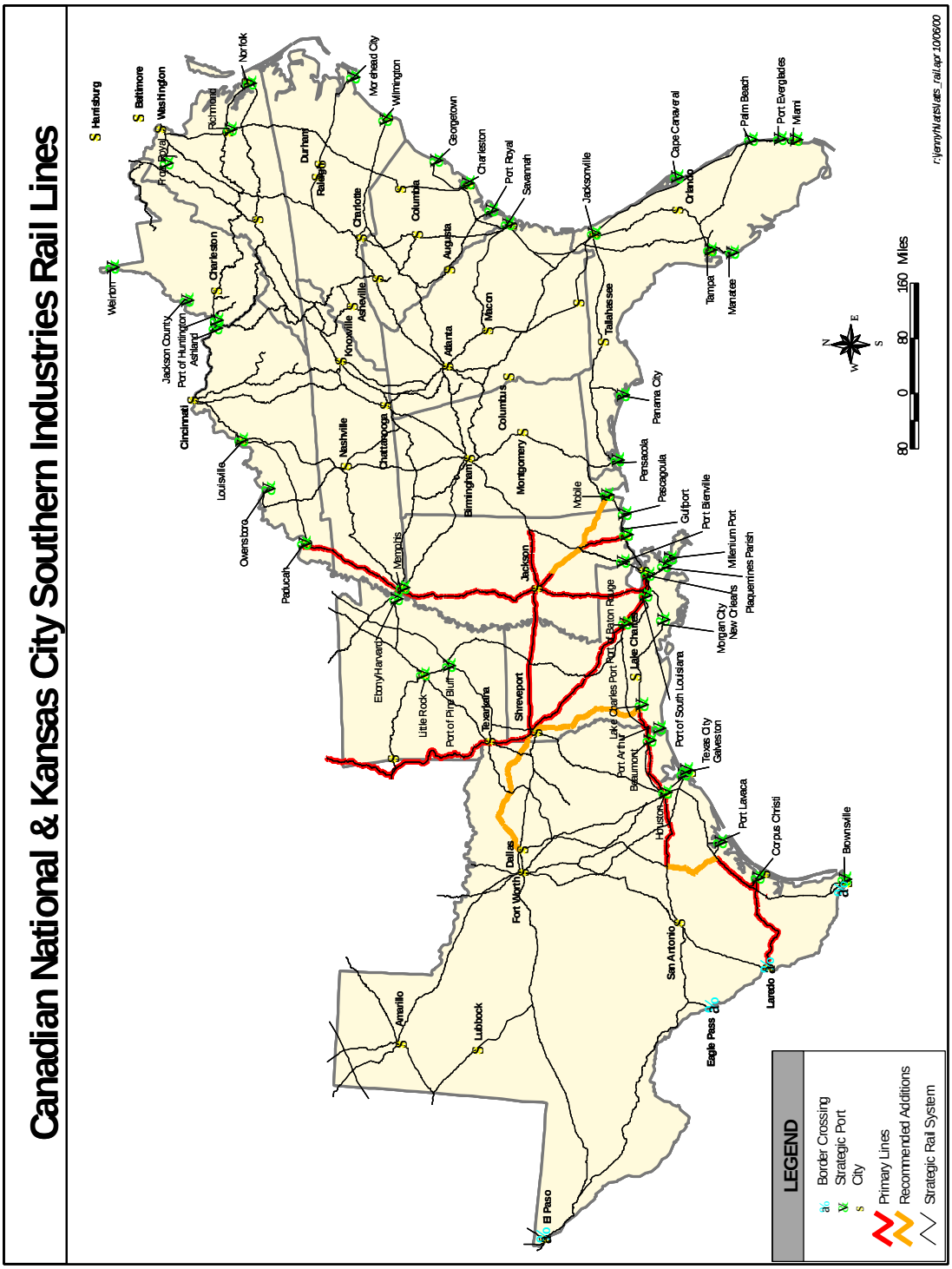


Exhibit C3-25

LATTS Strategic Rail System

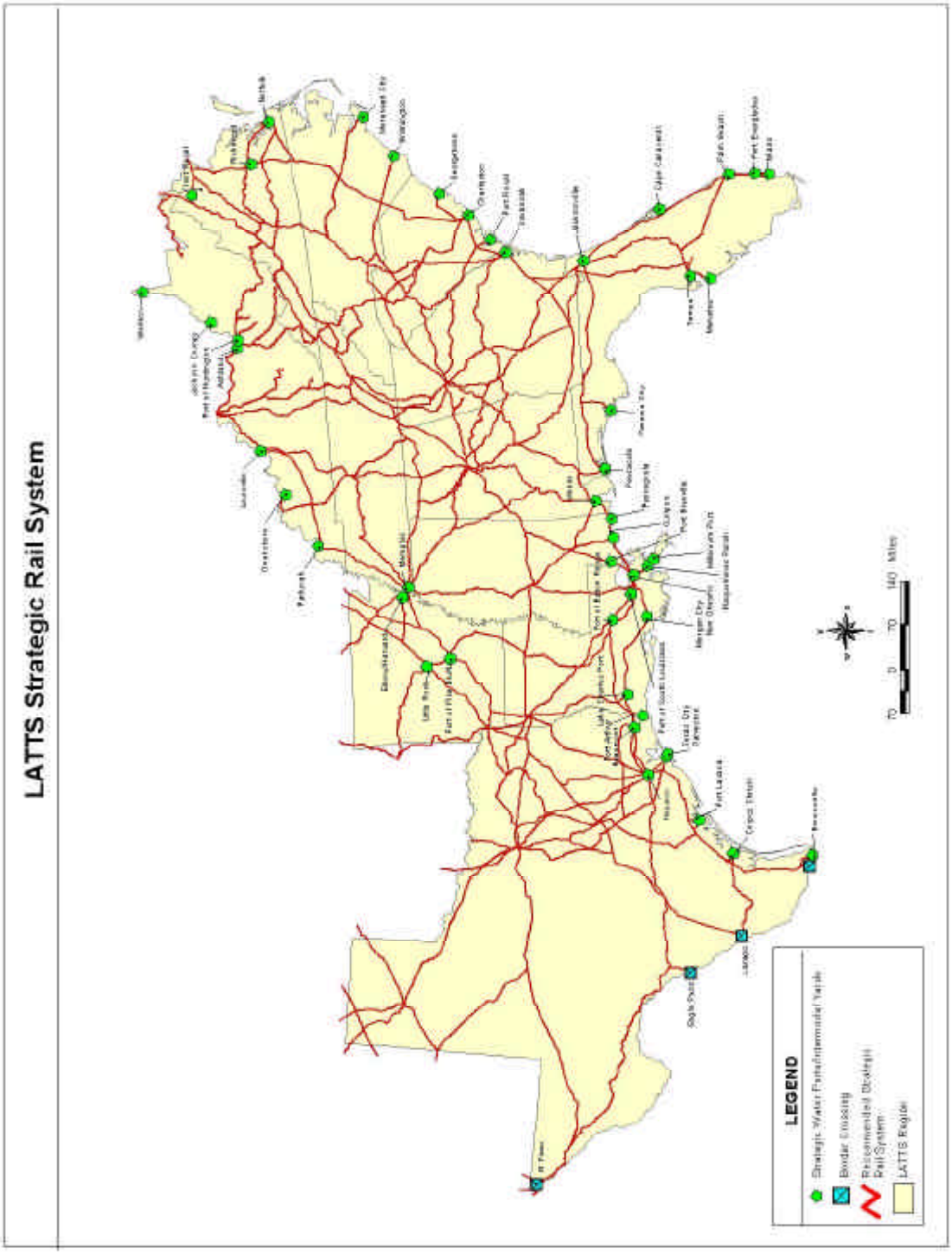


Exhibit C3-26
STRATEGIC RAIL SYSTEM MILEAGE

Alabama	1,634
Arkansas	1,293
Florida	1,548
Georgia	2,115
Kentucky	1,392
Louisiana	1,465
Mississippi	1,051
North Carolina	1,174
South Carolina	1,284
Tennessee	1,391
Texas	5,544
Virginia	1,716
West Virginia	678
Total	**22,285**

SECTION C4
LATTS STRATEGIC HIGHWAY SYSTEM

The specific highways which comprise the LATTS Strategic Highway System were identified through an interactive process involving each individual Alliance Member and the consultant team. The LATTS Steering Committee, working through the LATTS Working Committee representatives, adopted a series of criteria to help identify a network of highways for further analysis. The 22,859-mile mainline LATTS Strategic Highway System shown in **Exhibit C4-1** resulted from this process. As discussed subsequently, the system also included intermodal connectors, i.e., highways that link mainline highways with LATTS intermodal facilities (water ports and airports).

HIGHWAY IDENTIFICATION PROCESS AND CRITERIA

Development of the process and criteria used to identify the LATTS Strategic Highway System involved an initial examination of the nature and extent of the existing highway system in the Alliance Region. Consistent with the emphasis of the LATTS analyses, it was determined that the main focus of the highway analyses should be upon major highway corridors since these facilities serve the largest volume of road-based Latin American trade flows. Additionally, in keeping with the study's systems approach, other highway elements were added to the overall Strategic Highway System to comprise an interconnected network which serves major intermodal facilities which are important to Latin American trade.

The criteria which evolved from these initial analyses are as follows:

- All **Interstate Highways** in the Alliance Region (14,602 miles) were included because these are the corridors that have the greatest national and regional significance. Also, these major corridors are the principal carriers of heavy freight. Accordingly, it was reasonable to assume that they also are the most important highway corridors for trade flows involving Latin America. Subsequent LATTS analysis confirmed that there is a very high concentration of LATTS truck traffic on these highways. These facilities are shown in **Exhibit C4-2**.

- Selected **National Highway System (NHS) Freeways** (roadways built as fully access-controlled facilities, both "free" and tolled) were included based on the assumption that higher-order state, U.S. and state routes are more likely to serve heavy trade flows since they are built to withstand truck weights and to accommodate large vehicles. It was not intended that all NHS Freeways be included in the Strategic Highway System. Rather, only those that serve a multi-state area and are of a scale, character and significance similar to other Strategic Highway System components were included.

Exhibit C4-1
LATTS STRATEGIC HIGHWAY SYSTEM
Mainline Highways

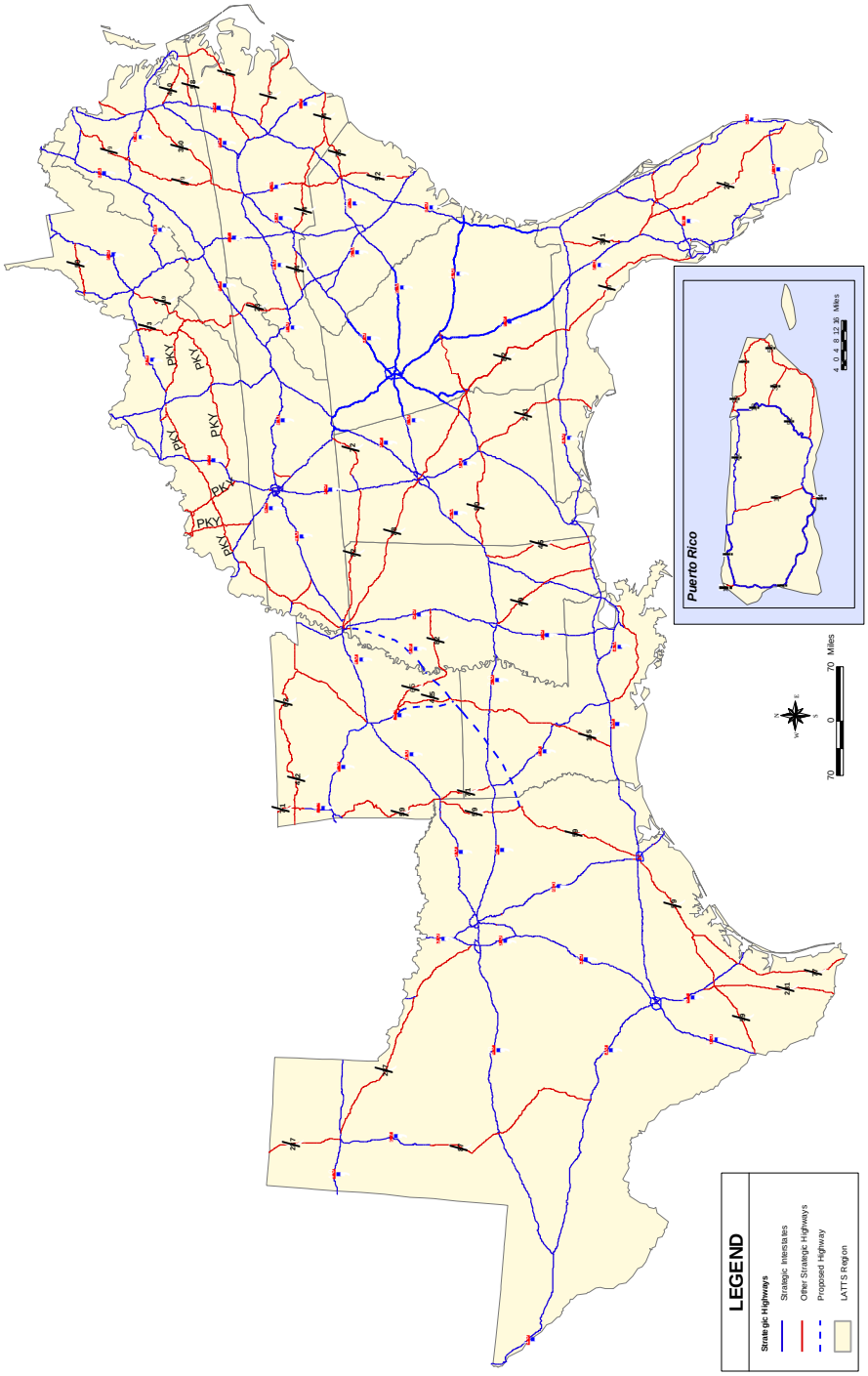
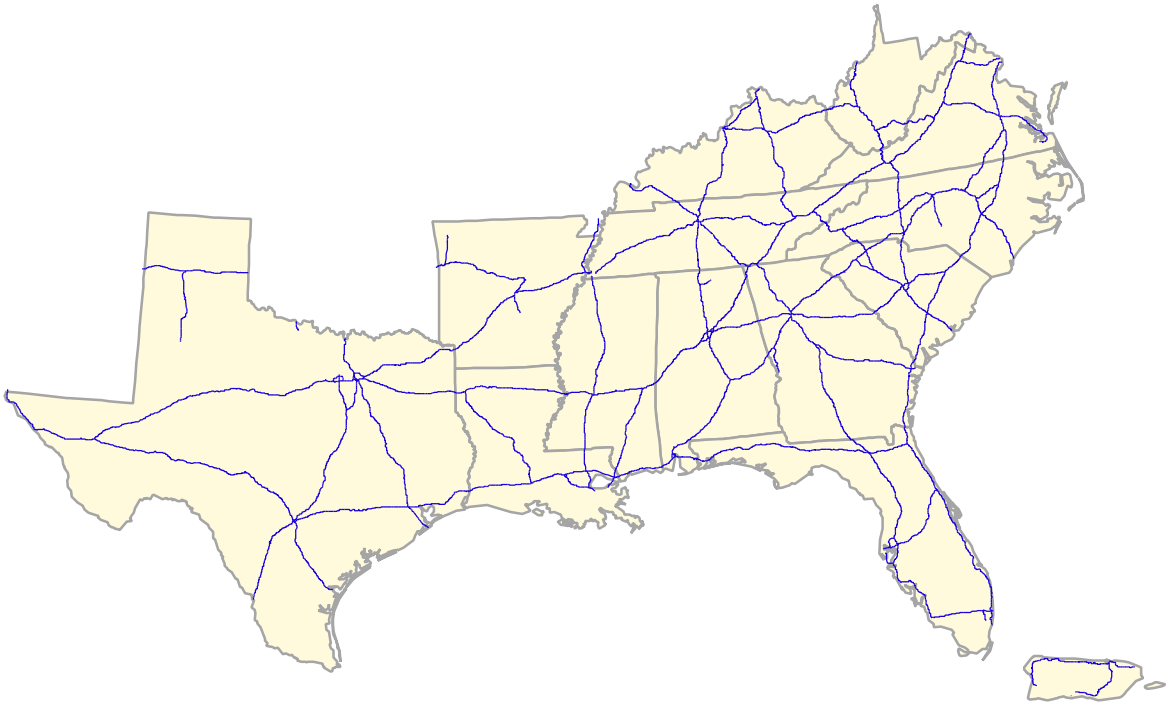


Exhibit C4-2
INTERSTATE HIGHWAY SYSTEM
ALLIANCE REGION



- A few **NHS Non-Freeways** (facilities built to lesser standards) were included. This recognized important existing roadways that have not been upgraded, yet remain important to highway freight movements. Many of the two-lane highways included in the LATTS System are proposed to be upgraded.

- **ISTEA/TEA-21 High Priority Corridors** within the Alliance Region were included in the Strategic Highway System if: 1) they currently exist (as a facility consistent within the corridor definition); or 2) there is no existing facility, but one is economically justified. There are 43 identified High Priority Corridors nationwide (**Exhibit C4-3**). Eighteen of these High Priority Corridors are within the Alliance Region. Of these, five were excluded because they did not meet the above criteria (**Exhibit C4-4**).

- **NHS Connectors** linking a LATTS Strategic Highway with a LATTS airport or water port were included in the Strategic Highway System. The principles of intermodalism justify the inclusion of NHS Connectors, especially because many of the inefficiencies experienced at freight terminals can be traced to access problems on routes linking the facility with higher order roadways.

The relationship between LATTS Connectors and LATTS “mainline” highways is illustrated in **Exhibit C4-5**.

Exhibit C4-3
HIGH PRIORITY CORRIDORS

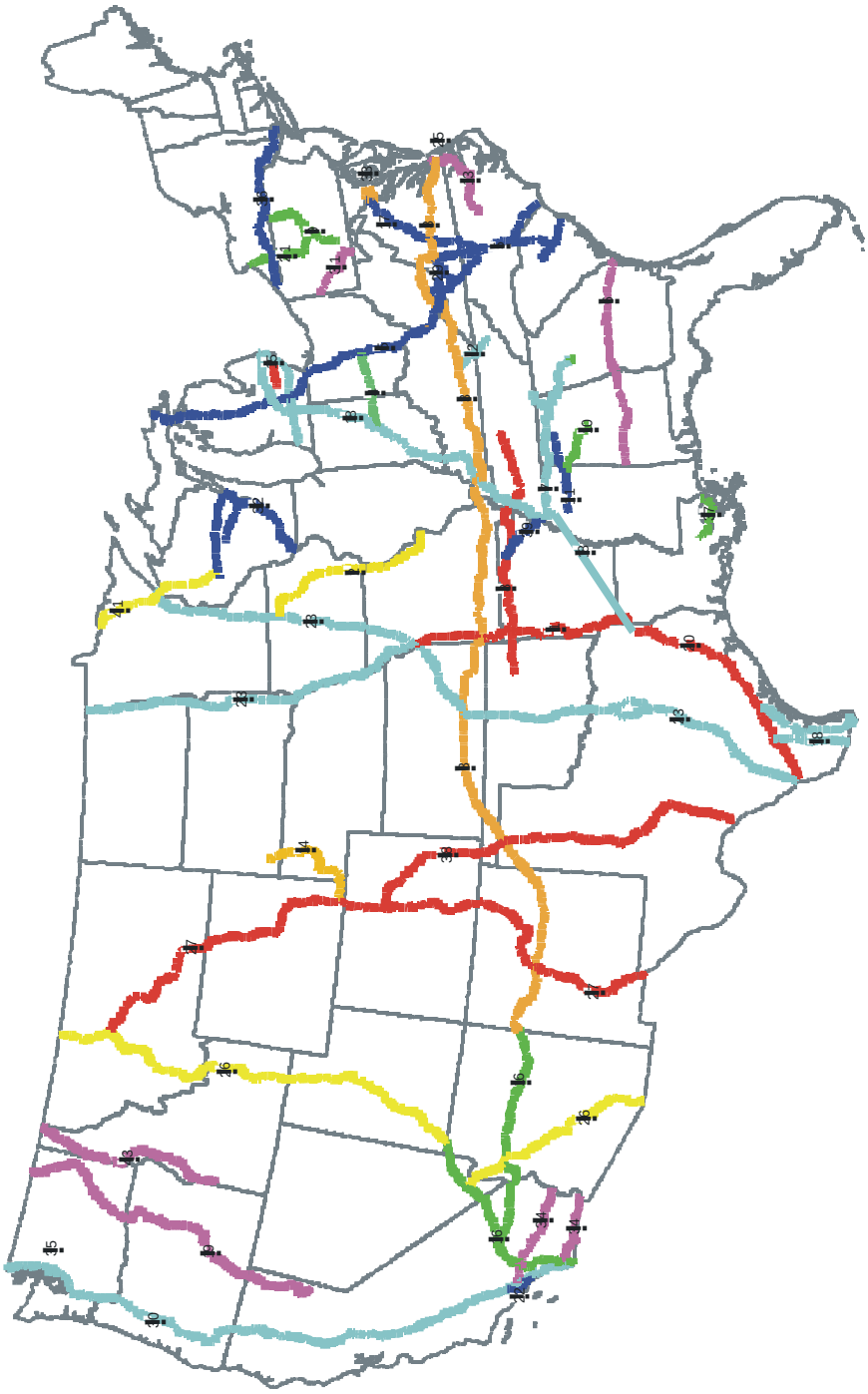
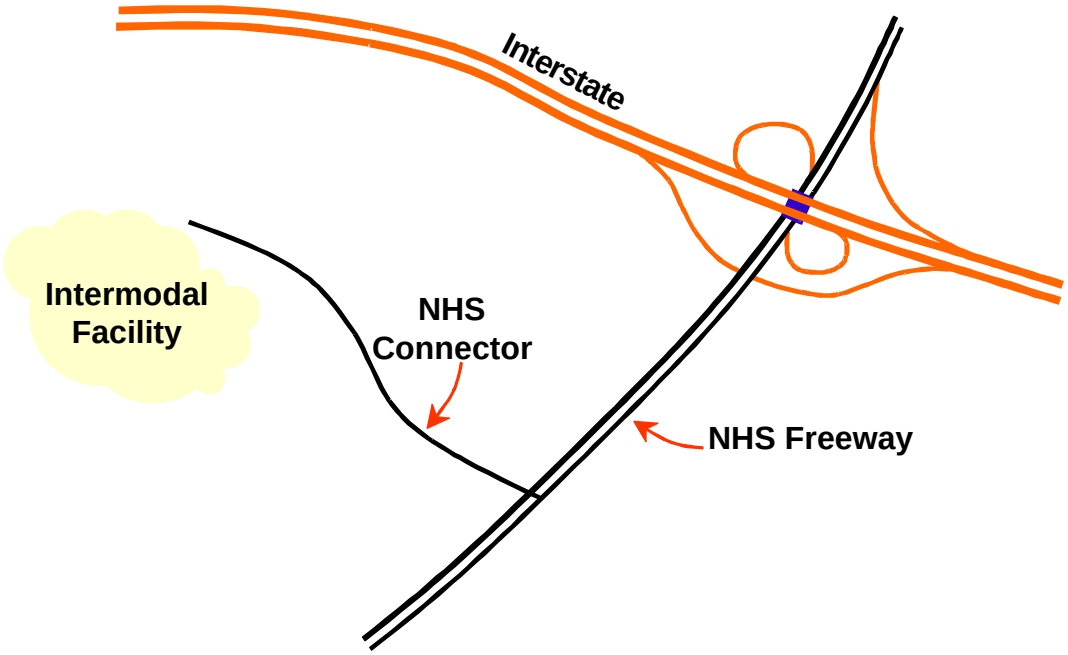


Exhibit C4-4
ISTEA HIGH PRIORITY CORRIDORS ON THE NATIONAL HIGHWAY SYSTEM & WITHIN THE SOUTHEASTERN TRANSPORTATION ALLIANCE

Corridor	Description
1	North-South corridor from Kansas City, MO to Shreveport, LA (I-49).
3	East-West Transamerica Corridor commencing in the Hampton Roads area, going west across VA, then to a WV corridor centered around Beckly, then to a KY corridor, into IL, into MO, and moving westward across southern KS.
5	I-73/74 corridor from Charleston, SC through Winston-Salem, NC to Ohio, with termini at Detroit, MI and Sault Ste. Marie, MI.
6	U.S. 80 Corridor from Meridian, MS to Savannah, GA.
7	East-West corridor from Memphis, TN through Huntsville, AL to Atlanta, GA and Chattanooga, TN.
8	Highway 412 East-West corridor from Tulsa, OK through AK to Nashville, TN.
10	Appalachian Regional Corridor X (from northeast MS to Birmingham, AL).
11	Appalachian Regional Corridor V (from I-55 in MS, via Huntsville, AL to the vicinity of Chattanooga, TN).
12	US 25 E from Corbin, KY to Morristown, TN.
13	Corridor from Raleigh NC to Norfolk, VA.
17	Route 29 corridor from Greensboro, NC to the District of Columbia.
18	Corridor from Indianapolis, IN through Evansville, IN, Memphis, TN, MS, AR, Shreveport/Bossier City, LA, Houston, TX to the Lower Rio Grande Valley (I-69).
20	US 59 from Laredo, TX, through Houston, to the vicinity of Texarkana, TX
23	I-35 from Laredo, TX, through Oklahoma City, Kansas City, Des Moines, and Minneapolis to Duluth, MN.
25	State Route 168 (South Battlefield Boulevard), VA from the Great Bridge Bypass to the North Carolina state line.
27	The Camino Real Corridor from El Paso, TX to Denver, CO.
28	The Birmingham Northern Beltline from I-59 near Trussville, AL to a terminal at the I-59/I-459 interchange.
29	The Coalfields Expressway beginning at Beckly, WV to Pound, VA.

NOTE: Corridors denoted by shaded boxes do not meet the LATTS Strategic Transportation System criteria.

Exhibit C4-5
LATTS HIGHWAY SYSTEM COMPONENTS



Alliance members' suggestions for inclusion of additional LATTS highways also were given due consideration. Some of these routes were found to be of marginal importance regionally, but of significant importance to local economies. Because of the LATTS emphasis upon important freight highways serving regional travel, some suggested highways were excluded from the System, while others were added when they reasonably met the definition and criteria for the LATTS Strategic Highway System.

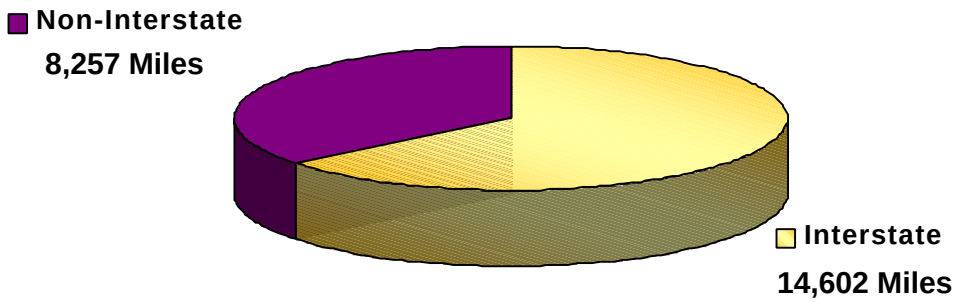
LATTS STRATEGIC HIGHWAY SYSTEM

The resulting mainline LATTS Strategic Highway System was depicted earlier in Exhibit C4-1. **Exhibit C4-6** displays the composition of the LATTS mainline highways by system. **Exhibit C4-7** depicts the LATTS System composition as a subset of all Alliance highway mileage.

Interstate Highways

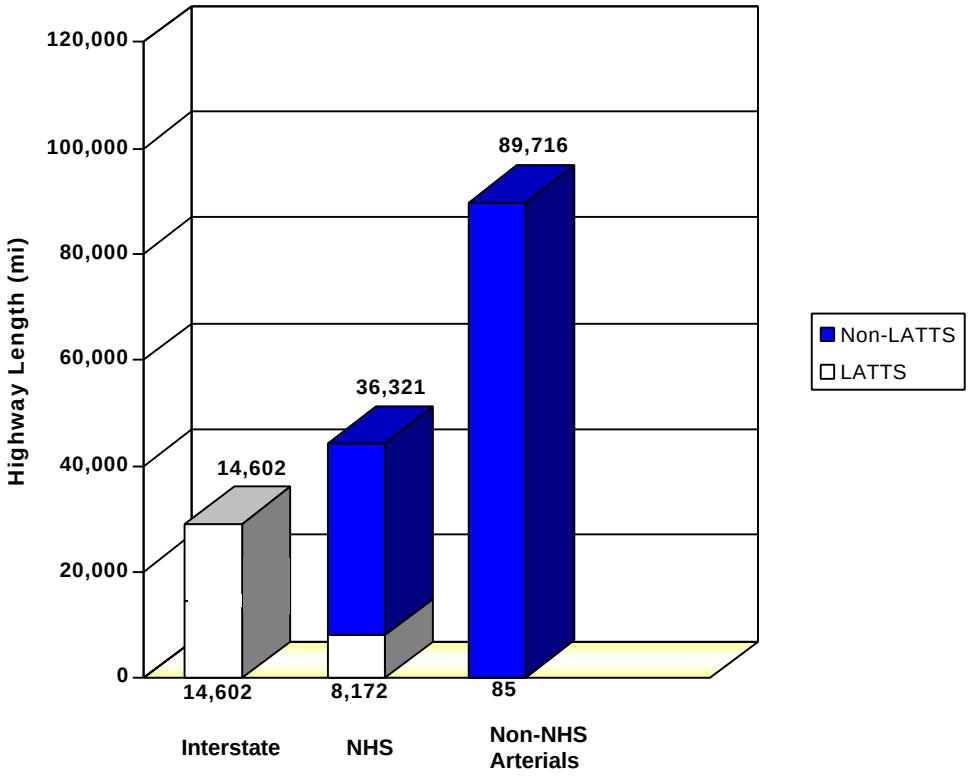
All Interstate Highways (14,602 miles) in the Alliance were included in the LATTS Strategic Highway System. Nearly two-thirds of the LATTS mainline Strategic Highway System is part of the Interstate System.

Exhibit C4-6
LATTS STRATEGIC HIGHWAY SYSTEM



22,859 Miles Total **Excludes LATTS Connectors**

Exhibit C4-7
MILES OF LATTS MAINLINE HIGHWAYS IN THE ALLIANCE REGION



Non-interstate NHS Routes

The National Highway System (NHS) is a system approved by Congress in 1995 as an outgrowth of the ISTEA legislation. NHS routes, like LATTS highways, serve mostly long distance interregional traffic, intermodal facilities, and major freight generators. They are a higher-order subset of the principal arterial system.

The Alliance members have 36,321 non-interstate miles on their NHS. Of these, nearly one-fourth (8,172 miles) were included in the mainline LATTS Strategic Highway System. Because of the unique characteristics of each Alliance member, there is considerable range between the Alliance members: about 8% of Georgia's non-interstate NHS mileage was included in the LATTS mainline system vs. 40% in Arkansas, 42% in Kentucky, and 86% in Puerto Rico.

Non-NHS Routes

Criteria for the LATTS Strategic Highway System discouraged inclusion of highways that are not part of the NHS. Non-NHS highways comprise lower order rural/urban other principal arterials, rural/urban minor arterials, and rural/urban collectors. These facilities, as distinguished by their functional classification, tend to serve trips of shorter distances. Also, because the highway portion of the LATTS system is essentially a truck network, lower order facilities typically are excluded from state-designated truck systems (Class I, II, III designation). Therefore, these lower order highways were generally considered inappropriate for inclusion in the LATTS Highway System.

The 14-member Alliance designated just one section of their 89,716 miles of non-NHS highways for inclusion in the LATTS System. An 85-mile segment of US 80 (Corridor 16) between Columbus and Macon, Georgia is not part of the National Highway System. However, this segment is part of the Congressionally-designated High Priority Corridor 6 stretching from Meridian, Mississippi to Savannah, Georgia.

The Alliance highway mileage by Alliance member is listed in **Exhibit C4-8**. Of the 140,639 highway miles classified as arterial or higher in the 14-member Alliance Region, about 16 percent was included in the mainline LATTS Strategic Highway Network. Texas has the largest amount of LATTS mainline mileage (4,917) while Puerto Rico has the least (419).

LATTS HIGHWAYS VS. LATTS TRADE CORRIDORS

For analysis purposes, the 22,859 miles of "mainline" LATTS Strategic Highways were grouped into 25 LATTS Trade Corridors (**Exhibit C4-9**). The Trade Corridors were established using principal origins/destinations and assigning each highway to only one corridor. Each corridor was assigned a number (from 1 to 25) and was referred to by the primary highway within the corridor (i.e., "I-40"). **Exhibit C4-10** summarizes mainline LATTS Strategic Highway System mileage by LATTS Trade Corridor, and **Exhibit C4-11** lists the highways included within each corridor.

Exhibit C4-8
LATTS STRATEGIC HIGHWAY SYSTEM
Mainline Miles by State

	Total Mainline LATTS Miles	Interstate	**Non-Interstate**
Alabama	1,485	905	580
Arkansas	1,481	631	850
Florida	2,302	1,472	830
Georgia	1,478	1,233	245
Kentucky	1,632	762	870
Louisiana	1,431	893	538
Mississippi	1,396	685	711
North Carolina	1,647	987	660
Puerto Rico	419	250	169
South Carolina	1,029	829	200
Tennessee	1,269	1,073	196
Texas	4,917	3,231	1,686
Virginia	1,663	1,106	557
West Virginia	710	545	165
Total	**22,859**	**14,602**	**8,257**

Exhibit C4-9
LATTS TRADE CORRIDORS

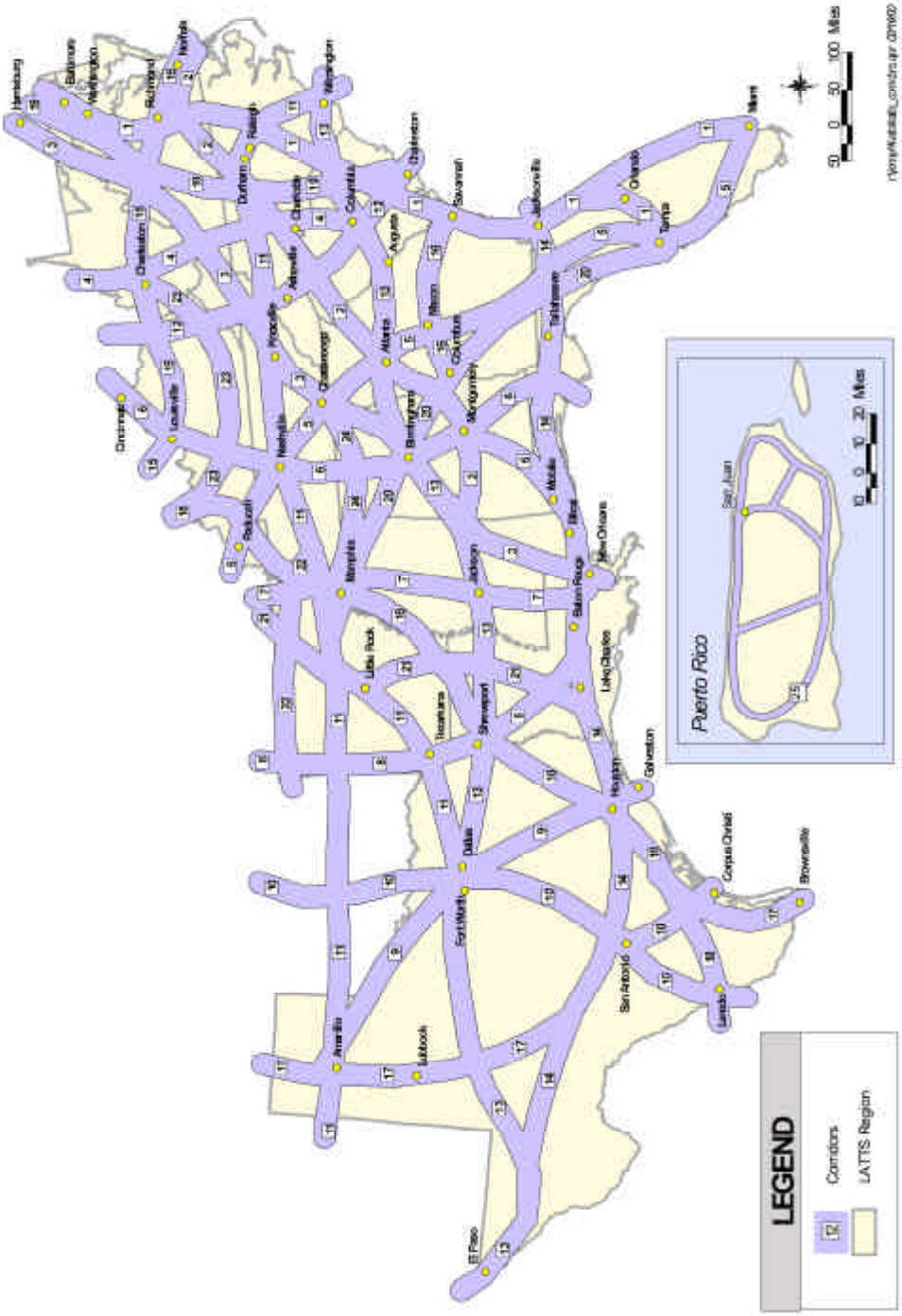


Exhibit C4-10
LATTS STRATEGIC HIGHWAY SYSTEM
Miles by Corridor

Corridor	Interstate	Non-Interstate	Total
1	1,320	66	1,386
2	844	401	1,245
3	995	177	1,172
4	656	77	733
5	1,576	515	2,091
6	740	177	917
7	438	146	584
8	265	241	506
9	300	335	635
10	769	0	769
11	1,769	328	2,097
12	308	225	533
13	1,459	58	1,517
14	1,883	157	2,040
15	641	0	641
16	169	85	254
17	124	310	434
18	0	1,716	1,716
19	12	642	653
20	0	710	710
21	46	591	637
22	16	323	339
23	0	578	578
24	22	231	253
25	250	169	419
Total	14,602	8,257	22,859

Exhibit C4-11
LATTS CORRIDORS AND STRATEGIC HIGHWAYS

Route	Termini	States	Miles
Corridor 1	**South Florida to Washington, DC**		**1,386**
I-4	I-95 @ Daytona Beach to I-275 @ Tampa	FL	132
I-95	Washington DC to Miami	VA, NC, SC, GA, FL	1,053
I-195	I-95 in Miami to Miami Beach	FL	4
I-195	I-64 to S-195 in Richmond	VA	3
I-295	I-64 NW Richmond to I-95 @ Petersburg	VA	53
I-295	Around Jacksonville	FL	36
I-395	in Miami	FL	1
I-395	Washington DC to I-95 W. Alexandria	VA	10
I-495	Maryland SL to I-95 W. Alexandria	VA	15
I-595	I-75 to I-95 @ Ft. Lauderdale	FL	13
US-58	I-95 @ Emporia to Norfolk	VA	66
Corridor 2	**W. Alabama to Norfolk**		**1,245**
I-85	I-95 @ Petersburg to I-65 @ Montgomery	VA, NC, SC, GA, AL	661
I-185	Greenville, SC to I-85	SC	3
I-185	I-85 to Columbus, GA	GA	49
I-285	Around Atlanta	GA	61
I-385	Greenville, SC to I-26	SC	42
I-585	in Spartanburg, SC	SC	2
I-985/US 19 & 23	N. I-85	GA	26
US 64/17	I-40 S. Raleigh to Norfolk	NC, VA	177
US 80	I-20/59 to I-65 @ Montgomery	AL	133
US 80	I-20 W. Auburn to Columbus, GA	AL	38
US 460	I-95 @ Petersburg to I-64 @ Norfolk	VA	53
Corridor 3	**New Orleans to Pennsylvania & DC**		**1,172**
I-59	I-24 @ Chattanooga to I-10 @ New Orleans	TN, AL, GA, MS, LA	448
I-66	I-81 to Washington, DC	VA	75
I-81	MD-SL to I-40 E. Knoxville	WV, VA, TN	428
I-459	Around Birmingham	AL	33
I-581	in Roanoke	VA	7
I-759	@ Gadsden	AL	4
US 45/S 57/63	I-20 @ Meridian to Pascagoula	MS	177
Corridor 4	**South Carolina to Ohio**		**733**
I-68	I-79 @ Morgantown to Maryland SL	WV	32
I-70	Ohio SL to Pennsylvania SL	WV	15
I-77	Ohio SL to I-26 @ Columbia, SC	WV, VA, NC, SC	444
I-79	Pennsylvania SL to I-77 @ Charleston	WV	161
I-277	in Charlotte	NC	4
US 50	I-77 @ Parkersburg to I-79	WV	77

Exhibit C4-11 (cont'd)

Route	Termini	States	Miles
Corridor 5	**South Florida to Illinois**		**2,091**
I-24	IL State Line @ Paducah to I-75	KY, TN, GA	272
I-75	Ohio SL @ Cincinnati S821 in Miami	KY, TN, GA, FL	1,152
I-124	Nashville	TN	2
I-175	Tampa	FL	1
I-275	Tampa	FL	62
I-275	Around Cincinnati	KY	25
I-275	in Knoxville	TN	3
I-375	Tampa	FL	1
I-475	W. of Macon, GA	GA	16
I-575	I-75 N. near Marietta	GA	31
I-675	I-285 to I-75 S. Atlanta	GA	11
US 27	FL Turnpike W. Orlando to Miami	FL	246
US 301	I-10 W. Jacksonville to I-95	FL	73
S-528	Turnpike S. Orlando to I-95	FL	41
FL Turnpike	I-75 S. Ocala to I-95	FL	155
Corridor 6	**Mobile to Cincinnati**		**917**
I-65	Indiana 56 to I-10 @ Mobile	KY, TN, AL	625
I-71	I-75 to I-65	KY	78
I-165	I-65 to I-10 in Mobile	AL	5
I-265	I-71 to I-65 @ Louisville	KY	24
I-265	in Nashville	TN	3
I-471	S. Cincinnati	KY	5
US 82/231	Montgomery to Panama City	AL, FL	169
S-840	I-24 to I-40 @ Nashville	TN	8
Corridor 7	**New Orleans to St. Louis**		**584**
I-55	Missouri SL to I-10 in New Orleans	AR, MS, LA, TN	438
US 49	I-55 @ Jackson to I-10 @ Biloxi	MS	146
Corridor 8	**New Orleans to Kansas City**		**506**
I-49	I-20 @ Shreveport to I-10 @ Lafayette	LA	208
I-540	Ft. Smith to Fayetteville	AR	57
US 71	Missouri SL to I-20 @ Shreveport (I-540 gap)	AR, LA	241
Corridor 9	**Amarillo to Galveston**		**635**
I-44	Oklahoma SL to US 287	TX	15
I-45	I-20 @ Dallas to Galveston	TX	285
US 81/287	I-40 @ Amarillo to Ft. Worth	TX	335
Corridor 10	**Plains to South Texas**		**769**
I-35	Oklahoma SL to Laredo	TX	589
I-37	I-35 @ San Antonio to Corpus Christi	TX	143
I-635	in Dallas	TX	37

Exhibit C4-11 (cont'd)

Route	Termini	States	Miles
Corridor 11	**North Texas to Wilmington**		**2,097**
I-30	Dallas to Little Rock	TX, AR	367
I-40	New Mexico SL to Wilmington NC	TX, AR, TN, NC	1,297
I-140	S. Knoxville	TN	11
I-240	in Memphis	TN	19
I-240	in Asheville	NC	9
I-430	I-30 to I-40 W. Little Rock	AR	13
I-440	@ Little Rock	AR	10
I-440	in Nashville	TN	8
I-440	@ Raleigh	NC	17
I-540	@ Raleigh	NC	4
I-630	in Little Rock	AR	7
I-640	in Knoxville	TN	7
US 74	I-26 to US 76	NC	215
US 70	I-95 to Morehead City	NC	113
Corridor 12	**Charleston, SC to Ohio**		**533**
I-26	I-40 @ Asheville to Charleston, SC	NC, SC	261
I-126	in Columbia	SC	4
I-526	in Charleston	SC	19
US 19	TN State Line to Asheville	NC	33
US 23/I-181	Ohio SL to Asheville	KY, TN, NC, VA	216
Corridor 13	**El Paso to Wilmington**		**1,517**
I-20	El Paso to Wilmington	TX, LA, MS, AL, GA, SC	1,384
I-220	@ Shreveport	LA	18
I-220	@ Jackson	MS	12
I-520	@ Augusta, GA	GA	10
I-820	in Ft. Worth	TX	35
US 76	I-20 to US 74	NC, SC	58
Corridor 14	**W. Texas to Jacksonville**		**2,040**
I-10	I-20 to I-95	TX, LA, MS, AL, FL	1,659
I-12	I-10 @ Baton Rouge to I-10/59	LA	86
I-110	@ Biloxi	MS	4
I-110	in Pensacola	FL	7
I-110	in Baton Rouge	LA	9
I-210	in Lake Charles	LA	12
I-310	in New Orleans	LA	11
I-410	in San Antonio	TX	50
I-510	@ Metarie	LA	3
I-610	in New Orleans	LA	4
I-610	in Houston	TX	38
US 90	I-10 @ Baton Rouge to I-10 in New Orleans	LA	157

Exhibit C4-11 (cont'd)

Route	Termini	States	Miles
Corridor 15	**Louisville to Norfolk**		**641**
I-64	Indiana SL to Norfolk	KY, WV, VA	577
I-264	in Louisville	KY	23
I-264	Norfolk	VA	12
I-464	Norfolk	VA	6
I-564	Norfolk	VA	3
I-664	Norfolk	VA	20
Corridor 16	**Columbus, GA to Savannah, GA**		**254**
I-16	Macon to Savannah	GA	165
I-516	Savannah	GA	4
US 80	Columbus to Macon	GA	85
Corridor 17	**Texas to Denver**		**434**
I-27	I-40 to Lubbock	TX	124
US 87	Lubbock to San Angelo	TX	250
US 277	San Angelo to I-10	TX	60
Corridor 18	**Laredo to Indianapolis**		**1,716**
US 51/Purchase Pkwy	I-24 E. Paducah to Memphis	KY, TN	163
US 59	I-30 @ Texarkana to Laredo	TX	616
US 77	I-37 to Brownsville	TX	238
US 281	I-37 to Mexico	TX	172
W. KY/Blue Gr Pkwy	I-24 to Lexington	KY	208
New	Memphis to US 59	TN, MS, AR, LA, TX	319
Corridor 19	**Charleston, SC to Maryland**		**653**
US 29	Washington, DC to Greensboro, NC	VA, NC	253
US 52	US 1 to Charleston, SC	SC	151
US 220/1 (I-73)	Greensboro to US 52 in SC	NC, SC	103
US 360	Richmond to Danville, VA	VA	146
Corridor 20	**Tampa to Memphis**		**710**
US 78	Memphis to Birmingham	MS, AL	184
US 280/19	Birmingham to Tampa	AL, GA, FL	526

Exhibit C4-11 (cont'd)

Route	Termini	States	Miles
Corridor 21	**Lake Charles to St. Louis**		**637**
I-530	Little Rock to Pine Bluff	AR	46
US 65/82	Pine Bluff to I-55	AR, MS	170
US 67	US 412 to Little Rock	AR	121
US 425/165	Pine Bluff to I-10 E. Lake Charles	AR, LA	300
Corridor 22	**Tulsa to Nashville**		**339**
I-155/US 412/63/65	Oklahoma SL to I-40 @ Jackson, TN	AR, TN	339
Corridor 23	**St. Louis to Charleston, WV**		**578**
US 119	US 23 @ Pikeville, KY to Charleston, WV	KY, WV	105
S 402/Combs Mtn Pkwy	I-64 E. Lexington to US 23	KY	76
Audubon Pkwy	Pennyrile Pkwy S. Evansville to Owensboro	KY	25
Cumberland/Boone Pkwy	I-65 E. Bowling Green to US 23	KY	220
Pennyrile Pkwy	Evansville to I-24 S. Hopkinsville, KY	KY	71
Natcher Pkwy	Owensboro to Bowling Green	KY	70
Corridor 24	**Memphis to Chattanooga**		**253**
I-565	@ Huntsville, AL	AL	21
US 72	Memphis to Chattanooga	TN, MS, AL	232
Corridor 25	**Puerto Rico**		**419**
	Island Routes	PR	419

It is recognized that the process of identifying specific LATTS highways has both similarities and differences from the LATTS Trade Corridor concept. Following are some examples of these key similarities and differences:

- LATTS Trade Corridors are generally multi-state in nature; while many LATTS highways serve multiple states, others are wholly contained within a state.

- LATTS Trade Corridors connect significant freight endpoints (Miami, New Orleans, Memphis, Cincinnati, Norfolk, etc.), while LATTS highways typically serve just a portion of the corridor.

- Both LATTS Corridors and LATTS highways serve regionally significant freight traffic, international crossings, movements in all directions, and important economic centers.

- Designating both LATTS Corridors and LATTS highways considered future trade expectations. While the tendency may be to focus on existing patterns and volumes, for purposes of these analyses the establishment of trade corridors and the highways included in them emphasized future traffic volumes, new destinations, and anticipated growth.

An example of this emphasis is the inclusion of the Laredo to Indianapolis (US 59, US 51) Corridor #18 in the LATTS Strategic Highway System. This corridor links Laredo, Houston and Texarkana on US 59 with Memphis, Evansville, Indianapolis and Detroit. While no interstate-type facility exists in much of the corridor now, it has been the subject of considerable recent study to determine feasibility as a Congressionally-designated High Priority Corridor. This corridor holds future promise as a freight route linking the Great Lakes Region with Mexico via Indianapolis and Memphis.

- Trade corridors serve external endpoints (Chicago, Baltimore, St. Louis, etc.), while LATTS highways terminate at the LATTS Region boundaries.

The 25 LATTS Trade Corridors are shown in **Exhibit C4-12** and listed in **Exhibit C4-13**.

Exhibit C4-12
LATTS TRADE CORRIDORS AND STRATEGIC HIGHWAY SYSTEM

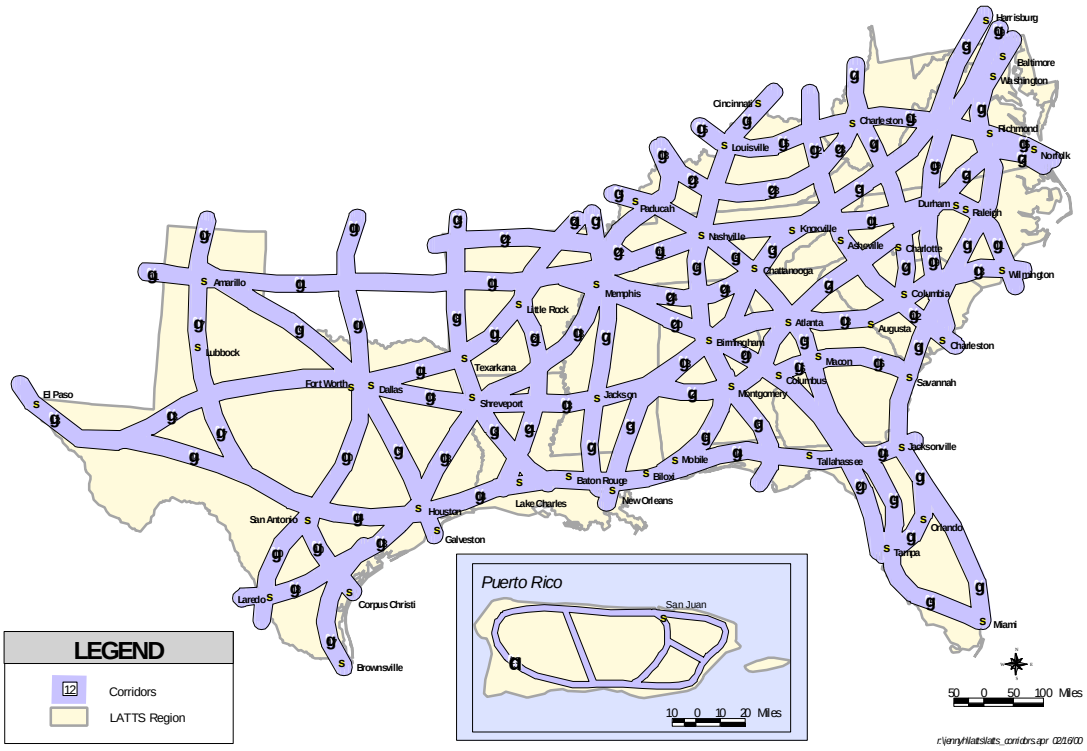


Exhibit C4-13
LATTS TRADE CORRIDORS

LATTS Corridor No.	Major Route	Termini
1	I-95, I-4	South Florida to Washington, DC
2	I-85	West Alabama to Norfolk, VA
3	I-59, I-81, I-66	New Orleans, LA to DC and Pennsylvania
4	I-77, I-79	Columbia, SC to Ohio and Pennsylvania
5	I-75, I-24	South Florida to Illinois
6	I-65	Mobile, AL to Cincinnati, OH
7	I-55	New Orleans, LA to St. Louis, MO
8	I-49, US 71	New Orleans, LA to Kansas City, MO
9	I-45, US 287	Amarillo, TX to Galveston, TX
10	I-35, I-37	South Texas to Plains
11	I-40	North Texas to Wilmington, NC
12	I-26, US 23	Charleston, SC to Ohio
13	I-20, US 76	El Paso, TX to Wilmington, NC
14	I-10	West Texas to Jacksonville, FL
15	I-64	Louisville, KY to Norfolk, VA
16	I-16, US 80	Columbus, GA to Savannah, GA
17	I-27, US 87, US 277	Texas to Denver, CO
18	US 59, US 51	Laredo, TX to Indianapolis, IN
19	I-73, US 52, US 29	Charleston, SC to Maryland
20	US 19, US 78, US 280	Tampa, FL to Memphis, TN
21	US 67, US 65, US 165	Lake Charles, LA to St. Louis, MO
22	US 412	Tulsa, OK to Nashville, TN
23	KY Parkways, US 119	Evansville, IN to Charleston, WV
24	US 72	Memphis, TN to Chattanooga, TN
25	PR-2, PR-3	Puerto Rico

WATER PORT AND AIRPORT INTERMODAL CONNECTORS

The focus of the highway analysis was, appropriately, on the mainline portion of the LATTS Strategic Highway System. This is the portion of the highway network carrying the vast majority of truck travel (vehicle miles) and has "needs" that could be quantified using existing databases. Additionally, the portion of the highway system connecting the LATTS mainline system with the LATTS water ports and airports also was assessed. While these highway *intermodal connectors* sometimes are overlooked, their deficiencies can significantly impact the efficient movement of vehicles, especially large trucks. This report section examines these *LATTS intermodal connectors*.

LATTS intermodal connectors are the highways that link the mainline LATTS Strategic System with LATTS intermodal facilities (water ports and airports). To avoid costly new data collection activities, a recently compiled database was used to conduct the connectors analysis. This database, the *NHS Connectors*, was populated by the state DOTs and compiled by the Federal Highway Administration. It includes a high quality sample of the LATTS Intermodal Connectors.

A Brief History of Intermodal Connectors

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) established a new way of looking at the national transportation policy. ISTEA made it federal policy "to encourage and promote development of a national intermodal transportation system in the United States to move goods and people in an energy efficient manner, provide the foundation for improved productivity growth, strengthen the nations ability to compete in the global economy and obtain the optimum yield from the nations transportation resources."

As a result of this new policy, ISTEA also mandated the establishment of the National Highway System (NHS). During the development of the NHS the US Department of Transportation recognized the critical nature of intermodal connectors. In 1997 the NHS was comprised of almost 157,000 miles and more than 2,000 miles of NHS intermodal connectors. Though these NHS miles accounted for only 4% of all highway miles in the US, they carried 45% of the vehicle miles traveled (VMT).

Understanding the significance of these numbers, Congress enacted the ISTEA reauthorization bill entitled The Transportation Equity Act for the 21st Century (TEA-21). This bill directed that an intermodal freight connector analysis be conducted. This study was to:

- Report on the condition of and improvements made to the NHS connectors
- Review projects performed to improve the connectors
- Identify improvements to the intermodal connectors

This analysis of LATTS Intermodal Connectors is based upon data obtained from this federal study. This data is discussed in greater detail later in this section.

The Role of Intermodal Connectors

Intermodal Connectors fulfill an ever-increasing role in freight transportation. The requirements placed on these network elements are forcing competition at the national, state, and municipal levels. The need for the best freight system possible is clear. Therefore, it is important that any constraints identified by thee analyses be viewed as Alliance-wide issues, since the economic effects of one facility's inability to serve travel needs will affect not only its local market/state economy, but that of the whole Alliance. Addressing these issues will ensure safe and efficient distribution of goods, enhance the Alliance's market position and enhance military mobility, thereby adding to the level of national security.

NHS Connector Database

The data used for this study was provided by the Federal Highway Administration's Office of Intermodal and Statewide Programs. This data source was chosen because it gave the most comprehensive information and relieved the Alliance from the task of collecting/generating a new database. The FHWA collected the data as part of a requirement of the Congressionally-mandated study under Section 1106(d) of TEA-21. This legislation charged the Administrator of FHWA to "review the condition of and improvements made, since the designation of the National Highway System, to connectors on the National Highway System that serve seaports, airports, and other intermodal freight transportation facilities."

The first step in this process was to compile a brief description of all water ports, airports, and other intermodal freight transportation facility NHS connectors. This effort resulted in the *NHS connector database.* This database consists of the following information:

- Facility Identification
- State FIPS
- County and regional codes
- Facility name
- Selection criteria
- Connector description
- Connector length

The second step was to collect data with the cooperation of the states on the condition of these connectors. Because of the large amount of time and money involved in this undertaking, criteria were established to provide the states and FHWA with a more manageable list of connectors. While the list of connectors was being compiled, a survey was being formulated which covered all ranges of physical and operational characteristics. The survey was entitled *Intermodal Connectors Condition and Investment Study – Field Inventory Data Checklist* and its results formed the *NHS Intermodal Connectors Inventory* database.

FHWA Criteria for Inventory

Exhibit C4-14 shows the criteria used by the FHWA to identify those connectors which were then inventoried.

Exhibit C4-14
FHWA CONNECTOR CRITERIA

Primary Criteria for Commercial Aviation Airports	Passenger	Scheduled commercial service with more than 250,000 annual enplanements
	Cargo	100 trucks per day in each direction on the principal connecting route, or 100,000 tons per year arriving or departing by highway.
Secondary Criteria for Commercial Aviation Airports	Intermodal terminals that handle more than 20% of passenger or freight volumes by mode within a state and which have significant highway interface. Intermodal terminals identified by an Intermodal Management System or State/MPO transportation plan as a major facility and is targeted by State/MPO for major investment to address a deficiency on a connecting route or anticipated deficiency as a result of significant expansion of traffic.	
Primary Criteria for Commercial Water Ports	Cargo	Terminals that handle more than 50,000 TEUs per year (or 100 trucks per day in each direction -- trucks are defined as large single-unit trucks or combination vehicles handling freight). Bulk commodity terminals that handle more than 500,000 tons per year by highway or 100 trucks per day in each direction on the principal connecting route (clusters of terminals are can be considered as on facility)
	Passenger	Terminals that handle more than 250,000 passengers per year or 1,000 passengers per day for at least 90 days during the year.

The FHWA used freight and passenger information to define its criteria for the NHS Intermodal Connector inventory database. LATTS criteria included such issues as physical features, intermodal considerations, socioeconomic factors, and political funding. **Exhibit C4-15** shows the LATTS criteria.

LATTS Connectors Database

A LATTS Intermodal Connector may not be included in the *NHS Intermodal Connectors Inventory* database because:

- FHWA either had not obtained information for all NHS connectors at the time of these analyses or it had not been entered into the database.
- The facility has no connector because the facility is located on the NHS highway.
- The facility is new and will be built in the future.
- The facility did not meet FHWA criteria for inclusion.

Exhibit C4-15
LATTS CONNECTOR CRITERIA

LATTS Water Ports	Include all NHS waterports and complexes that meet the following criteria:	All NHS deep-water ports (channel depths of 35 feet or more)
		All NHS shallow-draft facilities that currently handle in excess of 500,000 tons annually of waterborne Latin American cargo.
	Include any proposed water ports which the respective state believes will meet the above criteria within the next 10 to 15 years.	
	Include flexibility to include a port that only marginally fails to meet the above criteria.	
	Include any significant water port in any Alliance member that does not have a facility that meets the above criteria.	
LATTS Airports Criteria	Include all that have nonstop flights to/from Latin America.	
		Physical Features • Runway Length (>10,000 ft.) • Secondary Runway at least 80% of primary runway length • Adequate apron area • Cargo handling facilities • Designated as a port of entry with US Customs on-site • Foreign trade zone • Available for industrial activities
		Intermodal Considerations • Reasonable access to an interstate highway • At least one other modal connection (rail or port) LATTS Airports Criteria
		Socioeconomic factors • Available labor force • Population base • Tourism market • Existing passenger jet service
		Political/Funding • Local funding capability • State funding support • Economic incentives • Adequate zoning
	Include all facilities that may meet criteria in the next 10 to 15 years.	
	Retain flexibility to include facilities that meet most criteria and only misses marginally	
	Include one airport for any state that does not meet the above criteria	

There are 52 LATTS water ports in the Strategic Transportation System. These 52 ports have 61 major terminal areas. The NHS Connectors database contained information for 50 of these major terminal areas. The 50 LATTS terminal areas in the NHS Connectors database have a total of 69 highway connectors (several terminal areas have more than one connector). Of these 69 highway connectors, there was information in the NHS Connectors database for 57 individual connectors, totaling 113 miles.

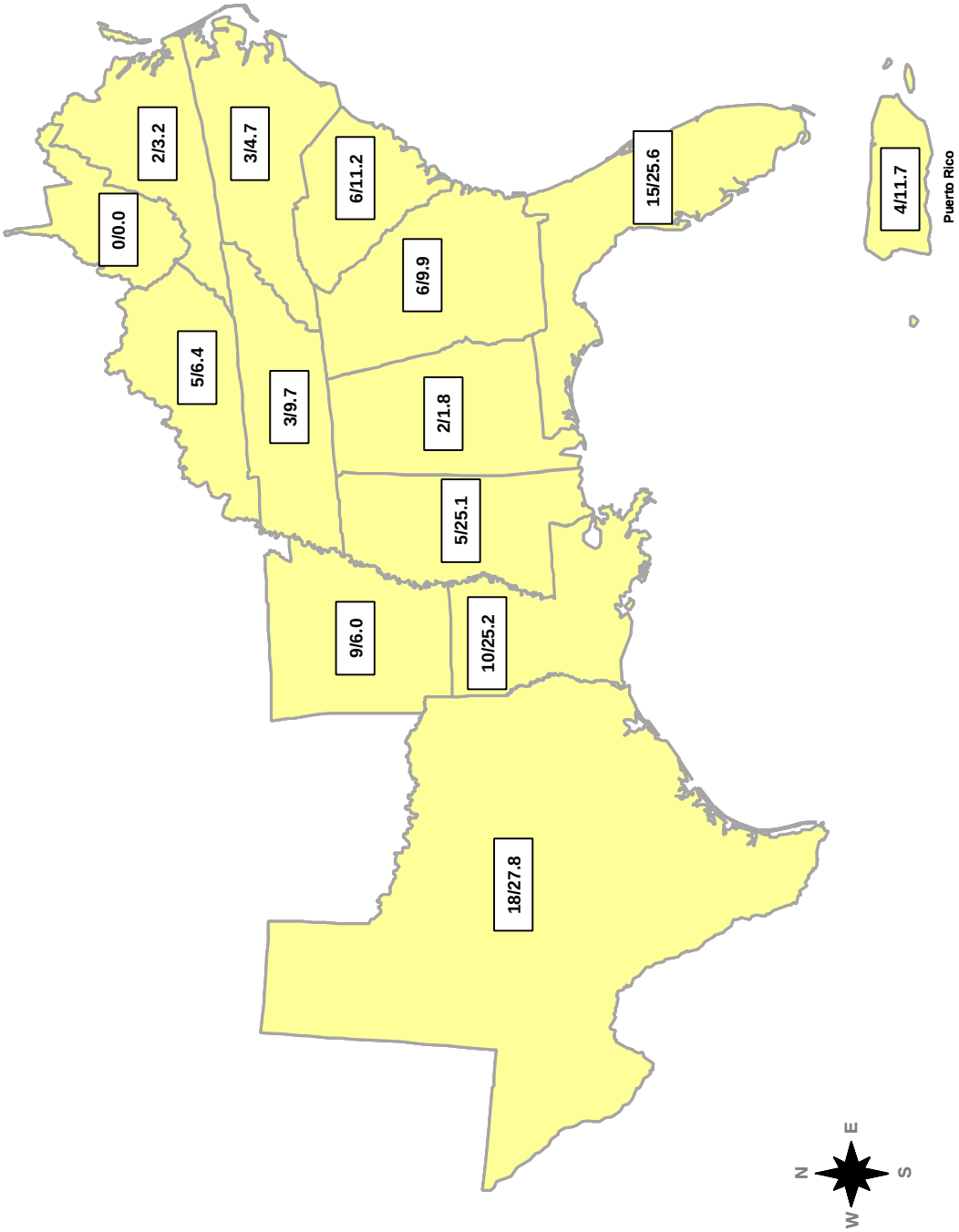
Of the 46 existing LATTS airports, 42 were represented in the NHS Connectors database. These 42 airports have 54 highway connectors, of which 31 were inventoried in the NHS Connectors database (55 miles).

Thus, this analysis used data for 88 LATTS intermodal connectors totaling 168 miles. These are the connectors for which information was available at the time of these analyses. They are distributed among the Alliance members as shown in **Exhibit C4-16**. As depicted in the map, Texas, Louisiana, and Florida had about half (43) of the inventoried connectors totaling more than 78 miles.

Exhibit C4-16

LATTS STRATEGIC HIGHWAY SYSTEM

NUMBER OF LATTS NATIONAL HIGHWAY SYSTEM
CONNECTORS & NUMBER OF MILES
(Connectors with Data in the NHS Intermodal Connectors
Inventory Database)



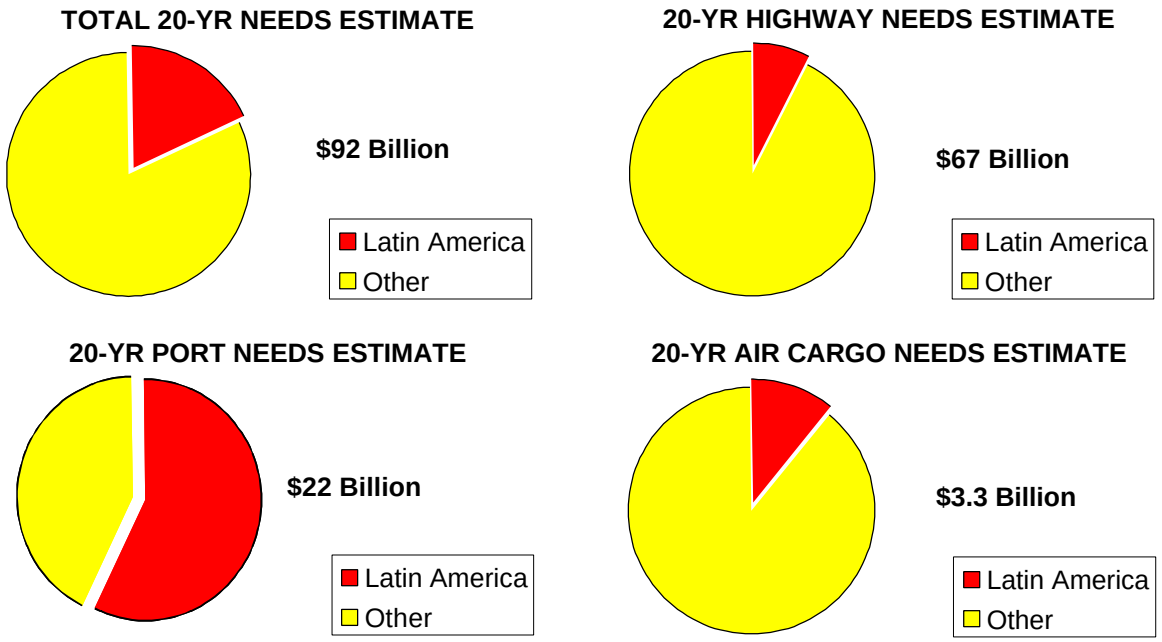
SECTION D
INVESTMENT NEEDS

The analysis of investment needs as reported in this section provides a perspective for the adoption of investment strategies that will achieve the LATTS goal and its seven supporting objectives that are discussed in Section E. The overview and perspective which follows indicates the magnitude of the challenge that lies ahead as well as various characteristics of the total investment needs. These features, in turn, influenced the particular strategies which were adopted by the study.

TOTAL INVESTMENT NEEDS

Depicted in **Exhibit D-1** are various characteristics of public sector investment needs on an overall basis. These needs encompass the LATTS Strategic Port, Airport and Highway Systems. No needs are included for the LATTS Strategic Rail System because they are almost exclusively the domain of the private sector and are not directly germane to public investment strategies. Nevertheless, the rail system and its freight transportation role and performance characteristics does influence, to a degree, public sector investment strategies for other modes, particularly highways.

Exhibit D-1
20 YEAR NEEDS ESTIMATES



Public sector investment needs on the LATTS Strategic Transportation System were found to be as follows:

- Total needs amount to $92 billion over the 20-year period.
  - Of this amount, $18 billion, or 20 percent of the total, are the direct result of Latin American traffic.
  - The vast majority of total needs (80 percent) are required to serve personal travel and non-Latin American freight flows.
  - Given this relationship and the nature of the LATTS Strategic Transportation System, investments aimed at serving growing trade flows with Latin America will also have a very substantial impact upon serving overall transportation needs within the Alliance Region.

- Twenty-year port needs amount to $22 billion.
  - This represents 24 percent of the total for all needs on the LATTS Strategic Transportation System.
  - Of the port total, the majority (57 percent) is related to trade with Latin America. This reflects the importance of Latin America trade flows to the Alliance Region's ports.

- Air cargo needs of the LATTS Strategic Airport System amount to $3.3 billion.
  - This is the smallest of the three modal components, constituting only 4 percent of the total.
  - Of the air cargo total, only 12 percent is directly related to Latin American trade flows.
  - The vast majority of total needs (88 percent) are a result of air cargo needs associated with other international and domestic flows.

- Needs for the LATTS Strategic Highway System total $67 billion over the 20-year analysis period.
  - Highway needs are the largest component of total needs of the three modes at 72 percent.
  - Nevertheless, only 8 percent of the total needs of the LATTS Strategic Highway System is directly related to trade with Latin America.
  - On the other hand, some 92 percent of the needs of the LATTS Strategic Highway System are attributable to traffic flows which are not directly associated with Latin American trade flows.

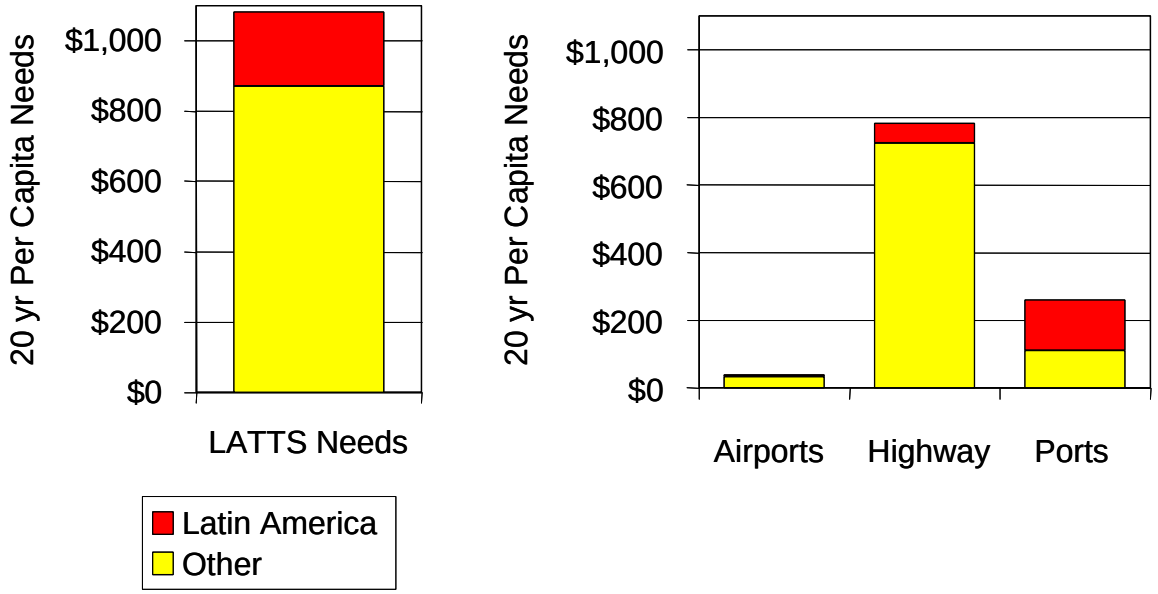
Investment Needs Per Capita

The $92 billion in needs for the LATTS Strategic Transportation System clearly is a hefty amount. However, when viewed in terms of per capita investment needs, it takes on a different perspective, as depicted in **Exhibit D-2**. For this presentation, per capita estimates were based on regionwide population (1998).

- Total needs of $92 billion equates to $1,082 per person over 20-years.
- The Latin American component of total needs amount to $211 per capita, or only 20 percent of the total.
- Per capita needs are significantly higher for the highway component, amounting to $783 over 20-years.

- Port per capita needs for the 20-years amount to $260.
- By far the smallest per capita needs by mode is for airport cargo facilities at $39.

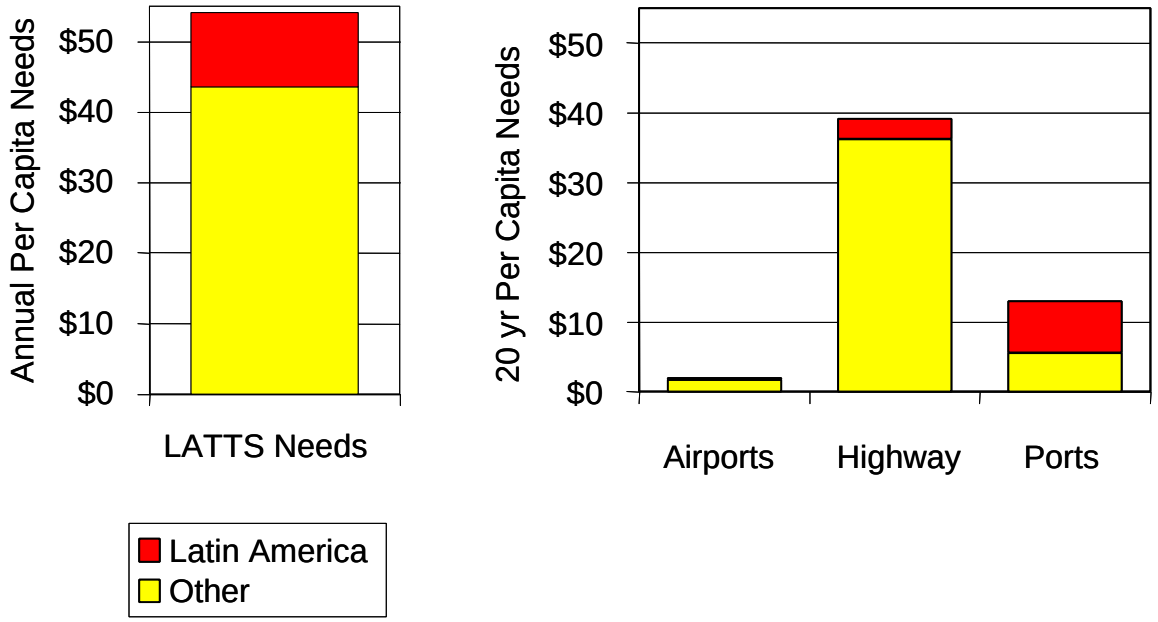
Exhibit D-2
PER CAPITA LATTS NEEDS ESTIMATES
20 YEAR TOTAL



The total 20-year need values are converted to annual amounts in **Exhibit D-3**.

- On an annual basis, per capita needs of the LATTS Strategic Transportation System amount to $54.
- Of this total, only $11 is related to Latin America trade flows.
- Annual highway needs amount to $39 per capita.
- Ports have annual needs of $13 per person.
- Only $2 per person per year is needed for air cargo flows.

Exhibit D-3
PER CAPITA LATTS NEEDS ESTIMATES
Annual per Capital Average



Comparison with Industrial Capital Investments

Industry clearly has a major dependence upon the transportation system to transport raw materials, intermediate and finished goods. Despite this heavy dependence, industrial capital investments are far greater than transportation investment needs.

As noted in **Exhibit D-4**, in 1998 investment by private industry (in South Carolina) equated to more than $1,500 per capita. As already emphasized, only $52 per capita is required annually for the LATTS Strategic Transportation System.

LATTS Strategic Port System Needs

The needs of the ports included in the LATTS Strategic Transportation System, as previously noted, amount to $22 billion over 20-years. Translation of this value into per capita values is depicted in **Exhibit D-5**.

- On a 20-year basis, port needs equate to $260 per person.
- The Latin American trade component of these needs amounts to $148 per capita, or 57 percent of the total.
- On an annual basis, total per capita needs amount to just $13, of which $7 constitutes the portion attributable to Latin American trade.

Exhibit D-4
LATTS NEEDS vs INDUSTRIAL CAPITAL INVESTMENT (South Carolina)
Annual per Capita Average

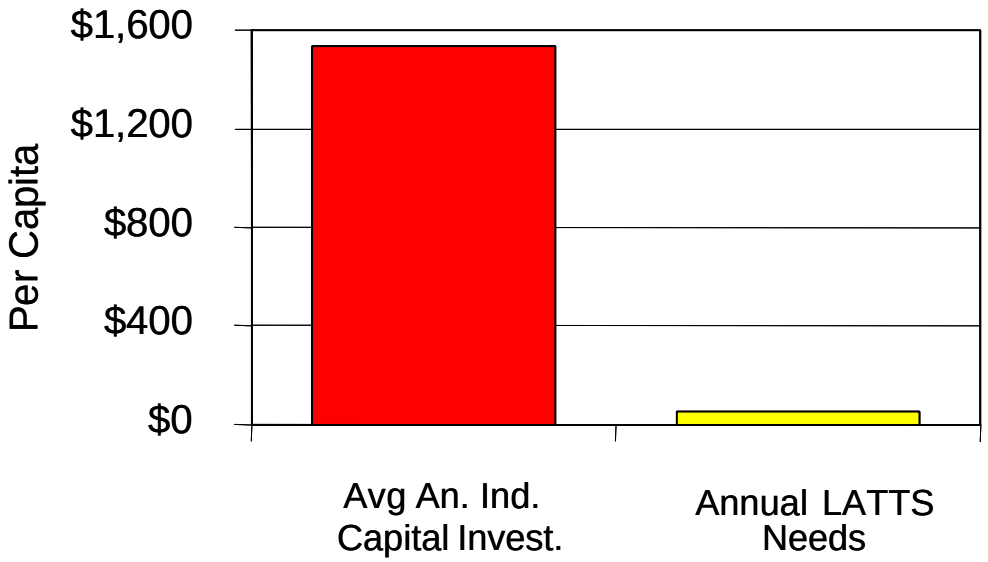
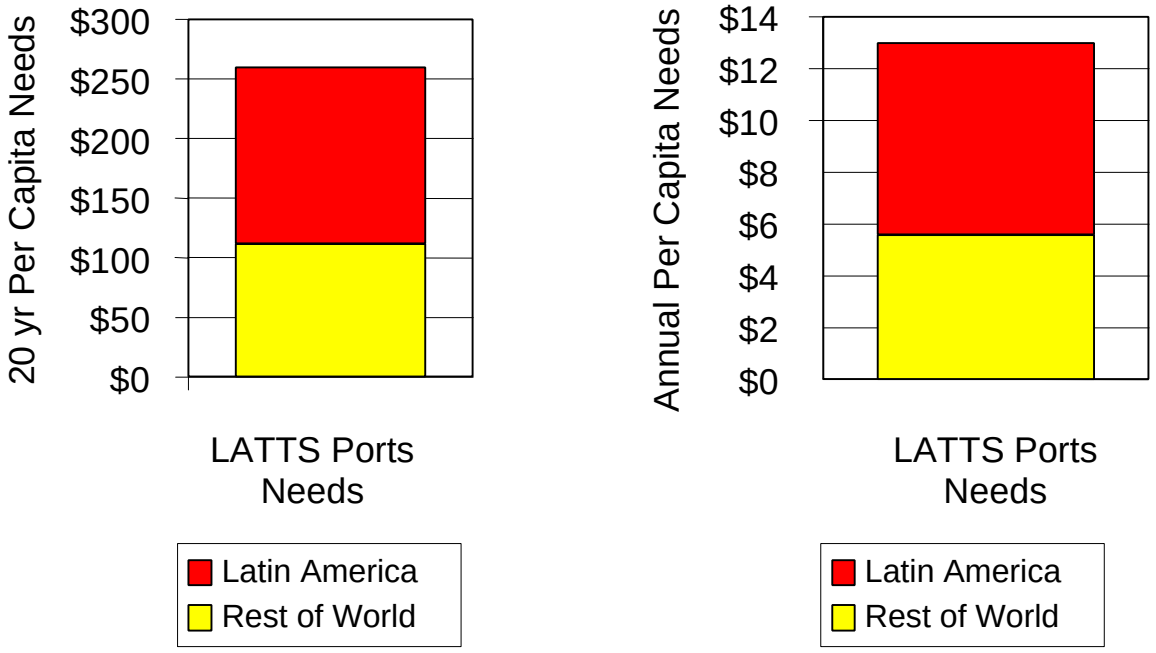


Exhibit D-5
LATTS PORTS NEEDS ESTIMATES

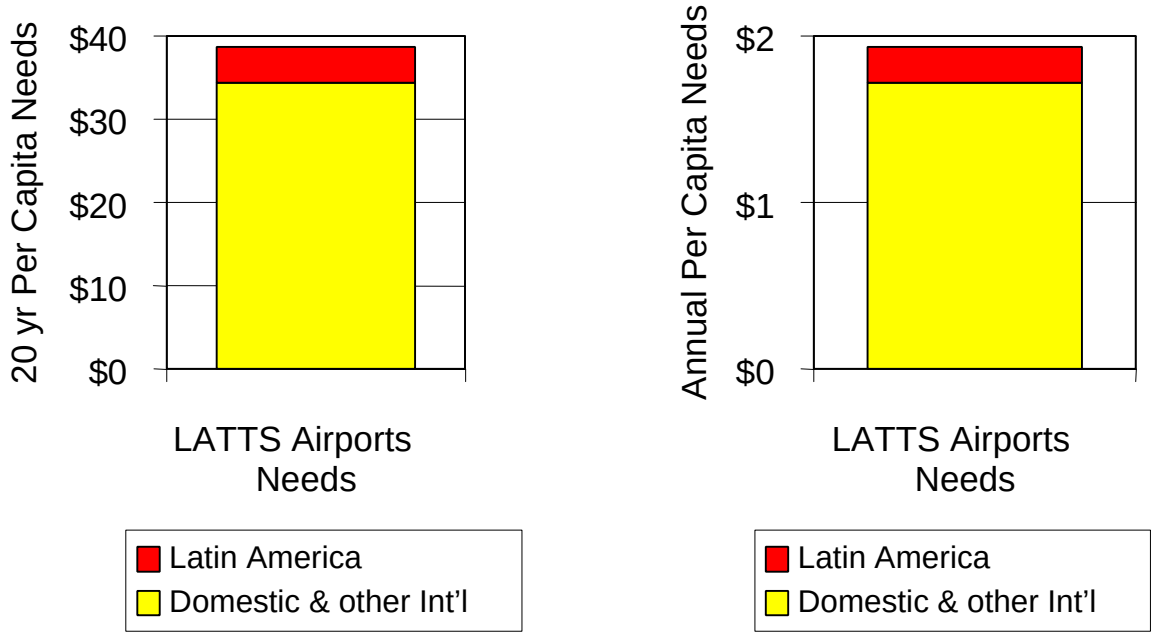


LATTS Strategic Airport System Needs

Total 20-year needs for air cargo at LATTS airports amounts to some $3.3 billion. Based upon this amount, **Exhibit D-6** presents per capita values.

- Per capita public sector needs over the 20-years total $39.
- Of this total, only $4 is due to Latin American trade flows.
- On an annual basis, per capita needs amount to only $2, of which only 12 percent is due to Latin American trade.

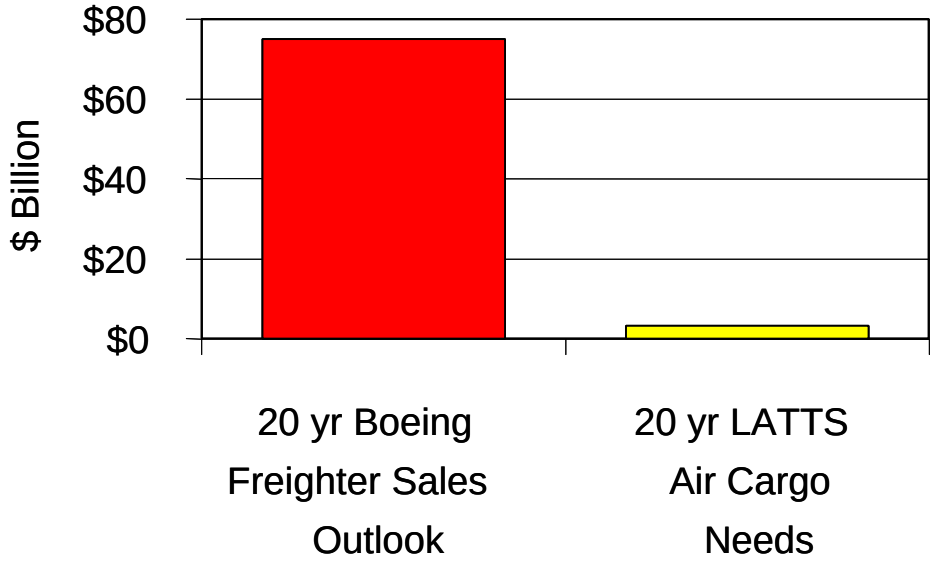
Exhibit D-6
LATTS AIRPORTS NEEDS ESTIMATES



As noted, public sector air cargo needs at LATTS airports are only a small component of total needs of the LATTS Strategic Transportation System. Further, they are dwarfed by the amount of investment by the private sector for air cargo. **Exhibit D-7** compares the 20-year LATTS air cargo needs of $3.3 billion to the $75 billion[1] forecast for Boeing freighter sales over a like span of years. The huge disparity is readily apparent.

[1] Boeing World Air Cargo Forecast 2000/2001.

Exhibit D-7
LATTS AIRPORTS NEEDS vs BOEING FREIGHTER SALES
20 Year Outlook



LATTS Strategic Highway System Needs

Discussed earlier was the total of $67 billion in 20-year needs for the highways included in the LATTS Strategic Transportation System. **Exhibit D-8** translates these needs into per capita values.

- Over 20-years, per capita needs amount to $783.
- Only 7.5 percent of this total, or $59, is directly due to Latin American trade flows.
- On an average annual basis, highway needs amount to $39 per person but only $3 is required by the incremental Latin American component of total traffic.

On a per capita basis, **Exhibit D-9** compares the LATTS annual highway needs estimate to historical highway expenditures.

- On a national basis, public outlays amounted to some $36.2 billion in 1998, an amount 7.5 times the annual LATTS highway needs value of $4.6 billion.
- The Alliance had higher 1998 outlays per capita than for the nation as a whole.
- Alliance expenditures averaged $147 per person, a value 3.8 times the LATTS annual highway per capita needs value.

Exhibit D-8
LATTS HIGHWAY NEEDS ESTIMATES

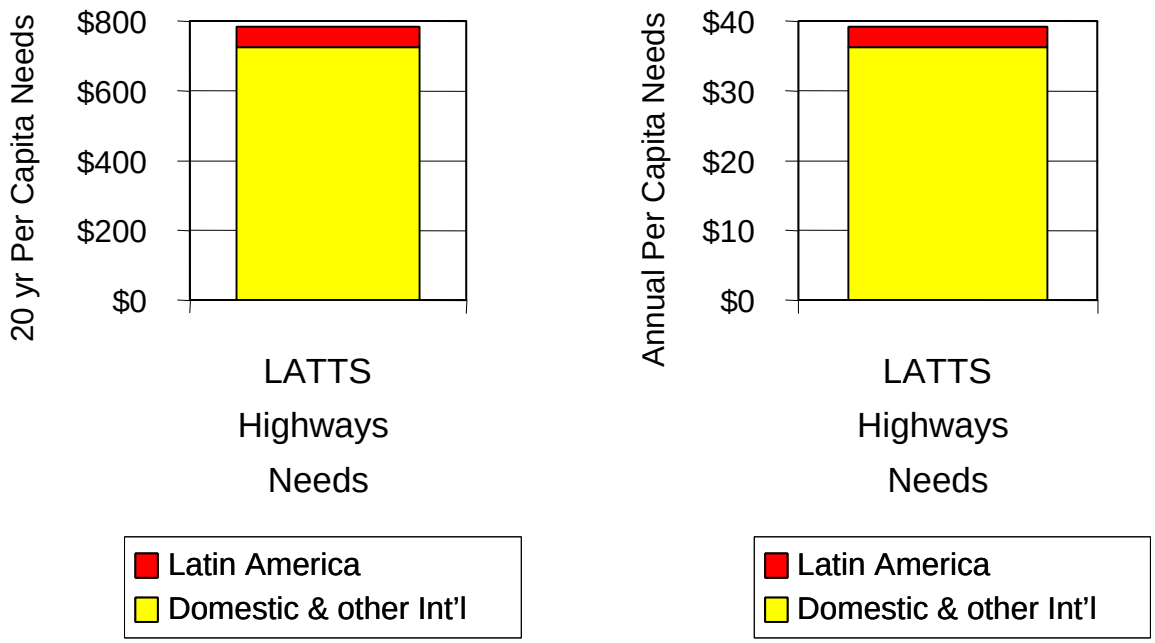
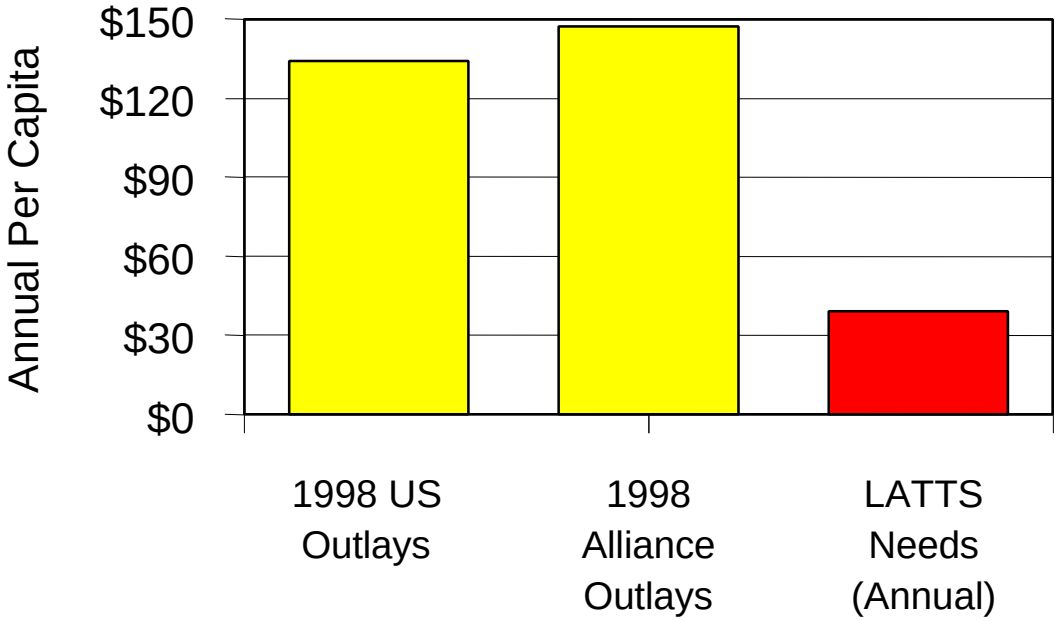


Exhibit D-9
LATTS HIGHWAY NEEDS vs HISTORICAL EXPENDITURES
Annual Expenditures



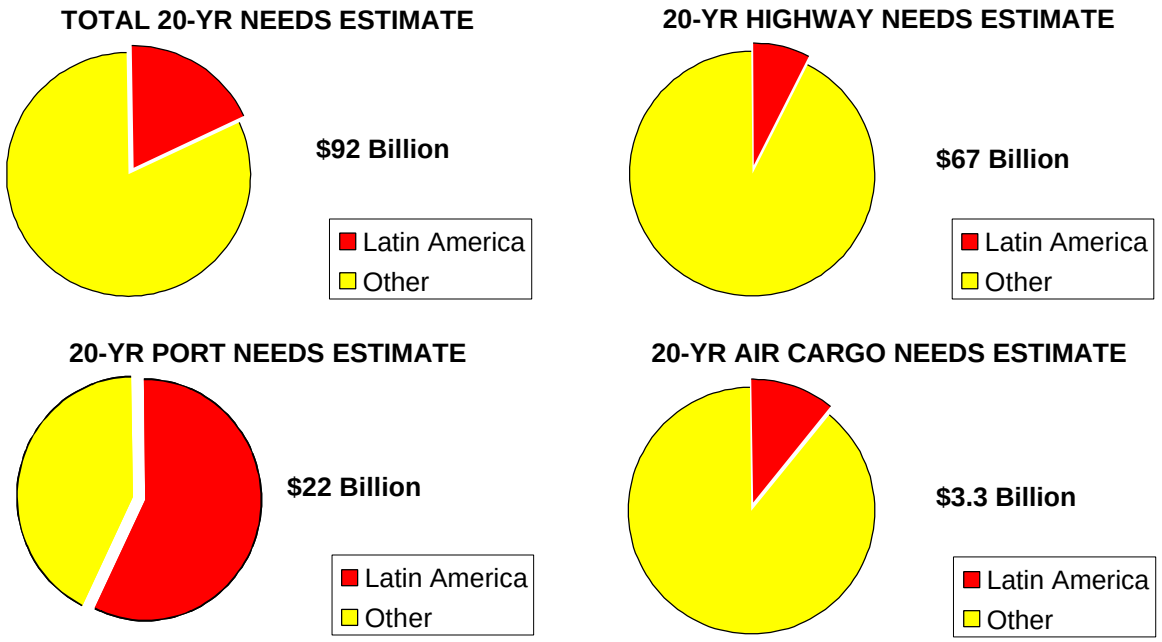
SECTION D
INVESTMENT NEEDS

The analysis of investment needs as reported in this section provides a perspective for the adoption of investment strategies that will achieve the LATTS goal and its seven supporting objectives that are discussed in Section E. The overview and perspective which follows indicates the magnitude of the challenge that lies ahead as well as various characteristics of the total investment needs. These features, in turn, influenced the particular strategies which were adopted by the study.

TOTAL INVESTMENT NEEDS

Depicted in **Exhibit D-1** are various characteristics of public sector investment needs on an overall basis. These needs encompass the LATTS Strategic Port, Airport and Highway Systems. No needs are included for the LATTS Strategic Rail System because they are almost exclusively the domain of the private sector and are not directly germane to public investment strategies. Nevertheless, the rail system and its freight transportation role and performance characteristics does influence, to a degree, public sector investment strategies for other modes, particularly highways.

Exhibit D-1
20 YEAR NEEDS ESTIMATES



Public sector investment needs on the LATTS Strategic Transportation System were found to be as follows:

- Total needs amount to $92 billion over the 20-year period.
  - Of this amount, $18 billion, or 20 percent of the total, are the direct result of Latin American traffic.
  - The vast majority of total needs (80 percent) are required to serve personal travel and non-Latin American freight flows.
  - Given this relationship and the nature of the LATTS Strategic Transportation System, investments aimed at serving growing trade flows with Latin America will also have a very substantial impact upon serving overall transportation needs within the Alliance Region.

- Twenty-year port needs amount to $22 billion.
  - This represents 24 percent of the total for all needs on the LATTS Strategic Transportation System.
  - Of the port total, the majority (57 percent) is related to trade with Latin America. This reflects the importance of Latin America trade flows to the Alliance Region's ports.

- Air cargo needs of the LATTS Strategic Airport System amount to $3.3 billion.
  - This is the smallest of the three modal components, constituting only 4 percent of the total.
  - Of the air cargo total, only 12 percent is directly related to Latin American trade flows.
  - The vast majority of total needs (88 percent) are a result of air cargo needs associated with other international and domestic flows.

- Needs for the LATTS Strategic Highway System total $67 billion over the 20-year analysis period.
  - Highway needs are the largest component of total needs of the three modes at 72 percent.
  - Nevertheless, only 8 percent of the total needs of the LATTS Strategic Highway System is directly related to trade with Latin America.
  - On the other hand, some 92 percent of the needs of the LATTS Strategic Highway System are attributable to traffic flows which are not directly associated with Latin American trade flows.

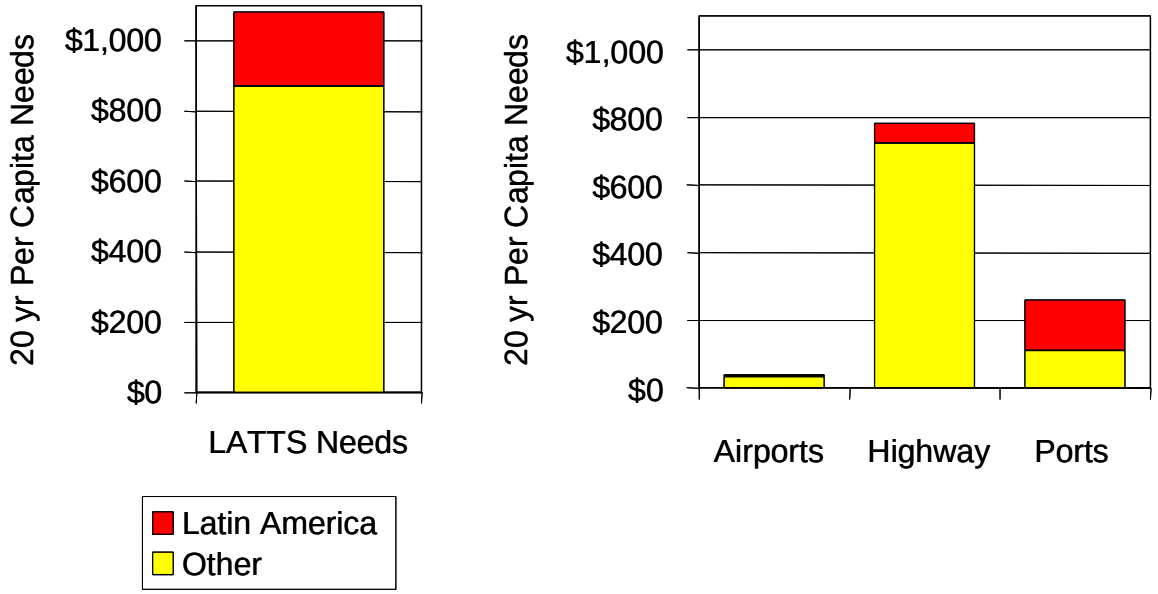
Investment Needs Per Capita

The $92 billion in needs for the LATTS Strategic Transportation System clearly is a hefty amount. However, when viewed in terms of per capita investment needs, it takes on a different perspective, as depicted in **Exhibit D-2**. For this presentation, per capita estimates were based on regionwide population (1998).

- Total needs of $92 billion equates to $1,082 per person over 20-years.
- The Latin American component of total needs amount to $211 per capita, or only 20 percent of the total.
- Per capita needs are significantly higher for the highway component, amounting to $783 over 20-years.

- Port per capita needs for the 20-years amount to $260.
- By far the smallest per capita needs by mode is for airport cargo facilities at $39.

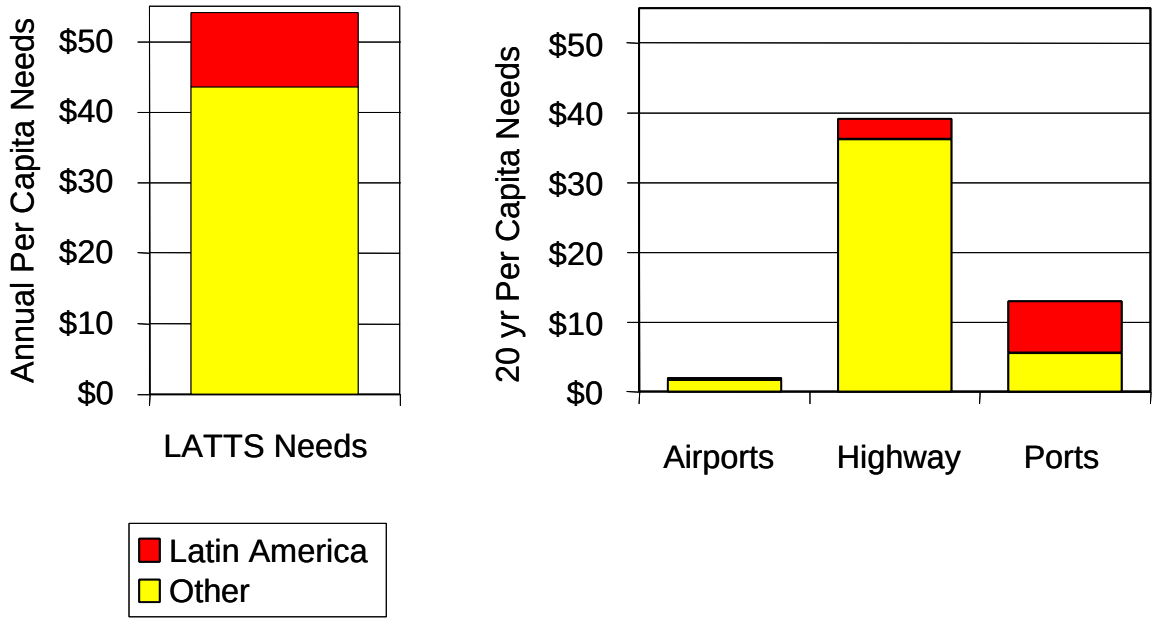
Exhibit D-2
PER CAPITA LATTS NEEDS ESTIMATES
20 YEAR TOTAL



The total 20-year need values are converted to annual amounts in **Exhibit D-3**.

- On an annual basis, per capita needs of the LATTS Strategic Transportation System amount to $54.
- Of this total, only $11 is related to Latin America trade flows.
- Annual highway needs amount to $39 per capita.
- Ports have annual needs of $13 per person.
- Only $2 per person per year is needed for air cargo flows.

Exhibit D-3
PER CAPITA LATTS NEEDS ESTIMATES
Annual per Capital Average



Comparison with Industrial Capital Investments

Industry clearly has a major dependence upon the transportation system to transport raw materials, intermediate and finished goods. Despite this heavy dependence, industrial capital investments are far greater than transportation investment needs.

As noted in **Exhibit D-4**, in 1998 investment by private industry (in South Carolina) equated to more than $1,500 per capita. As already emphasized, only $52 per capita is required annually for the LATTS Strategic Transportation System.

LATTS Strategic Port System Needs

The needs of the ports included in the LATTS Strategic Transportation System, as previously noted, amount to $22 billion over 20-years. Translation of this value into per capita values is depicted in **Exhibit D-5**.

- On a 20-year basis, port needs equate to $260 per person.
- The Latin American trade component of these needs amounts to $148 per capita, or 57 percent of the total.
- On an annual basis, total per capita needs amount to just $13, of which $7 constitutes the portion attributable to Latin American trade.

Exhibit D-4
LATTS NEEDS vs INDUSTRIAL CAPITAL INVESTMENT (South Carolina)
Annual per Capita Average

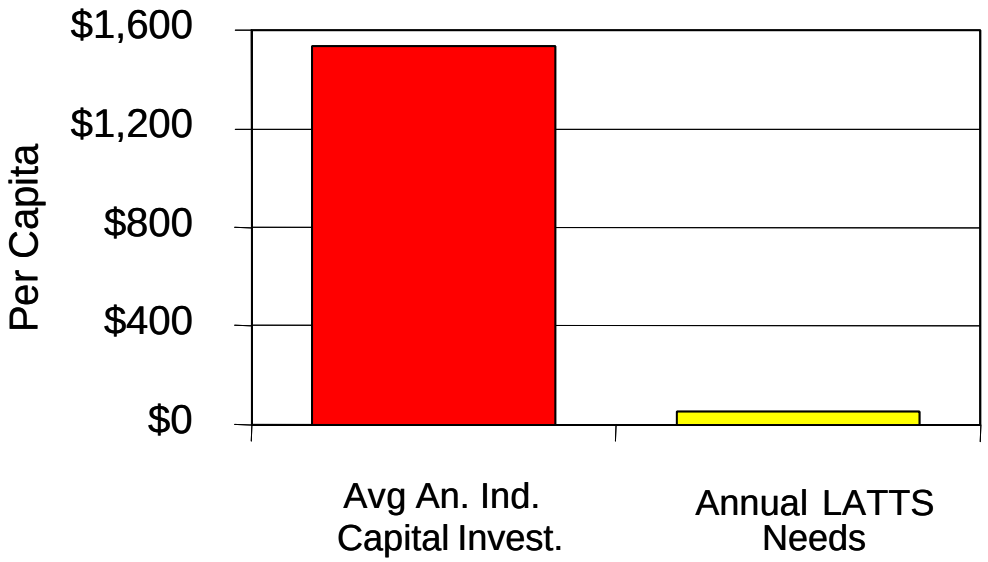
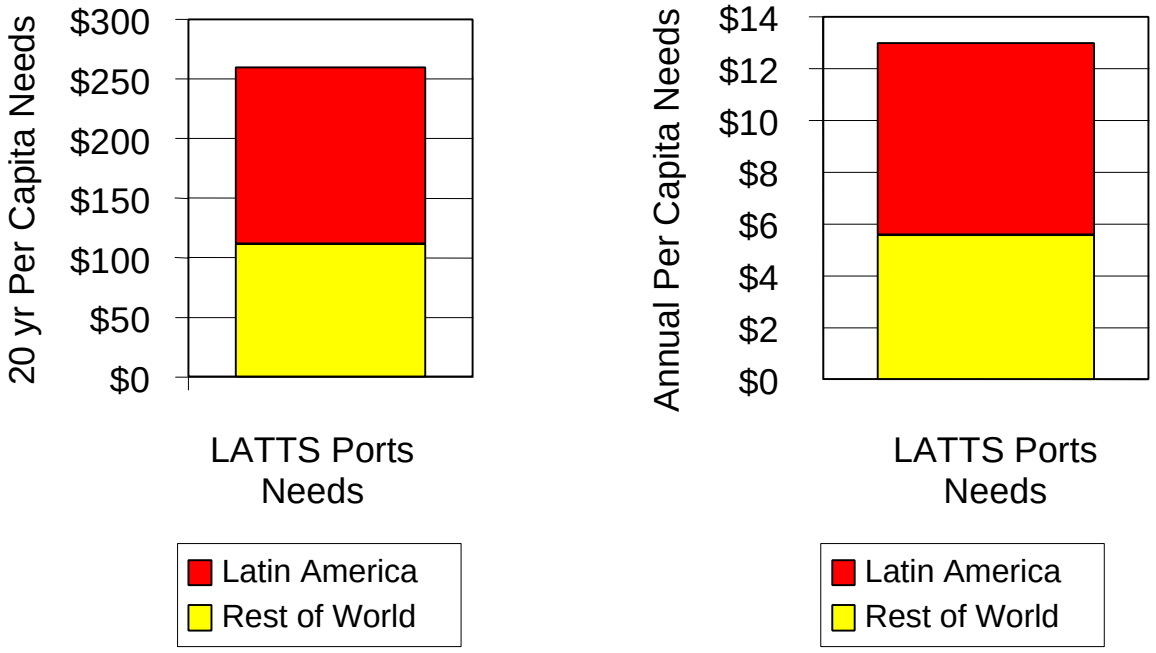


Exhibit D-5
LATTS PORTS NEEDS ESTIMATES



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Total 20-year needs for air cargo at LATTS airports amounts to some $3.3 billion. Based upon this amount, **Exhibit D-6** presents per capita values.

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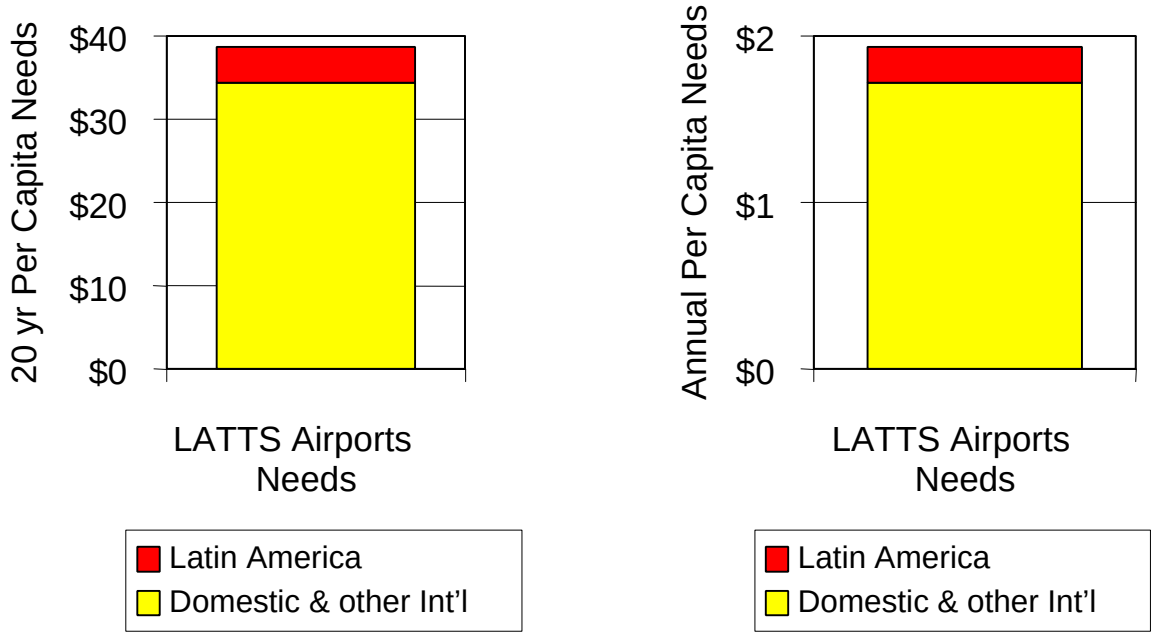

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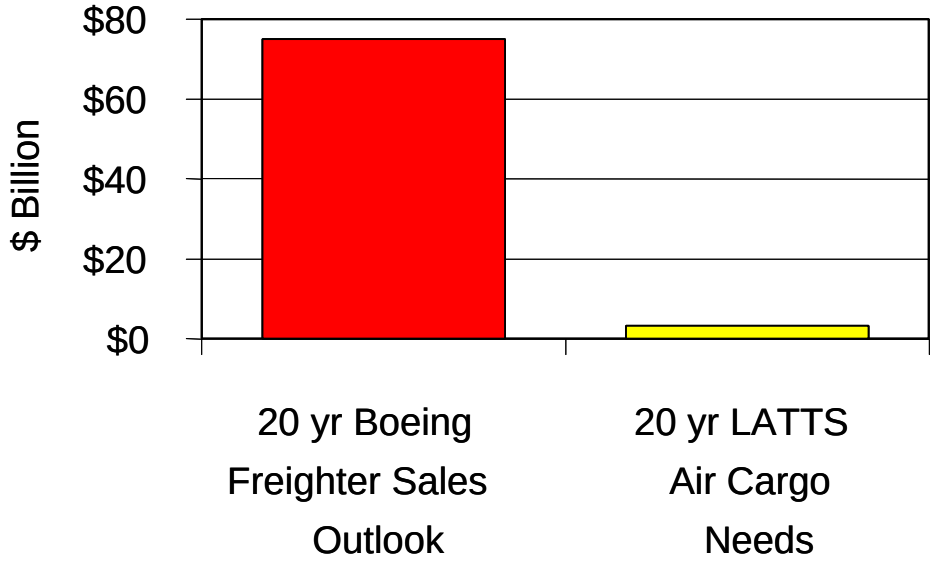
20 Year Outlook



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On a per capita basis, **Exhibit D-9** compares the LATTS annual highway needs estimate to historical highway expenditures.

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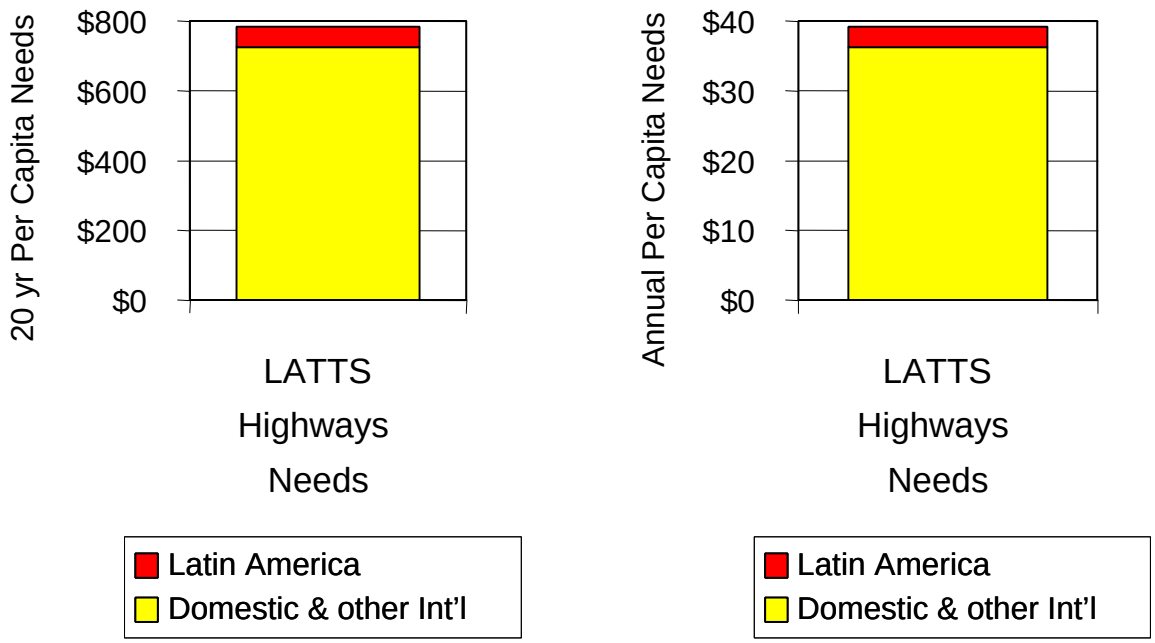

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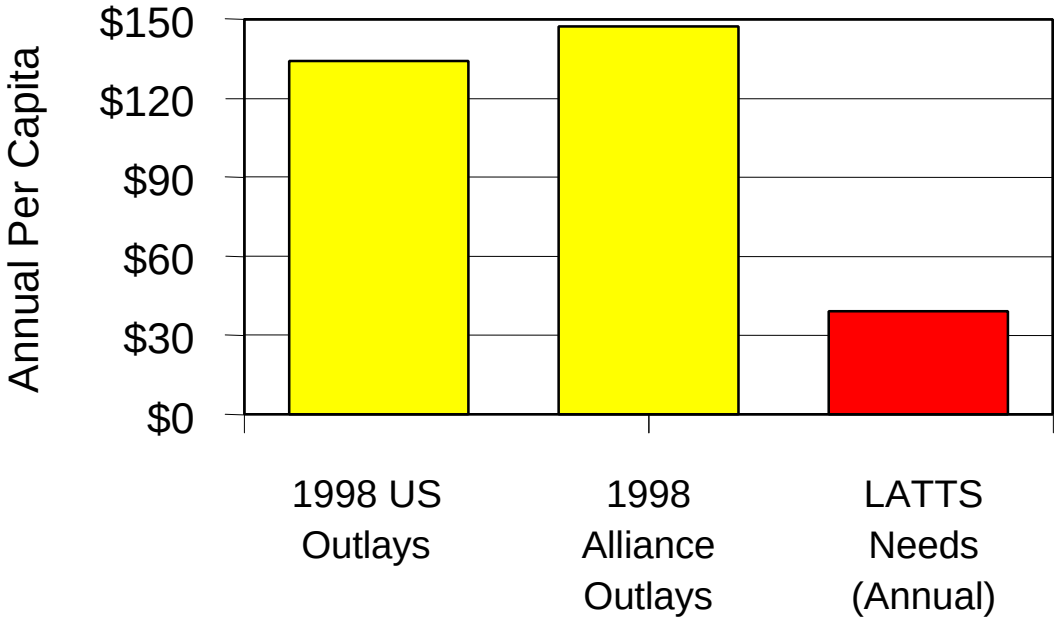
Annual Expenditures



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).

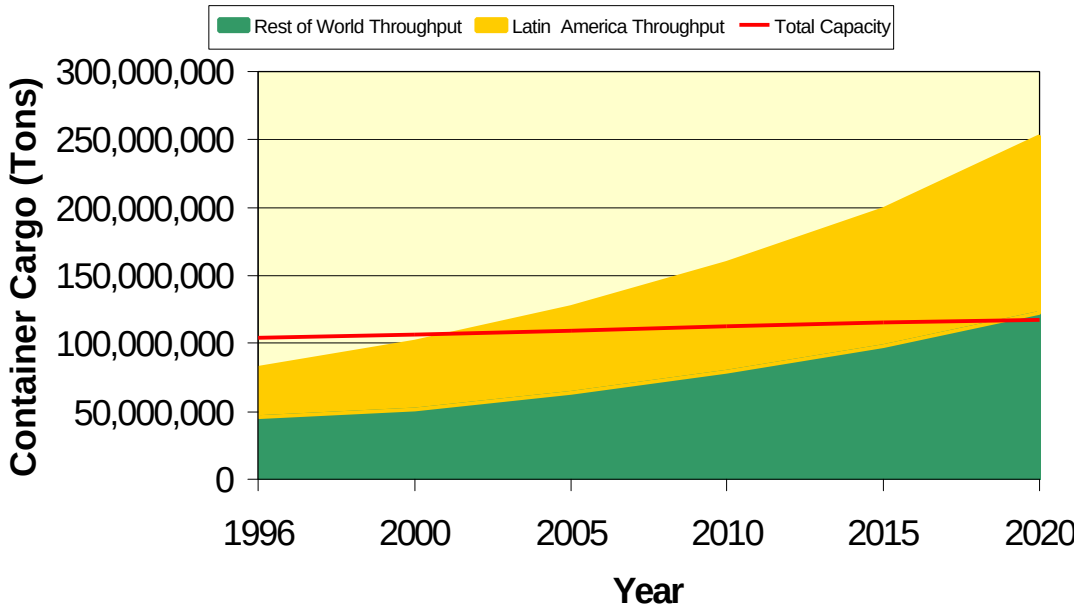
5. Consider the amount of PIERS containerized cargoes that are provided by each source and are dependant upon the breakdown of cargo that is provided by the ports (matching the mix in the PIERS data to the mix in port data).

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

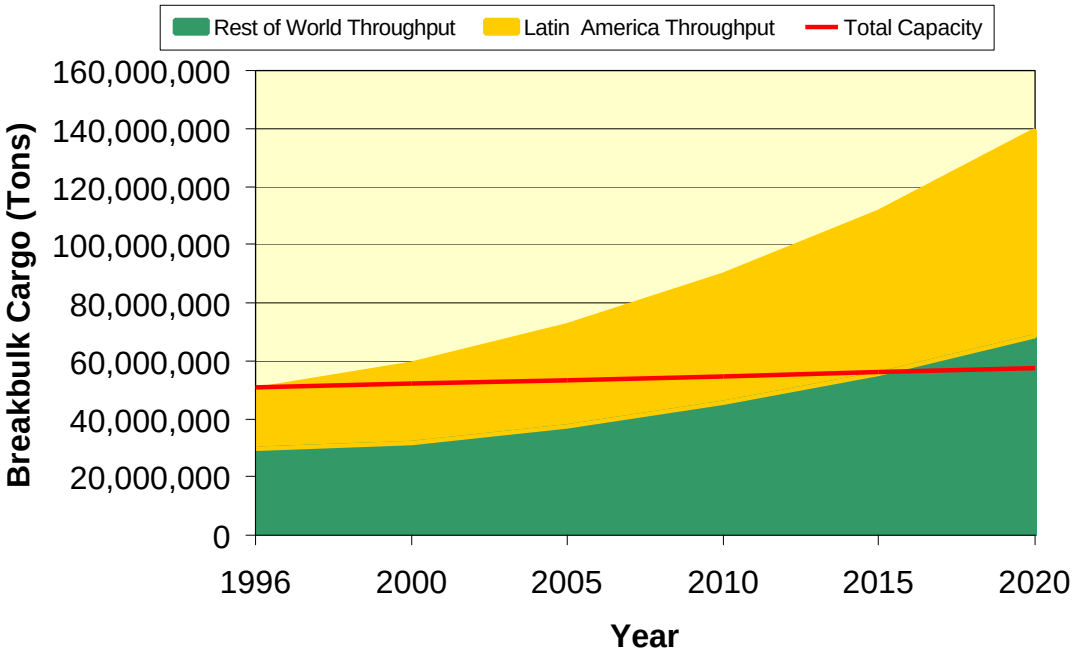
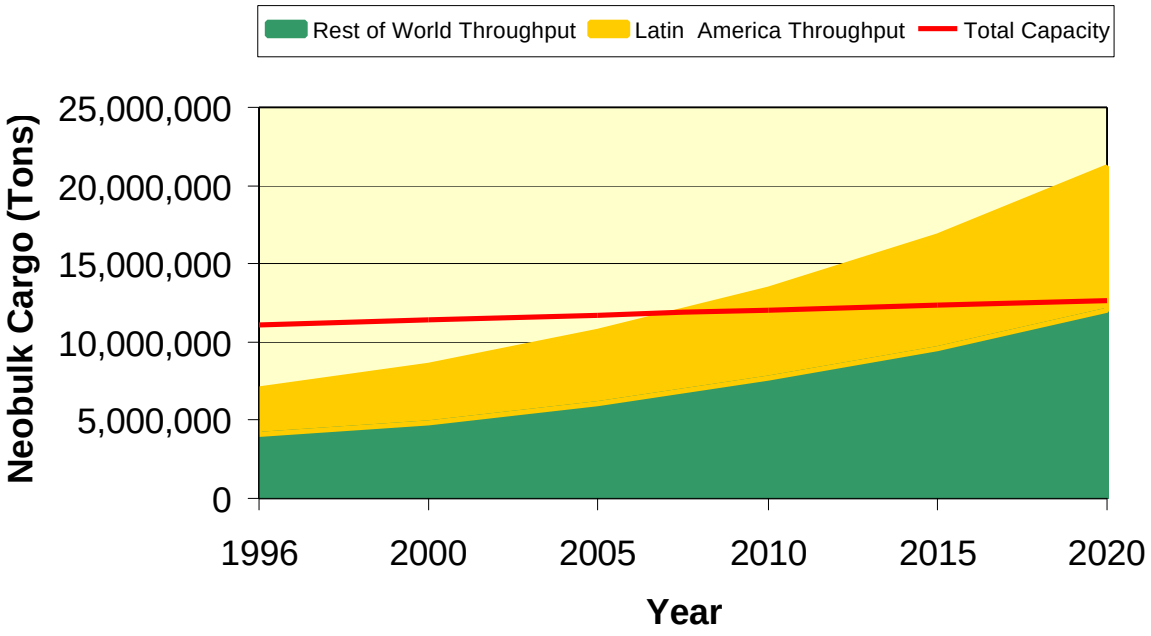


Exhibit D1-3 (cont'd)
LATTS REGION NEO-BULK THROUGHPUT vs CAPACITY



LATTS REGION DRY BULK THROUGHPUT vs CAPACITY

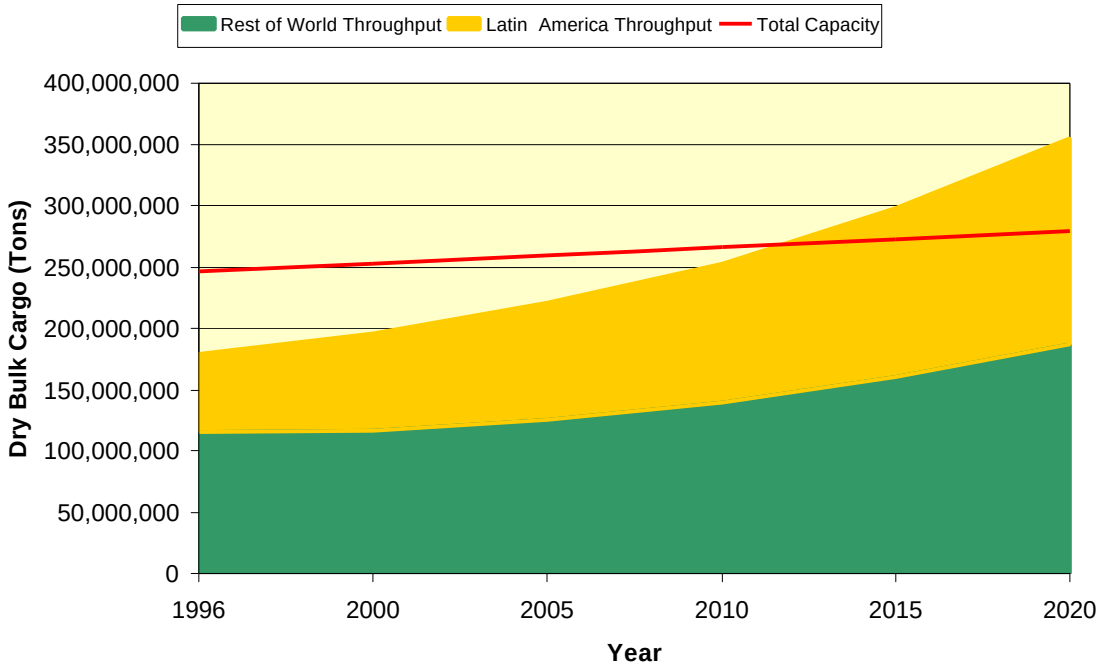
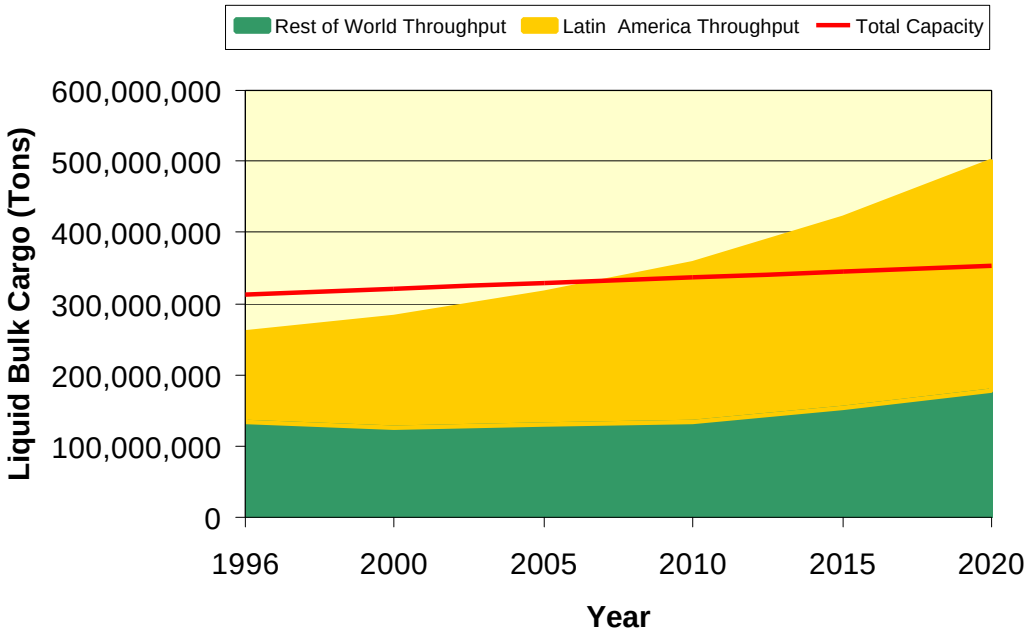
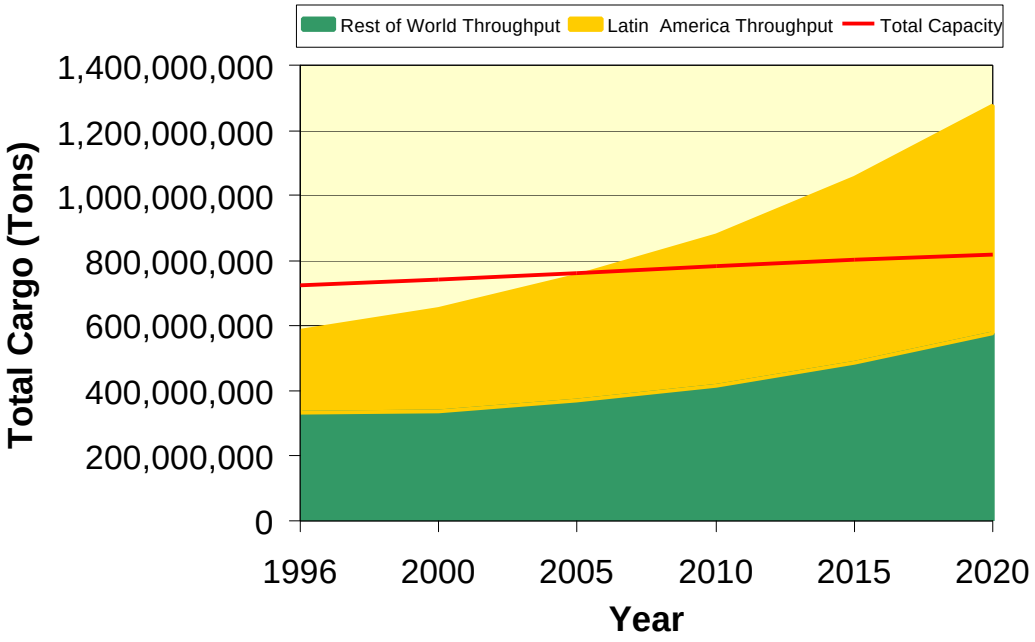


Exhibit D1-3 (cont'd)
LATTS REGION LIQUID BULK THROUGHPUT vs CAPACITY



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.

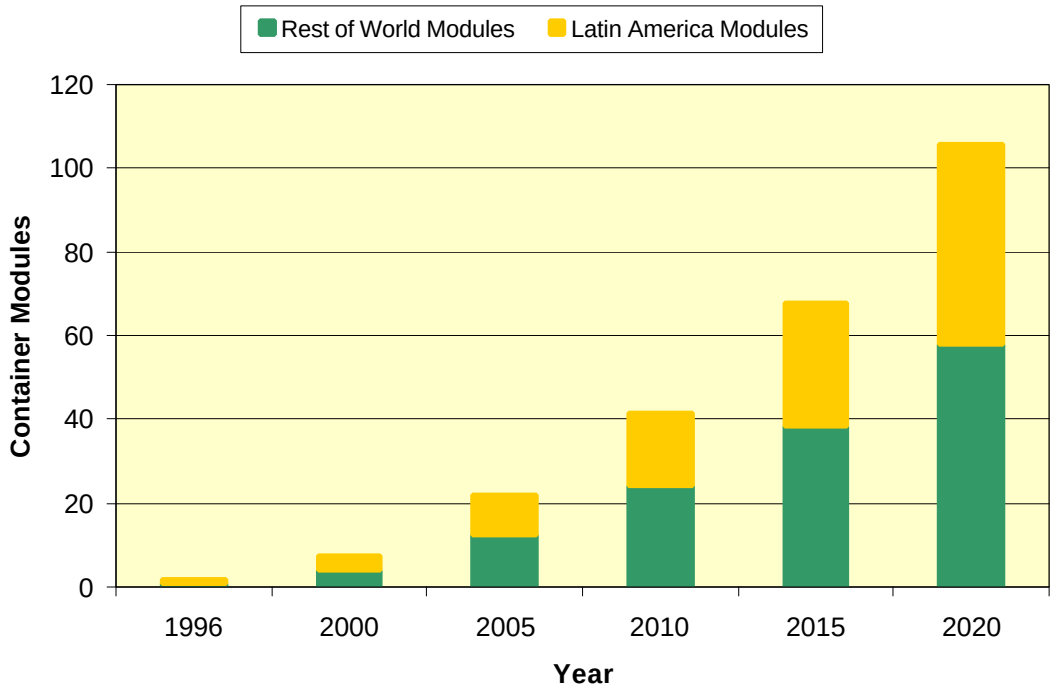
Container

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

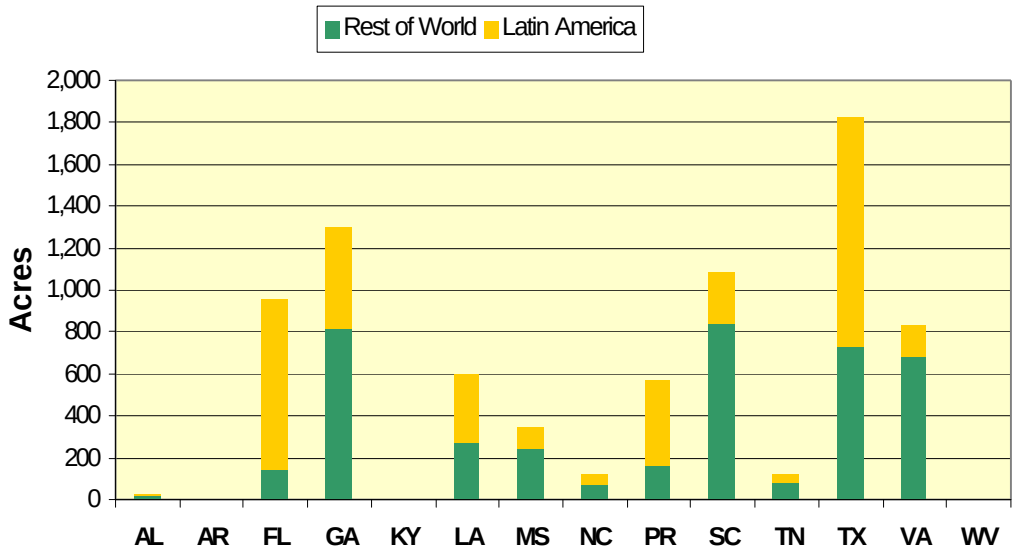
CARGO TYPE/ESTIMATED COST	STORAGE MODE	ESTIMATED CAPACITY (TONS/YR)
CONTAINER $32,000,000	Wheeled – Cw Grounded - Cg Other/Mixed - Co	880,000 1,739,000 1,467,000
BREAK-BULK $20,600,000	Outside – BBo Warehouse – BBw Mixed - BBm	148,000 187,000 142,000
NEO-BULK $14,600,000	Outside – NBo Warehouse – NBw 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



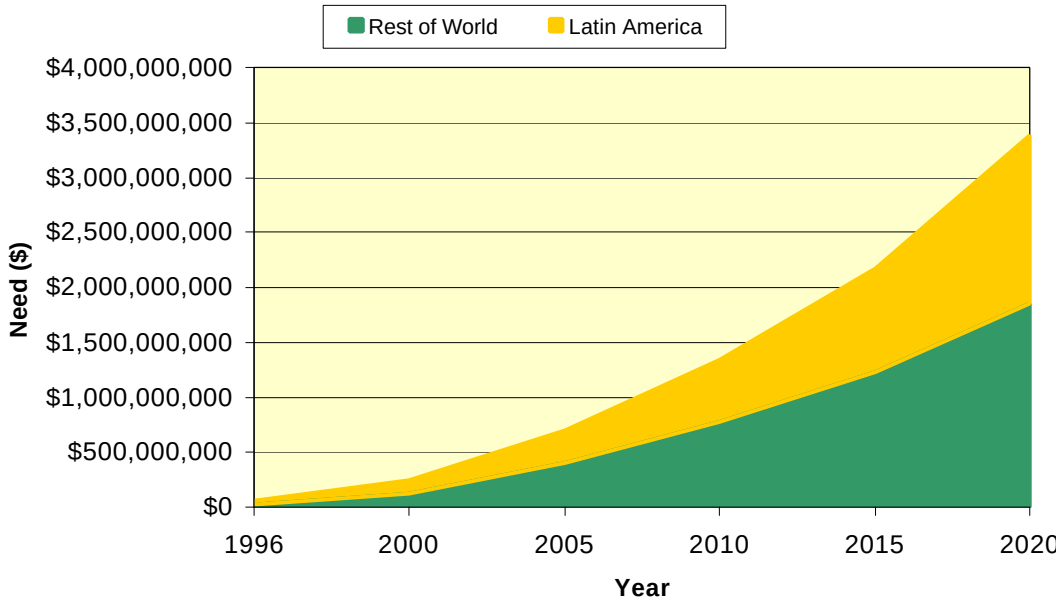
To better understand the future infrastructure needs, a state distributed acreage summary for the LATTS region is presented in **Exhibit D1-6**. The infrastructure need in this graph is shown for Latin America Cargo as well as Rest of World Cargo similar to the module need graph.

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.

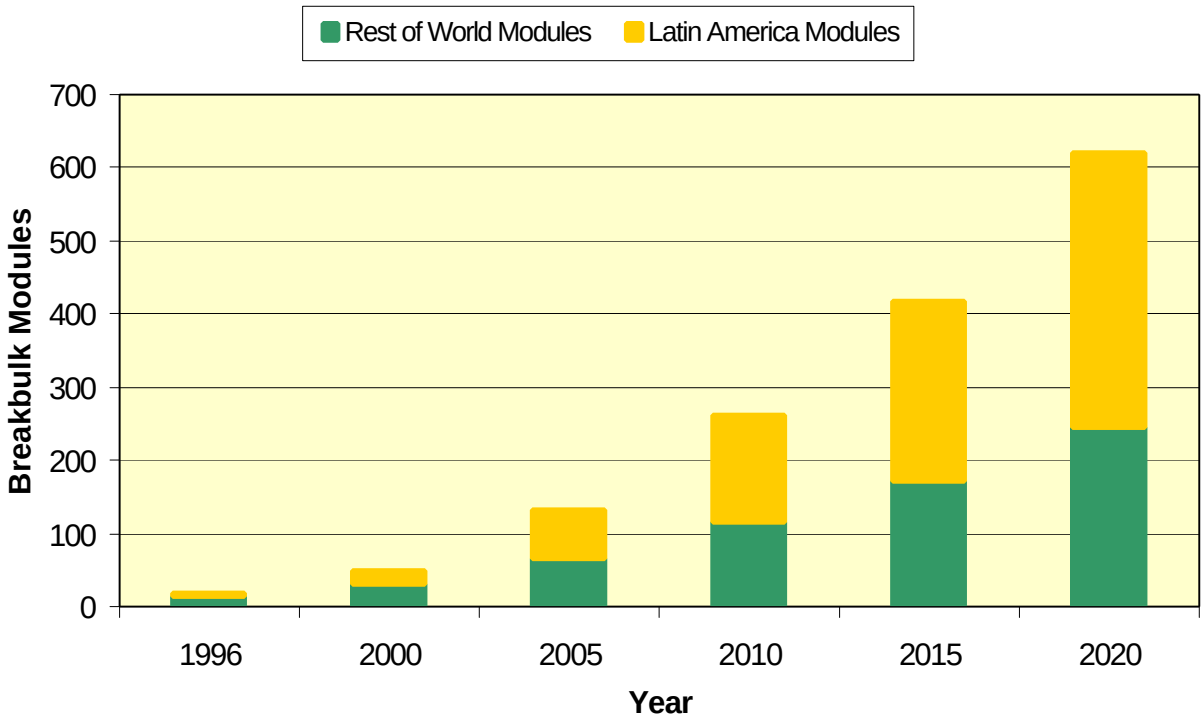
Exhibit D1-7
LATTS REGION ESTIMATED CONTAINER INFRASTRUCTURE NEED



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

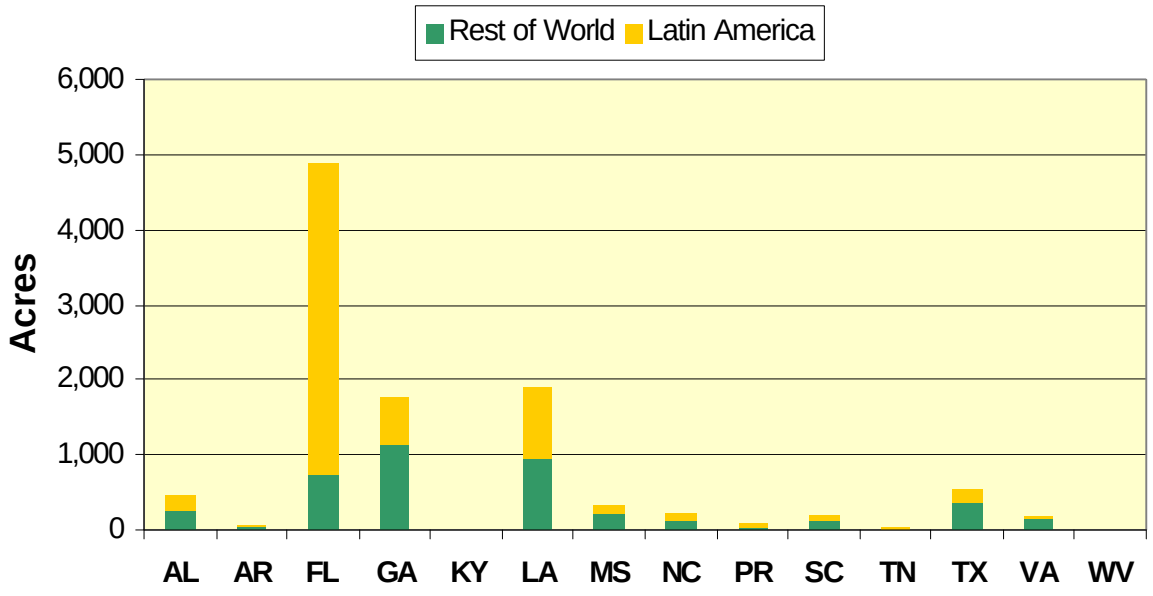
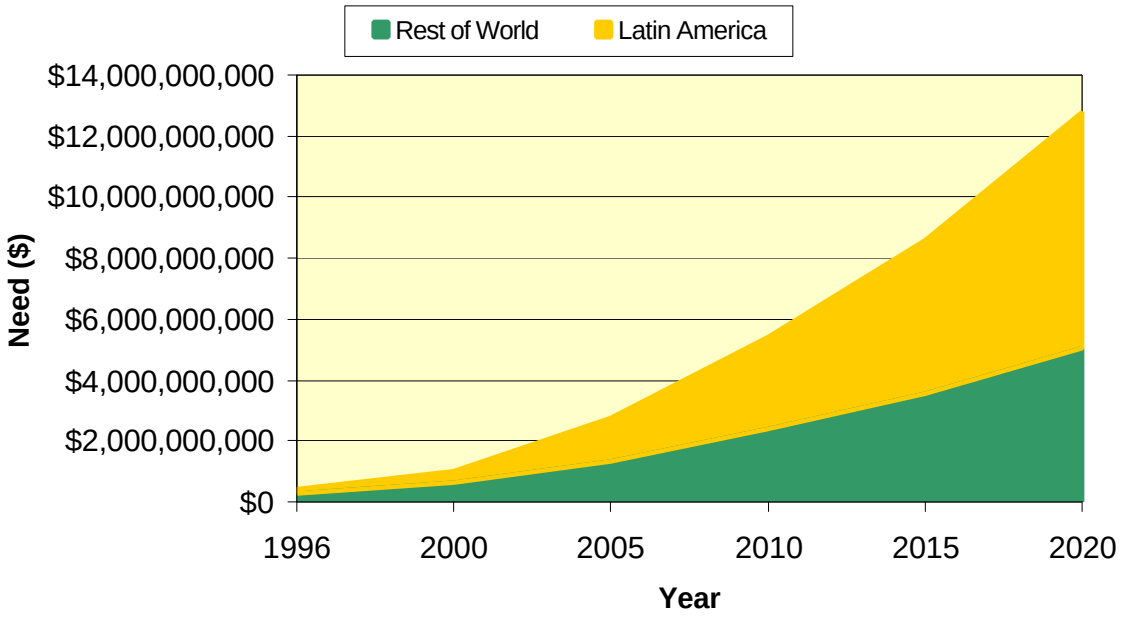


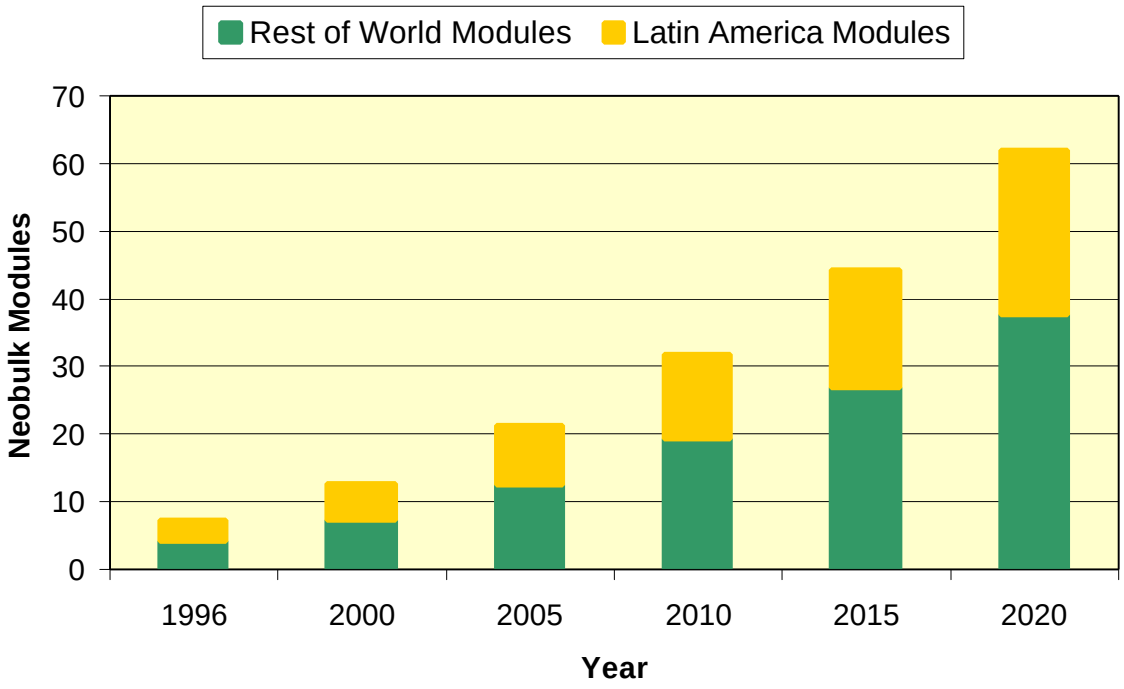
Exhibit D1-10
LATTS REGION ESTIMATED BREAK-BULK INFRASTRUCTURE NEED



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

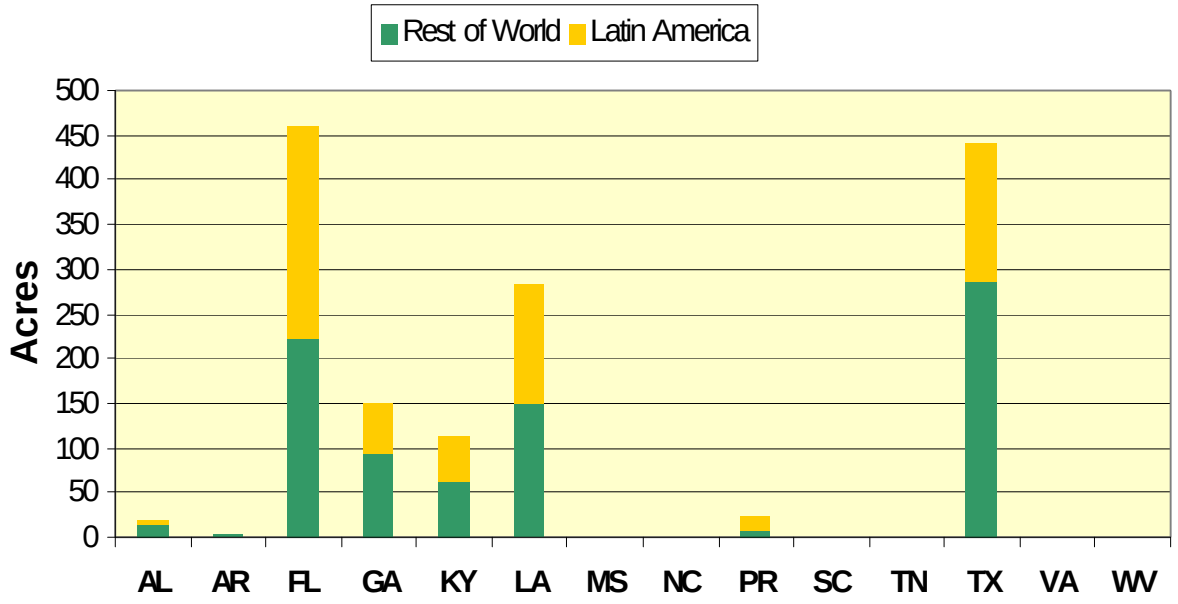
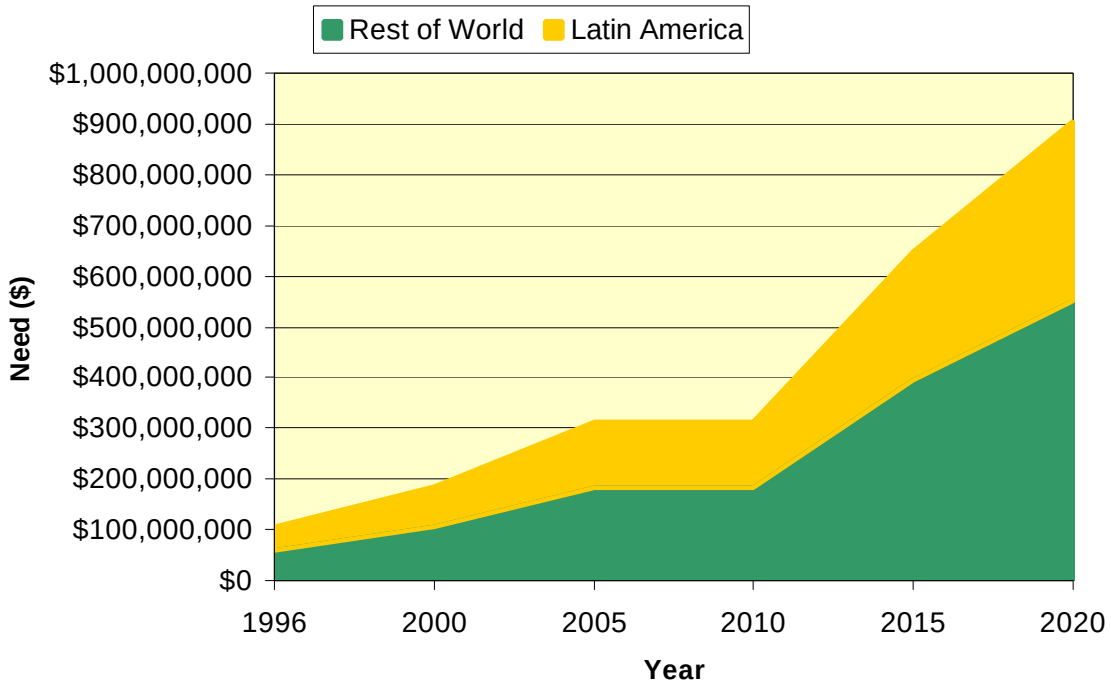


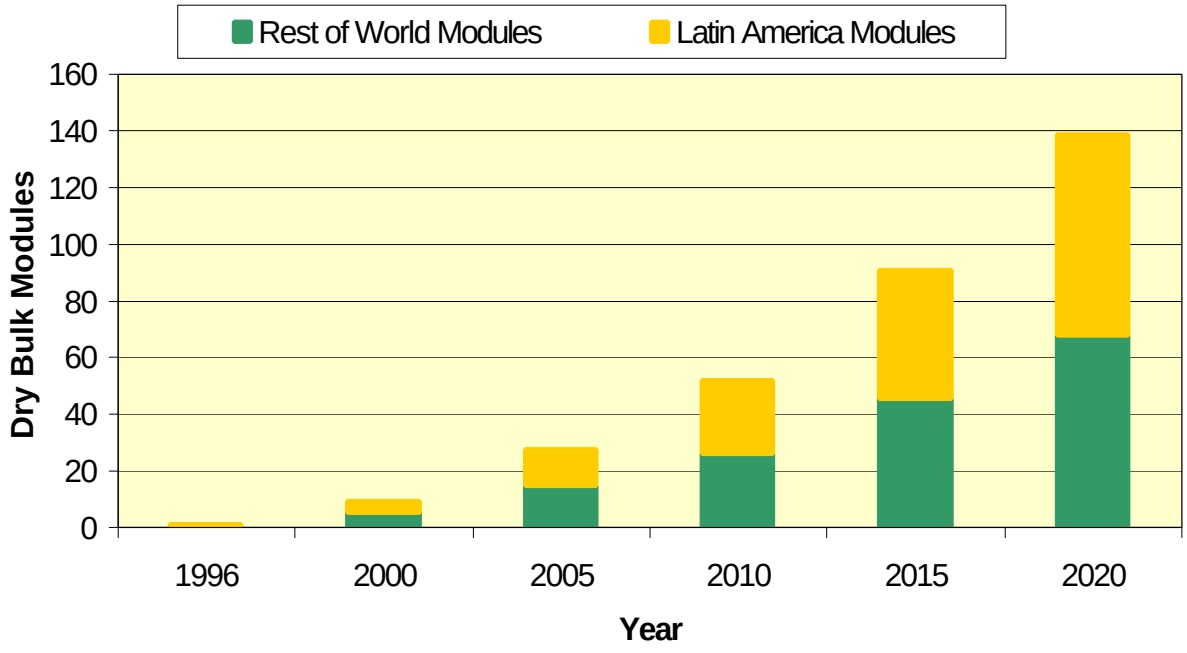
Exhibit D1-13
LATTS REGION ESTIMATED NEO-BULK INFRASTRUCTURE NEED



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

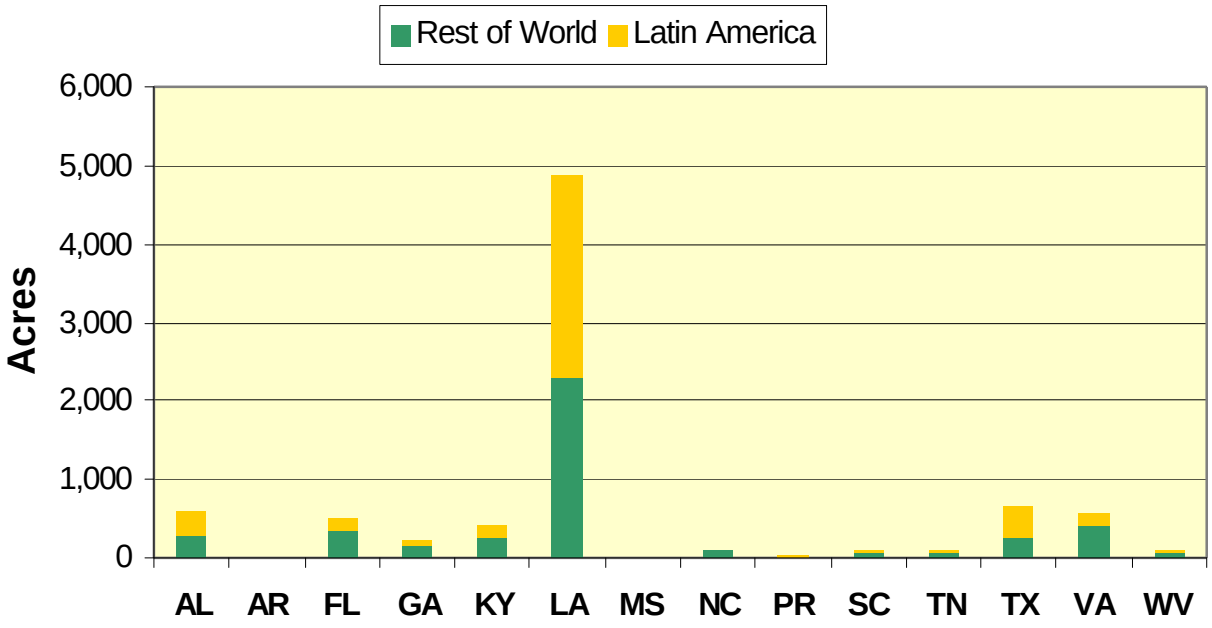
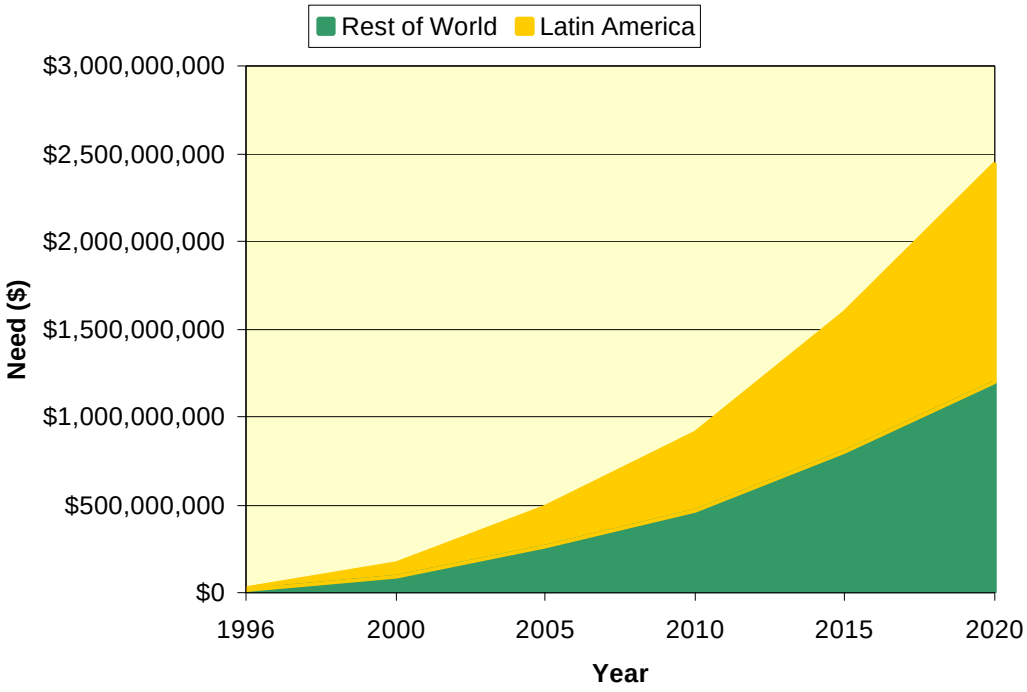


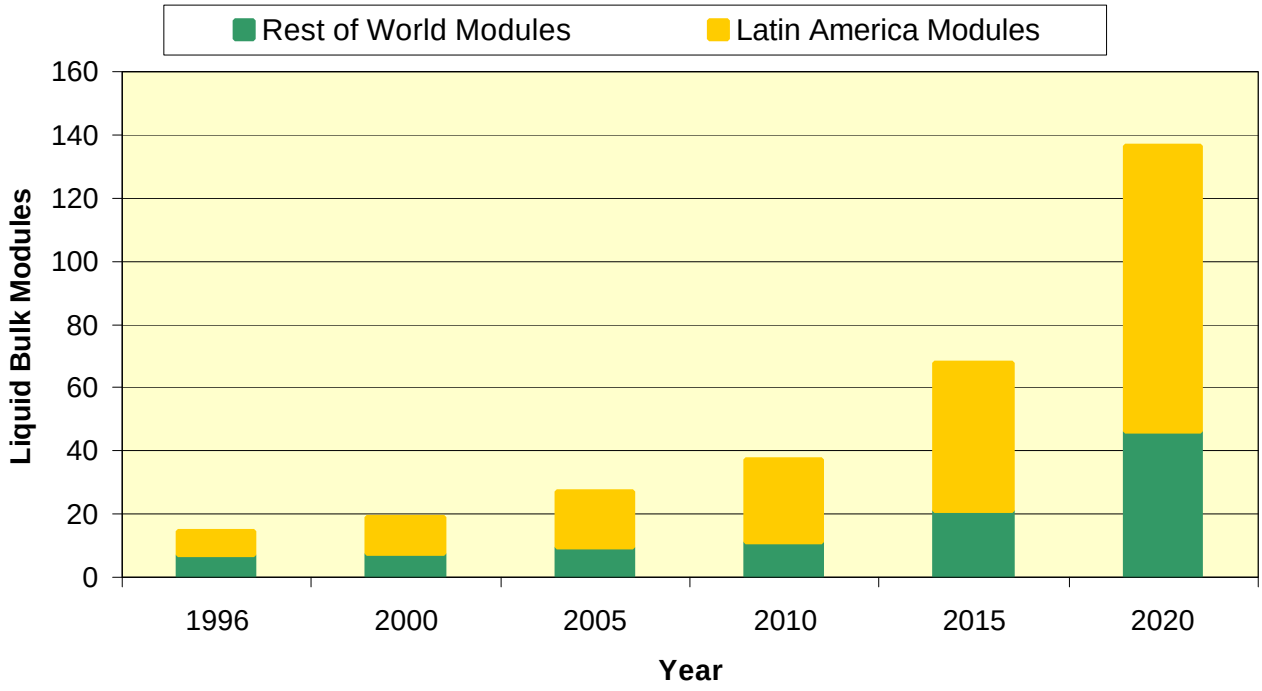
Exhibit D1-16
LATTS REGION ESTIMATED DRY BULK INFRASTRUCTURE NEED



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

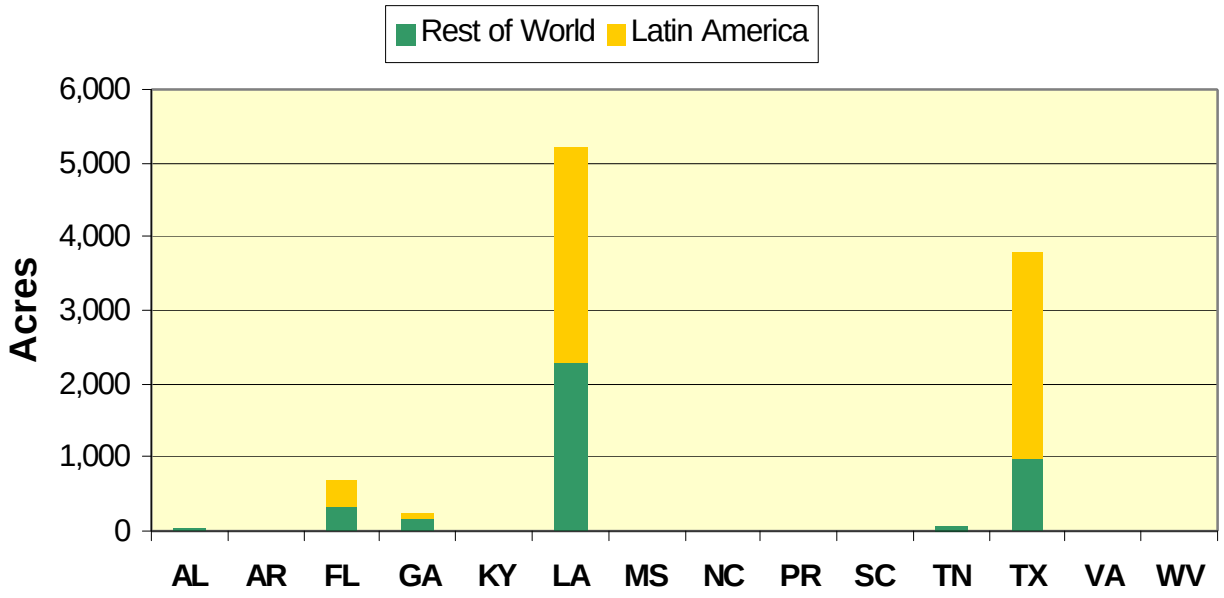
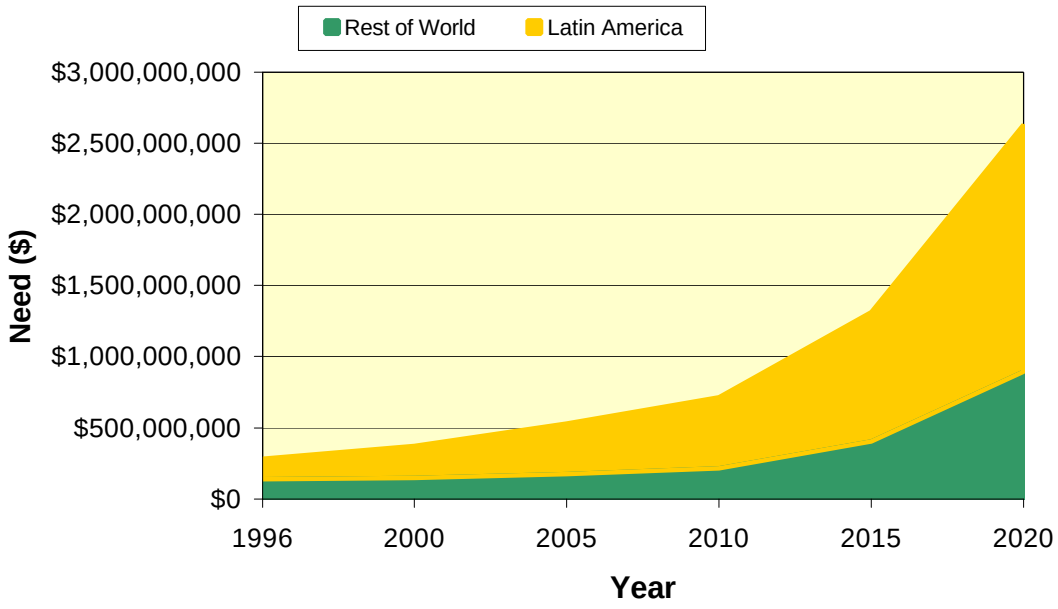


Exhibit D1-19
LATTS REGION ESTIMATED LIQUID BULK INFRASTRUCTURE NEED



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.

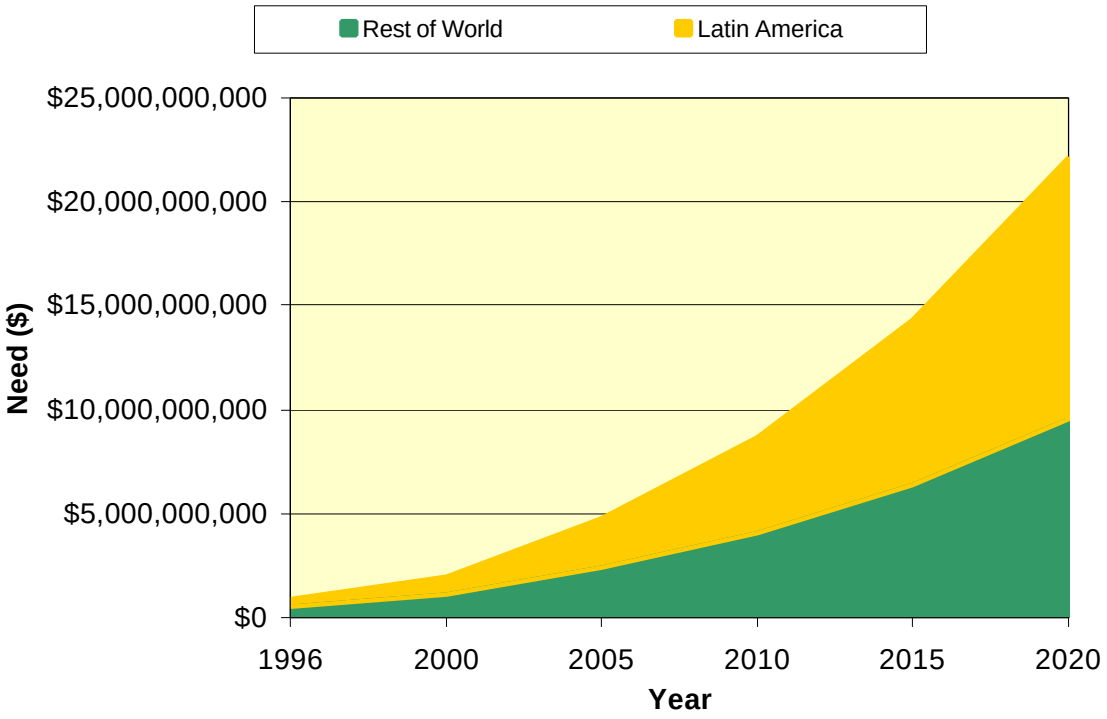
Exhibit D1-20
TOTAL LATTS REGION PORT NEEDS SUMMARY

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



SECTION D2
INVESTMENT NEEDS FOR THE LATTS STRATEGIC AIRPORT SYSTEM

The Alliance Region is the dominant air gateway to Latin America, and accommodates over 80 percent of Latin American air cargo trade (export and import) for the U.S. Much of this is due to the proximity of the Region to Latin America and the existence of major international gateway facilities.

Investment needs for the LATTS Strategic Airports were based on the estimated forecast increase in air cargo tonnage for LATTS Strategic Airports, with specific emphasis on the need for facilities to accommodate Latin American air cargo.

BASELINE FREIGHT VOLUMES

The initial element of the investment needs analysis was the establishment of the baseline year (1996) cargo tonnage and facilities usage for the LATTS Strategic Airports. A determination of total air cargo tonnage (international, Latin American, domestic, and mail) by state was developed. Domestic cargo and mail tonnage was obtained from Airports Council International. Total international air cargo tonnage was derived by using ACI or DRI International data, whichever was larger. Since the DRI data is for freight only and excludes mail and express, this approach was used to derive an international estimate that is more inclusive of other freight sectors.

Latin American air cargo tonnage was derived by determining the ratio between DRI Latin American tonnages versus DRI International flows, and applying that ratio to the derived total international air cargo tonnage. This approach resulted in a Latin American estimate that is inclusive of all freight sectors (even those not reported by DRI). LATTS Strategic Airports System 1996 air cargo tonnage by state for derived international and derived Latin American air cargo are shown in **Exhibit D2-1**.

These data clearly show that Florida is the dominant Latin American (and U.S.) state gateway. Florida handles over 90 percent of the Southeast Alliance Region's airborne gateway Latin American trade. Much of this is due to Miami-Dade County's cultural and socioeconomic ties with Latin America and the proximity of Miami International Airport to Latin American markets.

BASELINE CARGO BUILDINGS

An inventory of baseline year cargo building facilities in the Alliance Region and a determination of baseline year international and Latin American air cargo building utilization was undertaken as part of these analyses. This included a survey of the forty-six existing airports included in LATTS Strategic Airport System. The survey documented existing cargo building area as reported by the airport or as

Exhibit D2-1
BASE YEAR INTERNATIONAL AND LATIN AMERICA AIR CARGO DATA

Alliance Member	1996 International Tonnage	1996 Latin American Tonnage
Alabama	14,358	297
Arkansas	216	1
Florida	1,383,214	1,218,345
Georgia	163,917	8,030
Kentucky	15,980	270
Louisiana	2,539	0
Mississippi	0	0
North Carolina	52,266	7,382
Puerto Rico	36,515	20,311
South Carolina	11,292	905
Tennessee	124,585	15,144
Texas	191,396	23,089
Virginia	34,629	835
West Virginia	10,305	1,206
Totals	**2,041,211**	**1,295,814**

SOURCE: DRI-McGraw Hill and ACI.

identified in airport master plans. A cargo building utilization rate was determined for each state's air cargo facilities by dividing reported cargo building area by estimated annual airfreight tonnage.

Exhibit D2-2 depicts 1996 cargo building area and utilization rates by state. For planning study purposes, a rate of 1.5 square feet of building area per ton of annual airfreight is generally used to assess adequacy of air cargo facilities. This utilization rate is based on an average utilization rate at major U.S. airports. Graphic depictions by state of total baseline cargo building square feet and estimated domestic and international cargo building utilization are shown in **Exhibits D2-3** and **D2-4**.

Air cargo forecasts for the Alliance Region for the forecast year 2020 were developed using the DRI forecasts produced as part of the LATTS study. In addition, a control total for total (international and domestic) 2020 air cargo traffic through the Alliance was derived by applying a growth rate to the I996 ACI estimate. An average annual growth rate of 5.9% was used. This is based on published air cargo industry forecasts such as the Airbus Global Market Forecast (1999). Based on this, air cargo is expected to grow from a 1996 base of 9.4 million tons to over 35 million tons in 2020, an increase of 26 million tons. Of that, approximately 6 million tons is expected to be international air cargo, over half (3.7 million) of which is expected to be Latin American air cargo.

Exhibits D2-5 and **D2-6** depict the international and Latin American air cargo tonnage forecast by state for 2020. **Exhibits D2-7** and **D2-8** graphically illustrate the significant increase in air cargo for the Alliance by 2020 for both domestic and international air cargo tonnage.

Exhibit D2-2
CARGO BUILDING AREA UTILIZATION RATE BY STATE

ALLIANCE Member	1996 Cargo Building Area	1996 Cargo Utilization Rate
Alabama	302,145	4.2
Arkansas	38,280	1.9
Florida	5,090,805	2.2
Georgia	1,500,000	1.9
Kentucky	2,387,901	1.4
Louisiana	311,875	3.9
Mississippi	47,000	0.7
North Carolina	818,763	1.9
Puerto Rico	693,850	1.9
South Carolina	142,106	0.9
Tennessee	4,635,046	2.3
Texas	2,582,320	1.9
Virginia	197,475	1.5
West Virginia	N/A	N/A
Totals	**18,747,568**	**2.0**

Exhibit D2-3
AIR CARGO BUILDING SPACE, BY STATE

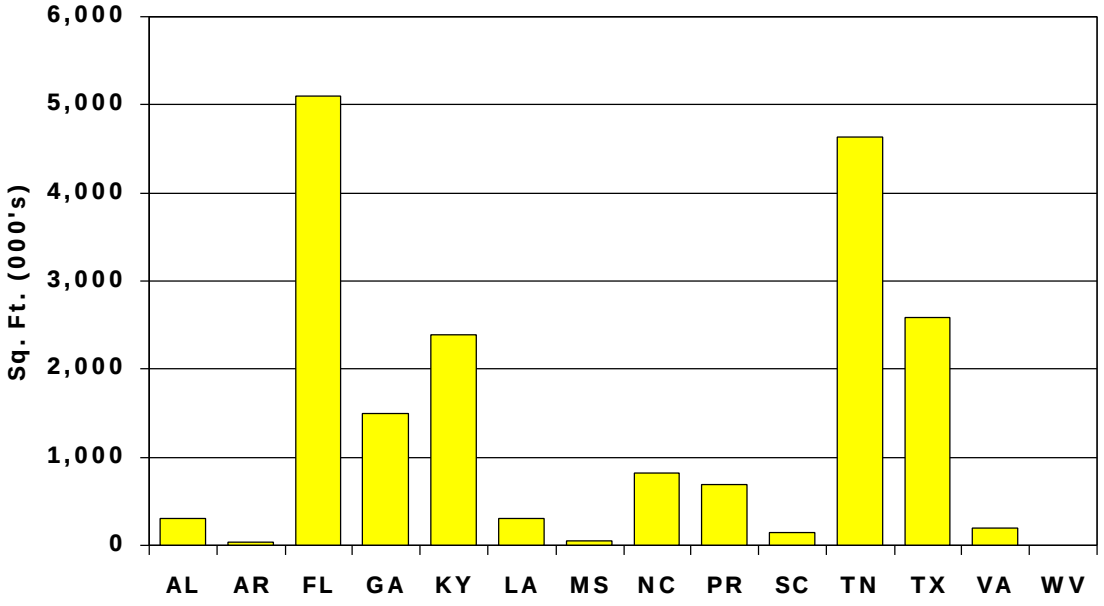


Exhibit D2-4
UTILIZATION OF EXISTING AIR CARGO BUILDING SPACE, BY STATE

AIR CARGO FORECASTS

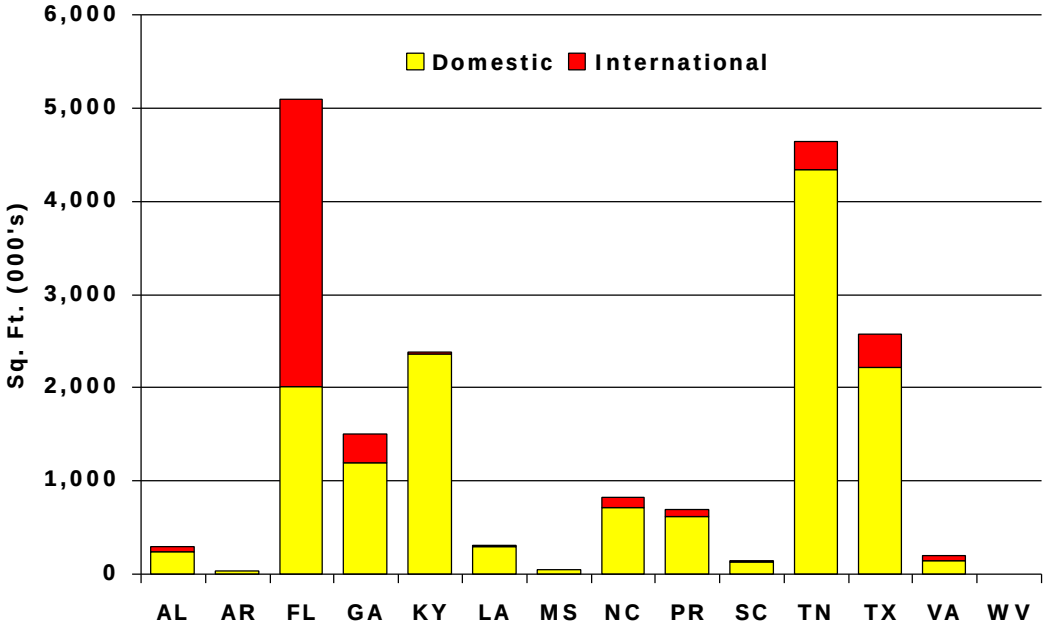


Exhibit D2-5
INTERNATIONAL AND LATIN AMERICAN AIR CARGO FORECAST FOR THE ALLIANCE REGION

Alliance Member	2020 International Tonnage	2020 Latin American Tonnage
Alabama	44,828	1,079
Arkansas	1,069	2
Florida	3,781,959	3,404,615
Georgia	672,713	36,626
Kentucky	11,908	424
Louisiana	0	0
Mississippi	0	0
North Carolina	259,621	43,334
Puerto Rico	140,492	75,977
South Carolina	55,323	4,120
Tennessee	532,044	78,655
Texas	568,347	75,742
Virginia	130,942	4,136
West Virginia	52,008	7,806
Totals	**6,251,253**	**3,732,515**

SOURCE: Derived from DRI-McGraw Hill and ACI data.

Exhibit D2-6
2020 TONNAGE BY STATE, DOMESTIC AND INTERNATIONAL

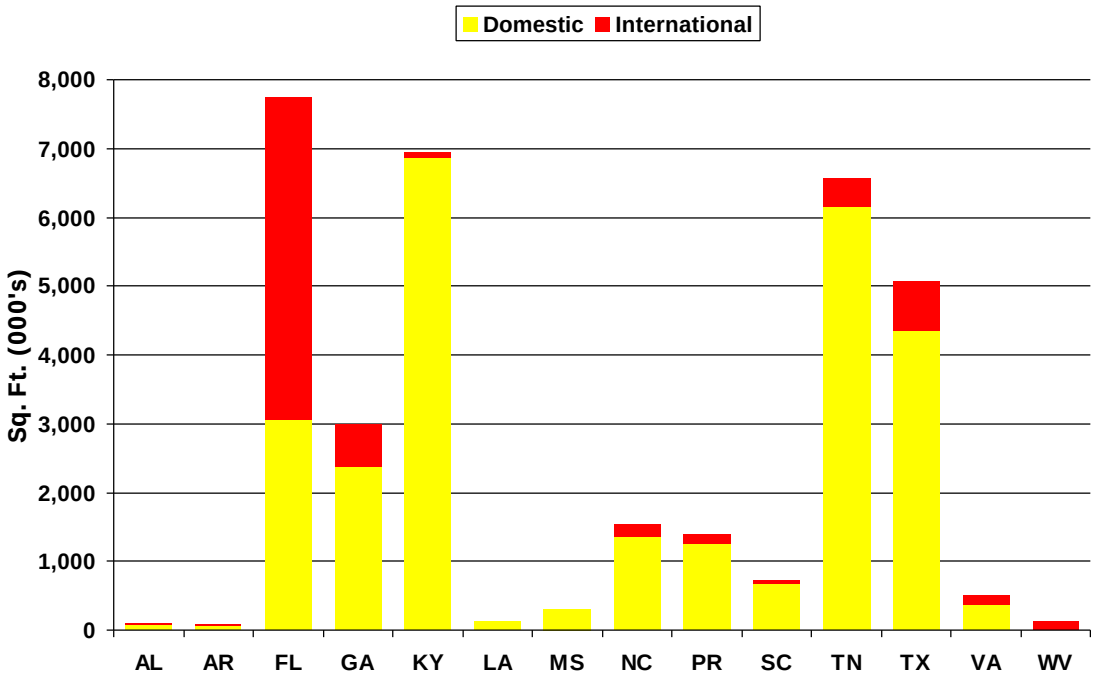


Exhibit D2-7
EXPECTED INCREASE IN TOTAL AIR CARGO TONNAGE THROUGH THE ALLIANCE

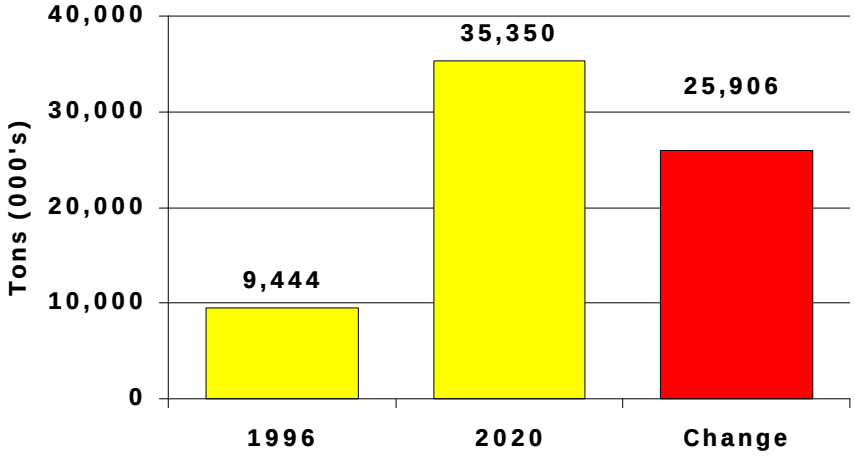
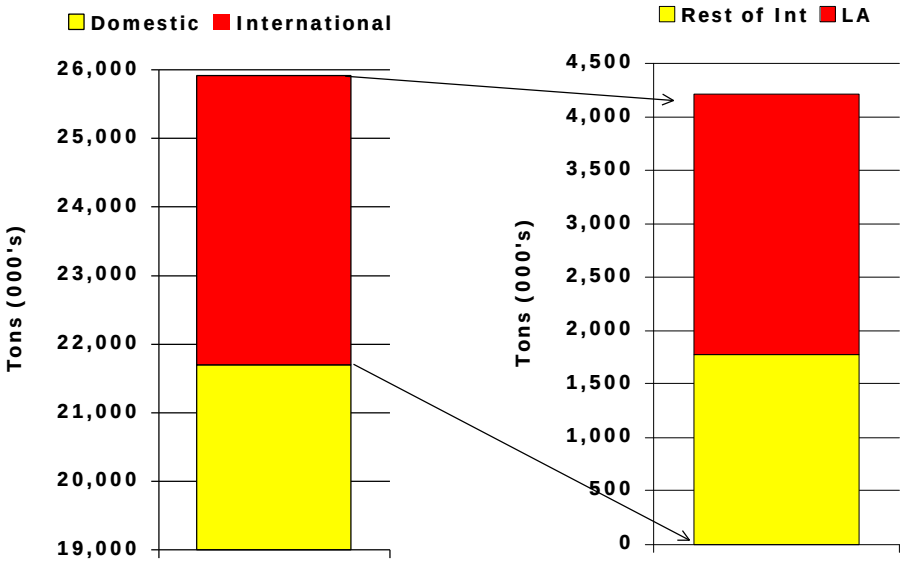


Exhibit D2-8
LATIN AMERICAN PORTION OF ALLIANCE AIR CARGO TRAFFIC GROWTH



It is important to note that the individual state forecasts are based on 1996 shares among the member states. Moreover, the forecasts do not reflect any future constraints that may develop. Therefore, these forecasts do not account for potential shifts among states due to market changes, capacity constraints, or any other reason. These forecasts were used as a basis to compute future capacity needs for the Region as a whole. Actual apportionment of future capacity investment among the member states is dependent on individual state efforts to capture a share of future capacity improvements and market.

ADDITIONAL CARGO BUILDING REQUIREMENTS

The investment needs assessment analysis determined 2020 cargo building area requirements by state. As previously noted, a cargo building utilization of 1.5 square feet per ton of annual airfreight was used for general planning purposes. Total cargo tonnage forecast for 2020 was multiplied by 1.5 to arrive at the amount of cargo building area needed. Existing 1996 cargo building area was then subtracted from this amount to determine the need for new cargo building square footage. The 2020-need analysis for new cargo building area for the Alliance Region and by state is presented in **Exhibits D2-9**, **D2-10** and **D2-11**.

Exhibit D2-9
2020 ESTIMATED CARGO BUILDING AREA NEEDS

Alliance Member	2020 Total Cargo Building Area	2020 New Cargo Building Area Needed
Alabama	405,687	103,542
Arkansas	115,172	76,892
Florida	12,837,581	7,746,776
Georgia	4,490,313	2,990,313
Kentucky	9,334,480	6,946,579
Louisiana	446,520	134,645
Mississippi	352,458	305,458
North Carolina	2,374,196	1,555,433
Puerto Rico	2,082,095	1,388,245
South Carolina	870,246	728,140
Tennessee	11,205,448	6,570,402
Texas	7,659,132	5,076,812
Virginia	716,165	518,690
West Virginia	135,802	135,802
Totals	**53,025,294**	**34,277,726**

Exhibit D2-10
CHANGE IN CARGO BUILDING NEEDS FOR THE ALLIANCE REGION

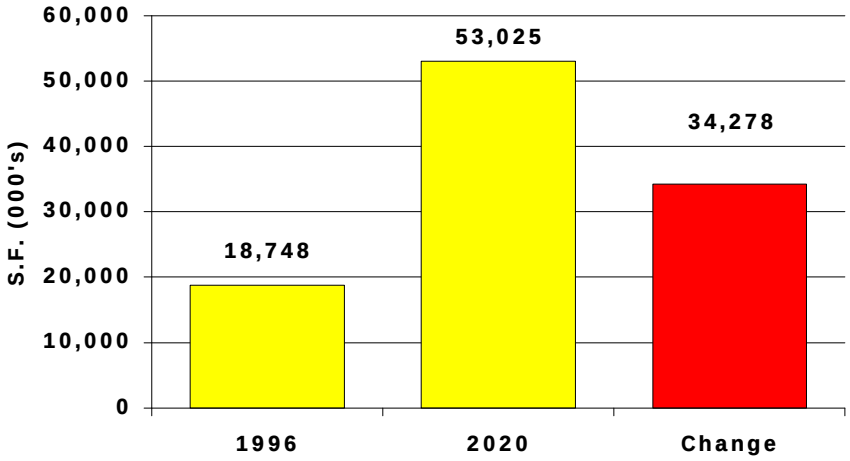
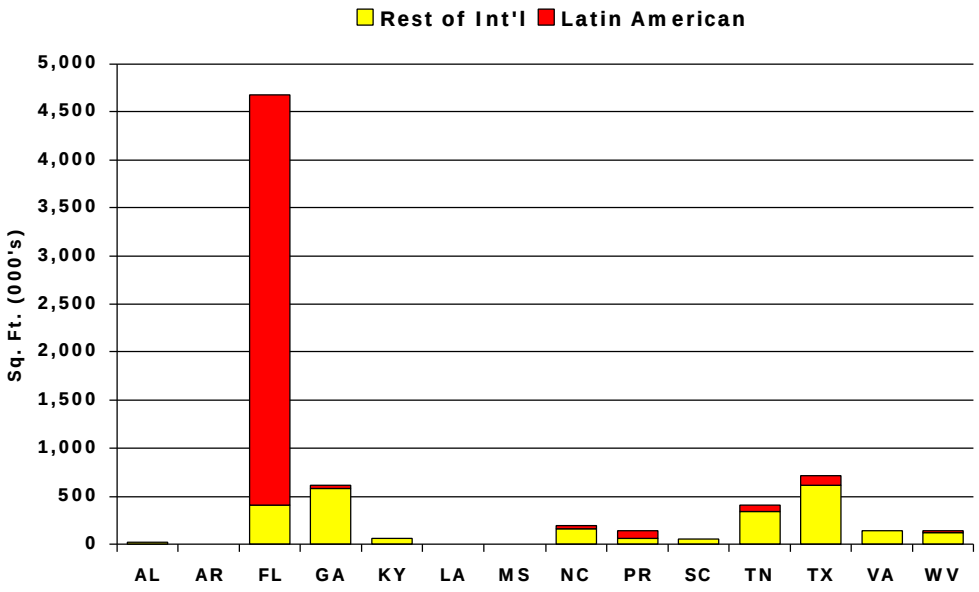


Exhibit D2-11
2020 BUILDING NEEDS BY STATE, INTERNATIONAL AND LATIN AMERICA



CARGO RAMP AND APRON AREA REQUIREMENTS

New air cargo ramp/apron area that would be needed also was estimated. This estimate was based on new building square footage and aircraft parking/maneuvering requirements. One aircraft parking position per 45,000 square feet of new cargo building area was used to estimate new air cargo ramp/apron areas. Ramp/apron area determinations were based on an adequate parking position/maneuvering area for a Boeing 767-300 freighter, which equates to 8,000 square yards of apron/ramp area. This aircraft parking position area would provide sufficient apron/ramp area for a mix of smaller or larger cargo aircraft. **Exhibit D2-12** depicts the amount of new apron/ramp area required by state by the year 2020.

INFRASTRUCTURE NEEDS COST ESTIMATE

As a final component of the needs analyses, an estimate of infrastructure costs for new cargo building and ramp area was developed. New cargo building costs were based on $80 per square foot. New ramp/apron area was based on $90 per square yard. New cargo building costs for the Alliance Region were estimated to be approximately $2.74 billion dollars. New ramp/apron area costs for the Alliance Region were estimated to be approximately $548 million dollars. **Exhibits D2-13**, **D2-14**, and **D2-15** portray 2020 air cargo infrastructure costs for each state.

In summary, overall total air cargo building square footage in the Alliance will need to increase by an approximate factor of 3 to accommodate projected total 2020 air cargo tonnage. A conservative estimate of $3.2 billion dollars will be needed to fund this infrastructure.

Exhibit D2-12
2020 CARGO APRON NEEDS, ALL CARGO

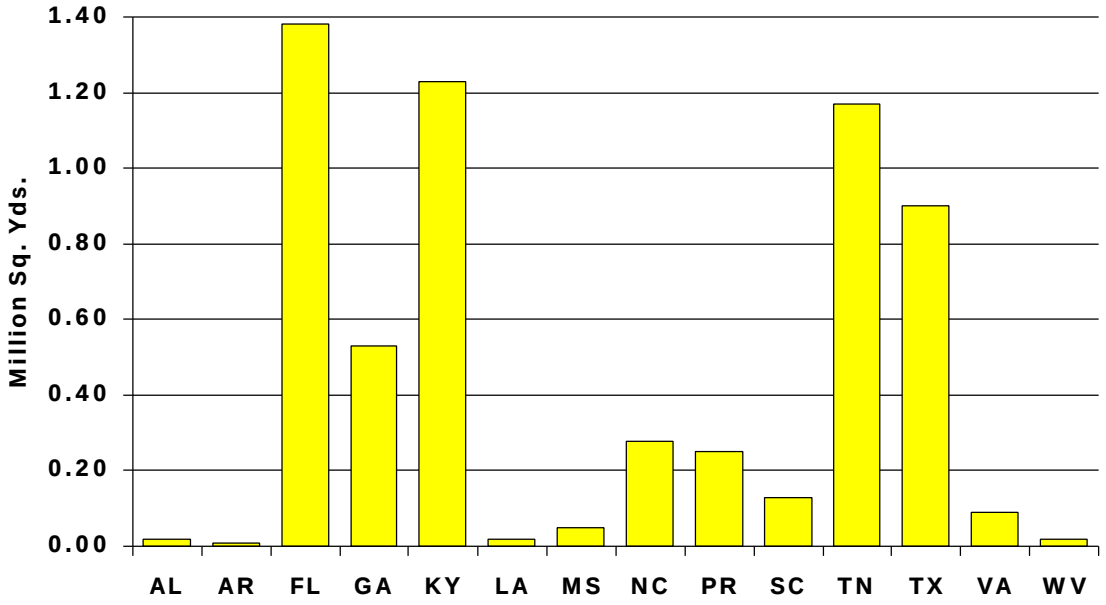


Exhibit D2-13
2020 AIR CARGO INFRASTRUCTURE COSTS – NEW CARGO BUILDING & RAMP SPACE

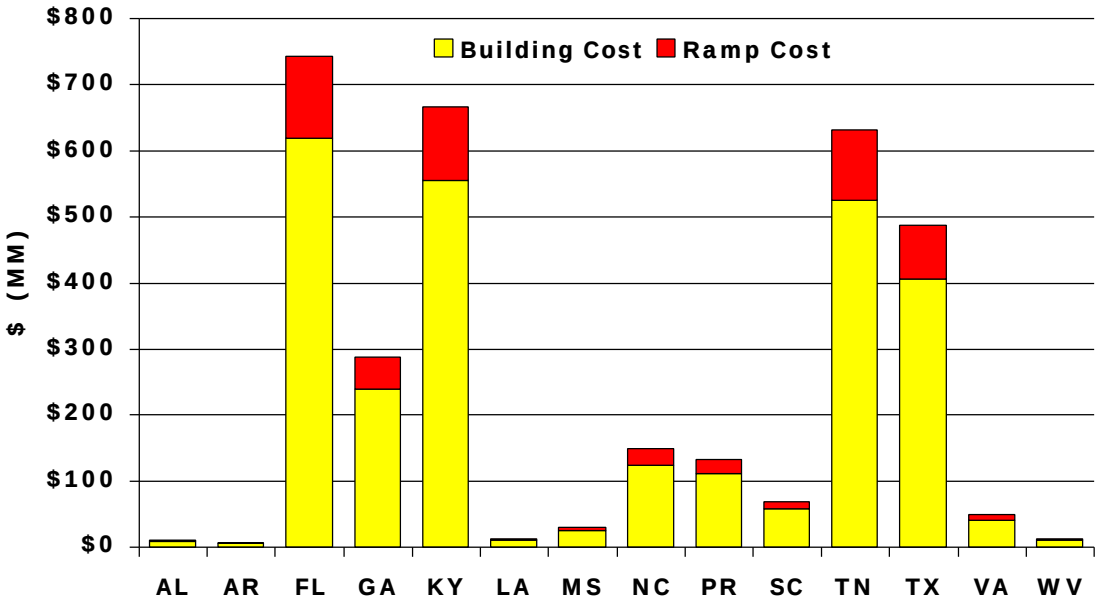


Exhibit D2-14
2020 AIR CARGO INFRASTRUCTURE COSTS – DOMESTIC AND INTERNATIONAL

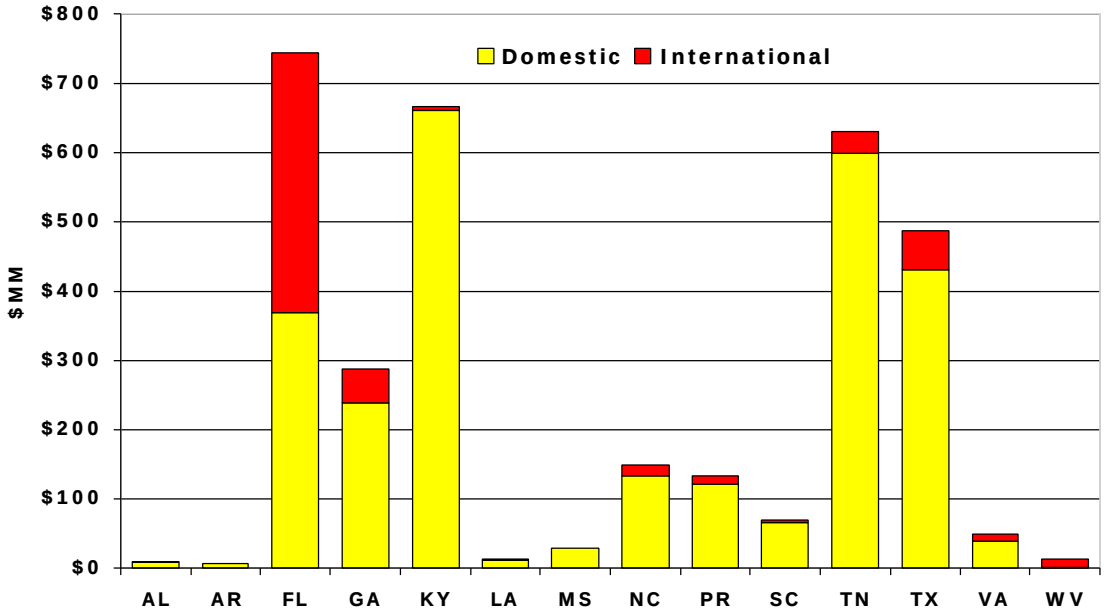
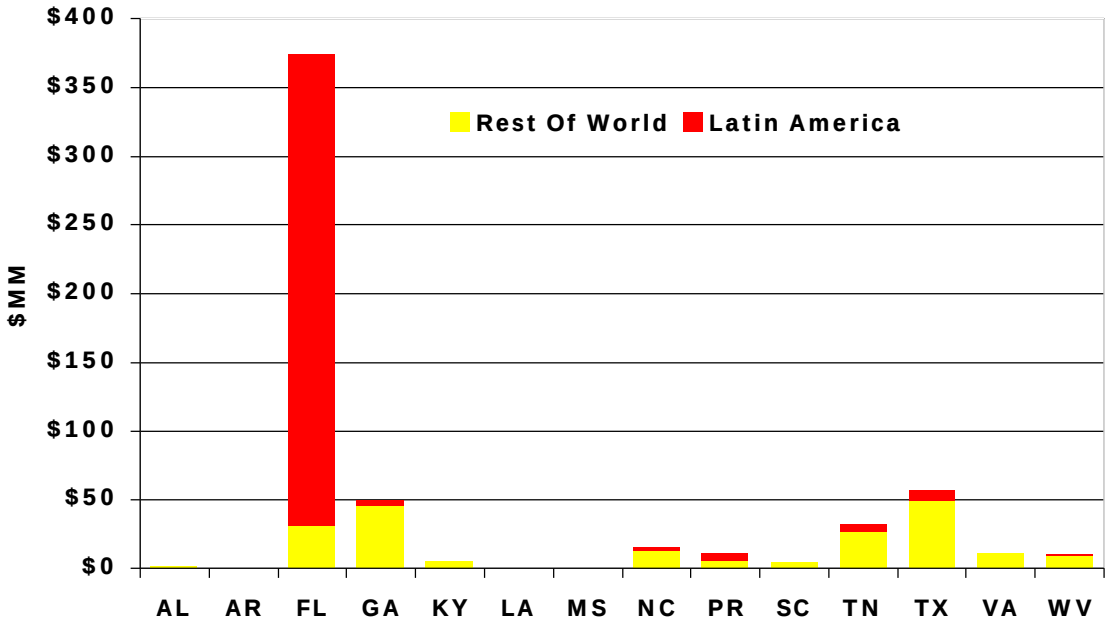


Exhibit D2-15
2020 AIR CARGO INFRASTRUCTURE COSTS – INTERNATIONAL AND LATIN AMERICA



SECTION D3
INVESTMENT NEEDS FOR THE LATTS STRATEGIC HIGHWAY SYSTEM

OVERVIEW

This report section has two parts (a) the LATTS Strategic (Mainline) Highway System, and (b) the LATTS Highway Connectors (i.e., facilities which link a LATTS Strategic Highway with a LATTS airport or waterport). Beyond the anticipated overall growth in traffic, the analysis addressed the additional impact of projected LATTS traffic. A statistical analysis model was utilized to perform these assessments. The Mainline and Connectors were analyzed for performance and deficiencies (for example, truck operating speed was identified as a major performance measure). The analysis yielded several conclusions which are presented at the end of this report section in more detail. The conclusions identify:

- Type of traffic with the highest growth;
- Investments needed by type of traffic;
- Investments needed by highway type;
- Investments needed by corridor; and
- Investments needed by state.

Some highlights of the significant findings include:

- Truck traffic is projected to grow at a greater rate than all other traffic types;
- Truck traffic will require significant highway investments in capacity and pavement rehabilitation;
- Interstate highways were identified as the type of highway having the greatest projected need for capacity improvements;
- Corridor 14 (I-10 from West Texas to Jacksonville, FL) was identified as the LATTS corridor with the greatest projected needs for highway investment; and
- Texas is projected to be the Alliance member with the highest investment need.

LATTS STRATEGIC HIGHWAY NETWORK

Section C of this report describes the criteria and process that was used to identify mainline highways which are of the greatest significance to Latin American trade flows. Section C also identifies the Strategic Highway System that emerged from those analyses.

In this report section, the process and results of the analyses conducted to determine investment needs of these mainline facilities are presented. The presentation is organized as follows:

- Network Database
- Truck Traffic
- Needs Categories
- Capacity Analysis
- Pavement Analysis
- Operating Speeds

Network Database

For purposes of these analyses it was necessary to compile a database which described the main features of the Strategic Highway Network. A principal consideration was to develop a database that was consistent for all of the more than 22,000 miles of highways comprising the LATTS Strategic Highway System. It was also recognized that gathering new data on a timely basis from 13 different States and Puerto Rico would be difficult. Accordingly, it was determined that the source of data for the strategic network would come from an existing database--the Highway Performance Monitoring System (HPMS) database.

The HPMS is the nation's highway database, maintained by the FHWA, using data supplied by the states, and updated on a regular basis. The HPMS was developed to replace a series of random-needs studies conducted by the FHWA for the U.S. Congress. Among other things, the HPMS data can be used to:

- Calculate performance characteristics
- Model traffic growth and pavement deterioration
- Calculate capacity and congestion
- Estimate capital needs by functional classification and category over time

In fact, HPMS is used by the federal government to compute the apportionment of some federal highway funding authorized by TEA-21. Because of the familiarity of Alliance members with HPMS and the consistency in format and information it provides, the LATTS investment needs evaluation was based upon data and processes from the HPMS, modified for use in the LATTS analyses.

As part of the HPMS database, the states report certain information to FHWA for every segment of highway and roadway open to the public. For example, the states report mileage, average annual daily traffic (AADT), route number, jurisdiction, functional classification, number of lanes and pavement condition. In addition, the states report additional information for a statistically valid sample of roadway sections by functional classification and volume group. The highway sections with additional information are called *sample segments* as opposed to the former segments called *universe segments.* The additional data required for the *sample segments* include detailed pavement information, geometric data, traffic/capacity data, and environmental data. The FHWA asks the states to update the HPMS data every year. Not every item is updated every year but

items which can change quickly, like traffic volume and pavement condition, are updated more frequently than other data items.

Higher-order routes, such as interstates, typically have 40 to 60 percent of their mileage sampled by the HPMS. The sample rate decreases as the functional classification drops in importance. Not every route in a state is necessarily sampled for the HPMS. The random nature of selecting sample sections ensures representation of like routes with like traffic volumes, but there is no requirement that every route be sampled. Many states prefer to sample their routes at rates higher than the FHWA minimum, especially on interstates and on the NHS. The number of states with 100 percent representation on higher-order functional classes in the HPMS is growing. This is because more states have come to appreciate and use some of the supporting HPMS analytical software provided by the FHWA to help quantify investment needs over time.

The 1997 HPMS database was obtained from the FHWA and used in this study because it was the latest HPMS database available at the time it was needed. First, the records for the 13 LATTS states and Puerto Rico were extracted. The database was reduced further by identifying and keeping only those highway records that represented a segment of highway belonging to the LATTS strategic network. During this process, the corridor number to which each highway was assigned was affixed to each record. In all, 19,423 HPMS records were identified and selected for further analysis.

The LATTS HPMS database consists of 6,540 sample records (34 percent) and 12,883 universe records (66 percent). Most needs studies ignore universe records and only use sample records by appending an expansion factor to each sample record to estimate total needs. This method ignores all of the specific segment information contained on the universe records. Also, with such an approach, one database record can correspond to a portion of many highway segments scattered all over the state, rather than to one cohesive segment of highway. For this study, which analyzed needs in limited categories, all records for both the universe and samples were used.

Data items needed for the analyses but not available on the universe records were defaulted, based on the sample records for the same route and the same functional classification within each state. For example, highway capacity was required for some of the analyses but is not available on universe records. For example, capacity for a universe record representing a rural segment of I-95 in Florida was estimated. The estimate was based on the number of lanes on that segment and an average capacity per lane, calculated from all sample segments in Florida representing the rural portion of I-95.

Where insufficient sample segments were available for a specific route and functional classification, a statewide average default value by functional class was used. With this approach, critical data such as AADT and number of lanes available on all records were used. In addition, with this approach, an equivalency between physical highway segments and database records was

maintained. This last feature was important to match LATTS' River Of Trade truck volumes and highway segments.

The LATTS HPMS database only includes information for existing (1997) highways. A number of existing highways in the Alliance Region are planned to be upgraded to higher standard roadways as part of the ISTEA/TEA-21 High Priority Corridors (from major arterial to interstate standards, for example). New highways, such as I-69, are also planned but not built yet. These highways, and their potential impact on existing facilities, were not included in the estimation of investment needs (diverted traffic).

The information in the HPMS database may differ from information in other databases. For purposes of consistency, the LATTS analyses used only the information in the HPMS database and did not attempt reconciliation with other databases.

Truck Traffic

Analyses were undertaken to estimate the volume of truck flows associated with Latin American trade that would use the LATTS Strategic Highway System. Additional analyses were performed to quantify LATTS truck traffic in terms of annual vehicle miles of travel and to relate LATTS truck traffic to total trade truck traffic on the Strategic Highway System.

Latin America Trade Flows

As explained in a previous section of this report, 1996 and expected 2020 trade volumes with Latin America were estimated. The portion of this trade that would be transported using highway facilities was translated into truck flows. These truck flows were then assigned to specific highway facilities using GIS generated shortest time paths. The resulting truck traffic from both cross-border and intermodal traffic is shown in **Exhibit D3-1** for 1996 and **Exhibit D3-2** for 2020. **Exhibit D3-3** shows the change in Latin American truck traffic between 1996 and 2020.

As illustrated in these two maps, LATTS truck traffic is much higher in some corridors than in others. Some of the corridors with the heaviest truck traffic include:

- I-10 corridor through Texas, Louisiana, Florida, Alabama and Mississippi;
- I-35/I-37 corridor in Texas; and,
- I-95 from Florida to Washington, D.C.

Other corridors which also have significant truck traffic include:

- I-59/I-81 from Mississippi to the northeast;
- I-20/I-30/I-40 through Texas and Arkansas; and,
- I-65/I-85 from Mobile, AL, to Atlanta, GA.

Exhibit D3-1
LATIN AMERICAN TRUCK FLOWS – 1996
Annual Truck Flows

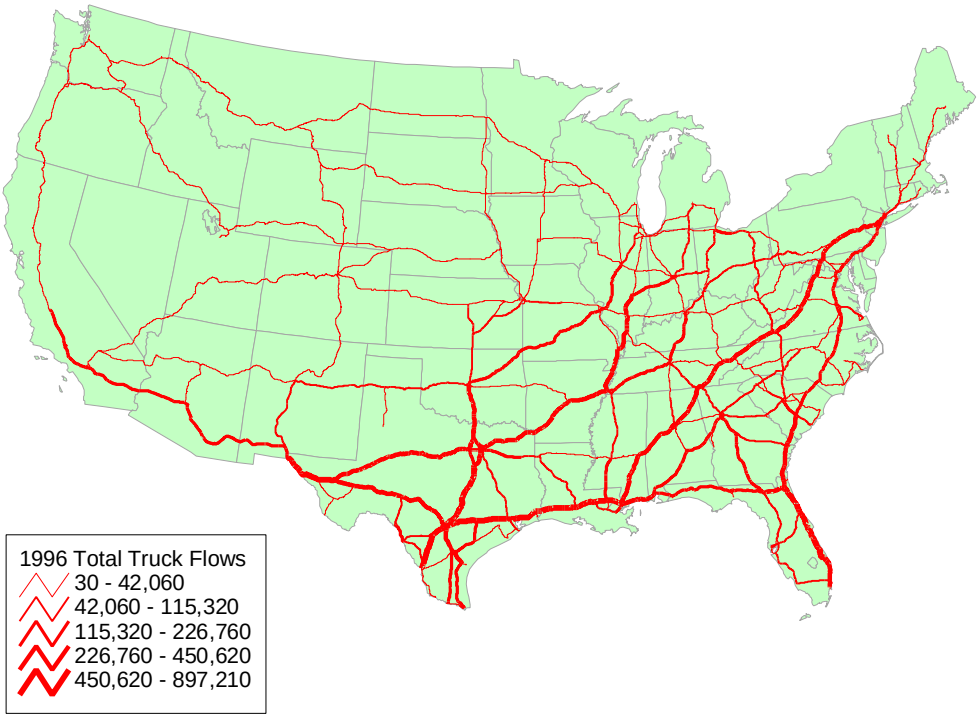


Exhibit D3-2
LATIN AMERICAN TRUCK FLOWS – 2020
Annual Truck Flows

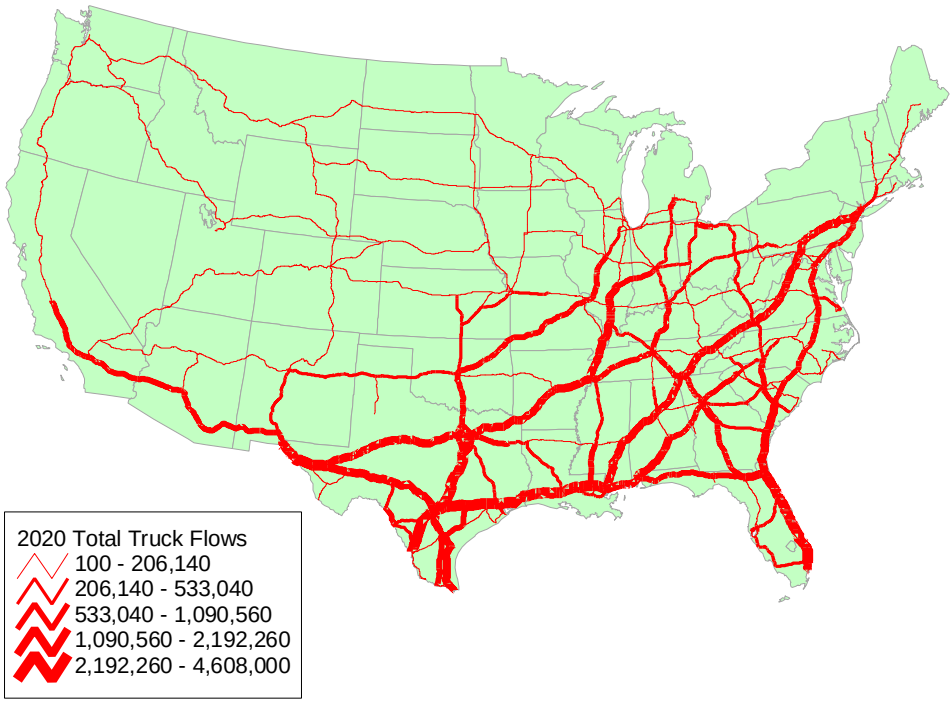
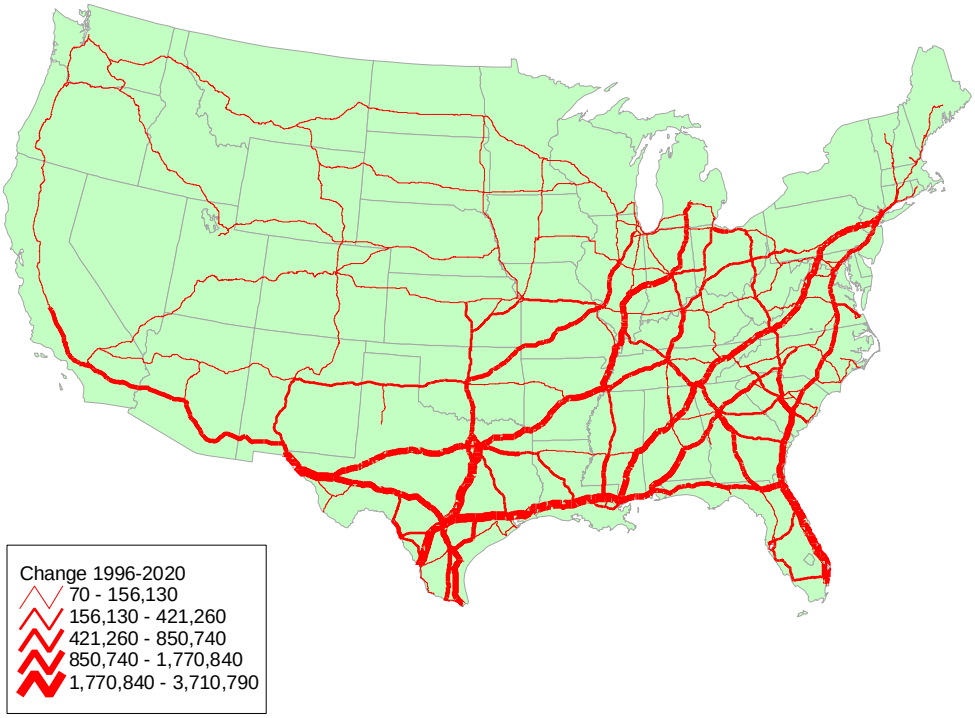


Exhibit D3-3
CHANGE IN LATIN AMERICAN TRUCK FLOWS – BETWEEN 1996 & 2020
Annual Truck Flows



It should be noted that the process sometimes assigns no LATTS traffic to certain portions of the LATTS strategic network. This is because the assignment procedure, which is based on the shortest time path, favors interstates. Further, the selected strategic network includes more routes than are needed to distribute LATTS traffic throughout the Region. Some highway segments in the network, especially among those corresponding to a lower functional classification, have no LATTS traffic assigned, as follows:

- 34 percent (7,729 miles) of the 21,956 miles of highways;
- 7 percent (1,047 miles) of the 14,525 miles of interstate; and
- 90 percent (6,683 miles) of the 7,430 miles of other non-interstate routes.

The network database and results of the LATTS truck flow assignments were combined by appending the LATTS truck traffic by route segment to the corresponding HPMS highway segments. First, 1996 LATTS truck flows were replaced by 1997 flow-through interpolations to make traffic volumes from HPMS and LATTS compatible. The combined two sets of data yielded total traffic on given highway segments (cars and trucks) and that portion of the truck traffic that was Latin American trade specifically.

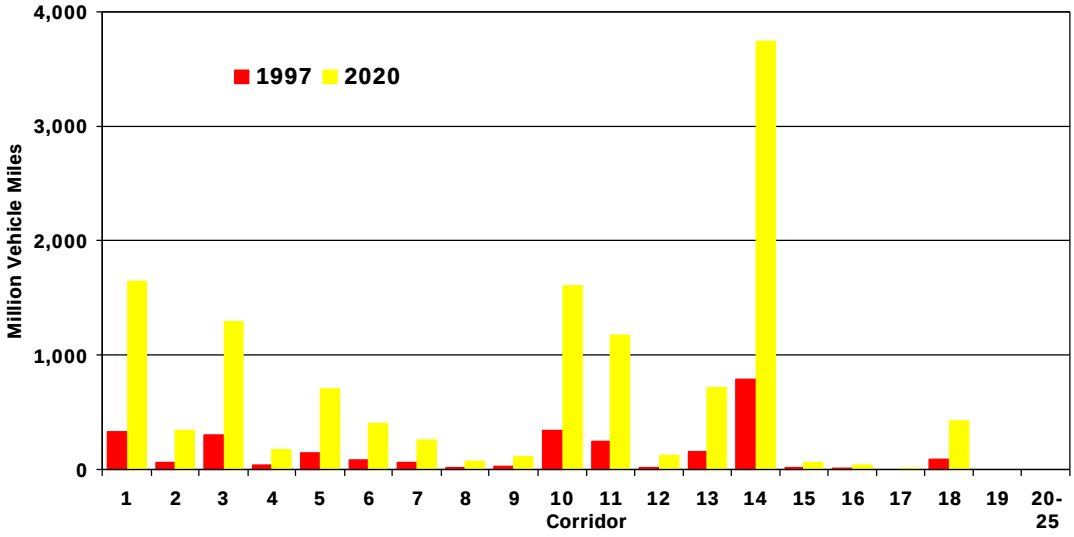
LATTS Trucks Vehicle Miles of Travel (VMT)

Exhibit D3-4 presents the LATTS truck traffic in VMT by corridor for both 1997 and 2020. Some corridors are shown to carry much more LATTS trucks than other corridors:

Corridor 14 (I-10 from West Texas to Jacksonville, FL) will carry more than twice the VMT of any other corridor --3.7 billion LATTS truck miles in 2020;

Corridor 1 (I-95 from South Florida to Washington D.C.) and Corridor 10 (I-3/I-37 from South Texas to the Plains) – 1.6 billion LATTS truck miles in 2020;

Exhibit D3-4
LATTS ANNUAL TRUCK TRAFFIC
By Corridor



- Corridor 3 (I-59/I-81/I-66 from New Orleans, LA to Washington, D.C.) and Corridor 11 (I-40 from North Texas to Wilmington, NC) -- 1 billion LATTS truck miles expected in 2020;

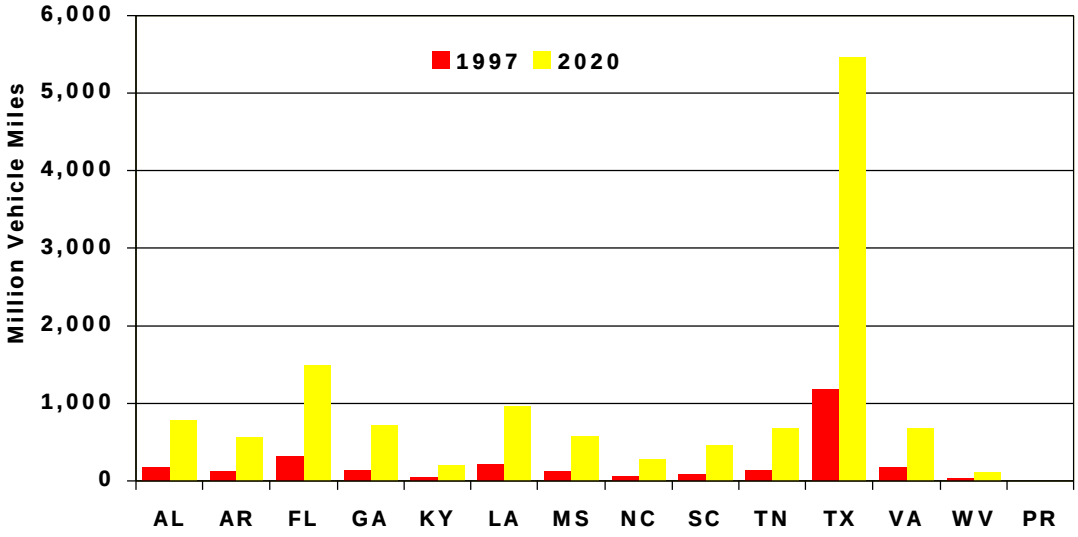
- Corridor 5 (I-75/I-74 from South Florida to Illinois) and Corridor 13 (I-20/U.S. 76 from El Paso, TX to Wilmington NC) both will carry more than 0.7 billion truck miles of LATTS traffic in 2020; and

- Other corridors have less LATTS traffic and Corridors 20 through 25 were assigned no LATTS truck traffic.

Exhibit D3-5 presents LATTS truck traffic by state. Considering that the most heavily LATTS traveled corridor (I-10 from West Texas to Jacksonville, FL) and several other heavily used LATTS corridors pass through Texas, it is not

surprising that Texas is expected to carry a large portion of the total LATTS truck traffic.

Exhibit D3-5
LATTS ANNUAL TRUCK TRAFFIC
By State



Findings by state for most LATTS annual truck miles include:

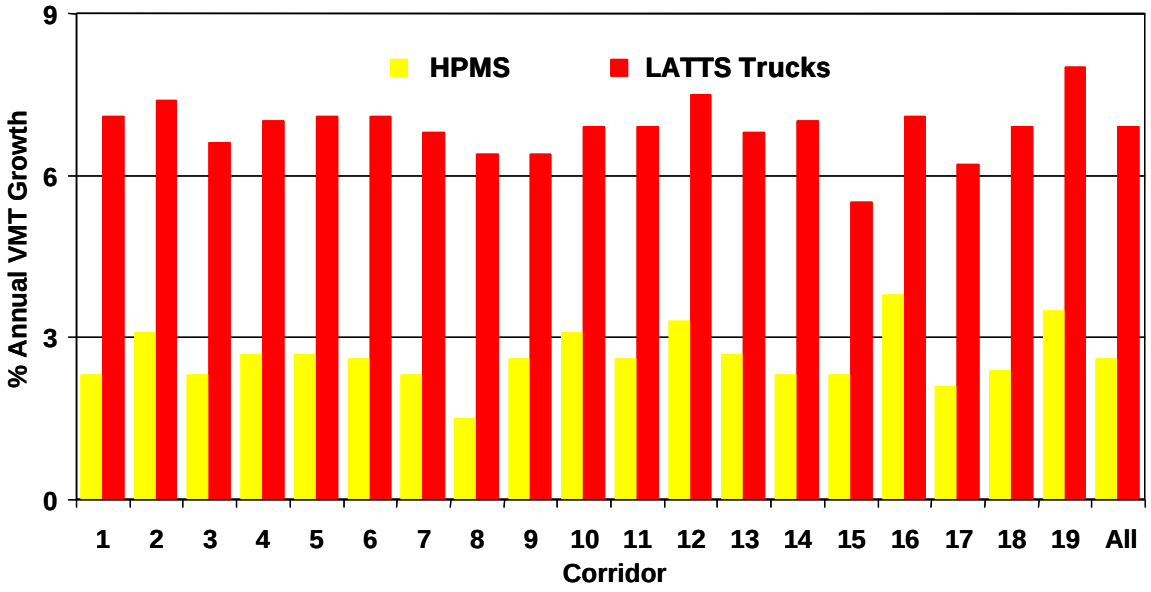
- Texas will carry 42 percent or 5.5 billion LATTS truck miles in 2020 out of 12.9 billion LATTS truck miles for all the states within the Alliance; and,

- Florida (1.5 billion) and Louisiana (nearly 1 billion) are a distant second and third.

Exhibits D3-4 and D3-5 also indicate the tremendous growth in traffic expected from the increased trade with Latin America between 1997 and 2020. Overall, VMT from LATTS will increase nearly five times, from 2.8 billion truck miles in 1997 to 12.9 billion truck miles in 2020. This represents an average annual growth rate of 6.9 percent.

An analyses was performed to compare this expected LATTS traffic growth with the overall growth expected on the strategic network from all sources of traffic. To accomplish this, overall traffic growth on all segments was estimated, based on the 1997 AADT and projected 2020 AADT included in the HPMS database. **Exhibit D3-6** shows, by corridor, expected overall traffic growth compared to LATTS truck traffic growth.

Exhibit D3-6
LATTS TRUCKS versus OTHER TRAFFIC
Average Annual VMT Growth



As shown, truck traffic from LATTS is expected to grow at a much higher annual rate than overall traffic, 6.9 percent versus 2.6 percent. Over the 23-year span, such annual growth will translate into a 365 percent increase for LATTS trucks versus an 80 percent increase for all traffic, according to the information in the HPMS database.

LATTS "Additional" Truck Traffic

The overall "base" growth projected from the HPMS database does not include the expected additional growth in traffic from Latin American trade flows. Whereas the 1997 "base" HPMS traffic included the full LATTS traffic, the 2020 "base" traffic (2020 HPMS traffic) would have only included that portion of LATTS traffic corresponding to the "base" traffic growth. The projection would have only shown LATTS traffic growing at the HPMS 2.6 percent annual rate instead of 6.9 percent annual rate. To fully account for LATTS traffic, the truck traffic and the total traffic on each HPMS highway record was adjusted to reflect this "additional" LATTS truck traffic. The difference in 2020 LATTS truck growing at the "base" rate (overall 2.6 percent annual rate) versus the LATTS growth rate (overall 6.9 percent annual rate) produced the calculated 2020 "additional" LATTS truck traffic. This "additional" truck traffic was added to both the 2020 overall truck traffic and the 2020 total traffic (AADT) for each segment.

Since a main purpose of the LATTS highway investment study was to measure the additional impact of LATTS traffic which is not already anticipated, this "additional" LATTS truck traffic is specifically addressed in the analysis of needs,

capacity and pavement which follow. Needs caused by that portion of LATTS traffic already included in the existing traffic forecast were treated as part of overall needs and were not the focus of this analysis.

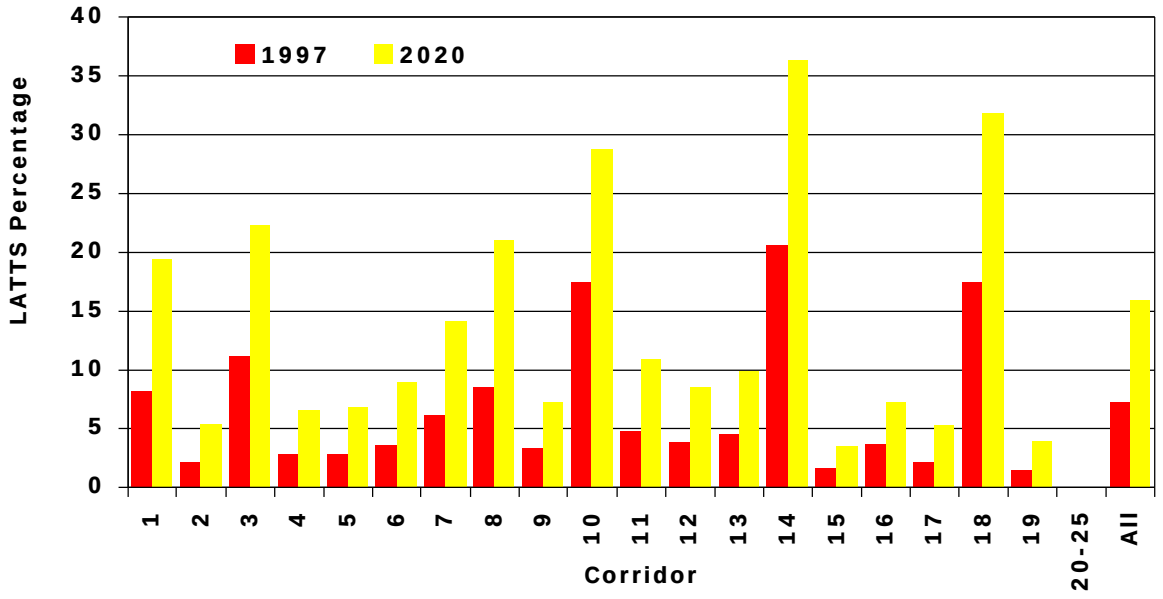
LATTS Share of Total Truck Traffic

Exhibit D3-7 shows, by corridor, the dramatic increase in the LATTS total share of truck traffic. From 1997 to 2020, LATTS overall share of total truck VMT will more than double from 7.3 percent to 15.9 percent. These percentages were calculated using only those highway segments that carry some LATTS traffic.

Comparisons of the expected growth rate of LATTS share of the total truck traffic (Exhibit D3-7) to the projected growth rate only for LATTS traffic (Exhibit D3-4) produced the following observations:

- Corridor 14 (I-10 from West Texas to Jacksonville, FL) will serve a higher share of LATTS traffic than any other corridor;
- The difference with other corridors is not as significant as for total traffic, i.e., the Corridor 14 "spike" is not as pronounced; and
- Corridor 18 (from Laredo, TX to Indianapolis, IN) has the second largest share of LATTS traffic to total truck traffic but only the eighth highest LATTS annual truck traffic.

Exhibit D3-7
LATTS SHARE OF TOTAL TRUCK TRAFFIC
by Corridor



Note: Highway segments not used by LATTS not included.

This indicates that some corridors will be proportionally more affected than others by LATTS traffic regardless of the actual volume. For example, Corridor 14 carries so much traffic from various sources that LATTS traffic will not affect it proportionately as much as might otherwise be expected, considering it will carry 29 percent of all LATTS traffic. Inversely, LATTS traffic on Corridor 18 is much lower by volume but represents a large portion of total traffic on that corridor.

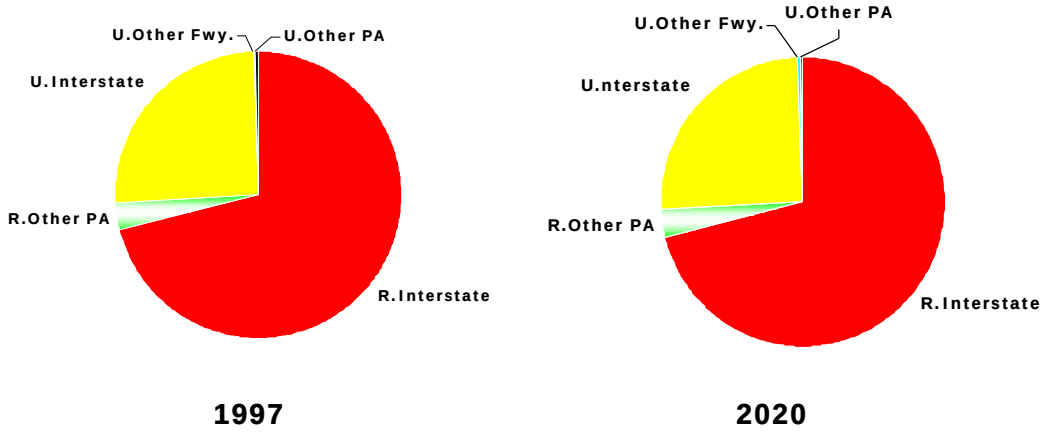
LATTS Traffic by Functional Classification

Exhibit D3-8 shows the distribution of LATTS expected truck traffic by the functional classification of the highway:

- 71 percent of the LATTS traffic will be on Rural Interstate;
- 3 percent will use Rural Other Principal Arterials;
- 25 percent will travel on Urban Interstate; and
- Less than 1 percent will use other urban facilities.

Considering the long distance nature of the LATTS truck traffic once the freight has arrived in the U.S., such a distribution pattern is to be expected.

Exhibit D3-8
LATTS TRUCK TRAFFIC
by Functional Class



NEEDS CATEGORIES

The highway analysis quantified the LATTS strategic network total investment needs as well as the incremental investment needs attributed specifically to LATTS truck traffic. Most highway needs can be organized into four general categories i.e., level of service, geometric, pavement, and maintenance and administration. Because of the unique nature of LATTS and its focus, only two of the four possible needs categories (or impact measures) were used for this study.

- Level of Service Needs – For this study, capacity needs due to LATTS truck traffic were quantified and priced in terms of additional lanes of traffic. As overall traffic from both cars and trucks grows, the amount of congestion on a given highway increases, thereby resulting in lower operating speeds. To maintain an acceptable level of service, additional capacity must be provided. The most direct way to add highway capacity is to add travel lanes. While less expensive measures are available to increase capacity (ITS, Travel Demand Management, etc.) they are less applicable to truck traffic.

- Geometric Needs – Highway geometric deficiencies (lane width, shoulder width, grades and curves) were not considered in this study. While geometrics affect vehicle performance, the geometric deficiencies are not a result of LATTS truck traffic. In addition, because the LATTS strategic highway network consists mostly of interstates and other higher level roadways, geometric needs on these types of highway would be minimal.

- Pavement Needs – Increased resurfacing needs due to LATTS traffic were estimated and priced as part of this study. Pavement condition deteriorates over time and highway must be resurfaced periodically. Since heavy truck traffic greatly affects pavement deterioration rates, LATTS truck traffic will increase the frequency of resurfacing needs.

- Maintenance and Administration Needs – The additional maintenance needs (snow removal, traffic signals, mowing, litter cleanup) due to LATTS truck traffic were considered marginal compared to overall maintenance needs. Consequently, incremental maintenance needs due to LATTS traffic were not estimated.

In summary, capacity needs and pavement resurfacing needs were the two needs categories used in this study.

Methodology

A special methodology was developed to distinguish the needs specifically attributable to LATTS traffic from the needs for traffic other than LATTS (i.e., cars and other trucks). This was done for year 2020 by calculating needs twice:

(1) With the “normal” traffic as defined by HPMS coded AADT, truck percentages, and growth rate; and

(2) With the same HPMS traffic plus the “additional” LATTS truck traffic defined and described earlier.

The differences in values thus derived represented the incremental needs due to LATTS.

Minimum Tolerable Conditions

In order to estimate needs, minimum tolerable conditions (MTCs) were defined. Minimum tolerable conditions represent the lowest acceptable threshold for highway facilities. MTCs are different from design standards, which are the features associated with a new, reconstructed, or rehabilitated roadway. MTCs are used to signal the need for an improvement once an impact measure falls below the minimum. The states represented in the Alliance typically establish unique MTCs to quantify highway needs and set capital improvement priorities in their respective states. For this study, however, it was desirable to establish a set of minimum tolerable conditions that were consistent for all of the Alliance Members. Consequently, the LATTS minimum tolerable conditions are in no way intended to replicate or replace individual state criteria. The LATTS minimum tolerable conditions are presented in the following paragraphs.

Capacity Analysis

Roadway operational deficiencies are manifested as congestion (i.e. too many vehicles trying to travel on a roadway with inadequate capacity). The LATTS deficiency analysis for capacity examines the volume-to-capacity ratio and level of service (LOS) on each highway segment. The LOS is a qualitative expression of operating conditions (congestion) using an alphabetic rating scheme (A to F) as defined below:

- A – free flow (low volumes and high speeds)
- B – stable flow (speed restricted somewhat by volume)
- C – restricted stable flow (lower speed, less maneuverability)
- D – approaching unstable flow (speed considerably affected by changes in operating conditions)
- E – unstable flow (at or near capacity, some stoppages)
- F – forced flow (volumes exceed capacity, slow speeds, frequent stoppages)

For LATTS highway analysis the following minimum tolerable conditions for capacity were used:

- Rural highways: Level of Service C
- Urban highways: Level of Service D

Pavement Analysis

The measure of pavement condition used for this study was the Pavement Serviceability Rating (PSR). PSR is a 0 to 5 value which is reported to the nearest tenth. It is derived from the Pavement Serviceability Index and other condition ratings, and is designed to assess pavement condition as well as roughness. The following exhibit (**Exhibit D3-9**) taken from the HPMS Field Manual depicts PSR ratings.

Exhibit D3-9
PAVEMENT CONDITION RATING

PSR	*Description*
4.0 – 5.0	Only new (or nearly new) superior pavements are likely to be smooth enough and distress free (sufficiently free of cracks and patches) to qualify for this category. Most pavements constructed or resurfaced during the data year would normally be rated in this category.
3.0 – 4.0	Pavements in this category, although not quite as smooth as those described above, give a first class ride and exhibit few, if any, visible signs of surface deterioration. Flexible pavements may be beginning to show evidence of rutting and fine random cracks. Rigid pavements may be beginning to show evidence of slight surface deterioration, such as minor cracks and spalling.
2.0 – 3.0	The riding qualities of pavements in this category are noticeably inferior to those of new pavements, and may be barely tolerable for high-speed traffic. Surface defects of flexible pavements may include rutting, map cracking, and extensive patching. Rigid pavements in this group may have a few joint failures, faulting and/or cracking, and some pumping.
1.0 – 2.0	Pavements in this category have deteriorated to such an extent that they affect the speed of free-flow traffic. Flexible pavement may have large potholes and deep cracks. Distress includes raveling, cracking, rutting and occurs over 50 percent of the surface. Rigid pavement distress includes joint spalling, patching, cracking, scaling and may include pumping and faulting.
0.0 – 1.0	Pavements in this category are in an extremely deteriorated condition. The facility is passable only at reduced speeds, and with considerable ride discomfort. Large potholes and deep cracks exist. Distress occurs over 75 percent or more of the surface.

Source: HPMS Field Manual, 1998.

For the LATTS highway analysis, the following MTCs for pavement condition were used:

- Interstate type facilities: PSR 3.0
- Other facilities: PSR 2.5

Capacity Analysis

A needs analysis model was developed to analyze capacity needs for 1997 and 2020. This model applied the same methodology as found in the HPMS Analytical Package to calculate capacity needs. For the year 2020, capacity needs, with and without the "additional" LATTS traffic, were estimated. The model was applied to each of the 19,423 HPMS records forming the LATTS highway database and the results were summarized. Some important features of the methodology include:

- The existing capacity used in this analyses was the 1997 capacity coded in the HPMS database, based on the 1994 Highway Capacity Manual. The same existing capacity was used for 1997 as for 2020.

- A capacity deficiency was identified when the volume/capacity ratio of a section during peak hour exceeded a threshold value. The threshold value corresponds to the selected minimum LOS criteria for that type of facility.

- Needed additional lanes were calculated to meet the minimum LOS criteria in 2020.

- In pricing the identified capacity needs, the same major widening unit costs were used consistently throughout the Alliance Region. These unit costs were provided by the FHWA and correspond to 1997 national averages. They are presented in **Exhibit D3-10**. To maintain consistency throughout the Region, no attempt was made to tailor these unit costs to each Alliance member beyond the stratification provided by the FHWA.

- Results reflect the information contained in the HPMS database and do not consider any improvements that may have occurred subsequently or any planned improvements.

Exhibit D3-10
MAJOR WIDENING UNIT COSTS

	Rural Interstate			Rural Other Princ. Arterial		
	Flat	**Rolling**	**Mountain**	**Flat**	**Rolling**	**Mountain**
Construction	309	329	418	315	350	670
Right of Way	41	45	73	44	52	78
Total	**350**	**374**	**491**	**359**	**402**	**748**

Costs are in $ 1,000 per finished lane mile.

	Urban Fwy. & Exp.	Urban Other Divided	Urban Undivided
Construction	2,322	1,398	1,117
Right of Way	1,149	776	506
Total	**3,471**	**2,174**	**1,623**

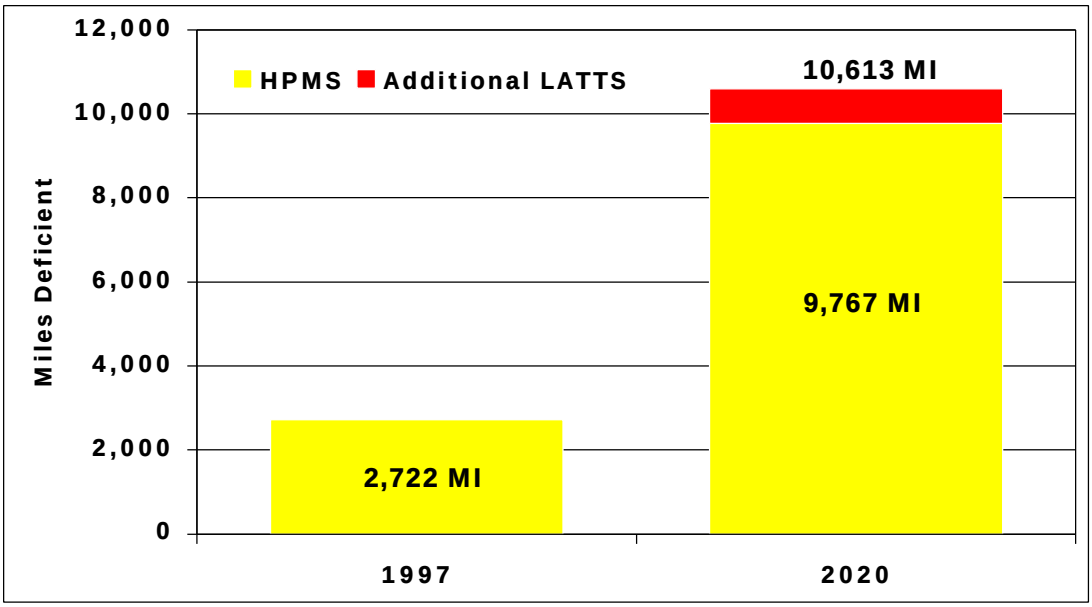
Costs are in $ 1,000 per added lane mile.

Source: FHWA 1997 Unit Cost

Capacity Needs

Exhibit D3-11 portrays projected 1997 and 2020 capacity deficiencies, by miles, for the LATTS strategic highway network. For 2020, the capacity deficiencies, with and without the “additional” LATTS traffic, are shown. Some significant findings include:

Exhibit D3-11
LATTS STRATEGIC HIGHWAY NETWORK
Capacity Deficiencies – Mileage

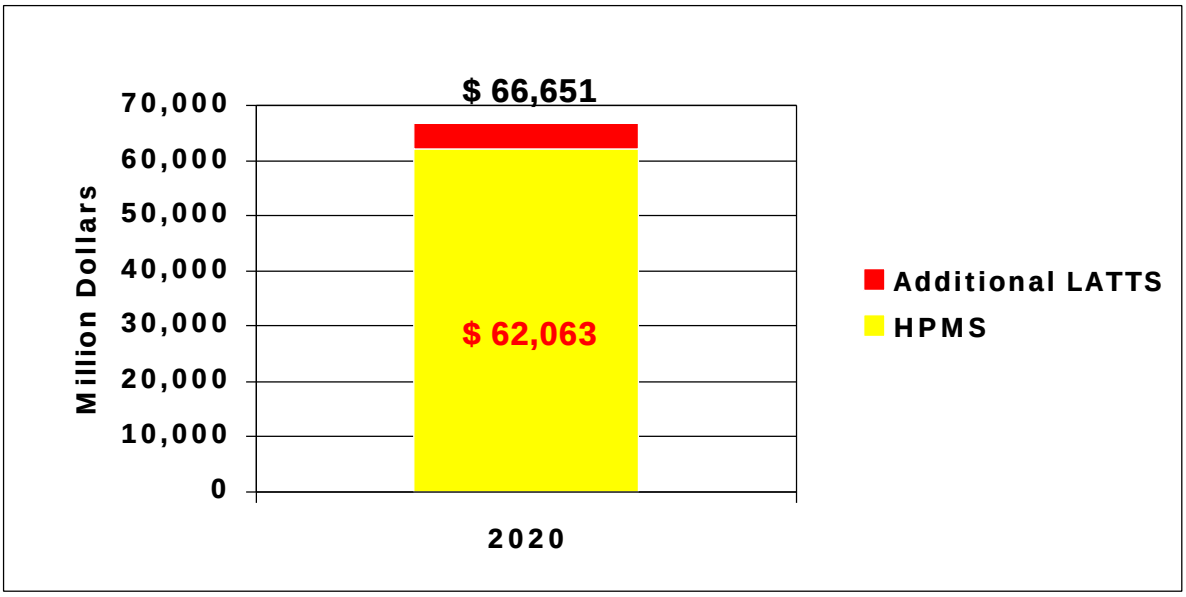


- While 12.4 percent (2,722 miles) of the network has existing capacity problems, the majority of the capacity deficiencies will occur in the next 20 years, unless capacity is added.
- With the expected "normal" growth (as defined by the HPMS database), 44.5 percent (9,767 miles) will have congestion problems by 2020.
- The "additional" LATTS trucks are expected to increase the total to 48.3 percent (10,613 miles) of total mileage.
- LATTS trucks will increase congested miles of roadway by about 8.7 percent.
- The majority of the projected congestion problems in the Region are due to expected overall growth, not LATTS traffic.
- Unless these capacity needs are met, LATTS truck traffic will be affected by all the capacity deficiencies regardless of their source.

As congestion increases, LATTS truck traffic (like other traffic) can be expected to experience lower operating speeds, more frequent speed changes, lower travel time reliability, and increased operating costs.

Exhibit D3-12 shows the projected, cumulative cost of capacity improvements until the Year 2020. Some key points:

Exhibit D3-12
LATTS HIGHWAY NETWORK
2020 Capacity Analysis - Costs



- Based on the HPMS expected growth in traffic, more than $ 62 billion will be required in the next 20 years to address congestion problems on the LATTS Strategic Highway Network.

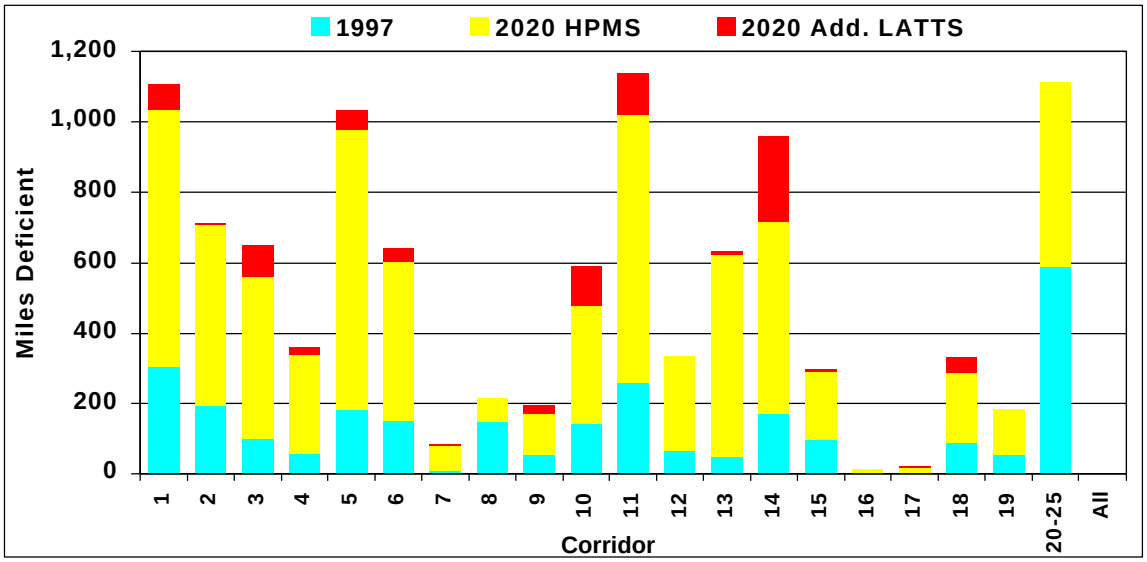
- The "additional" LATTS traffic will bring that total to nearly $ 67 billion, a 7.4 percent increase.

- The majority of LATTS truck traffic occurs on rural highways, which are less expensive to improve than urban highways. Therefore, the increase in costs to improve capacity deficiencies (as shown in Exhibit D3-11) is lower than the increase in capacity deficiencies per mile (as shown in Exhibit D3-10) for the LATTS Strategic Highway Network.

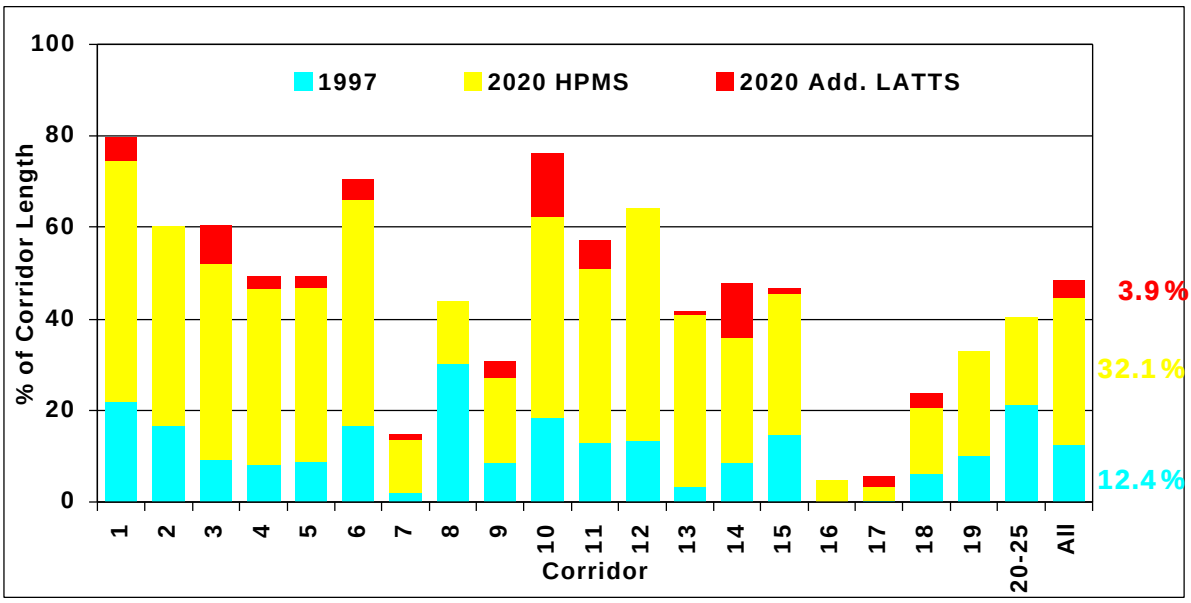
The top of **Exhibit D3-13** presents the roadway miles with capacity deficiencies, by corridor. The deficient mileages for 1997 and 2020, with and without LATTS additional traffic, are shown cumulatively. The bottom part of the exhibit shows the percentage of each corridor length with deficient capacity. The 25 LATTS corridors have different capacity deficiencies whether measured in terms of miles or percentages of corridor with deficient capacities.

- Corridor 1 (I-95 from South Florida to Washington, D.C.) and Corridor 11 (I-40 from North Texas to Wilmington, NC) both will have more than 1,100 miles with capacity deficiencies by 2020 including those due to LATTS "additional" traffic. Nearly 80 percent of Corridor 1 will have capacity deficiencies while 57 percent of Corridor 11 will suffer the same problem.

Exhibit D3-13
CAPACITY DEFICIENCIES
by Corridor



Percent of Corridors with Deficient Capacity



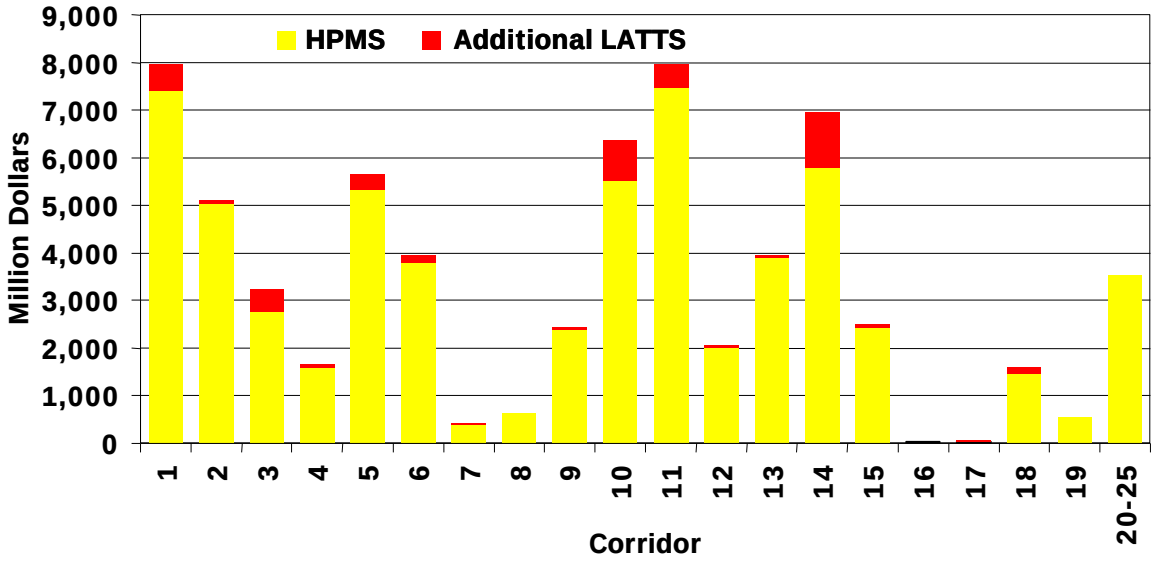
- Corridor 5 (I-75/I-24 from South Florida to Illinois) and Corridor 14 (I-10 from West Texas to Jacksonville, FL) will have the next highest capacity-deficient mileage with about 1,000 miles deficient each. This represents about 49 percent and 48 percent of the respective corridor length.

- Corridor 2 (I-85 from West Alabama to Norfolk, VA), Corridor 3 (I-59/I-81/I-66 from New Orleans, LA to Washington, D.C. and Pennsylvania), Corridor 6 (I-65 from Mobile, AL to Cincinnati, OH) and Corridor 13 (I-20/U.S. 76 from El Paso, TX to Wilmington, NC), will have approximately 600 capacity-deficient miles respectively. This represents about 60 percent of the length of Corridors 2 and 3, 70 percent of Corridor 6 and 40 percent of Corridor 13.

- The portion of these capacity deficient miles due to the "additional" LATTS traffic corresponds with the LATTS traffic usage of the corridors. Corridors 14, 1, 10, 3, and 11 will have the highest LATTS truck traffic and the highest capacity deficient miles due to LATTS traffic. As a group, they also will have the highest proportion of their length with capacity deficiencies due to LATTS traffic but with some variations. For example, Corridor 14 will have by far the highest volumes of LATTS truck traffic, but the percentage of this corridor length with capacity deficiencies due to "additional" LATTS traffic will be lower than for Corridor 10.

Exhibit D3-14 presents, by corridor, the estimated costs of providing the 2020 needed capacity. These costs conform to the miles of capacity-deficient highway as presented in Exhibit D3-13. The added costs to provide capacity for the "additional" LATTS traffic is roughly proportional to the corresponding deficient miles, except for Corridor 14 (the cost of providing the additional capacity is relatively lower than the corresponding additional deficient mileage). The cost to

Exhibit D3-14
CAPACITY IMPROVEMENT COSTS
by Corridor



address all capacity needs on Corridor 5 (I-75/I-24 from South Florida to Illinois) is proportionally lower than the number of miles with capacity deficiencies. The reverse is true for Corridor 10 (I-35/I-37 South Texas to Plains). These variations between the miles deficient and the associated costs are related to the proportion of rural versus urban mileage with capacity deficiencies and the fact that adding capacity is more expensive in urban areas than in rural ones. For example, Corridor 5 has a higher proportion of rural highway with capacity deficiencies and so, relatively lower costs to address these deficiencies. Corridor 10 has a higher proportion of urban capacity deficiencies and severe congestion in the Dallas-Fort Worth and Houston areas, which increases the costs.

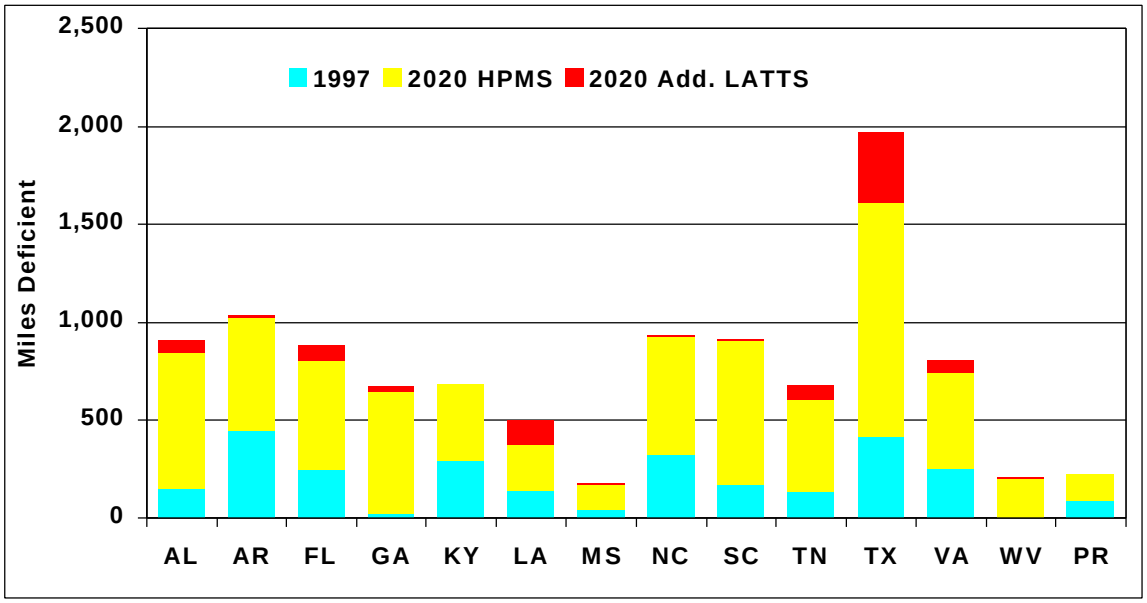
The top of **Exhibit D3-15** shows the roadway miles with capacity deficiencies, by state. The deficient miles for 1997 and 2020, with and without LATTS additional traffic, are shown cumulatively. The bottom part of the exhibit shows the miles of interstate highways within each state. These two graphs are presented together to show the strong relationship between the total miles with capacity deficiencies, and the total miles of interstate highways, which are the most traveled type of highway. Texas is shown to have about twice the number of miles with capacity deficiencies as does the next closest state (Arkansas). It also has more than twice the number of interstate highways.

The portion of the capacity-deficient miles due to the “additional” LATTS traffic for each state is related somewhat to the volume of LATTS traffic within that state, although the correspondence is not exact. For example, the large volume of LATTS truck traffic within Texas (see Exhibits D3-2 and D3-5) results in the largest incremental capacity deficiencies. Florida and Louisiana, however, which are second and third in terms of LATTS truck traffic, are third and second respectively in terms of incremental miles with capacity problems.

The top of Exhibit D3-16 presents the estimated total costs of providing the 2020 needed capacity by state. These costs are in line with the miles of capacity-deficient highway as presented in Exhibit D3-15. The added costs to provide capacity for the “additional” LATTS traffic are approximately proportional to the corresponding deficient miles.

The bottom part of **Exhibit D3-16** presents the same incremental costs due to LATTS expressed in terms of percentage of total capacity improvement costs. While the capacity improvements costs due to LATTS for Louisiana and Mississippi are much smaller than in Texas, they represent a larger share of total capacity needs than in Texas, 22 and 15 percent respectively versus 12 percent. The overall average for the Alliance States is a 7.4 percent increase in costs to address additional capacity requirements due to LATTS traffic.

Exhibit D3-15
CAPACITY DEFICIENCIES BY STATE
Miles with Deficient Capacity



Miles of Interstate by State

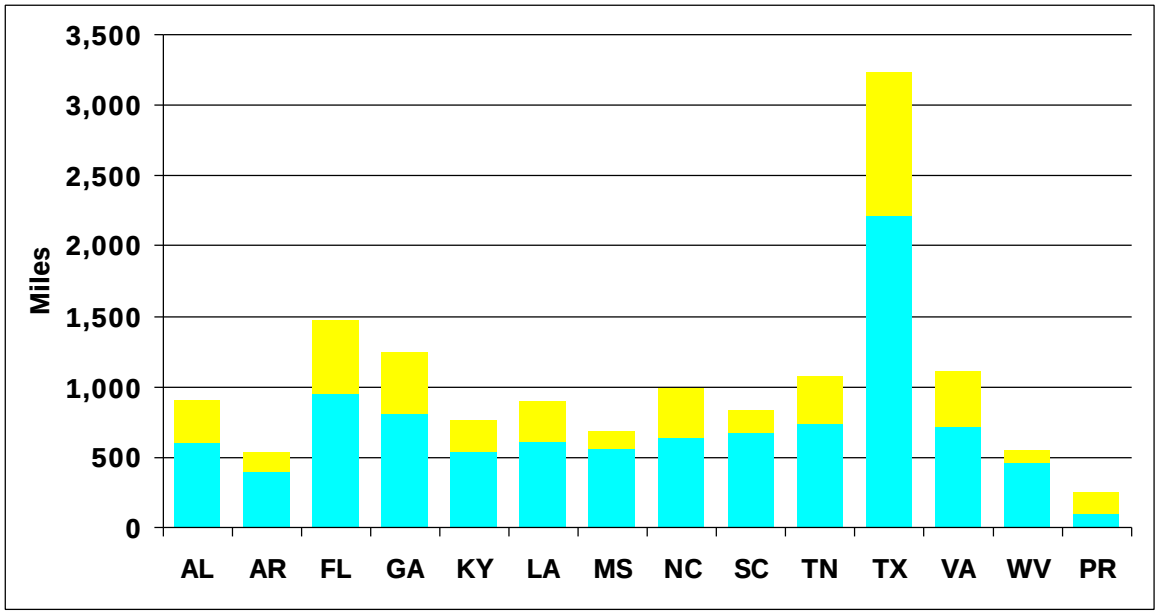
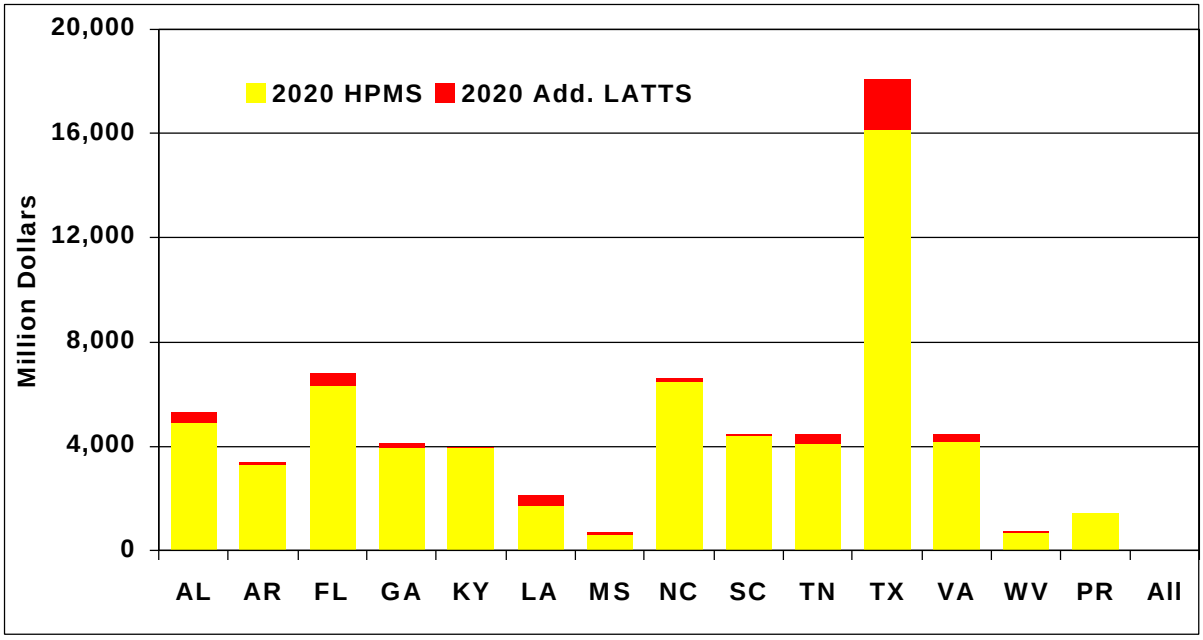


Exhibit D3-16
TOTAL CAPACITY IMPROVEMENT COSTS BY STATE



% Costs Increase Due to LATTS

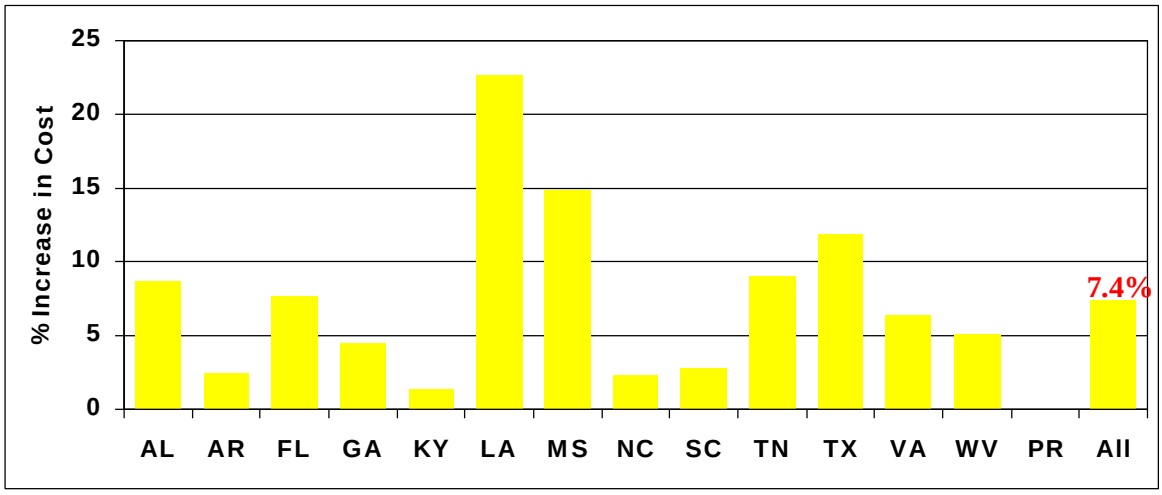


Exhibit D3-17 shows the LATTS network capacity needs in terms of miles to be improved and costs of the improvements by functional classification. The left portion of the exhibit corresponds to the “base” needs while the right portion corresponds to the "additional" needs due to LATTS “additional” traffic. The two key points from this exhibit are:

1) The "additional capacity-deficient miles due to LATTS" are more concentrated into the rural interstate category than the "base" case (LATTS traffic's long distance nature favors a heavier usage of the rural interstate). This represents more than 80 percent of total LATTS related deficiencies.

2) Because the costs of providing additional capacity are much higher in urban areas than in rural areas, most of the costs to provide the needed capacity are for the urban interstate system. This is true for both the "base" case and the “additional LATTS” case.

Pavement Analysis

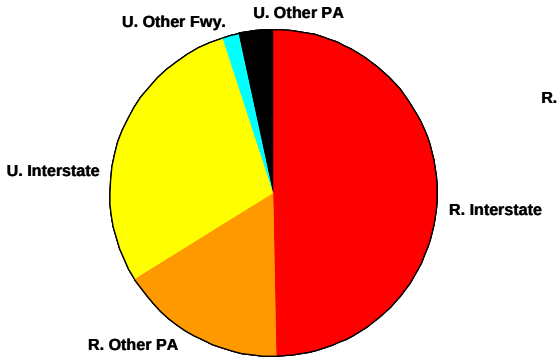
Unlike capacity needs, pavement needs are not cumulative. If a highway section needs four additional lanes by 2020 to handle the predicted traffic, two lanes can be added in 2010 and another two in 2020. On the other hand, if pavement is left to deteriorate past a certain level, a more expensive improvement such as reconstruction will be needed. The frequency of the need to resurface depends on both the volume of traffic (truck traffic mostly) using the highway and on the pavement maintenance program applicable to the specific highway.

Methodology

The methodology used to evaluate pavement needs of the LATTS highway network estimated the average annual pavement needs in 2020 instead of the total, cumulative needs through 2020 (measured in the earlier model). The number of years it would take for the pavement to deteriorate from new in 2020 to a deficient PSR rating (as defined by the minimum tolerable conditions presented earlier) was calculated for each highway segment with and without LATTS additional traffic. As an indicator of the existing condition of the network, pavement deficiencies were also identified for 1997. The difference in average pavement life is an indicator of the impact of LATTS additional traffic on the Region’s pavements. It can also be translated into incremental pavement costs.

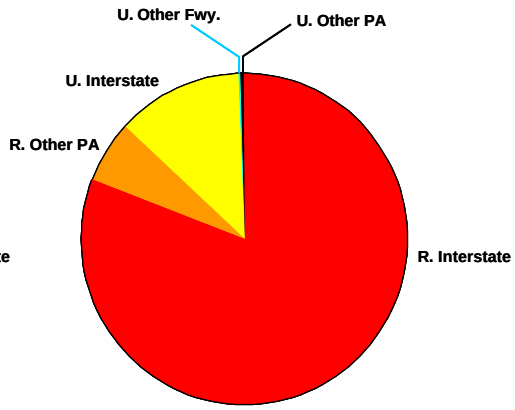
Pavements typically are designed to last for a fairly long time. However, as they age and are subjected to traffic loads, they deteriorate. The pavement life measure used in these analyses is dependent on the amount of traffic using the highway and, more specifically, truck traffic (car traffic is a factor in the pavement deterioration rate but it has much less impact). The type of pavement (for example, high flexible versus high rigid) is also an important factor affecting pavement deterioration rates. The pavement type on each highway segment, as indicated by the 1997 HPMS database, was used in the estimation of the deterioration rates. Finally, the HPMS-AP methodology for deteriorating

Exhibit D3-17
CAPACITY IMPROVEMENTS
by Functional Classification



2020 Base (HPMS)

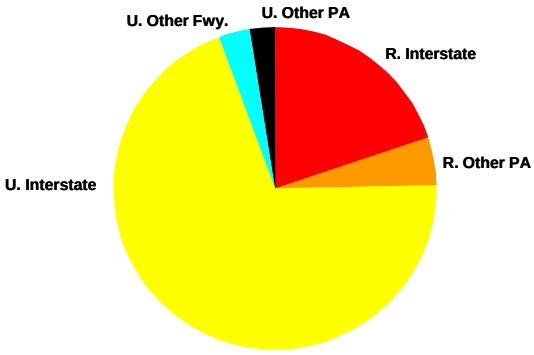
Total Miles: 9,767 Miles



Additional LATTS

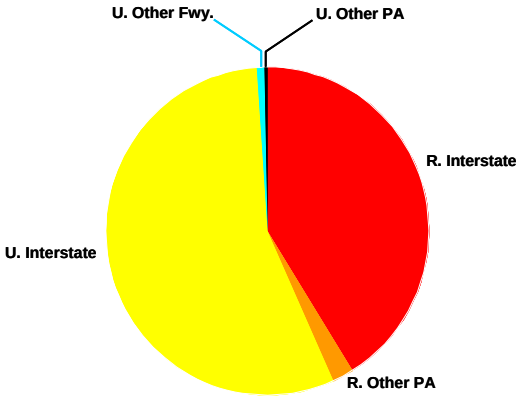
Additional Miles: 847 Miles

2020 CAPACITY IMPROVEMENT COSTS
by Functional Class



2020 Base (HPMS)

Total Costs: $62,063 Million



Additional LATTS

Additional Costs: $ 4,588 Million

pavement was applied in this study. It is based on the concept of 18 Kip Equivalent Single Axle Loads (ESALs). Weather condition or type of subsoil can also influence pavement deterioration rates. For this study, only traffic and pavement type were used to differentiate pavement deterioration rates between states.

Each highway segment pavement's remaining life was calculated twice-- first using the “base” car and truck traffic from the HPMS database, then adding the “additional” LATTS traffic to the base. The difference in the two pavement lives is a measure of the impact of LATTS traffic on the Region's pavements.

Similar to the capacity analysis, the same resurfacing unit costs were used consistently throughout the Region. The 1997 FHWA unit costs were used. They are presented in **Exhibit D3-18**. To maintain consistency throughout the Region, no attempt was made to tailor these unit costs to each state beyond the stratification provided.

Exhibit D3-18
RESURFACING UNIT COSTS

	Rural Interstate			Rural Other Princ. Arterial		
	Flat	Rolling	Mountain	Flat	Rolling	Mountain
Resurfacing	109	106	136	70	70	101

Note: Costs are in $1,000 per finished lane mile.

	Urban Fwy. & Exp.	Uuban Other Divided	Urban Undivided
Resurfacing	202	135	154

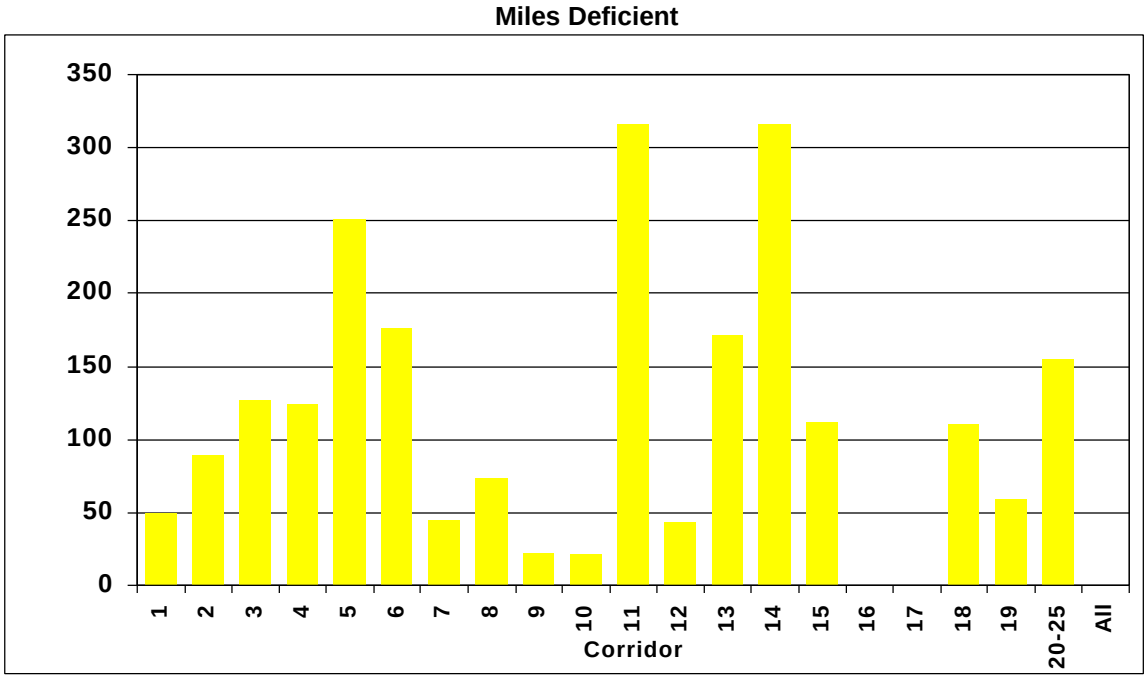
Note: Costs are in $1,000 per finished lane mile.

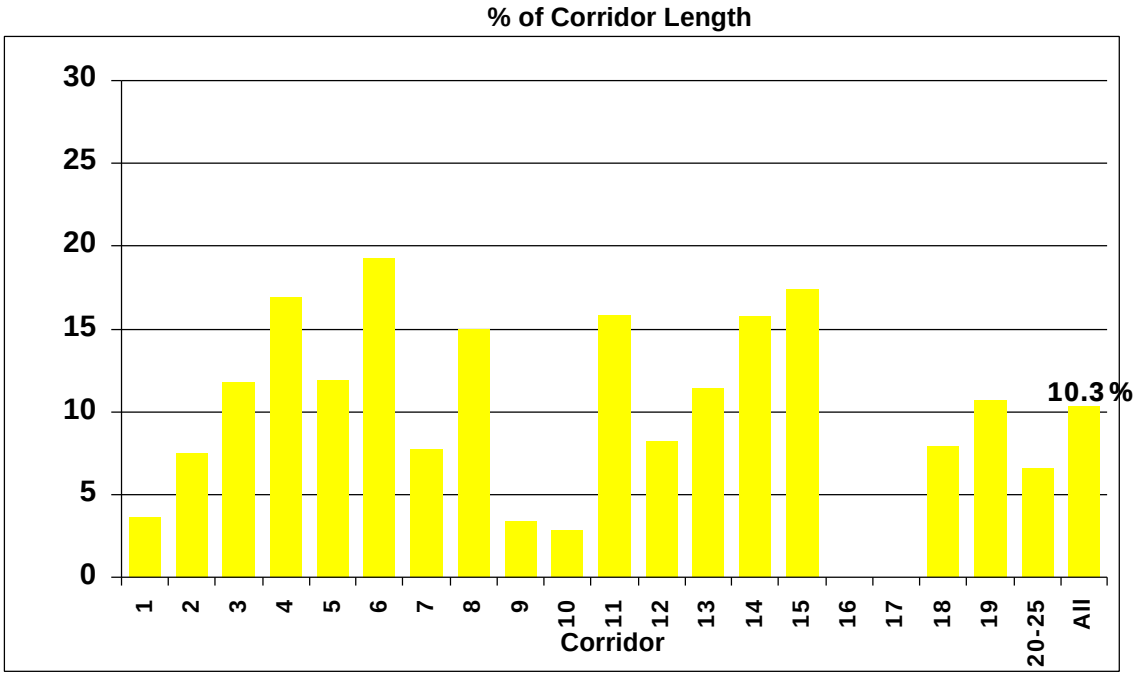
Source: FHWA 1997 Unit Costs

Pavement Needs

Exhibit D3-19 illustrates the extent of existing (1997) pavement deficiencies by corridor. The top of the exhibit shows the number of highway miles with deficient pavement condition. The corridor miles with deficient pavement are related to the total corridor length. For example, Corridors 5 (I-75/I-24 from South Florida to Illinois), Corridor 11 (I-40 from North Texas to Wilmington, NC) and Corridor 14 (I-10 from West Texas to Jacksonville, FL) are the longest corridors and have the most pavement deficiencies. The lower part of the exhibit demonstrates that the percentage of each corridor with pavement deficiencies does vary. Overall, about 10 percent of the LATTS strategic network has existing pavement

Exhibit D3-19
1997 PAVEMENT CONDITION DEFICIENCIES BY CORRIDOR

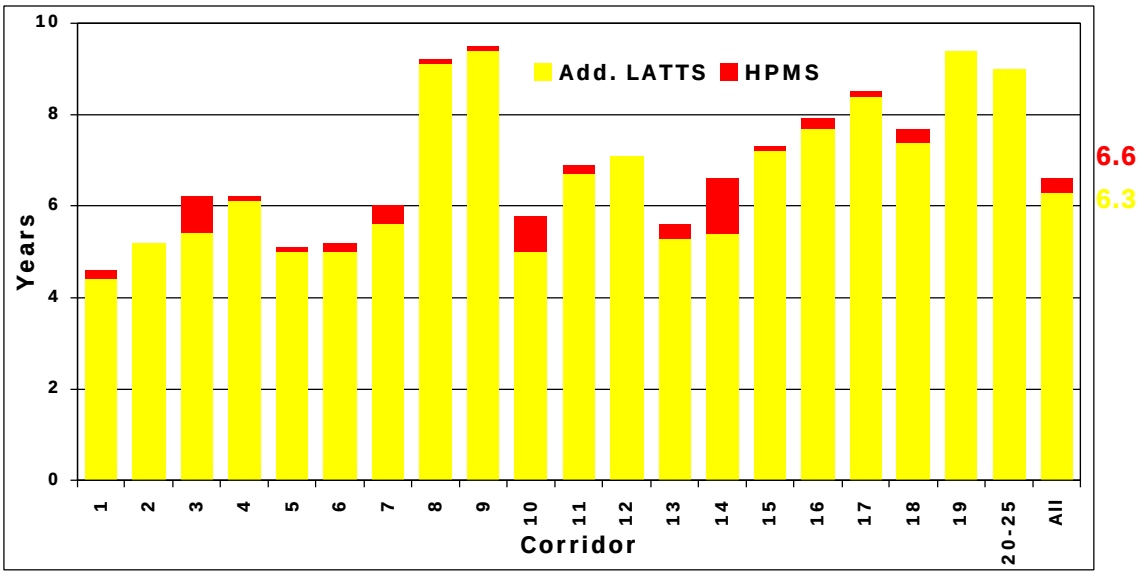




deficiencies. This percentage varies by corridor from zero for Corridor 16 (I-16/U.S. 80 in Georgia) and Corridor 17 (I-27/U.S. 87/U.S. 277 from Texas to Denver, CO), to close to 20 percent deficient for Corridor 6 (I-65 from Mobile, AL to Cincinnati, OH).

The LATTS Strategic Highway Network's expected average pavement life in 2020, with and without the LATTS "additional" traffic, is summarized in **Exhibit D3-20**. There are significant differences between corridors. The first differences are in overall pavement life. While the pavement life of Corridor 1 (I-95/I-4 from South Florida to Washington, D.C) averages 4.6 years, Corridor 9 (I-45/U.S. 287 from Amarillo, TX to Galveston, TX) has a pavement life expectancy of 9.5 years, more than twice as much. Such disparity is due to a combination of factors including the existing pavement type/strength (high rigid pavement lasts longer than flexible pavement for example) and the amount of truck traffic (LATTS and others) using these highways.

Exhibit D3-20
2020 AVERAGE PAVEMENT LIFE
by Corridor

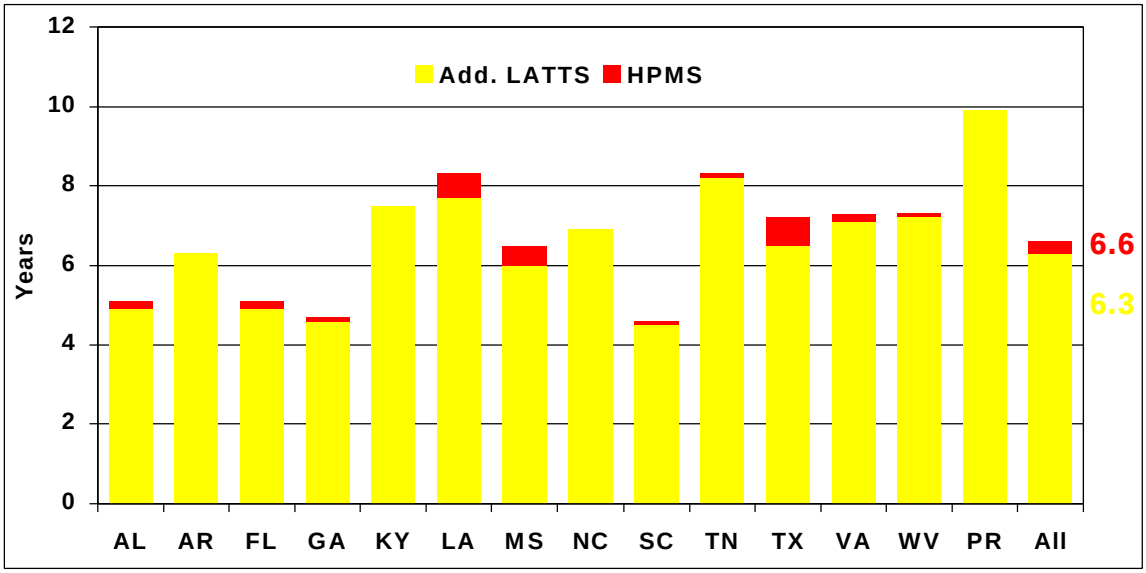


The second difference is in the LATTS "additional" traffic impact. One would expect that the most heavily traveled corridor would show the largest impact. Exhibit D3-20 confirms this expectation only partially. Corridor 14 (I-10 from West Texas to Jacksonville, FL), by far the most heavily traveled corridor, shows the highest reduction in pavement life due to LATTS traffic, from 6.6 years to 5.4 years on average. Other heavily traveled corridors such as Corridor 3 (I-59/I-81/I-66 from New Orleans, LA to Washington, D.C. and Pennsylvania) and Corridor 10 (I-35/I-37 from South Texas to the Plains) also indicate significant reduction in average pavement life due to LATTS traffic. However, Corridor 1 (I-95/I-4 from South Florida to Washington D.C) and Corridor 11 (I-40 from North

Texas to Wilmington, NC) were determined to experience smaller reductions in pavement life despite the heavy traffic from LATTS.

Average pavement life, with and without LATTS "additional" traffic, is displayed, by state, in **Exhibit D3-21**. Pavement life varies from 4.6 years in South Carolina to 8.3 years in Louisiana and 9.9 years in Puerto Rico. The pavement life for the entire LATTS Strategic Network averages 6.6 years. The differences between states are due to a variety of reasons including pavement design standards and truck traffic (LATTS and others). The estimated impact of LATTS traffic in terms of decreased pavement life is related to the proportion of LATTS truck traffic. Texas, Louisiana and Mississippi will experience the highest share of LATTS truck traffic relative to total truck traffic and also will experience the most reduction in pavement life. However, Florida will experience less impact than would be expected considering the amount of LATTS truck traffic in this state. It may be due to the fact that the LATTS truck traffic in Florida represents only 2.9 percent of total traffic traveling on the LATTS Strategic Network in 2020 versus 5.4 percent in Texas and Louisiana, and 4.6 percent in Mississippi.

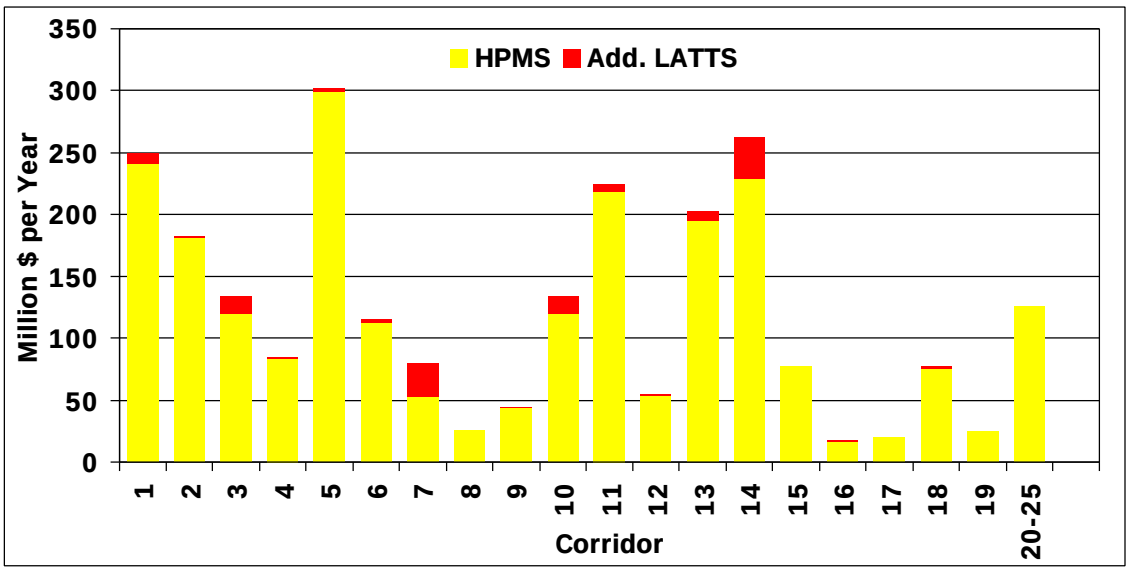
Exhibit D3-21
2020 AVERAGE PAVEMENT LIFE
by State



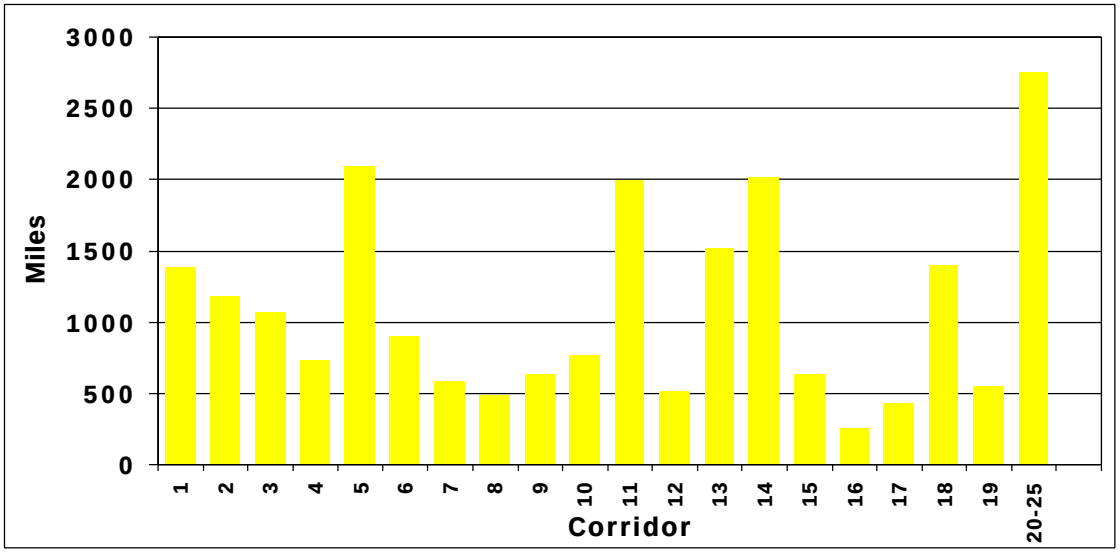
Total resurfacing costs are a function of the average pavement life and the length of the corridors. Average annual resurfacing costs were calculated as the total pavement resurfacing cost amortized over the life of the pavement i.e., resurfacing cost divided by the expected life of the pavement. **Exhibit D3-22** summarizes the average annual resurfacing costs by corridor. The top part shows the total costs with and without LATTS "additional" traffic, and the bottom part presents the total length of each corridor. Total corridor pavement costs are

Exhibit D3-22
2020 AVERAGE ANNUAL RESURFACING COSTS
by Corridor

Total Annual Resurfacing Costs



Total Length of Corridors



highly correlated to corridor length yet there is a less than perfect correspondence between costs and length. The shorter pavement life on Corridor 1 (I-95/I-4 from South Florida to Washington D.C) and the longer pavement life on Corridor 18 (from Laredo, TX to Indianapolis, IN) demonstrate this point. The incremental costs due to LATTS traffic are closely related to the reduction in pavement life due to LATTS traffic (shown previously in Exhibit D3-20).

Exhibit D3-23 summarizes the average annual resurfacing costs by state. Total resurfacing costs are a function of the average pavement life and the length of the LATTS network within each state. Texas, with the longest LATTS network, has the highest annual resurfacing costs followed by Florida, which has the next longest LATTS network. While the top part of Exhibit D3-23 shows the total costs with and without LATTS "additional" traffic, the bottom part presents the percentage increase in annual resurfacing costs due to LATTS traffic. On average, LATTS "additional" traffic will result in a 4.3 percent increase in resurfacing costs for the Region. However, this increase is not uniform among the Alliance states. The incremental costs due to LATTS traffic are closely related to the reduction in pavement life due to LATTS truck traffic. Texas and Louisiana will experience about a 10 percent increase in resurfacing costs while Arkansas, Georgia, Kentucky and Puerto Rico will experience less than 1 percent increase in costs.

Exhibit D3-24 presents, by functional classification, the LATTS highway network resurfacing needs in terms of pavement life and incremental resurfacing costs due to LATTS traffic. Increases in pavement needs due to LATTS traffic will occur mostly on the rural interstate system since, as mentioned earlier, the heaviest LATTS traffic will occur on that part of the system. While about one-fourth of the LATTS traffic will occur on the urban interstate system, the impact is lower because it represents a smaller portion of total traffic on these facilities. As a result, the increase in resurfacing costs will vary from 8.3 percent for the rural interstate system to 2.5 percent for urban interstates and lower for other functional classifications.

Operating Speeds

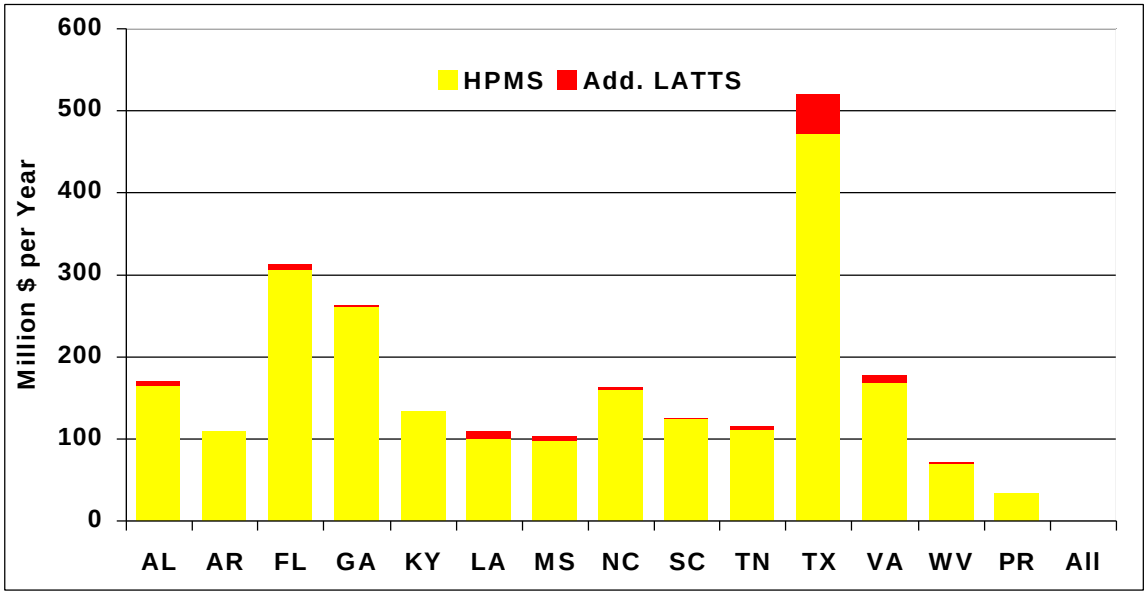
Truck operating speed was chosen as the key study performance measure for the LATTS Strategic Highway Network. Truck operating speeds were estimated for each LATTS roadway segment based on the conditions of the roadway, including roadway geometry and alignment, pavement condition, speed limit and traffic volumes.

Two types of truck operating speeds were calculated:

- The average daily truck operating speed; and
- The peak hour truck operating speed (as defined by the peak hour factor or "K" factor for each road segment).

Exhibit D3-23
AVERAGE ANNUAL RESURFACING COSTS
by State

Total Costs



Percentage Increase Due to LATTS

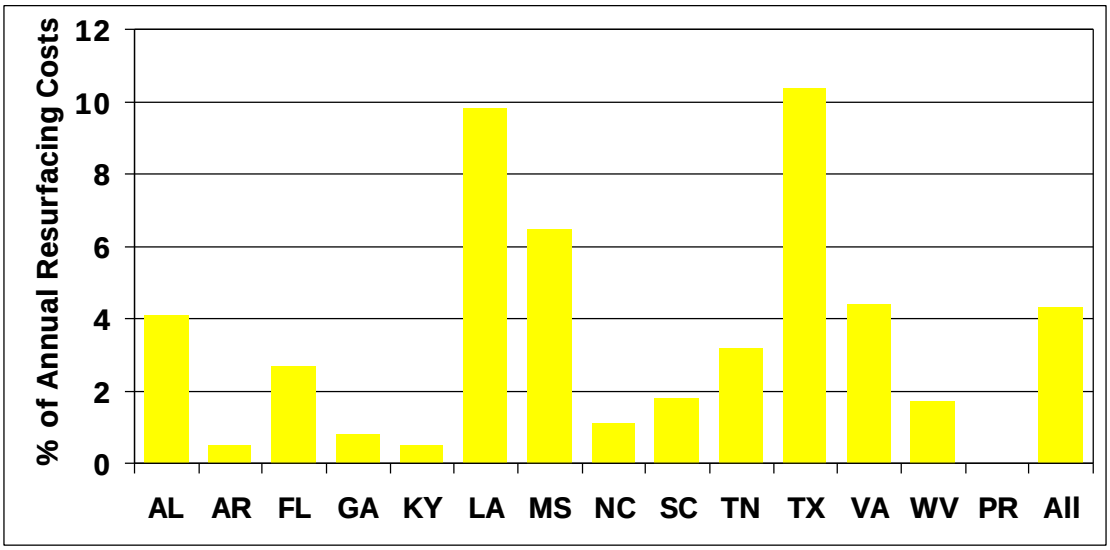
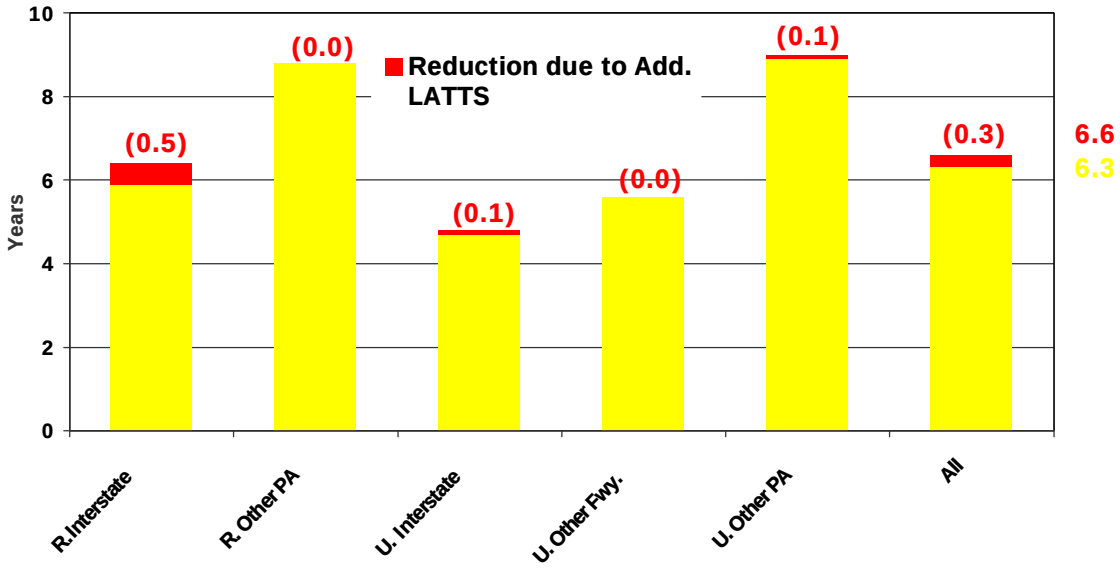
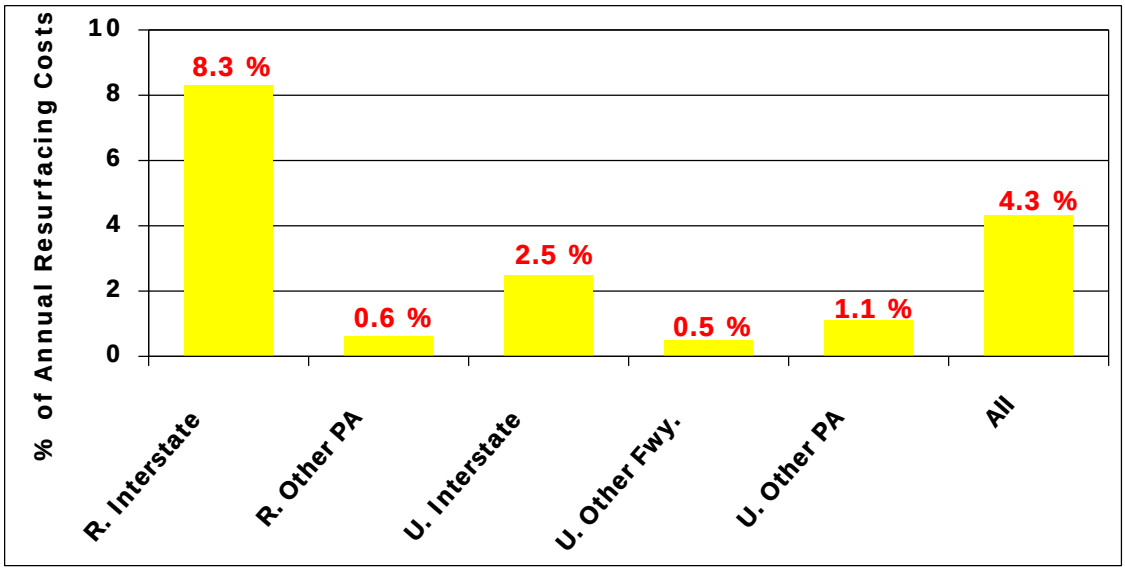


Exhibit D3-24
2020 AVERAGE PAVEMENT LIFE
by Functional Classification



Additional Resurfacing Costs per Year
by Functional Class



Because available information does not denote when a truck would travel over a specific highway section during the peak hour, the peak hour operating speed assumes that the forecast trucks would travel over every section during peak hour. As a result the calculated peak hour speed and travel time for an entire corridor is overstated, as it is unlikely that a truck would travel every section during peak hour conditions. However, the difference in peak hour operating speeds with and without additional LATTS traffic is a good indicator of how much worse existing congestion problems are going to become with the additional LATTS traffic.

Truck Operating Speed Methodology

Truck operating speeds were calculated for each LATTS roadway section. Operating speeds over a combination of segments were then calculated by adding travel time and distance for each segment and calculating the new speed.

The operating speed calculation for each sample segment or link was based on the methodology of the HPMS Analytical Package used by FHWA to estimate highway needs. The process is summarized in **Exhibit D3-25** and is as follows:

1. Based on the type of facility (urban interstate versus two-lane rural arterial, for example) and the ratio of Average Annual Daily Traffic (AADT) to hourly capacity, the AADT was distributed into as many as 12 time periods, each with a specific hourly Volume to Capacity ratio (V/C ratio). Obviously, the higher the AADT compared to capacity, the more traffic occurs during congested (high V/C ratio) periods.

2. For a given time period, initial speed per vehicle type was then estimated based on the time period V/C ratio, type of facility, weighted design speed and the speed limit. This initial speed was adjusted to take into account pavement condition and the section's alignment characteristics (steep grades and/or sharp curves reduce speed). The "initial" speed represents operating speed assuming neither speed change nor stop or idling time.

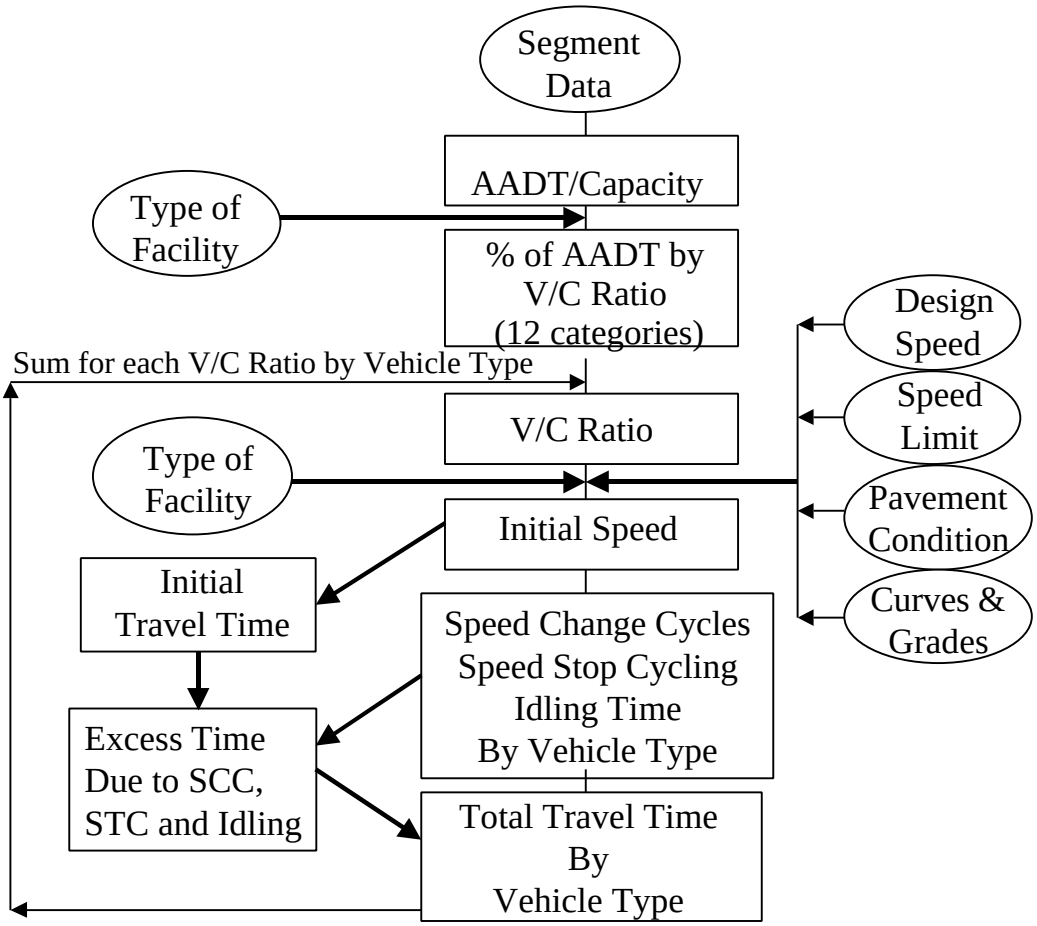
3. The initial speed was translated into initial time to travel the length of the highway segment.

4. Next, the average number of speed change cycles and stop cycles per vehicle mile of travel per vehicle type was calculated, based again of the facility type and the V/C ratio. Those cycles were then translated into excess travel time and average idling time was added.

5. The initial travel time and excess travel time by vehicle type was added for each time period, to estimate total travel time for that period.

6. The average daily operating speed was calculated by weighting travel time, by time period, by the proportion of traffic during that period, and translating into speed. This calculation assumes that the proportion of trucks in the traffic stream remains constant during the day.

Exhibit D3-25
OPERATING SPEED CALCULATION



Source: HPMS Analytical Package

Peak hour operating speed was estimated in a similar fashion, but assumes a single time period whose V/C ratio is the peak hour V/C ratio as defined by the peak hour or "K" factor.

Truck Operating Speeds Results

Truck operating speeds were calculated and summarized using the process explained above. An example of results is shown in **Exhibit D3-26**.

For each corridor, results are presented by functional class. The total lengths of all the segments used in the analysis of the corridor are listed first. This is followed by items which describe the principal characteristics of the segments, including average number of lanes, speed limit, and AADT. The purpose of

Exhibit D3-26
LATTS TRUCKS OPERATING SPEEDS

Corridor/ Functional Class	Length (Miles)	Average No. Lane	Speed Limit (MPH)	Average 1997 AADT	1997 Truck Speed (MPH)		2020 Truck Speed (MPH) W/O Added LATTS Traffic		2020 Truck Speed (MPH) With Added LATTS Traffic	
					Daily Average	Peak Hour	Daily Average	Peak Hour	Daily Average	Peak Hour
1	**I-95, I-4**		**South Florida to Washington, DC**							
R.Interstate	796.5	4.2	66.2	39,935	62.3	56.4	58.1	30.0	57.1	29.2
R.Other PA	48.8	4.0	55.0	11,592	53.8	53.8	53.8	53.2	53.8	53.2
U.Interstate	523.8	5.8	61.9	95,183	53.8	25.0	38.0	18.8	37.5	18.7
U.Other Fwy.	12.1	4.5	55.0	26,513	57.4	56.9	57.2	31.4	57.2	31.4
U.Other PA	4.7	4.0	48.8	19,529	33.7	33.7	33.7	33.7	33.7	33.7
TOTAL	**1,385.8**	**4.8**	**63.9**	**59,632**	**58.3**	**38.2**	**48.2**	**24.8**	**47.5**	**24.4**
Time					**23.8**	**36.3**	**28.7**	**55.9**	**29.2**	**56.7**
10	**I-35, I-37**		**South Texas to Plains**							
R.Interstate	428.4	4.1	69.3	23,068	60.8	58.3	56.6	43.1	55.5	40.1
U.Interstate	340.8	5.6	63.0	84,745	53.4	25.5	33.9	17.5	32.8	17.1
TOTAL	**769.2**	**4.8**	**66.4**	**50,393**	**57.3**	**37.1**	**43.6**	**26.1**	**42.5**	**25.2**
Time					**13.4**	**20.7**	**17.6**	**29.4**	**18.1**	**30.6**
11	**I-40**		**North Texas to Wilmington, NC**							
R.Interstate	1,223.8	4.0	67.2	24,902	61.8	59.5	60.1	40.1	59.9	38.2
R.Other PA	182.0	3.3	54.9	11,506	50.9	47.5	49.7	40.0	49.7	39.9
U.Interstate	559.7	5.1	60.9	62,123	54.4	30.5	39.8	19.3	39.4	18.7
U.Other Fwy.	15.8	4.5	49.3	21,786	39.2	29.9	35.8	26.2	35.8	26.2
U.Other PA	17.2	4.0	52.5	31,606	31.9	18.6	23.1	15.2	23.1	15.2
TOTAL	**1,998.6**	**4.3**	**63.7**	**34,139**	**57.8**	**45.2**	**50.9**	**30.4**	**50.6**	**29.3**
Time					**34.6**	**44.2**	**39.3**	**65.8**	**39.5**	**68.3**
14	**I-10**		**West Texas to Jacksonville, FL**							
R.Interstate	1,377.3	4.0	67.0	19,532	61.0	59.9	60.3	47.8	60.1	44.5
R.Other PA	86.7	4.0	55.0	16,913	54.6	54.5	54.6	53.6	54.6	53.6
U.Interstate	505.7	5.3	59.1	71,879	54.8	30.4	40.8	21.1	40.0	19.7
U.Other Fwy.	8.1	4.0	55.0	12,242	51.0	51.0	51.0	51.0	51.0	51.0
U.Other PA	37.7	4.6	45.8	33,892	30.9	16.7	27.6	13.8	27.3	13.8
TOTAL	**2,015.5**	**4.4**	**63.7**	**32,794**	**57.9**	**46.2**	**52.6**	**35.2**	**52.1**	**32.9**
Time					**34.8**	**43.7**	**38.3**	**57.3**	**38.7**	**61.2**

listing these items is to facilitate a better understanding of the calculated operating speeds. For example, two/three-lane highways have lower operating speeds than equivalent four-lane highways because of passing difficulties. Similarly, low speed limits will result in low operating speeds on facilities no matter what the road conditions are. The average daily and peak period speeds/travel times for trucks are then presented for the base year (1997). Finally, truck operating speeds are listed twice for year 2020. For the first entry, truck operating speeds were calculated assuming the base growth rate, i.e. the growth rate indicated by the HPMS database. For the second entry, truck operating speeds were calculated with the LATTS “additional” traffic. Overall results for the entire corridor are then listed, as well as the overall time required to travel the entire corridor. By comparing these speed and travel time values (based on present conditions), it is possible to determine:

- Which facilities are most efficient today;
- Which facilities are going to experience deteriorating conditions due to traffic growth regardless of LATTS impact; and,
- Which facilities are going to be most affected by LATTS traffic.

Exhibit D3-27 summarizes the calculated truck operating speeds, daily average and peak hour, by corridor. With the exception of Corridor 4 (I-77/I-79 from Columbia, SC to Ohio and Pennsylvania) most corridors with a majority of interstate facilities (Corridors 1 through 16) had average daily operating speeds above 50 MPH in 1997. Corridors 17 through 25 had lower average daily speeds in the 40 to 50 MPH range because they are composed of lower type facilities. The projected growth in traffic between 1997 and 2020 will affect this measure of performance significantly:

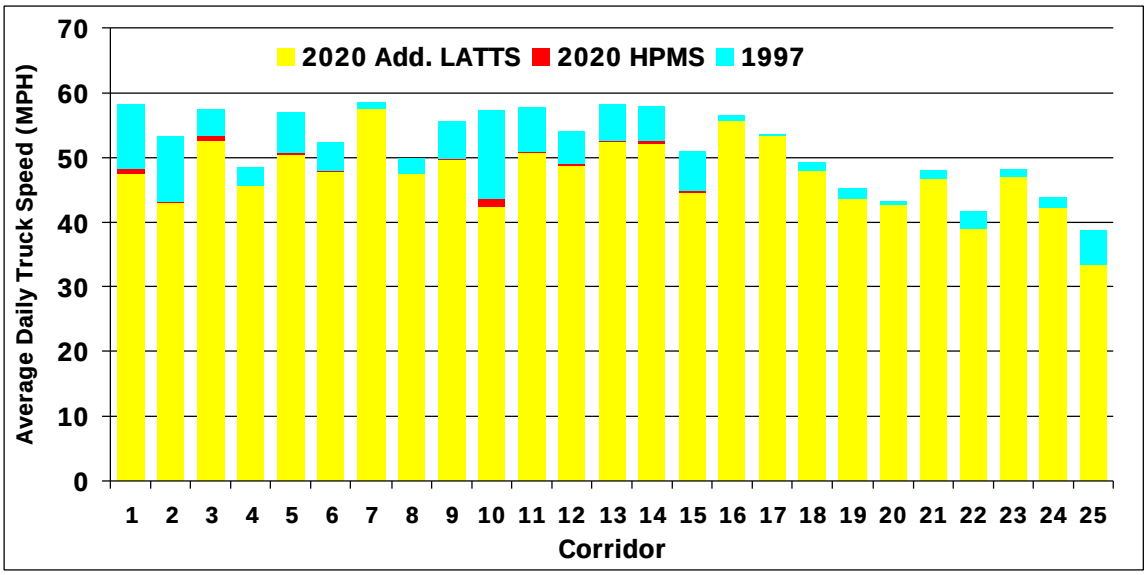
- Unless additional capacity is provided, the average daily speed in many of the LATTS corridors will be reduced by more than five MPH.
- Corridor 10 (I-35/I-37 from South Texas to the Plains) will experience the most deterioration in average daily travel speeds, close to a 14 MPH reduction, unless new measures are taken.
- Corridor 1 (I-95/I-4 from South Florida to Washington, D.C.) and Corridor 2 (I-85 from West Alabama to Norfolk, VA) could experience a reduction in average travel speed of more than 10 MPH.

The impact of the “additional” LATTS traffic, on average daily truck travel speed, appears minor compared to the impact of the expected traffic growth between 1997 and 2020. Even the worse case, Corridor 10 will only experience an additional reduction in average daily speed of 1.1 MPH. The reason there is such an apparently minor impact on average speeds, when the impact of LATTS traffic on capacity appeared much more significant, is due to the selected minimum tolerable standards used to identify capacity needs. The capacity needs are based on not exceeding LOS C on rural highways and LOS D on urban highways. However, travel speeds are most affected (change rapidly) when the LOS reaches E and F. In other words, capacity needs are based on explicit standards that are higher than those used implicitly in the operating speed calculation.

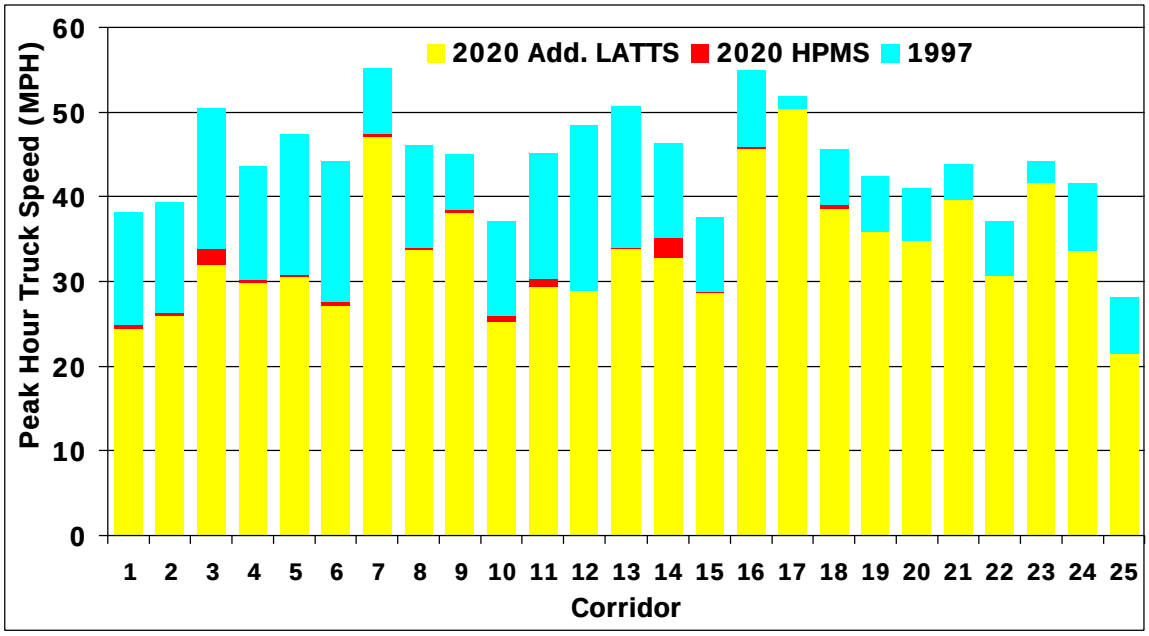
There is significantly more variation in truck “peak hour” speeds such as from 37.1 MPH on Corridor 10 (I-35/I-37 from South Texas to the Plains) to about 55 MPH on Corridor 7 (I55 from New Orleans, LA to St. Louis, MO) and Corridor 16 (I-16 from Columbus, GA to Savannah, GA). In addition, the impact of additional traffic is more pronounced on “peak hour” speeds than on average daily speeds. Five corridors could experience reductions in truck “peak hour” speeds of more than 15 MPH and another 7 corridors could be reduced between 10 and 15 MPH.

Exhibit D3-27
TRUCK OPERATING SPEEDS

Truck Traffic Impact – Daily Average Speed



Truck Traffic Impact – "Peak Hour" Speed



As mentioned earlier, these travel speeds were estimated assuming no change in capacity on any section of the LATTS highway network and future traffic peaking patterns which are the same as they are today.

The potential impact of the LATTS "additional" traffic is also more pronounced on truck "peak hour" speeds than on average daily speeds. Corridor 14 (I-10 from West Texas to Jacksonville, FL), the most traveled LATTS corridor, and Corridor 3 (I-59/ I-81/I-66 from New Orleans, LA to Washington, D.C. and Pennsylvania), the fourth most traveled LATTS corridor, were estimated to have their truck "peak hour" speeds further reduced by 2.3 and 2.0 MPH respectively due to LATTS "additional" truck traffic.

Conclusions

Major observations derived from the above analyses for the mainline Strategic Highway System can be summarized as follows:

- LATTS truck traffic is expected to grow at a much higher rate than the rest of the traffic in the region. From 1997 to 2020, LATTS truck traffic will increase by 364 percent while all other traffic is expected to increase by 80 percent.

- As a result, LATTS truck traffic will have an increasing impact on the Region's highway investment needs. By 2020, LATTS "additional" truck traffic will result in:
  - 8.7% more highway miles needing capacity improvements.
  - 7.4% additional costs to provide these capacity improvements.
  - 4.3% increase in pavement resurfacing costs.

- The additional highway investment needs are not uniformly distributed among the various types of highways comprising the LATTS Strategic Highway Network.
  - 93 % of the additional miles with capacity deficiencies are interstate highways (81% rural interstate and 12% urban interstate).
  - 97% of the additional capacity costs are for interstate highways (41% rural interstate and 56% urban interstate).
  - 98% of the additional pavement needs are for interstate highways (69% rural interstate and 29% urban interstate).

- The additional highway investment needs are not uniformly distributed among the various corridors of the LATTS Strategic Highway Network.
  - Corridor 14 (I-10 from West Texas to Jacksonville, FL), which will carry 29% of all LATTS truck traffic by 2020, will have 25% of all LATTS additional capacity needs and 34% of its additional pavement needs.
  - Corridor 10 (I-35/I-37 from South Texas to Plains), which will carry 12% of all LATTS truck traffic by 2020, will have 18% of all LATTS additional capacity needs and 14% of its additional pavement needs.
  - Corridor 3 (I-59/I-81/I-66 from New Orleans, LA to D.C. and Pennsylvania), which will carry 10% of all LATTS truck traffic by 2020, will have 11% of all LATTS additional capacity needs and 14% of its additional pavement needs.

- Corridor 1 (I-95/I-4 from South Florida to Washington D.C.), which will carry 13% of all LATTS truck traffic by 2020, will have 12% of all LATTS additional capacity needs and 8% of its additional pavement needs.
- Corridor 11 (I-40 from North Texas to Wilmington NC), which will carry 12% of all LATTS truck traffic by 2020, will have 18% of all LATTS additional capacity needs and 14% of its additional pavement needs.
- Corridors 2, 4, 5, 6, 7, 8, 9, 12, 13, 15, 16, 17, 18 and 19 carry the rest of the LATTS traffic in the Region (27% of all LATTS truck traffic). Together, they will have 23% of all LATTS additional needs and 15.5% of its additional pavement needs.
- Corridors 20 through 25 do not carry any significant portion of the LATTS truck traffic and as a result have no additional needs due to LATTS traffic.

- The additional highway investment needs are not uniformly distributed among the various states comprising the LATTS Strategic Highway Network.

  - Texas alone will carry 42% of all LATTS truck traffic in 2020. It will have 42% of all LATTS additional capacity needs and 49% of its additional pavement needs.
  - Florida, which will carry 12% of all LATTS truck traffic in the Region by 2020, will have 11% of all LATTS additional capacity needs and 8% of its pavement needs.
  - Louisiana, which will carry 7% of all LATTS truck traffic in the Region by 2020, will have 8.5% of all LATTS additional capacity needs and 10% of its pavement needs.
  - Alabama, which will carry 6% of all LATTS truck traffic in the Region by 2020, will have 9% of all LATTS additional capacity needs and 7% of its pavement needs.
  - All other states in the Region will collectively carry 33% of all LATTS truck traffic and will have 29.5% of the additional capacity needs and 26% of its additional pavement needs.

LATTS HIGHWAY CONNECTORS

While the HPMS database was available for purposes of the LATTS analyses of mainline facilities, detailed information of this type has not been compiled for LATTS connectors. Instead, a more limited inventory of those facilities has been compiled by FHWA, using data supplied by the states. While the database did not include all of the LATTS connectors, it was possible to conduct an analysis for those connectors for which inventory data were available. The analysis utilized the NHS Connector data for 168 miles of NHS connectors (i.e., 88 highway connectors linking LATTS intermodal facilities with the mainline LATTS Strategic Highway System) for which inventory data were available. Although the 168 miles are not a 100% inventory of all LATTS Highway connectors, the sample was deemed to be reasonably representative of the LATTS Connector "universe" because it includes nearly all important freight-related intermodal facilities.

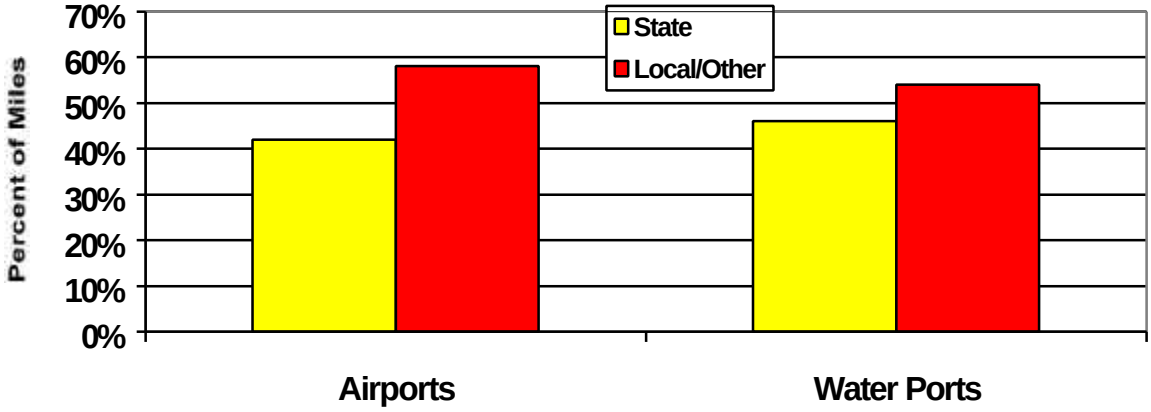
The information from the inventory database was segregated into the following categories:

- **Jurisdictional breakdown of LATTS connectors**
- **Connectors with pavement problems**
- **Connectors with geometric/physical problems**
- **Connectors with at-grade railroad crossing problems**
- **Connectors with traffic operations and safety problems**

JURISDICTIONAL RESPONSIBILITY FOR LATTS CONNECTORS

State governments have jurisdiction over 46% of the LATTS waterport connectors and 42% of the airport connectors in the sample (45% total). Jurisdiction for the remaining connectors varies between different levels of local (municipal, county, township) government and private authorities (see **Exhibit D3-28**). This information is important to the overall picture, as responsibility for maintenance and improvement of all the mainline LATTS Strategic System rests 100% with state government. Since this is not the case with the intermodal connectors, it complicates the capital improvement process. Although NHS connectors are eligible for NHS funds, on an overall basis local governments and private authorities tend to have fewer financial resources upon which to draw to address highway deficiencies. In addition, the priority-determination process at the local level often gives greater weight to high volume roadways, as opposed to lower-volume intermodal connectors.

Exhibit D3-28
JURISDICTION OF LATTS CONNECTOR MILES



State vs. Local/Other

The following physical and operational information shows that the connectors under the state jurisdiction are generally in better condition than those that are not state responsibility (referred to as “local” through the remainder of this discussion).

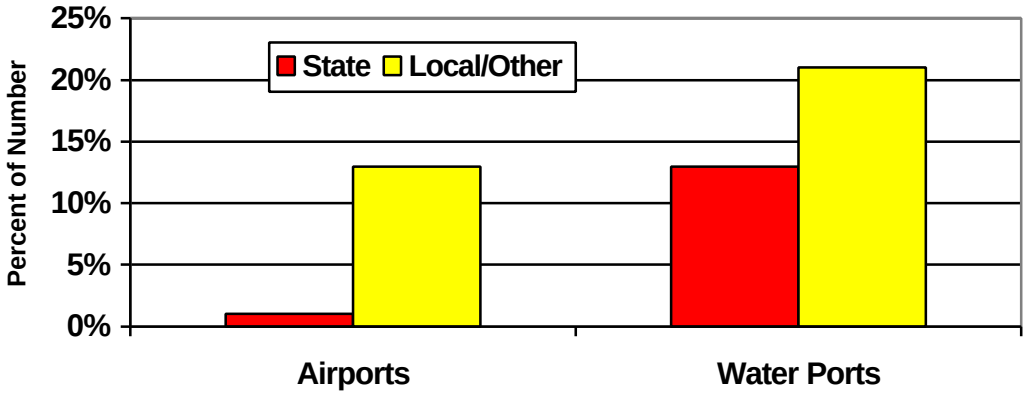
CONNECTORS WITH PAVEMENT PROBLEMS

Roadway pavements on connectors serving LATTS cargo facilities were generally not built to withstand the heavy truck weights they currently serve. Pavement materials and foundation thickness are, in many cases, not able to stand up to the volume and weight demands placed on them. This is compounded by exploding auto traffic on many connector highways and increased size and weight of container trailers.

Pavement conditions directly impact the quality and efficiency of truck access to intermodal facilities. Poor pavement quality caused by any number of pavement distresses (cracking, joint deterioration, potholes, shoving, spalling, etc.) results in lower truck operating speeds to minimize vehicle damage, reduce freight breakage, and enhance vehicle control. The "spin-off" effects of lower operating speeds due to poor pavement quality are congestion and accidents. Thus, pavement issues can affect the landside access to airports and waterports and be a factor in shipper/manufacturer decisions to use a particular facility.

Pavement problems are more common on waterport connectors than on airport connectors. The NHS Connector sample of all LATTS Connectors shows 17% of LATTS waterport connector miles and 8% of LATTS airport connector miles have poor or very poor pavement conditions, compared with the U.S. average of 8% (see **Exhibit D3-29**). Pavement conditions on local jurisdiction connectors are somewhat worse than on state jurisdiction connectors: 21% of local waterport connector miles and 13% of local airport connector miles have pavement problems, compared with 13% of state jurisdiction waterport connector and 1% of state jurisdiction airport connector mileage.

Exhibit D3-29
LATTS CONNECTORS WITH PAVEMENT PROBLEMS



State vs. Local/Other

These numbers are not unexpected. The high percentage of pavement problems associated with waterport connectors can be attributed to the high volume of

heavy truck traffic in and around Alliance waterports. Trucks and trailers exact a much greater toll on roads than do passenger automobiles, and waterports tend to handle heavier cargoes than airports.

Somewhat unexpected is the geographic distribution of connectors with pavement problems. Just two states (Louisiana and Mississippi) have a higher than average rate of pavement deficiencies.

CONNECTORS WITH GEOMETRIC/PHYSICAL PROBLEMS

The connector inventory data revealed high percentages of certain geometric and physical deficiencies on LATTS Connectors. Included in the "Geometric/Physical Problem" definition are drainage problems, rough rail/highway crossings, horizontal/vertical bridge clearance restrictions, bridge weight limits, tight turning radii at intersections, narrow/unstabilized shoulders, and narrow travel way width (which restricts widening opportunities).

The data shows that both waterport and airport connectors have significant geometric/physical problems (77% and 58% of the connectors respectively have at least one). However, in both instances there are more problems on local jurisdiction connectors (see **Exhibit D3-30**) than on connectors under the jurisdiction of the state. Alliance members with a high percentage of connectors with geometric/physical problems are Florida, Louisiana, and Texas.

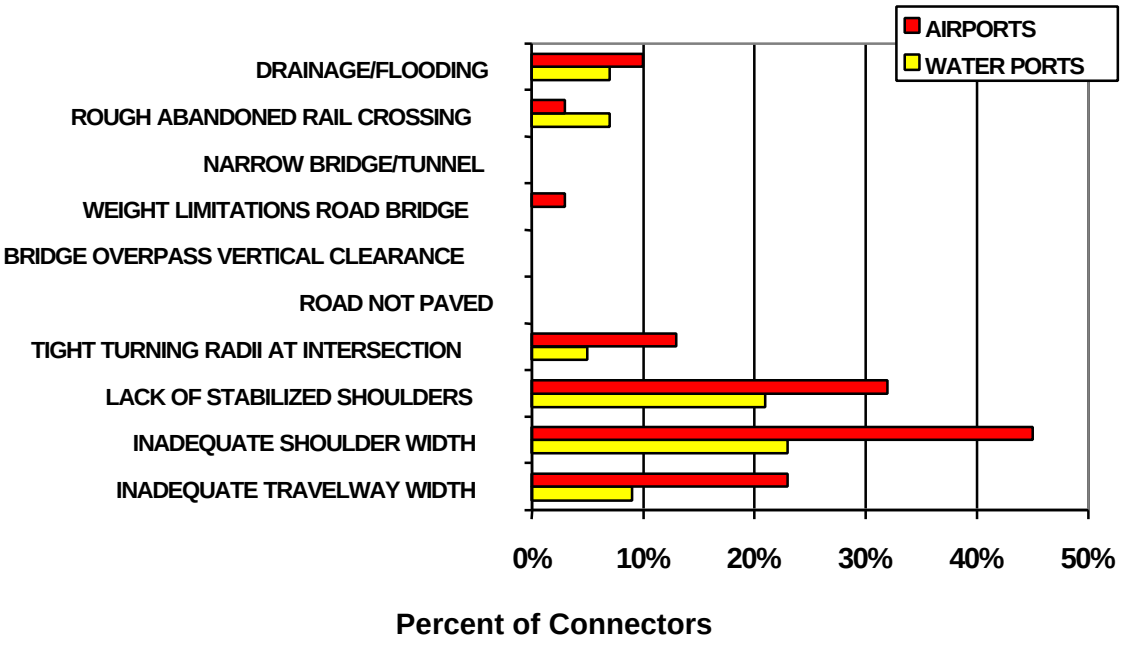
Exhibit D3-30
LATTS CONNECTORS WITH GEOMETRIC/PHYSICAL PROBLEMS
State vs. Local/Other

Geometric and physical deficiencies, like pavement problems, slow vehicle operating speeds. Trucks facing bridge clearance restrictions, inadequate

shoulders, tight turning radii, and rough rail crossings must reduce speed in order to operate safely. This, of course, affects delivery reliability and efficiency.

Exhibit D3-31 indicates that inadequate shoulder width and the lack of stabilized shoulders is the most common geometric/physical deficiency, followed by inadequate travel way width.

Exhibit D3-31
GEOMETRIC/PHYSICAL PROBLEMS
LATTS Connectors

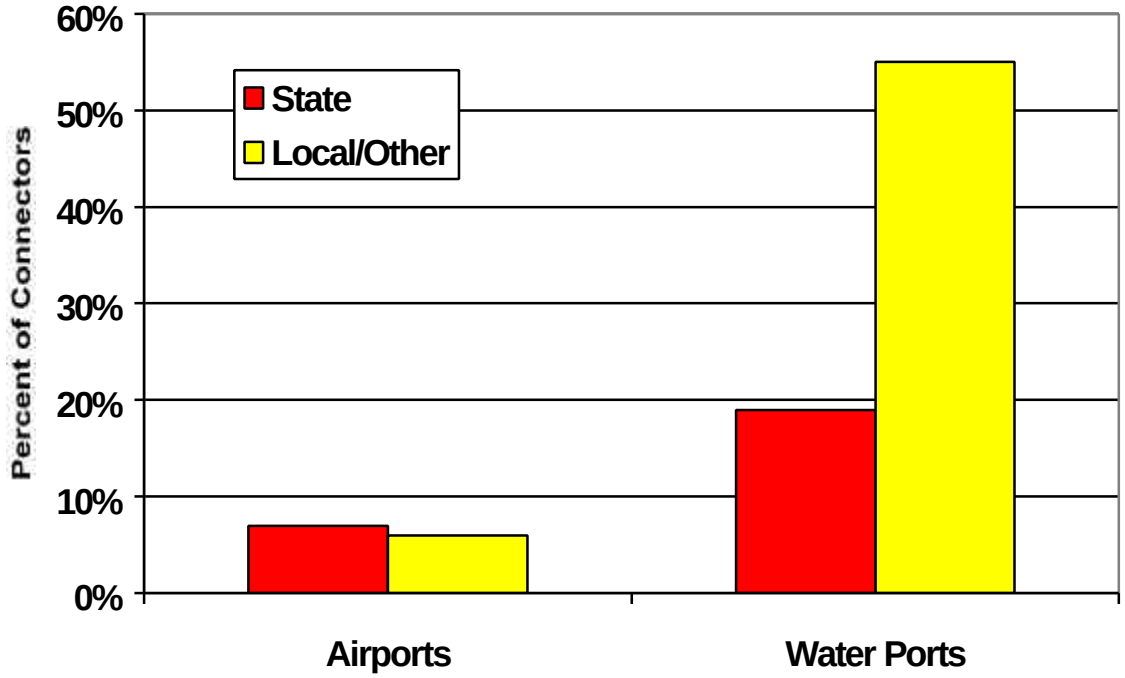


Connectors with At-Grade Railroad Crossing Problems

At-grade railroad crossing problems can severely impact the quality of access to intermodal facilities. Railroad crossing problems such as rough crossings, delays, extended switching operations, lack of an alternate route, inadequate sight distance, and warning device problems (missing, broken, inadequate) are fairly common on LATTS waterport connectors, with 39% having at least one deficiency. Waterport at-grade crossings under local jurisdiction have a much larger share of problems (55%) than their state counterparts (19%). Airport connectors, predictably, have fewer at-grade rail crossing problems (see **Exhibit D3-32**).

States with the greatest share of rail crossing problems on LATTS connectors include Mississippi, Texas and Louisiana.

Exhibit D3-32
CONNECTORS WITH AT-GRADE RR XING PROBLEMS
State vs. Local/Other



Rough at-grade crossings are the most common problem in this category. It was also discovered that the lack of an alternate route, warning device deficiencies, and delays were common problems. **Exhibit D3-33** illustrates the different deficiencies inventoried in this area of the survey.

Connectors with Traffic Operations and Safety Problems

Traffic operations and safety problems include on-street parking conflicts, frequent accidents, intersection problems (lack of signals or turning lanes, difficult right turns, signal timing), and congestion. Nearly 75% of LATTS waterport connectors have at least one traffic/safety problem. Contrary to patterns regarding other deficiency types, 81% of state jurisdiction connectors have at least one deficiency, compared with 58% of local jurisdiction waterport connectors. Fewer airport connectors (58%) have at least one traffic/safety problem, with more state than local deficiencies (92% vs. 33%) (see **Exhibit D3-34**).

Exhibit D3-33
RAILROAD CROSSING PROBLEMS
LATTS Connectors

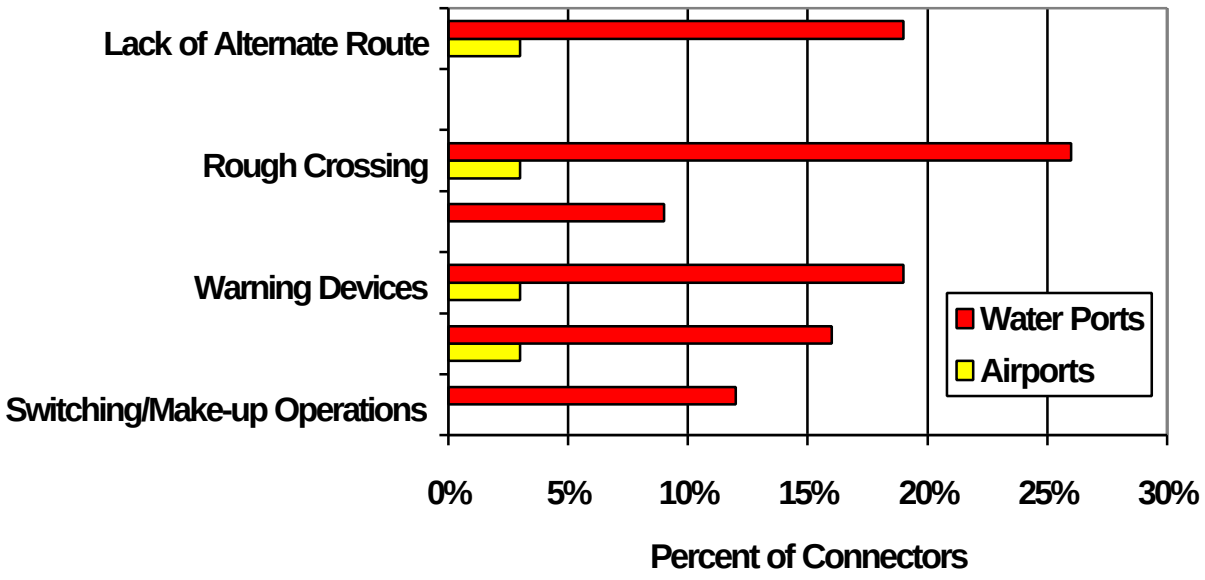
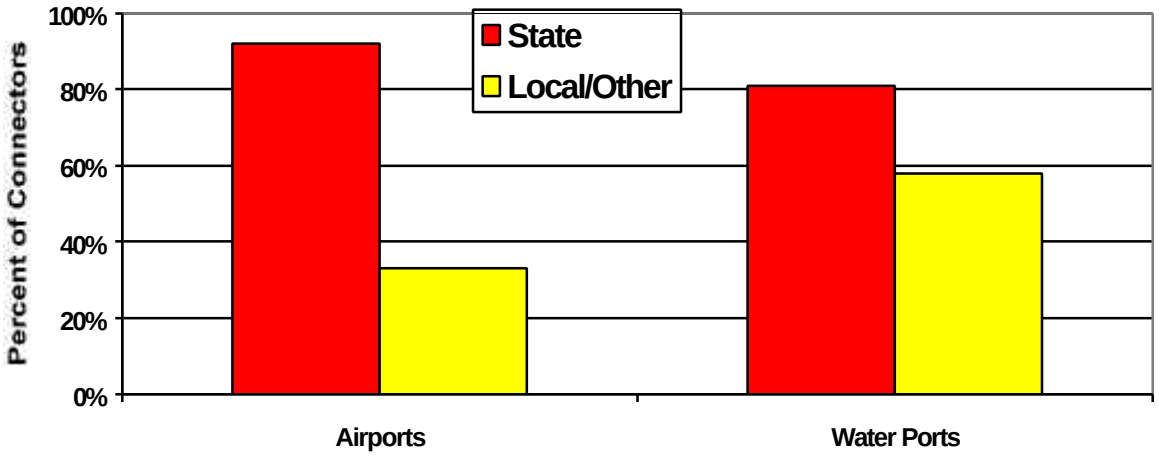


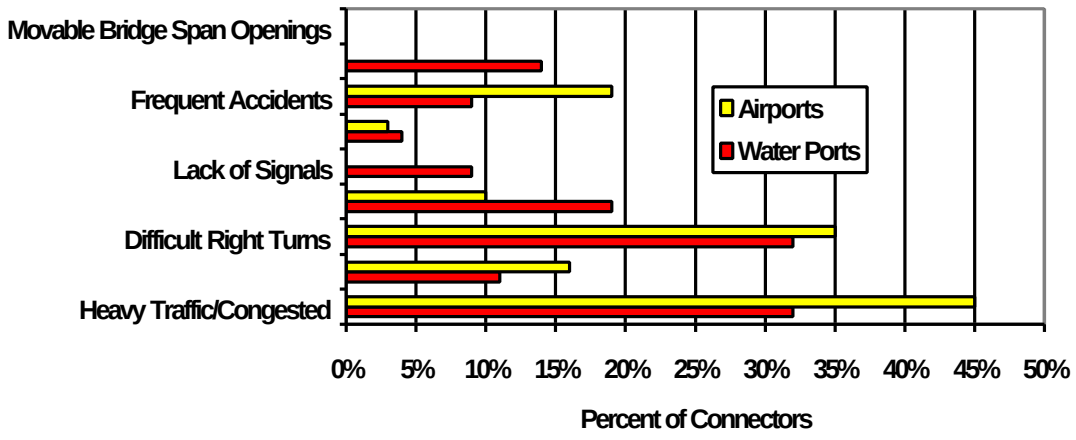
Exhibit D3-34
LATTS CONNECTORS WITH TRAFFIC OPERATIONS & SAFETY PROBLEMS
State vs. Local/Other



Heavy traffic (congestion) and intersection turning problems are the most frequent traffic/safety deficiencies mentioned for both waterport and airport connectors. **Exhibit D3-35** shows the distribution of different deficiency types.

Alliance members with higher than average operations/safety deficiencies on intermodal connectors include South Carolina, Florida, North Carolina, and Puerto Rico.

Exhibit D3-35
TRAFFIC OPERATIONS & SAFETY PROBLEMS
LATTS Connectors



SUMMARY

Many deficiencies on LATTS connectors were revealed by this analysis. It should be emphasized that, with the exception of pavement condition analysis, none of this information is quantitative in nature. Also, the data does not indicate the degree to which the different deficiencies affect the accessibility to any LATTS facility. The data does however provide insight into a growing concern in the national arena, the reduced efficiency of and congestion around landside cargo facilities.

The primary findings from the LATTS Connector analysis are summarized below.

Waterport Connector Issues

- 54% of waterport connector miles are local jurisdiction
- More than 80% of waterport connectors have at least one deficiency, and 45% have two or more
- Pavement condition problems are more prevalent on local jurisdiction connector roadways – more than twice the U.S. average

- More than 75% of the connectors have geometric/physical problems, including shoulder type/width, turning movement restrictions, and narrow travel way

- Nearly 40% of the connectors have rail crossing deficiencies, notably rough crossings, delays, lack of alternate routings, and devices; more than half of the local jurisdiction roadways have rail crossing deficiencies

- Congestion and difficult right turns are common problems, especially on local roadways

Airport Connector Issues

- Nearly 60% of LATTS airport connector miles are local jurisdiction

- Shoulder type/width deficiencies and safety problems are prevalent

- Congestion, delays, turning restrictions are high, especially on state jurisdiction roadways

Jurisdiction Issues

Lack of adequate financial resources makes it difficult to address all connector issues or deficiencies. Another factor that complicates the connector issue is the mix of jurisdiction and responsibility – more than half the LATTS Connectors are the responsibility of local agencies. This pattern of jurisdictional responsibility presents a significantly different set of problems for the Alliance members as they try to address connector problems. It contrasts with the mainline LATTS Strategic Highway System for which the state governments have jurisdiction over all the mileage. Coordination between more than one level of government is not an issue for the mainline portion of the System.

On the other hand multiple agency ownership of LATTS connectors complicates planning for these facilities. Local agencies typically have fewer financial resources upon which to draw, and their transportation priorities may be concentrated on high volume arterials and congestion hotspots instead of lower volume connectors to intermodal facilities. In order to successfully address connector issues, more coordinated, comprehensive planning is needed to cut across jurisdictions.

SECTION E
ALLIANCE REGION INVESTMENT STRATEGIES

As noted in the initial announcement regarding the Latin America Trade and Transportation Study, the Southeastern Transportation Alliance was formed "…to assess infrastructure development required to capitalize on international trade with Latin America." Through the execution of this study, the Alliance desires to enhance economic development in the Alliance Region by taking advantage of the accelerating opportunities for trade with Latin America.

In preceding sections of this report, trade opportunities have been assessed, evaluated and forecast. Also, evaluations regarding relevant transportation infrastructure have been presented along with an identification of the infrastructure investments that would support the identified trade opportunities.

Proceeding from these assessments and evaluations, investment strategies were identified for the public sector component of each of the transportation modes. These investment strategies are presented in this section of the report with the intent that they will guide strategic decisions by the Alliance Region and its constituent states.

It may be noted in the subsequent discussions that not all of the strategies are specifically concerned with investment decisions. Instead, some of the initiatives involve institutional arrangements, partnerships, public awareness, etc. While not directly involved with capital programming decisions, these initiatives will influence the environment and processes within which investment strategies are conceived, evaluated and adopted. Use of this broader concept of "investment strategies" permits a more complete consideration of all of the initiatives that are of significant importance to the LATTS goal and supporting objectives, as discussed below.

OVERALL APPROACH

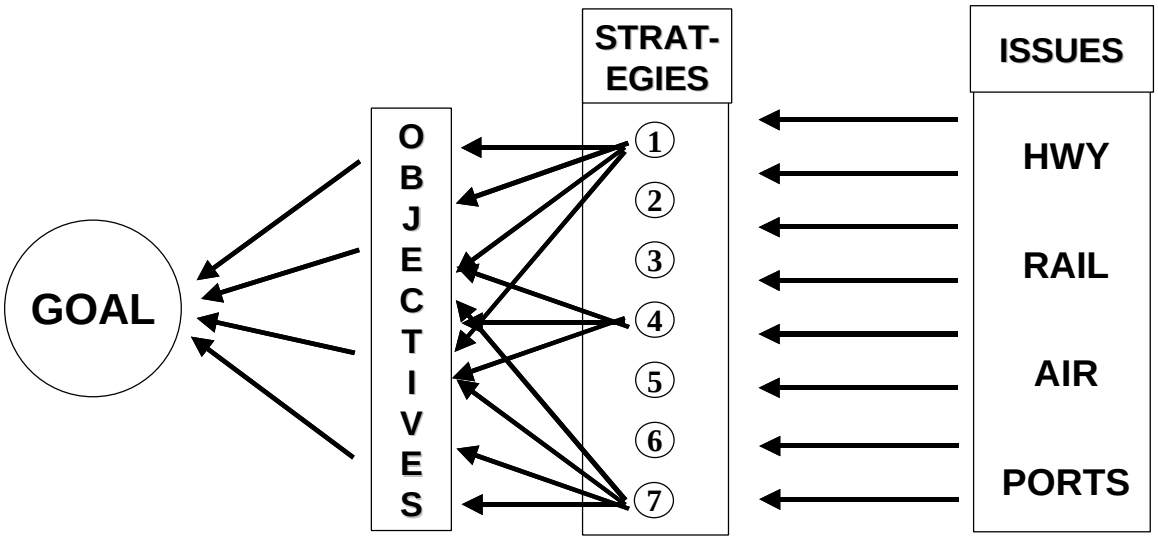
Development of LATTS investment strategies followed an orderly and structured process. The diagram presented in **Exhibit E-1** depicts the principal elements of the approach.

GOAL

The goal of the Latin America Trade and Transportation Study (noted above) framed the study task structure that was undertaken. Effectively, it also framed the goal which the investment strategies are intended to support. The overall goal may be summarized as follows.

> ***Goal*** *– Support economic development through improved transportation for trade.*

Exhibit E-1
INVESTMENT STRATEGY OVERVIEW



OBJECTIVES

Several objectives must be achieved if the LATTS goal is to be accomplished. Attainment of the following objectives, in turn, is the intent of the investment strategies which are presented subsequently.

1. **Regional Competitiveness** – Because of its proximity to Latin America, the Alliance Region has distinct geographical advantages with regard to trade with these countries. Effectively, the Alliance Region enjoys a significant advantage because of its geographical relationship to Latin America. To capitalize on this advantage, a number of measures such as a strong, well-educated labor force, favorable environment for industry and commerce, etc. is required. Provision of an adequate transportation system also will enhance the opportunities that derive from the Region's relatively short trade distances to Latin American markets.

   In particular, through the removal of bottlenecks and implementation of other freight facilitation measures, the transport cost component of the overall product cost equation will be reduced. This will yield advantages to those businesses which rely on the LATTS Strategic Transportation System for freight transport. This advantage extends not only to the Alliance Region's relationship to other states or groups of states in the U.S. but also to other western hemisphere countries and, indeed, global competitors.

2. **Freight Mobility** – Accommodations for freight mobility must be such that the Region is positioned to capitalize on the distinct geographical advantage it has with Latin America. The Region's transportation system must be capable of handling the wide variety of cargo origin/destination patterns, shipment

types, and service and handling requirements that are associated with trade with Latin America. The selection of strategic initiatives which follows will provide an optimal level of freight mobility, involving multiple choices of mode and allowing freight to reach markets and customers on a timely basis and at a low cost. This will ensure that the Region continues to enjoy advantages regarding freight mobility.

3. **Interconnected Multimodal System** – Achievement and continuance of a high level of freight mobility will require an interconnected multimodal transportation system. As noted throughout this report, there is a wide diversity in the characteristics of trade flows to and from Latin America. These diverse circumstances require that there be a high degree of flexibility available to shippers so that their specific needs and changing circumstances can be accommodated. Only an interconnected multimodal transportation system will provide the type of flexibility that is required. An interconnected multimodal system will provide modal alternatives and operational efficiencies that translate into faster connections, greater flexibility and safer conditions, thereby allowing freight to move in the most efficient and timely manner that is feasible.

4. **Efficiency** - Transportation efficiency embodies a number of features including directness of routing, responsiveness to a variety of transit time requirements, capacity, accommodation of freight handling needs, flexibility to address changing circumstances, transit reliability, etc. These features determine the ability of the transportation system to accommodate the diverse and frequently changing needs of international (and domestic) freight. Additionally, they affect the transportation costs of freight which, in turn, affects the competitiveness of industries engaged in trade with Latin America. Transportation investment strategies should ensure that the various transportation efficiency features are achieved.

5. **Environment** – The provision and maintenance of a high-quality transportation system that is responsive to the needs of international and domestic trade flows cannot be at the expense of a significant reduction in the environmental qualities that are highly regarded by the public. While some impacts are inevitable just because trade volumes will increase, responsible and feasible ameliorative actions are needed to ensure that the environment is not unnecessarily degraded. Indeed, if transportation investments are appropriately planned to handle increasing trade flows, the impact of higher volumes will be minimized. Further, the design and operating features of the future transportation system must, by statute, be in a manner that responds to environmental requirements.

6. **Safety** – Implementation of the LATTS investment strategies cannot be allowed to compromise transportation safety concerns. Appropriate safety features are required in the transportation system so that both freight and personal travel are accommodated without undue risk. Indeed, some of the deficiencies noted in earlier sections of this report have safety implications.

Decisions regarding transportation investments must weigh all considerations so that safety-related projects are appropriately addressed.

7. **National Security** – Recent times (e.g., Desert Storm) have demonstrated the need for the Alliance Region transportation system to respond to major surges in demand such as those associated with emergency national security needs. Indeed, as denoted by the name National System of Interstate and Defense Highway, planning for some transportation facilities explicitly addresses national security needs. Implementation of the LATTS investment strategies will not only improve mobility for freight and personal travel, but will also improve the capability of the nation's military forces to carry out their missions.

INVESTMENT STRATEGIES AND TRANSPORTATION ISSUES

The transportation investment strategies which evolved from the LATTS analysis and evaluations are supportive of the goal and objectives discussed above. Development of these strategies also took into account the various issues which were identified for each transportation mode during the course of the study. These issues constitute impediments to the realization of the goals and objectives that are the focus of the LATTS investment strategies.

Guiding Themes

The following three themes served as a guide for the development of investment strategies for each transportation mode:

- **Systems Approach** – While transportation facility planning often tends to focus upon individual facilities and services, a much broader approach is essential in planning for Latin American trade flows. As noted throughout this report, the focus of LATTS was upon Latin American trade but it also was essential that LATTS address total worldwide trade flows that affect the Alliance Region. Similarly, LATTS did not focus upon individual transportation facilities. Instead, all components of the transportation system in the Alliance Region that already serve Latin American trade flows, or which potentially could serve these flows, were identified and addressed.

- **Modal Choice** – With the exception of some of the Latin American trade flows across the Texas/Mexico border, virtually all trade with Latin America involves the use of more than one transportation mode. This partially is due to geographic conditions which require a mainline movement by water or air (again, excepting cross-border traffic), with domestic distributions using a variety of modes. The multimodal pattern of Latin American trade flows also is reflective of the huge diversity in the nature of the commodities which are shipped and the roles these commodities play in the industrial production and commerce sectors. A multimodal transportation system with a large variety of transportation services (e.g., door-to-door services, express services, "time-definite" services, integrated logistics services, etc.) is required to accommodate the vast variety of commodities and service requirements of business enterprises that are engaged in trade with Latin America.

- **Dynamic Economy** – Economic conditions which drive trade with Latin America are dynamic by their very nature. Indeed, the pace of economic change has been accelerating rapidly in recent times and, in all likelihood, will continue to do so for the foreseeable future. This partially reflects the changes in industrial and commercial technology, particularly that which is associated with communication systems. Additionally, it reflects the changes which occur in the overall economy of the United States as well as all of the international trading partners, including Latin American countries. While the approach taken by LATTS has been forward-looking, clearly it is not possible to anticipate fully the changes in economic conditions that will actually occur. The economic trends identified and forecast by LATTS will require periodic reexamination to determine the impact of economic changes that cannot fully be anticipated.

General Strategies

The strategic initiatives which evolved from these evaluations and assessments resulted in the identification of a series of basic strategies that will aid the Alliance in achieving its goal and the supporting objectives. The strategies generally fall into the following categories:

- **Utilization of Existing Infrastructure** – Because of scarce resources, it is essential that the existing transportation infrastructure be utilized in the most effective and efficient manner. Strategies designed to achieve optimal utilization primarily will support the LATTS objectives regarding regional competitiveness, freight mobility, efficiency and national security.

- **Add Physical Infrastructure** – In some cases, even the optimal use of existing infrastructure will not obviate the need to add capacity and connectivity to the transportation system. Accordingly, prudent investments in new physical infrastructure clearly will be required. Strategies involving additional infrastructure will support the LATTS objectives regarding regional competitiveness, freight mobility, interconnected multimodal system, efficiency, safety and national security.

- **Increase Operating Throughput** – Strategies to increase operating throughput overlap and are significantly interrelated to some of the other strategic initiatives discussed herein. In combination, implementation of these initiatives will ensure that the LATTS Strategic Transportation System is capable of accommodating the expected increases in trade with Latin America as well as the other transportation demands that are placed upon the system. Initiatives designed to increase throughput capacity will support LATTS objectives regarding regional competitiveness, freight mobility, interconnected multimodal system, efficiency and national security.

- **Corridor Approach for Investing** – Study analyses have documented a pattern of freight movements which often involve significant corridor volumes. Concentration of investments in major corridors will have a major impact upon the achievement of LATTS objectives regarding regional

competitiveness, freight mobility, interconnected multimodal system, efficiency, safety and national security.

- **Agile Freight Operations** – The LATTS Strategic Transportation System must be able to cope with major surges in traffic flows and with a variety of cargo handling and transportation requirements. Enhancement of the agility of the system to adapt to these circumstances will support LATTS objectives regarding regional competitiveness, freight mobility, interconnected multimodal system, efficiency and national security (including military deployments).

- **Improved Clearance Processes at Gateways** – A major challenge confronting the freight industry is to optimally improve clearance processes at gateways such as customs inspection stations and cargo delivery through freight terminal gates. These initiatives will support LATTS objectives regarding regional competitiveness, freight mobility, efficiency, and national security.

- **Attention to Connections** – Another major challenge is the facilitation of freight movements between freight terminals and mainline facilities. Strategies which address the needs of intermodal connectors will support LATTS objectives regarding regional competitiveness, freight mobility, interconnected multimodal system, efficiency, environment, safety and national security.

- **Encourage Technology** – Transportation technological advances often have a significant impact in terms of productivity gains. Initiatives designed to achieve optimal productivity through technology will support LATTS objectives regarding regional competitiveness, freight mobility, interconnected multimodal system, efficiency, environment, safety and national security.

- **Information Integration** – Improvements in communication and data interchange within the freight industry will support LATTS objectives regarding regional competitiveness, freight mobility, interconnected multimodal system, efficiency and national security.

- **ITS Applications** – Strategies to employ Intelligent Transportation Systems (ITS) are interrelated and overlapping with other strategies which focus upon better use of existing infrastructure, increased throughput capability, agile freight operations and improved clearance processes at gateways. ITS strategies will support LATTS objectives regarding regional competitiveness, freight mobility, interconnected multimodal system, efficiency, safety and national security.

- **Increase Public Awareness** – Achievement of the LATTS goal and objectives is, in large measure, dependent upon public and political support. Only with this support will it be possible to implement the strategic initiatives which are proposed by this study. In effect, public awareness initiatives will be supportive of all of the LATTS objectives.

- **Improve Institutional Relationships** – Formation of the Southeastern Transportation Alliance for purposes of conducting the Latin America Trade and Transportation Study illustrates the benefits that can be achieved by enhanced institutional relationships. Additional initiatives to improve institutional relationships within the governmental domain will support all of the LATTS objectives.

- **Partnerships** – In addition to improved relationships between governmental institutions, there is increasing awareness of the need for partnerships between public and private interests. This is particularly true regarding the freight industry which is largely dominated by the private sector. Nevertheless, the public sector plays a major role in the provision, maintenance and operation of significant portions of the freight transportation system. Partnerships which enhance the interrelationships between the public and private sectors will be supportive of all of the LATTS objectives.

- **Improve Freight Profile** – In recent times, freight transportation has achieved greater visibility within governmental transportation agencies. This higher profile is warranted by the importance of freight transportation in the economic viability of communities, states, the Alliance Region and the nation as a whole. Accordingly, initiatives are needed to raise the profile of freight within transportation planning activities and investment decisions. Initiatives which increase the visibility and profile of freight will be supportive of all of the LATTS objectives.

Subsequent discussions present a series of strategic initiatives which broadly encompass the categories of strategies summarized above. Because there is considerable overlapping and interrelationships between these categories, subsequent discussions do not rigidly adhere to the categorical structure set forth above. For purposes of convenience and ease of understanding, initiatives are presented within those categories for which they have the best fit. Consequently, it can be noted that some categories seem to be less represented simply because of this approach. However, careful consideration will reveal that all of the categories are encompassed by the proposed strategic initiatives even if they appear to be under represented in the structure of the following presentations.

LATTS STRATEGIC PORT SYSTEM ISSUES

The issues identified in this section address the challenges and opportunities that face the maritime industry from a landside infrastructure perspective. Members of the LATTS Alliance are facing significant challenges in the next 20-years. These challenges pose several opportunities for the maritime industry to develop a viable future for the significant cargo growth projections that are anticipated. The port issues for the LATTS Alliance may be grouped as follows:

- Capacity Needs
- Efficiency
- Port Agility
- Intermodal Systems
- Hub and Feeder Concepts
- Competitive Barriers
- Environment
- Finance

Capacity Needs

The primary issue facing the LATTS Alliance ports is revealed by the capacity analysis performed in the study. The future 2020 estimated infrastructure need of approximately 10,051 acres for all cargo types in the LATTS Alliance Region identifies a significant issue in relation to the future capacity needs for the projected cargo growth. The needed 10,000 + acres are in addition to the existing 7,327 acres that comprise the port infrastructure that was considered in the analysis. To accommodate future cargo projections with current infrastructure and operations, approximately 10,051 additional acres are needed.

It is important to make the correlation between the projected cargo tonnage increases and a physical need such as infrastructure acreage to better understand the capacity issues facing the Alliance Region. For example, the Port of New Orleans has begun to identify and address such future needs by considering possible opportunities to accommodate the potential cargo growth. The Port of New Orleans' Millennium Port Project considers the future need of approximately 250 acres of new container terminal infrastructure by the Year 2020. However, the infrastructure need in the Millennium Port Project considers relocating the current infrastructure as well as developing additional container terminal acreage.

Additionally, it is important to understand that the LATTS Alliance Region is not the only region within the United States that requires significant infrastructure improvements to handle projected cargo growth. For example, the Port of Los Angeles (POLA) and the Port of Long Beach (POLB) have recognized the future need for improved capacity at their facilities. A conservative estimate of the San Pedro Bay port's container growth projections shows a potential increase of three to four-fold by the Year 2020. This conservative estimate includes the continuation of the "Asian Flu" through the 20-year planning life. Such a growth in container cargo is estimated by the POLA and POLB to approximately equal an additional 9,400 acres of container terminal infrastructure to accommodate the throughput increases under current development and operating practices.

The remaining seven LATTS ports issues were derived from the capacity needs identified in this analysis or they have a direct impact on the implementation of accommodating the need. Either way, the following LATTS port issues are all effected or are affected by the estimated future capacity need in the Alliance Region.

Efficiency

Increasing marine terminal efficiency is the primary alternative to developing additional infrastructure. The majority of the LATTS ports are operating at adequate throughput efficiency levels. However, these efficiency levels are dependent on current industry technology and operating practices. Most ports have not completely embraced some of the Information Technology (IT) concepts that are available. Some of the new IT concepts have the potential to increase

efficiency and productivity at marine terminals, thereby lessening the acreage development that might otherwise be needed.

For the past decade, the port industry has been experiencing the new information age through various methods of communication and data interchange such as Terminal Operating Systems (TOS), Intelligent Transportation Systems (ITS), Automatic Equipment Identification (AEI) technology and cargo tracking systems. These IT concepts have a significant impact on the operations and physical requirements associated with marine terminal development. Potential efficiency increases are being identified in the development of intermodal systems, port agility and hub and feeder concepts.

As an alternative to developing additional infrastructure, the maritime industry should consider ways to maximize the efficiency of the current terminals. New technologies and concepts will have a direct effect on equipment utilization and operations at marine terminals that will provide increased efficiencies.

Another issue that affects the efficiency with which port capacities are utilized is associated with restrictive provisions in labor working arrangements and contracts. Work rules for longshoremen and other covered dock workers at some unionized seaports limit the ability of port management to implement changes regarding the hours of operation and, in some instances, changes involving advances in throughput technologies and mechanization that would lower overall handling costs. These constraints affect the ability of ports to achieve optimum efficiency in the use of capacity associated with port infrastructure.

Port Agility

Port agility concepts are being developed and assessed by several organizations within the United States. The Center for Commercial Deployment of Transportation Technologies (CCDoTT), a DOD funded research arm of the California State University at Long Beach, is addressing the DOD perspective on port agility. Port agility involves the ability of a commercial marine terminal to provide increased throughput capacity for military cargo during times of military surge, deployment and sustainment, with minimal disruption to existing cargo flows and port operations. In addition, this definition of port agility includes the capability of a marine terminal to remain flexible enough to accommodate multiple cargo types (i.e. container, break bulk and ro-ro).

As of the time of this report writing, CCDoTT was assessing and developing port agility concepts that apply to West Coast container operations while the Maritime Administration (MARAD) is leading an effort to assess the requirements and benefits for implementing a port agility concept in the Philadelphia region. The Philadelphia work is geared toward assessing the potential productivity increases of implementing an Agile Port System (APS) in the region for container, breakbulk and ro-ro terminals. The potential productivity increases will provide additional capacity at existing marine terminals while also providing the surge capability for the military.

Intermodal Systems

The service characteristics needed to enhance economic opportunities in current circumstances has been described as follows:

> *"In today's just-in-time shipping environment, importers and exporters are demanding that port authorities play a more assertive role in facilitating swift movements of their shipments….increasingly, shippers say, they want a total service from ports, including everything from frequent calls by ocean carriers to modern terminals and on-dock rail yards, to efficient highway and rail infrastructure….their wish list also includes extensive truck and rail service, professional treatment by Customs, and a productive labor force….when one or more of these elements break down, shipper's loyalty to a port (or region) begins to ebb and they look for alternative gateways….we don't want any bottlenecks….(The Journal of Commerce, June 16, 1997)."*

Current shipping and business practice calls for the delivery of product in inventory real-time, as needed. Nowhere is this "just-in-time" logistical supply chain for business more evident than in manufacturing and shipping. Many "value-added" manufacturing enterprises operate 24 hours per day and depend on the timely delivery of chemicals or partially assembled parts for production and the timely removal of finished product to keep operations and final assembly on-time and on-budget. Passengers transported to and from seaports for cruise travel are no different. Cruise operators also depend on "just-in-time" delivery of passengers, their baggage, as well as the provisions for their ships.

Port users, because of competition, are always looking for transportation savings when and wherever possible to maintain and grow their customer base. When transportation congestion is problematic on the routes between port and railhead or port and point of destination, transportation costs rise (labor, fuel, time) and their competitive edge diminishes. The ultimate losers in this process are the local, statewide, and regional communities that derive the economic benefit from the transport of international commerce.

The Alliance Region's continued growth in trade and its ability to attract new manufacturing and support industries are threatened if seamless, cost-efficient, intermodal transportation is overlooked. "Bottlenecks" at seaport or riverport gateways must be eliminated. Balanced system capacity is essential to maintaining the free flow of goods across port boundaries. Unless the landside intermodal system, consisting of the roads and railroads that are the "connections" to seaport and riverport gateways, match a port's own pace of throughput, the resultant bottlenecks will defeat the concept of "integrated, fast, and competitive."

Most "deficiencies" occur primarily in the shorter distances such as the immediate connections to the seaports or riverports, the congested urban streets over which trucks must move cargoes, and even the major arterials leading to somewhat distant industrial parks, warehouse, transloading facilities, and rail yards. Most of the bottlenecks impeding the integrated, fast and competitive

movement of goods occur at these locations, the on-port/off-port intermodal connections.

In the future, if these "deficiencies" are to be overcome, Alliance Region members must work collaboratively to develop a realistic estimate of the unfunded seaport-riverport related intermodal access needs on five, ten, and twenty year horizons. Once this is accomplished, then the most difficult variable, "financing" those needs, becomes the issue. This topic is also discussed in the "Highway" portion of this report section.

Agile Port System

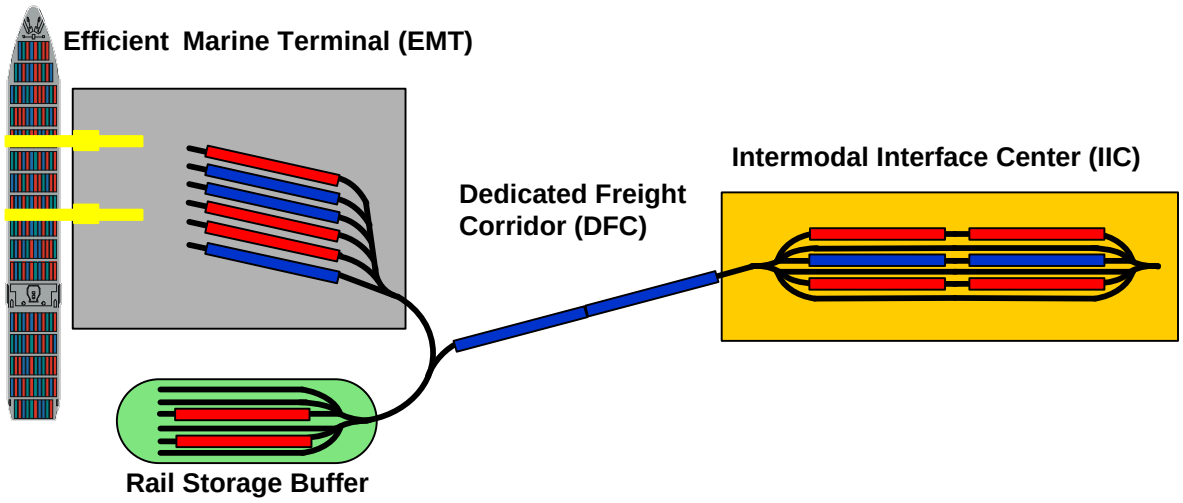
APS is being developed and assessed as one of various multimodal/intermodal concepts capable of accommodating a regional need for increased throughput capability and flexibility. In addition, all port agility attributes are applicable to APS concepts and include the integration and interoperability of all modes of transportation (i.e. marine, rail, truck, air) and their associated modal data.

By taking a systemic approach to port agility, increased productivity and additional efficiencies are attained. These are obtained by connecting multiple conventional marine terminals (no new equipment or infrastructure) to one or two Intermodal Interface Centers (IIC) with freight corridors (truck or rail). The APS concepts being developed address the need to move cargo through marine terminals at a higher velocity, thus increasing the throughput capacities of existing infrastructure. To accomplish the higher cargo throughputs, it is necessary to move the cargo storage, distribution and staging operations to the IIC at an inland location where development costs are lower and connectivity to highway and rail corridors is available.

A concept that is currently being assessed and developed by CCDoTT is called the Efficient Marine/Rail Intermodal Interface (EMRII) System (refer to **Exhibit E-2**). This patented concept envisions loading and unloading large amounts of container cargo in a rapid operation to increase cargo throughput at ports. The EMRII system uses simultaneous load and unload operations at the port between the vessel and "on-dock" rail loading tracks. Shuttle trains transfer the containers along a dedicated rail corridor between an Efficient Marine Terminal (EMT) and an IIC.

Such a systemic approach to accommodating marine cargo places a high demand on the cooperation between marine terminal, railroads, trucking companies and shippers. To successfully implement an APS it is necessary to provide the proper data for all parties involved. Therefore, the integration of various IT concepts and technologies is needed to bridge the communication gaps between all transportation modes and the terminals.

Exhibit E-2
CONCEPTUAL DIAGRAM OF THE EMRII SYSTEM



Hub and Feeder Concepts

The hub and feeder concept is the preference of large oceangoing carriers and many of the carrier alliances. This concept is designed to reduce port-of-calls for the carriers by utilizing larger capacity vessels and a network of feeder vessels serving a variety of ports. Like the hub and spokes of a wheel, the feeder portion of this system allows greater flexibility of service. Since the hub port provides the primary storage function for the hub carriers, much smaller vessels have access to cargo which, in turn, service smaller ocean and riverports. While the hub carrier vessels range from 3,000 to 6,000 TEU capacity, the feeder vessels carry as little as a few hundred twenty-foot equivalent units (TEU), particularly barge feeder services.

Competitive Barriers

The nature of the port industry is naturally competitive. Most ports are very competitive with their neighboring and regional counterparts. To implement systemic approaches for increasing cargo throughput with existing infrastructure, many of the competitive barriers that prohibit communication between carriers, shippers, terminals etc. will need to be eliminated or reduced.

Ports and railroads are beginning to recognize this need for communication of cargo transfer data and are benefiting from greater communication and coordination. Marine carriers and truckers will also need to join in and cooperate with all parties that are participating in the freight transportation chain. Increased communication between all transportation modes will not only benefit commercial freight but will also benefit military requirements. This type of increased cargo information sharing is a delicate process that will need to be implemented and

managed by a neutral party to ensure security and preservation of competitive advantages.

While it is very unlikely that the LATTS Alliance will develop into a large APS, regions (i.e. local, state, etc.) within the Alliance will be able to form an APS for their specific needs. This will require cooperation from neighboring ports and IIC terminals.

Environment

As the effect of industrial development and operations on the environment are better understood, new initiatives and constraints are being evolved that affect the development of port infrastructure. Recently, the California Coastal Commission (CCC) mandated that no new non-port designated area will be created in the state of California. This means that, while expansion of existing facilities is permitted, projects like the Port of New Orleans' Millennium Port would not be permitted. This type of environmental constraint has an adverse effect on the ability of a region to accommodate future cargo growth. Therefore, concepts other than developing new or additional infrastructure will need to be considered (i.e. higher efficiency and utilization of existing infrastructure).

Port development can have an adverse effect on the surrounding environment such as wetlands, riparion areas, shorelines and shallow water habitats. In many cases of environmental effects on these types of areas, appropriate mitigation is required to maintain the balance of the existing environment. In many cases, the required environmental mitigation is the minimum of a 1:1 ratio. For example, if 25 acres of wetland are claimed due to filling and constructing port infrastructure, the development of at least 25 acres of new or dedicated wetland is required.

As new technologies and additional infrastructure are developed for port activities, it will be necessary to minimize environmental impacts and their associated additional cost.

Finance

Development of marine terminal infrastructure is very costly. In most regions, new developments, retrofits and improvements to ports are typically subsidized or financed by means other than port revenue. Some of the financing sources available to ports include private funding, revenue or general obligation (GO) bonds, funding from the Transportation Equity Act of the 21st Century (TEA 21), National Corridor Planning and Border Infrastructure Programs and state and local grants and bond programs.

Innovative financing opportunities such as private/public partnerships and the Transportation Infrastructure Finance and Innovation Act (TIFIA) should be considered. TIFIA allows the U.S. DOT to provide credit assistance to public private sponsors of surface transportation projects. In addition, the possibility of combining funding opportunities between different transportation modes should be considered.

To accommodate the infrastructure and technology need of the future port industry, new and innovative financing alternatives will need to be developed and implemented. Similar to the demands on the existing port industry infrastructure and operations, current financing practices will not provide all that is required.

After appropriate sources of funding are identified, there are justifications for defining landside access projects to key intermodal facilities and port-related transportation projects as a special category for funding in the overall state and local transportation financing program. Once these projects are identified, and on the project candidate list, the state transportation agencies should collaborate with their metropolitan planning organizations to pare this list down to revenue reasonable annual funding priorities that eventually, over time, eliminate the deficiencies identified. The concept could be an entitlement work program similar to other work programs identified in the annual State Transportation Improvement Program. Although the work program for landside access and port infrastructure and for on-port infrastructure changes frequently due to market driven priorities, this type of structure has been shown to be effective by programs long underway in Florida and Louisiana.

LATTS STRATEGIC PORT SYSTEM STRATEGIES

The following strategies were developed by addressing the issues that were identified for LATTS Strategic Ports and the goal and supporting objectives adopted for the overall LATTS Strategic Transportation System.

Regional Competitiveness

The following summary of strategies consist of the maritime component of the LATTS objective regarding “Regional Competitiveness”:

Utilization of Existing Infrastructure - As cargo requirements increase, it will be important to maximize the utilization of existing port infrastructure prior to constructing new terminals. This approach will have a significant effect on how ports establish and maintain their competitive advantages between each other.

Develop Agile Freight Operations - As the systemic approach to the port industry begins to evolve, regional competition will begin to adjust to the needs of the region while maintaining competitive attributes within the ports. This is a significant hurdle for the port industry and will require a significant effort of cooperation and trust.

Encourage Technology/Integration of Information/ITS Applications -The first ports to implement a systems approach and to provide modal choice to their customers will have a significant advantage. However, it will be no small task for a port or region to provide the needed Information Technology (IT) solutions that their customers are beginning to demand.

Partnerships - Agreements between ports and other industries such as rail, truck and marine cargo carriers will become more important as the higher

demand for cargo throughput and efficiency occur. In addition, agreements between ports will become more prevalent as regional systems are developed.

Freight Mobility

The following summary of strategies constitutes the maritime element of the LATTS objectives regarding freight mobility.

Develop Agile Freight Operations - Freight mobility is becoming more dependent on the connectivity of different freight systems such as highway and rail infrastructure. By connecting the four transportation modes in a regional approach, the typical operations at marine terminals today contribute to increased productivity of freight mobility.

Improve Clearance at Gateways - To maintain efficiency and productivity within freight mobility, it will be important to increase the productivity of gateways such as customs inspection stations and cargo delivery through terminal gates.

Encourage Technology/Integration of Information/ITS Applications - The demand for IT capabilities to support requirements for cargo visibility, in transit rerouting, dynamic restowing of vessels and direct vender deliveries will help increase freight mobility. Improved information systems and equipment technologies will have a significant effect on port development and help accommodate the freight mobility needs of the port industry.

Improve Freight Profile - To support freight mobility, the freight profile or cargo type will evolve to the demand of the customer. For example, container cargo is the most agile unitized cargo in the freight system. To improve the freight profile of container cargo, the industry has undertaken innovations such as tagging for cargo tracking capabilities.

Interconnected Multimodal System

The following summary of strategies comprise the maritime component of the LATTS objective regarding “Interconnected Multimodal System”:

Utilization of Existing Infrastructure - From a multimodal system approach, it is important to maximize the utilization of existing port infrastructure prior to constructing new terminals. This approach will have a significant effect on how ports maintain and evolve their infrastructure to accommodate a systems approach.

Add Physical Infrastructure - In some cases where the cargo growth projections are fairly high, new infrastructure will be required. Implementing a multimodal system will not provide the needed cargo throughput capacity to accommodate all cargo projections. In addition, the retrofitting of existing port infrastructure and new infrastructure to connect the components of the system will be required.

Increase Operating Throughput - The primary goal for developing multimodal systems is to maintain a high level of cargo velocity within the freight system. The faster cargo passes through the freight system, the lower the burden on port throughput capability. This increase in port operating throughput will provide a significant amount of extra capacity in the Alliance ports to handle future cargo.

Corridor Approach for Investing - Investment strategies will be different as regional participation between a variety of multimodal system participants becomes more prevalent. Rather than competing between ports for investment opportunities, the industry is beginning to see ports combine efforts regarding investment strategies.

Develop Agile Freight Operations - The connectivity of different freight systems such as highway and rail infrastructure will require attention to agility as the systemic approach to the port industry begins to evolve. By connecting the four transportation modes with a regional system, the typical operations at marine terminals today will begin to change.

Improve Clearance at Gateways - To maintain efficiency within multimodal systems, it will be important to increase the productivity and security of gateways such as customs inspection stations and cargo delivery through terminal gates. One aspect of the multimodal systems is to allow pre-clearing of cargo at the marine terminal.

Encourage Technology/Integration of Information/ITS Applications - As APS concepts begin to develop in various regions, the demand for IT capabilities to support requirements for cargo visibility, in transit rerouting, dynamic restowing of vessels and direct vendor deliveries will increase. These improved IT capabilities will have a significant effect on port development costs and requirements.

Improve Institutional Relationships - One of the most challenging obstacles facing the implementation of multimodal systems requires a rethinking of institutional relationships. Ports will not be able to efficiently accommodate future cargo growth alone. Communication with other institutions such as the railroads will play a key role in the success of developing these systems.

Partnerships - Agreements between all modes of transportation (rail, truck, air and marine) will become more important as the higher demand for cargo throughput and efficiency begin to impact the existing infrastructure.

Efficiency

The following summary of strategies comprise the maritime component of the LATTS objective regarding “Efficiency”:

Utilization of Existing Infrastructure - It is important to maximize the utilization of existing port infrastructure prior to constructing new terminals. Increased throughput capacity can be reached by more efficient use of existing infrastructure. In most cases, the increased efficiencies are related to the proper use of IT.

Add Physical Infrastructure - In some instances, new infrastructure will be required. Implementing new efficient and systemic infrastructure will require proper planning to ensure the most efficient use of new infrastructure. In addition, retrofits to existing infrastructure should be considered as an alternative to new construction.

Increase Operating Throughput - Systemic approaches to port development are key to the increase of cargo velocity within the freight system. However new innovations in equipment and technology will help increase efficiencies at marine terminals. This increase in port operating throughput will provide a significant amount of extra capacity in the Alliance ports to handle future cargo and will have an effect on operating costs as well.

Develop Agile Freight Operations - Port operations in accordance with APS concepts will help increase efficiencies at marine terminals where intermodal operations occur. In addition, the capability of surging cargo with minimal disruption to marine terminal operations will contribute to increase efficiencies.

Encourage Technology/Integration of Information/ITS Applications - Without IT capabilities and all the benefits from new technologies and ITS applications, APS concepts could not exist. The heart and soul of APS is highly dependant on the benefits from information technology such as cargo visibility and in transit adjustments to freight flows.

Environment

While the need for additional infrastructure is a constant pressure, the port industry should consider the impact it may have on its surroundings. The following summary of strategies consist of the maritime component of the LATTS objective regarding “Environment”:

Utilization of Existing Infrastructure - The initial option for accommodating cargo growth should concentrate on rehabilitating or retrofitting existing infrastructure. However, some sites are environmentally unsafe and require a significant amount of cleanup. Some federal initiatives have been implemented to assist in the cleanup and development of “Brownfield” sites. These are sites that require a significant amount of cleaning of contaminants prior to developing future infrastructure.

Add Physical Infrastructure - In considering the addition of new port infrastructure, the EPA requires mitigation for claiming wetland areas while minimizing the impact of contaminants on wildlife, foliage and land. To preserve the environment, the port industry must consider the impact of future development on the ecosystem. Some ports go as far as mitigating with recreational areas, reclaimed wetland and other developments on port property.

Increase Public Awareness - ports need to educate the public regarding their contributions to the environment. Part of public acceptance of increasing port infrastructure is the public’s education of the existing environmental conditions

and potential impacts. Mitigation requirements and regulations have guided port development over the recent years. The public needs to be aware of these events to gain their acceptance of future development projects.

Safety

Ports are very busy work environments with large machinery and complex operations. Under these circumstances, it is important to provide a safe environment for workers to perform their responsibilities and duties. The following summary of strategies comprise the maritime component of the LATTS objective regarding "Safety":

Utilization of Existing Infrastructure - A constant effort is required to upgrade and maintain existing infrastructure to adhere to Occupational Safety and Health Administration (OSHA) regulations. These efforts include the renovation of existing infrastructure as well as new infrastructure

Increase Operating Throughput - As new types of marine terminals are being developed and new types of equipment are being used, OSHA regulations will need to adjust for the innovations. As cargo transfer becomes more rapid and freight flow begins to increase in velocity, safety issues will increase.

Encourage Technology/Integration of Information/ITS Applications - New innovations in technology for operating equipment are being developed to minimize the potential of worker injury. Better visibility of surroundings and operator friendly equipment will promote safe working areas at ports

National Security

Ports are primarily considered to be points of deployment from a national perspective of response to international instances. The U.S. military intends that future major foreign deployments will be more rapid and occur in less time than was taken in Desert Storm. This will place a significant demand on port infrastructure as troops and equipment are surged through the transportation system. The following summary of strategies presents the maritime component regarding the LATTS objective of "National Security":

Utilization of Existing Infrastructure/ Add Physical Infrastructure - To accommodate the future military requirements for surge and sustainment of military cargo through existing and future port infrastructure, new concepts such as APS will impact the way ports are developed and how they are retrofit with new equipment. Because the infrastructure that will be used by the military is developed for commercial use, innovative changes will be needed at ports to accommodate the military cargo.

Increase Operating Throughput/Develop Agile Freight Operations - To minimize disruption of existing commercial operations at ports, new operating concepts will need to be considered. Some of these innovative operations will be developed from APS concepts and others may be developed from new

equipment and new technologies. As military cargo demands change, operating requirements at ports will require new operating systems.

Encourage Technology/Integration of Information/ITS Applications - The military has a high need to understand cargo attributes such as what is in their containers, where their cargo is, where it is going, where it is coming from and when will it arrive. These requirements will not be met by military technology and IT capabilities alone. The military will need to utilize commercial technology and resources to better manage the transfer of their cargo through the freight system.

While there are significant needs and opportunities facing the port industry due to the future cargo projections in the LATTS Alliance Region, there are several challenges facing the industry as new and innovative concepts, operations and equipment are becoming more readily available. It is important for the Alliance Region to begin considering these issues to ensure the future viability of its port infrastructure and transportation system.

LATTS STRATEGIC AIRPORT SYSTEM ISSUES

There are a number of issues which weigh upon the ability of the LATTS Airport System to fulfill its functions within the overall LATTS Transportation System. This, in turn, presents challenges to the achievement of the LATTS goal and its seven supporting objectives. The most significant of these issues are summarized below.

Miami International Airport

Over 90 percent of the Alliance Region's airborne Latin American freight passes through gateways in Florida, with most of this traffic being concentrated at Miami International Airport (MIA). This is reflective of MIA's favorable location relative to Latin America as well as the strong cultural and socio-economic ties Miami-Dade County has with Latin America.

This high concentration of Latin American airborne freight at a single airport has certain advantages as it relates to domestic distribution. MIA serves as a major hub for this traffic ad the distribution pattern is of a hub and spoke nature.

Unfortunately, congestion at MIA is causing some concern, especially since there are limits as to what can be done to increase capacity by operational improvements and new facility construction.

Congestion at MIA is one of the reasons that other LATTS airports are beginning to serve growing volumes of Latin American airborne freight. In some cases, the growth in Latin American airfreight also reflects the geographical relationships of other LATTS airports to Latin America as well as the domestic distribution patterns that exist at these airports.

There are good reasons for the Alliance to encourage the growth of Latin American airfreight at other LATTS airports. This would help moderate the growth pattern of Latin American airfreight at MIA, thereby helping with

congestion problems at this major hub. It also would retain the Alliance Region's role as the major gateway for Latin American airfreight flows.

Constraints on Airport Expansions

As noted above, there are constraints at MIA which limit its ability to accommodate all of the growth in Latin American airborne freight which has been forecast by the LATTS analyses. Constraints also exist at other LATTS airports where congestion is becoming a concern such as Atlanta, Cincinnati, New Orleans, Charlotte, Dallas-Fort Worth, etc.

A long-term Alliance Region strategy must take into account the congestion levels that exist (and which are forecast) at those LATTS airports which are experiencing high traffic volumes and increasing congestion. Constraints on capacity expansion at these airports must be weighed against the benefits that would derive from promoting alternative LATTS airports to accommodate some of the future increase in air traffic. Of necessity, these evaluations will require consideration of total air passenger and airfreight flows since Latin American air traffic tends to be a small proportion of the total. Still, in improving Alliance Region's total airport system, this will benefit Latin American airfreight and further achievement of the Alliance's goal and supporting objectives.

Dominance of Air Passenger Traffic

Latin American airfreight tends to be a small portion of the traffic at most LATTS airports. Further, airfreight (including all trade sectors, not just Latin American air freight) typically involves a relatively small portion of total traffic at these facilities. The fact that commercial passenger airlines derive only 16 percent of their total revenue from air cargo partially indicates the secondary role of airfreight in the total aviation sector.

These and other factors sometimes result in airfreight being a secondary consideration in the planning and operation of airport facilities. While all-cargo operations typically receive reasonably high profile consideration, the largest airfreight segment (i.e., the 55 percent of air cargo carrying capacity which is in the bellies of passenger aircraft) appears to be getting diminishing attention. This is in part due to the higher overall profile of air passenger traffic and the many challenges airports and airlines are facing in their efforts to accommodate the growth in air passenger flows.

Consequently, except at a few airports like MIA, it is unlikely that the Latin American air cargo shipment of all air traffic will receive significant attention relative to other air traffic sectors. Special efforts will be required to raise the profile of this traffic segment and it is not clear that this is necessarily warranted given the many challenges which exist in the aviation sector.

Just-in-Time Shipments

While air passenger services continue to play a dominant role in the aviation sector, there are various changes in industry and commerce that are resulting in increasing volumes of airfreight. One phenomenon is the change in production philosophy to reduce inventory, storage and other costs via just-in-time

operations. For instance, Dell computer reportedly has adopted an operating philosophy to not manufacture products until the product is already sold. Saturn, the automobile manufacturer, tries to maintain an inventory of parts that does not exceed 18 hours of production.

Coupled with this type of production philosophy is the tendency for companies (or divisions of companies) to out source their logistics function rather than maintain an in-house logistics unit. Companies often determine that there are cost savings when they out source logistics services to integrated express carriers. The companies which do so often handle high-value, time sensitive products, i.e., products that are most suitable for transport by air. Also, these companies often have high inventory turnover, short product life cycle and rapid stock rotation. They typically require high levels of service such as that which is offered by the aviation sector.

Continued expansion of industries of this type will lead to further growth in airfreight. While a goodly portion of this has little to do with Latin American trade, it can be expected that this segment of airfreight will be impacted to some degree.

International Carriers

Another matter of concern is the expansion of the “open skies” policy. As this occurs, it is probable that more air freighters will be operated by international charters. The nature of international charter carriers tends to differ from domestic freight operators. These differences involve such things as available ground support equipment such as top deck loaders, availability of ground handling staff, customs processing, etc. This, in turn, places additional requirements on LATTS airports to handle international charters.

Multiple Types of Air Freight Operations

International charters as discussed above constitute one type of airfreight operations with which airports must cope. In fact, there are several different types of freight operations, all with their own requirements.

For example, regional airlines typically operate aircraft such as turbo-prop and regional jets that cannot accommodate large, bulky air shipments. On the other hand, airlines which operate wide-body aircraft, such as the B747, B777 and A300, have containerized lower decks. This allows greater speed in loading and off loading and provides the capability to handle larger, more bulky air shipments.

Another trend that has to be addressed is the increasing separation of air cargo operations from passenger airlines operations. The use of belly space in passenger aircraft is decreasing while the use of all-cargo aircraft is increasing. In part, this reflects changes in the weight and space accommodations for passengers and their baggage with a concomitant reduction in air cargo capacity. Further, airlines are trying to increase the amount of time aircraft spend in the air by reducing gate turnaround times. Shorter turnaround times reduce the window of time available for loading and unloading cargo.

Integrated express operators are another phenomenon that is changing the landscape for air cargo operations. Integrated express operators such as FedEx, UPS, Airborne Express, DHL Worldwide Express, USPS, Emery and Burlington Air Express provide next day, small package (two to 70 pounds) services. Increasingly, these carriers also are transporting "heavy" airfreight, i.e., shipments that exceed 70 pounds. Indeed, Emery and Burlington Air Express have always marketed themselves as express "heavy freight" carriers.

In addition, most "overnight" express operators now offer deferred service or second-day and third-day "time-definite" services. The lower cost deferred delivery market mostly is "time definite," meaning it is guaranteed to be delivered at the required time. This service is increasingly being used to move freight over 70 pounds. This change is significantly altering the dynamics of the air cargo industry. Forecasts suggest that deferred service will, at some time, surpass overnight delivery of letters, documents and packages, especially since facsimiles and electronic mail are cutting into the overnight letter and document market.

As these changes occur in the airfreight industry, they are having significant impacts that must be taken into account in planning for the LATTS Airport System. While the role of Latin American air cargo in these changes may not be a predominant consideration, the Alliance needs to keep this traffic in mind as it plans its airports to meet the needs of a changing world.

Trucking Growth in the Integrated Express Industry

There is a significant number of choices currently being offered to shippers by the air cargo industry for time critical shipments consisting of an expanding array of same-day overnight, deferred and time-definite options. In the U.S. domestic market, the LTL trucking industry, which is becoming increasingly automated, is also competing with the air cargo industry for time-critical, time-definite shipments on routes less than 1,000 miles. Substantial amounts of cargo shipped by second-day airfreight are in fact entirely transported on the ground, some by trucking companies owned or affiliated with air cargo carriers.

This situation has led to a blurring of the distinction between modes of transport. Integrated express carriers, passenger airlines and trucking companies use trucks and/or aircraft to serve the same market, although, with different products and different ways. In some cases, trucks and aircraft support each other, while in other cases they compete.

FedEx, UPS, and other integrators use trucks to smoothly interface with aircraft to provide "seamless", door-to-door service through their national sorting hubs. As the primary sort hubs reach capacity, however, the integrators are developing regional hubs to accommodate the growing volume. Depending on distances and product mix, the same destination city may be served as effectively by truck from a regional hub as by air from the national hub. Moreover, as non-overnight volume grows, the integrators also are increasing the amount of time-definite traffic that does not touch an airplane, but moves entirely by truck (at a fraction of

the cost) from origin to final destination. It is little wonder that UPS in now the largest trucking company in Europe and FedEx is one of the fastest growing trucking companies in the U.S. Two certificated airlines, LandAir International Airlines and Link America Airlines, do not own any airplanes, and transport all of their freight by long-haul trucks using their own two-letter airline identifier code and airbills. All shipments flow through a truck hub-and-spoke network operated to airline on-time performance standards.

Airport Access Roadways

Adequate on-airport and off-airport roadway access is as important to airfreight as it is to air passenger services. Good access is becoming even more important as the time-critical delivery of the freight industry continues to grow. In planning for airport roadways, due consideration should be accorded to the needs of freight operations, especially since they differ markedly from those associated with air passenger operations. Further, road freight vehicles vary from vans to tractor-trailer rigs. Accordingly, it is important that roadway access and staging area design include provisions for sufficient turning radii for large trucks while also addressing the needs of smaller cargo vehicles.

LATTS STRATEGIC AIRPORT SYSTEM STRATEGIES

The analyses of needs for the LATTS Strategic Airport System and the issues presented above have, in large measure, framed a series of strategies which will further achievement of the LATTS goal and its seven supporting objectives. These strategies are presented below and are organized on the basis of the LATTS objective for which they will have the greatest impact.

Regional Competitiveness

The proximity of the LATTS Strategic Airports to Latin American markets has been a major reason that the vast majority of Latin American air cargo gateways in the Alliance Region. Achievement of the LATTS objective to maintain and even increase the Alliance Regions share of these flows will be enhanced by the strategies discussed below.

Use of Existing Facilities

As previously highlighted, Florida handles over 90 percent of the Alliance Region's airborne gateway Latin American trade. Much of this is due to the proximity of Miami International Airport to Latin America as well as the cultural and socio-economic ties of Miami-Dade County with Latin America. Nevertheless, capacity at Miami International Airport is not unlimited and this constraint could result in more Latin American airborne cargo gatewaying elsewhere in the Region or even possibly outside the Region.

Accordingly, the optimal use of existing airport facilities is a useful strategy for maintaining and enhancing the Latin American trade advantages enjoyed by the Alliance Region. Clearly, there are a host of challenges and opportunities to improve the use of existing LATTS airports. While some of these are generally common to most LATTS airports, the very nature of each airport means that

usage optimization necessarily involves actions uniquely designed to fit the circumstances at each airport. Therefore, no single Region-wide approach is available. Nevertheless, it is important that, on an individual basis, each of the airports identify and implement measures which will ensure that past airport investments are used optimally. The basic aim should be to increase operational throughput, particularly at those LATTS airports which (1) are significant gateways for airborne Latin American trade and (2) which currently are experiencing operational challenges that could act as a restraint in accommodating the substantial increase in Latin American trade flows which are forecast to occur.

Additional Capacity at Existing Airports

While better use of existing airport facilities is an important initial strategy, it is obvious that the major increases in airport usage that have been forecast by the LATTS study cannot, in every instance, be accommodated by simply optimizing the use of existing facilities. Master planning at individual LATTS airports has addressed the unique needs of each airport to add capacity through expansion of existing facilities and/or the construction of new facilities. Strategies to implement the necessary capacity enhancement projects need to be developed (if they have not already been developed) to ensure that the additional capacity is in place in advance of the actual needs. This approach is necessary because failure to do so could result in the diversion of Latin American airborne cargo to other facilities. Once this is done, it will be difficult to recapture airborne cargo because carriers will have made investments and operational changes that create inertia to change.

Given the varied institutional environment in which airports exist, there does not appear to be much of an opportunity for the Alliance Region as a whole to undertake, on a regionwide basis, investment initiatives that address capacity additions. Consequently, this puts more of a burden on each Alliance member to undertake initiatives for LATTS airports within their state that require capacity expansions. In doing so, the unique ownership and funding relationships that exist in each Alliance state will be a major influence on the type of initiatives which are most appropriate.

Secondary Airports

A number of factors are giving rise to significant separations between operations which primarily serve air passengers and those which serve air cargo. Because of the rapid growth in air passenger travel, air cargo operations are increasingly being separated from air passenger services. Even though some 55 percent of air cargo capacity currently is in the bellies of passenger aircraft, the use of belly space is decreasing. Partly this is due to higher passenger load factors, which diminishes cargo capacity, particularly on long-stage flights where additional fuel is required. Also, faster turnarounds for operations which primarily serve passengers are decreasing the amount of time available for loading and off loading air cargo. Further, the share of the airborne cargo market held by integrated carriers is growing and those operators often use their own all-cargo aircraft.

Because of this growing separation, there is perhaps an opportunity to move some all-cargo operations to a secondary airport. There are, of course, significant benefits if this can be achieved. In the first instance, it would free up some operational capacity for passenger services at the primary airport. Secondly, in some instances, it possibly could free up space and facilities currently used for air cargo at the primary airport so that they could be used for expanded passenger operations. Thirdly, shifting some air cargo operations to a secondary airport would reduce the amount of conflict on the primary airport property and on primary airport ground access facilities caused by the different operational needs of passengers and airborne cargo.

Of course, development of secondary airports as the principal locations for all-cargo operations also faces numerous challenges. First and foremost is the fact that significant improvements are likely to be required at a secondary airport to accommodate all-cargo aircraft operations. Financing of those improvements likewise will be a challenge for a variety of reasons. In particular, air cargo operators are unlikely to willingly pay for all or a portion of such improvements if they can avoid such costs by continuing operations at a primary airport. To justify their participation in financing of such improvements, they would have to identify very major reductions in their operating costs sufficient to offset the cost of secondary airport facility improvements for which they might be asked to pay.

Despite these challenges, a number of secondary airports have successfully attracted cargo operations. Within the Alliance Region, Huntsville, Alabama is a notable example. Also, DHL has chosen to operate out of Page Field, a general aviation airport located in Fort Myers, rather than the Southwest Florida International Airport which serves commercial passenger airlines for the Fort Myers area. DHL made this choice because Page Field is less congested and is closer to DHL's customer base.

Freight Mobility

Air cargo, by its very nature, commands a high level of transportation mobility. The air mode often is the preferred modal choice for high-volume and time-sensitive freight. Accordingly, strategies are required that will enhance the mobility characteristics of airborne cargo.

Hub and Spoke Operations

Planning for the accommodation of increasing flows of airborne cargo needs to take into account the hub and spoke pattern that has emerged in recent times. This is particularly true for integrated express carriers which utilize a hub and spoke system similar to that which now characterizes passenger airline services. The FedEx operation at Memphis is a prime example of this type of operation.

Further, it is important to note that this hub and spoke pattern is changing to include regional or secondary hubs. For instance, as the volumes of cargo grew, FedEx established regional hubs in Alliance TX, Kansas City, Oakland, Indianapolis and Newark. Secondary hubs are dependent upon there being

sufficient volumes of cargo to justify such operations. Because a significant increase in airborne traffic has been forecast by the LATTS study, there is a strong possibility that the pattern of hub and spoke operations, coupled with secondary hubs, may result in more of the LATTS airports becoming major players. While it is not possible as a part of these LATTS analyses to determine the likelihood that additional LATTS airports may become air cargo hubs, Alliance members should be attentive to such possibilities because of the impacts it could have on the way LATTS airports function.

Improved Air Freight Profile

Planning for airports tends to focus upon passenger services because of the higher visibility they have. That is not to say that airfreight is ignored but it certainly is not a primary consideration. After all, only 16 percent of passenger airline revenues come from cargo.

Nevertheless, the substantial increases in air cargo that are forecast by the LATTS analyses deserve more than a casual consideration in planning for LATTS airports. Alliance members, functioning in their overall role for the airports in their respective states, need to ensure that airport master planning fully and adequately account for the growing volume of airborne cargo.

Interconnected Multimodal System

In most cases, very little air cargo originates at or is destined for the airport property itself. While commercial airlines generally provide airport-to-airport service, most air cargo is brought to and/or picked up at the airport from some off-airport sites. Consequently, a good interconnected multimodal transportation system is essential if the aviation sector is to fulfill its functions in freight transportation.

Integrated Services

Air cargo is sometimes brought to the airport by the shipper or the shipper's freight forwarder. At the destination airport, it sometimes is picked up by the receiver or the receiver's freight forwarder. The growing volume of air cargo has, however, resulted in an increasing portion of air cargo being handled by integrated carriers. It is important that airport master planning give an appropriate level of consideration to the facilities needed to accommodate these differing types of operations. Parking, maneuvering space, and freight handling facilities are needed to accommodate both small vans and large tractor-trailer units.

Access Roads

Airport access roads present a special challenge because airport authorities typically have no jurisdiction over such facilities. Instead, airport access roads are addressed in the overall metropolitan planning process. As a major road traffic generator, it is essential that the planning process adequately respond to airport access road needs.

Because of the high profile of all passenger operations, it is typical that little consideration is given to the need to accommodate the distribution needs of air cargo. Consequently, Alliance members have a responsibility to ensure that these freight distribution needs are appropriately addressed, especially in light of the significant increase in air cargo forecast by LATTS.

Partnerships with the Freight Industry

Metropolitan planning processes increasingly are addressing freight matters and are reaching out to the freight industry in various ways. Because of the unique interests of those who are engaged in the distribution of air cargo, it would be appropriate to ensure that they are included so that all freight needs can be identified and addressed.

Efficiency

If the aviation sector is to adequately fulfill its role in freight transportation, including that which involves Latin American trade flows, the system has to operate in an efficient manner. Nevertheless, a fair amount of attention is being directed at various matters which impede efficient aviation operations. Most of this attention is focused upon air passengers and the delays, frustrations, etc., which they encounter. Hopefully, LATTS analyses and findings will result in additional attention also being directed to matters which affect air freight.

Data Interchange

Airports with significant volumes of air cargo need to accommodate data interchange needs between various segments of the freight interchange. Provision of an easily accessible telecommunications system on site is an important component of the data interchange system.

Warehouse Space

Normal overnight delivery shipments tend to move through warehouses/sorting facilities rapidly so that delivery can be made within a 24-hour service window. Such shipments require a minimum of storage space.

On the other hand, there is continuing growth in delayed delivery services (i.e., two and three day services). This trend, in turn, is increasing cargo carrier's requirements for warehouse space. Air cargo facilities may need to increasingly consider options regarding multi-story buildings to accommodate this trend.

Environment

The LATTS objective regarding the environment must be supported by initiatives in the aviation sector. Airports are a point source of noise and air pollution that tends to receive high-profile attention by the public.

The initiatives for addressing these concerns apply equally to air passenger and airfreight operations. Because of the higher profile air passenger services tend to receive, these concerns usually are addressed in this context. Nevertheless,

the hub and spoke operations of integrated carriers have elevated the attention to high-volume airfreight operations, such as those at Memphis, TN. As Alliance members address the potential for the establishment of more hubs, or an increase in freight operations at existing hubs, the environmental impacts this would cause must be appropriately addressed. This is especially true since operations of integrated carriers at hubs leads to a high concentration of flights in certain time periods. This can have significant impacts on residential neighborhoods in the vicinity of such airports.

Safety

Air safety is a high profile issue and, as air traffic continues to grow, it is certain that it will receive increased attention. Many of the issues associated with air safety are out of the jurisdiction of Alliance members. Nevertheless, Alliance members need to pay appropriate attention to the safety aspects of aircraft movements at airports. Further, attention must be continually directed to property developments under flight paths, a matter of concern to both air passenger and air cargo operators.

National Security

While the LATTS Airport System fundamentally addresses the need for domestic and international airfreight and air passenger scenarios, it also plays a role with regard to national security. Joint use of airport facilities is a relatively common practice at many airports as the military conducts its defense readiness functions. Consequently, the peacetime joint use needs of civil and military operations are addressed on a routine basis.

Planning for major military deployments during times of emergency also needs to be addressed as airport planning is performed. This requires interaction with appropriate military units to understand fully the needs they might have to utilize LATTS airports to accommodate major surges in deployment of troops and equipment.

LATTS STRATEGIC RAIL SYSTEMS ISSUES

A number of general transportation and rail issues were identified during the course of the study and they are discussed in the following pages. Many of the issues are interrelated and some have a cause-and-effect relationships. They include the following general categories:

- Physical Capacity
- Operational
- States have Limited Jurisdiction
- Grade Crossings
- Megaload Centers
- Private Operations
- Funding

Capacity/Operations

Rail line capacity constraints today is a general issue virtually industry wide. Some of it is infrastructure related, and some of it is related to train operations. Currently in the LATTS Region, much of it is merger-related with the large carriers having just undergone major consolidations. The two principal railroads serving the western portion of the region, BNSF and UP, have worked out many problems since their 1995 and 1996 mergers, respectively, and the merger impacts are not as prevalent as those of CSXT and NS further east. The year-old split-up of Conrail is still impacting service in the East, and the additional traffic in the region has affected both routes and terminals. The robust economy of the last several years has further impacted service provision.

A side issue is the increased interest in rail passenger service at all levels – high speed, conventional intercity and local or commuter. The different levels of service have different requirements and thus, different impacts on the rail infrastructure, but all impact rail operations.

Grade Crossings

At-grade rail-highway crossings create safety and operational problems for both the railroads and highway vehicles. Separations and closures are the preferred solutions, but one is expensive and the other often politically unacceptable at the local level. The Federal Railroad Administration has set a nationwide goal of closing 25 percent of all existing at-grade crossings. Many parties have reservations regarding achievement of such a large number of closings.

Megaload Centers

The advent of the megaships using selected load centers will aggravate operational and capacity problems. The concentration of traffic at fewer points will impact rail systems at the intermodal connector and terminal level probably more than on through routes, although problems may develop on the latter also.

Funding/Jurisdiction

The railroads, for the most part, are privately owned and operated. Many states are constitutionally prohibited from providing public funds for any private enterprise, with railroads often specifically identified. Federal funding programs contained in TEA-21 are loan/loan guarantee oriented and contain terms and conditions that limit their use. Railroad funds are limited now due to resources being devoted to solving merger problems, although many of these expenditures are capacity related.

Private ownership, combined with limited public funding, translates into limited public influence on railroad operations. The passage of the Staggers Rail Act of 1980 changed the nature and limits of public regulation at both the state and federal level. Many states, when confronted with the federal requirements to maintain what state regulatory powers were permissible, opted not to continue those functions and left such matters up to the federal government.

LATTS STRATEGIC RAIL SYSTEM STRATEGIES

Strategic initiatives designed to deal with the Region's rail transportation issues are presented in the following discussions. These initiatives are organized on the basis of the LATTS objectives which they support the most. Despite this structure, it should be noted that initiatives often support more than one LATTS objective.

The largely private sector nature of the rail system limits the scope of initiatives that can be undertaken by the public sector. Nevertheless, there are some important strategies that can be employed to enhance the ability of the rail system to support the LATTS goal and its supporting objectives, as discussed below.

Regional Competitiveness

There are several rail system initiatives that will support the LATTS objective regarding "Regional Competitiveness," as noted below:

Better Utilization Of Existing Infrastructure

At one time the railroads in the U.S. had extensive physical plants. As rail traffic eroded with improvements in highways and trucking equipment (tractors and semi-trailers), capacity requirements diminished, the physical plant was rationalized to reduce costs, and much of it was lost forever. Several examples of means which increase utilization of the existing plant have already been employed in the LATTS region. Examples of applicable strategies follow.

Replace Double Track

Many existing rail routes at one time were double-tracked. Second tracks were sometimes removed, all or in part, during the period that rationalization was popular as a means to reduce costs. Nevertheless the roadbed and, in many cases, the bridges (or at least the abutments and piers) still exist. This reduces the effort (physical, environmental, and monetary) that would be required to increase capacity as opposed to construction of new alignments.

Improvement of Train Control Systems

Utilization of a rail line can be dramatically improved with various train control systems (signalization). Centralized Traffic Control (CTC) is being installed on the UP's Laredo line for that very purpose. Improved signalization was a common practice when physical plant was being downsized on main lines, i.e., reduction of double-tracked lines to single track with passing sidings with CTC and /or alternating sections of double track.

The latest development, with the promise of both improvements in capacity and safety, is the Positive Train Control (PTC) system. Now under development and field testing, it uses a number of intelligent transportation technologies, e.g., global positioning systems, onboard computers, computer route databases, and digital radio networks.

Directional Running on Paired Lines

Opportunities exist with merged rail systems in cases where different predecessor companies had parallel (but geographically separated) routes between major markets. Capacity is increased when trains are run in one direction on a single track rather than both directions requiring trains holding on sidings to effect meets with trains running in the opposite direction. This strategy is being employed in Central Texas on the UP.

Reuse of Dormant/Underutilized Routes

Many railroads have lines which have always been secondary routes, became surplus routes in mergers, or over which service has been discontinued or abandoned. Many of these routes have been upgraded and assigned new or former roles in the recent capacity crunch which clearly demonstrates the value of rail line/right-of-way preservation. In the LATTS Region, the former Central of Georgia (predecessor NS company) mainline from Macon, Georgia to Birmingham, Alabama, void of service for many years, but still in place, has been put back into service by NS as an Atlanta bypass. NS is promoting development of a secondary route through western Virginia as a principal route to handle Gulf Coast and western traffic to the Northeast. The route parallels I-81and the involved states are being asked to participate financially as they stand to benefit from the diversion of highway traffic to rail.

Two dormant rail lines in Texas also are involved in proposals for alternate routes for cross-border traffic. One is the South Orient Railroad, a Santa Fe spinoff, which connects with the Mexican rail system at Presido. The other is a former SP line which the TM is trying to acquire from the UP in order to avoid use of a busy UP line over which it has trackage rights to reach its KCS connection.

Rail Passenger Service

Concern over the impact on capacity for freight movement from new passenger services dictates a variety of improvements to the affected rail infrastructure as part of the implementation program. If adequate assessments and planning are conducted, the improvements can also benefit freight operations. If this is to be achieved, it is imperative that future freight traffic be considered in the process as well as existing traffic.

Grade Crossings

At-grade rail-roadway crossings are operational and safety hazards for railroads. Where there are multiple frequent crossings, such as in most communities, this often results in operating speed restrictions. They are also safety hazards for roadway vehicles and vehicular delays which intensify with frequent and slow trains.

Closures/Separations

The ideal way to mitigate crossing impacts is to eliminate them either through separations or closures. With the average separation costing between $3 and $5

million, and many times more than that in urban situations, this strategy can be applied only in limited situations. Closures are difficult to implement at the local level, but the chances for success can be enhanced through community-wide examinations and plan development. Closures combined with improvements in warning devices at the remaining crossings, development of connecting roadways and perhaps a separation, make a more palatable plan.

Technological Improvements

Means to improve safety are available or being developed in improved warning devices, barrier systems which keep vehicles from reaching the crossing, and ITS solutions relating to the use of global positioning systems (GPS) and PTC as mentioned earlier in the discussion regarding train control.

Corridor Approach

A variation of the community-wide crossing approach is the corridor approach. Most state grade crossing improvement programs are based on an accident prediction equation that prioritizes individual at-grade crossings to be addressed. This method results in the expenditure of funds throughout the state on a crossing-specific basis. Some states are beginning to address crossing improvements in selected corridors, which permits expenditures to be made in a more focused and coordinated fashion.

Corridors typically selected are those with passenger trains and their higher speeds, heavily used lines, and others where the probability of crossing incidents is highest. The coordinated approach provides the opportunities to address closures as well as make more efficient use of available funding.

Given the nature of LATTS and worldwide trade flows as addressed in this study, a corridor approach has considerable merit as an investment strategy for grade crossings.

Institutional Relationships/Partnerships

Attitudes vary among the states in regard to the public role in regard to railroads and the provision of funding. A public role is accepted regarding rail-highway crossings, although they are usually addressed from the highway side. A public role often is identified regarding the preservation of light density lines and retention/expansion of rail passenger service. Railroad main line freight services, however, are most commonly regarded as for-profit private-sector ventures.

Some states, however, have determined that it was in their best interest to become involved in railroad mainline operations. Several examples follow.

Washington State - Mainline congestion began to develop in Washington State which threatened the efficiency of its ports. As key players in Asian trade, the busy ports also comprised a major component of the Washington economy. Port activities, based on studies conducted at the time, 1993, accounted for 160,000 direct, indirect, and related jobs and $3 billion in wages. It was also determined

that 20 percent of all jobs in Washington State were related to import/export business at the ports.

This concern led to the preservation of the former Northern Pacific mainline over Stampede Pass which was declared surplus by the BN (now BNSF) as it already had two other routes to the Pacific Coast in Washington State. The BN placed the line on its System Diagram Map (SDM) as a potential abandonment candidate. The Washington State Department of Transportation, recognizing the route to be a corridor of statewide significance, obtained funding from the Legislature to acquire the line. The BN subsequently removed the line from its SDM, rehabilitated it and put the route back into service.

Several studies relating to port traffic congestion led to mainline connection improvements and the FAST (Freight Action Strategy for the Seattle – Tacoma Corridor) project, a series of grade separation projects in the I-5 Corridor between the Ports of Seattle and Tacoma. The FAST project is a joint activity of the WSDOT and the Puget Sound Regional Council (PSRC). The project involves the north-south rail lines running between Everett and Tacoma although the focus lies between Seattle and Tacoma. A project task is to develop a Corridor strategy, and to integrate proposed grade crossing and port access improvements. A goal is to develop public-private funding partnerships.

A series of rail-highway grade separations (bridges, viaducts, underpasses) totaling $350-400 million in cost are currently proposed in and around the port terminals at Seattle and Tacoma and along the I-5 corridor in between the two urban areas. Funding from the state ($354 million) was approved in 1999 for Phase 1 of the project. Federal funding was contained in TEA-21, and ports, railroads and other parties are also contributing to the projects.

Pennsylvania Clearance Project - Recognizing the evolution in intermodal transportation that was occurring, the need to have adequate clearances for double-stack containers, and that Philadelphia was the only major port in the middle Atlantic that did not have double-stack service, Pennsylvania commissioned a study to determine the possibilities and related costs and benefits of clearing (developing adequate clearances) selected routes in the state. Line segments of three railroads which together created an east-west and a north-south route to access the Port of Philadelphia were evaluated.

Total costs of $80.9 million, to be shared between the Commonwealth and the rail carriers, were found to generate cost savings with a present value of $382 million. The savings include both transportation costs and the reduction of non-transport shipper logistics costs to shippers and receivers located within the state. These cost savings translate into increased economic activity and more jobs for Pennsylvania residents, the latter projected at 22,000 in the Year 2000.

In 1993, a partnership was formed between Conrail, CSXT and CP to provide double-stack clearances from the Ohio and New York borders to the Port of Philadelphia. Bridge and tunnel clearances were completed in 1996.

Interstate 81, Virginia - A recurring theme in the LATTS discussions and in many public forums lately is a desire to place as much truck traffic on rail as possible. Intermodal is the typical medium for accomplishing this, but truck traffic also can be converted to rail carload traffic as well. The proposal comes about with ever shrinking highway construction and maintenance dollars compared with needs, an issue discussed in other sections of this report.

Faced with driver shortages and high recruitment and training costs, many of the large truckload carriers also have considered rail intermodal as a potential solution. Some of them, such as J.B. Hunt, even invested in domestic containers rather than trailers to take advantage of double-stack economics. United Parcel Service has always been one of the largest users of rail intermodal service. Recent railroad service problems, however, have diminished the attractiveness of this alternative.

Several criteria have to be met for rail intermodal to work. First, there has to be sufficient volume at any one point to justify the investment in a terminal and efficient loading/unloading equipment. Similarly, there has to be a like location some distance away that meets the same criteria, with demand for movements between it and the first point which creates a traffic "lane". Ideally, the two locations should be at least 500 miles apart (many would argue for an even greater distance such as 750-1,000 miles), in order that the savings in transportation overcome the cost of double-handling.

A number of such flows have been identified, and one example proposed is the Virginia I-81 corridor, a subject of forecast heavy Latin American traffic. The Commonwealth of Virginia is planning a 20-year, $3.5 billion project for capacity and safety improvements on Interstate 81 through western Virginia. Norfolk Southern has proposed that expenditures be made on its parallel rail line instead, suggesting that it could, with capacity and speed-enhancing improvements, divert enough truck traffic to rail to either dramatically delay or eliminate planned highway improvements. Trucks account for 40 percent of the traffic on some sections of I-81 and are blamed for many of the roadway's congestion and safety problems. The Virginia Legislature has mandated that the proposition be investigated (SJR-55), and the study is just commencing.

Interconnected Multimodal System

The advent of the megaload center will concentrate rail traffic on even fewer routes, thereby exacerbating existing rail capacity problems. The problem will more likely impact intermodal connections and terminal operations than main lines. Port access lines and intermodal connections will need special attention.

Some of the more promising landside strategies to address the sudden surge in demand upon docking of a megaship are contained within the port section presented earlier (i.e., under port agility and multimodal/intermodal concepts). Nevertheless, the rail solutions are worthy of note.

Summary Of Rail System Initiatives

A number of rail strategies have been presented, and, in reality, one highway strategy, i.e., truck-to-rail diversion. A common thread runs through all of the strategies – additional rail capacity and efficiency. All solutions will require the infusion of capital, some more than others.

By its very nature, the rail industry is capital intensive, and currently much of the industry is in poor financial condition from recent mergers, acquisitions and service problems. Public investment in rail projects is likely to be needed in many cases to implement proposals which, given the continuing pressure on public finances, not to mention the inherent problems with the use of public funds for private ventures, will not be easy to effect. There are some accepted public roles, such as grade crossings, and the potential exists to generate a variety of public benefits in other ventures such as truck-to-rail diversions. As an investment strategy, each Alliance state, through its rail planning process, could work with its railroads to identify and explore opportunities that offer the promise of mutual benefits, especially those that might reduce the demands on public resources for other approaches.

LATTS STRATEGIC HIGHWAY SYSTEM ISSUES

As noted earlier in this report, the LATTS Strategic Highway System embodies two principal elements. The first comprises the mainline routes which accommodate long distance travel. The second element is the intermodal connectors which connect major intermodal facilities (ports and airports) to mainline facilities. Evaluations regarding these two categories of LATTS highway facilities revealed a number of important issues which are summarized below.

- **Capacity** – The most prominent mainline deficiency, and costliest to address, is capacity. From a mainline perspective, the investment analysis concludes that nearly 7,900 additional miles of the LATTS network will be capacity deficient by 2020, in addition to the 2,722 that are congested now. Congestion slows travel speeds, adds truck speed cycling (gearing down, then up again, as congestion levels vary), and increases wear and tear on the vehicle. All this adds to transportation cost.

  Rural capacity additions are easier to implement than their urban counterparts. However, the addition of capacity to a rural interstate-type facility is usually lower in priority than other basic pavement and bridge preservation projects. This is because rural facilities usually operate at better levels of service than other highways and often are already access-controlled, which means they are safer.

  The process of adding capacity is an obvious remedy to many urban congestion problems. However, the context of capacity additions must be properly framed to fully appreciate spin-off impacts. The addition of capacity, especially to urban fully-access controlled facilities, is expensive. Major expressway projects that add capacity are typically beyond the reach of many state DOTs, and usually require special financing beyond traditional revenues

in order to implement. There are other problems that transportation agencies face when considering urban capacity improvements:

- **Environmental Issues** – These issues have become pervasive in many urbanized areas, especially in those nonattainment air quality areas that struggle to achieve a conforming Transportation Improvement Plan (TIP). A large capacity project may add traffic (VMT), thereby making it difficult to include it the project mix and keep the TIP in conformity. Capacity projects must be implemented with other positive air quality measures (carpooling, vehicle inspection, ITS, transit, TDM, etc.) to make them viable.

- **Right-of-way** – Space to expand existing highways is becoming a scarce commodity in many built-up areas. If right-of-way acquisition involves condemnation, the added cost, time, and adverse social impacts can fatally impact implementation of major highway improvements. Transport agencies are becoming more socially conscious of such takings, and are striving to avoid residential/business displacements. New environmental justice (EJ) regulations may have a significant impact on the process for implementing large scale improvements that take residential property.

- **LATTS and Other Traffic Benefits** - Traffic of all varieties benefits from capacity improvements. Thus, it should be recognized that LATTS freight traffic represents only a portion of the entire traffic mix, and an allocation of special LATTS funding for capacity improvements would benefit the entire traffic stream.

- **Operations** – Many highways, especially those with less than full access control, do not operate at optimum efficiency. Outdated signal systems, restrictive geometrics, entry (access) conflicts, narrow/unstabilized shoulders, rail/highway crossing problems, etc. limit traffic movement, reduce travel speeds, and introduce safety hazards. Though these deficiencies are more common on LATTS Intermodal Connectors, they are also issues for LATTS mainline network roadways.

- **Preservation** – The LATTS investment analysis yielded important information regarding the physical condition of LATTS mainline facilities. Generally, they are in good condition, and it can be argued that the impact of LATTS truck traffic is small when compared with all pavement and bridge deterioration. While there are several sections of the LATTS mainline Strategic Highway System (SHS) where the remaining pavement life is noticeably shortened due to LATTS traffic, these are sections which were built originally to standards that cannot withstand heavy truck traffic.

  It must be noted that bridge conditions can impact trucking operations. Narrow bridges on lower-type highways are a safety hazard, and bridges with load restrictions can cripple truck operations. The Alliance members are very aware of the impact of load restrictions and are very diligent about keeping bridges on the higher systems in good condition. However, a bridge posted to less than legal loads is a serious impediment to freight movement, adding travel delays and cost due to detours.

Pavement and bridge preservation is an issue that affects the entire traffic stream. On mainline LATTS facilities, this type of improvement presents more benefit to passenger traffic than freight, simply due to the disparity between passenger and freight volumes.

- **Finance** - The lack of funding is an issue that all state transportation agencies face. Federal aid has continued to increase, but most States face difficult capital programming choices. Mainline capacity improvements are expensive and often face public opposition, so many agencies do not seriously consider them.

LATTS MAINLINE HIGHWAY SYSTEM STRATEGIES

Several mainline LATTS Strategies have evolved from these evaluations. They are presented below and are organized on the basis of the LATTS objectives for which they will have the greatest impact.

Regional Competitiveness

Initiatives regarding the LATTS Strategic Highway System which will greatly impact upon the LATTS objectives regarding "Regional Competitiveness" include the following items. These initiatives also will advance LATTS objectives regarding "freight mobility" and "efficiency."

- **Capacity** – Of necessity, additional capacity in the locations of highest benefit must be a prominent strategy for improving mainline freight movement. Nevertheless, major capacity projects need to be considered on balance with needs of the LATTS Strategic Highway System for condition preservation, operational improvements and bridge projects. Each Alliance member will need to make these decisions in a manner which is consistent with its own capital programming philosophy.

- **Corridor Approach** – Even though each Alliance member must abide by its own policies for capital programming, a multi-state coordinated approach to corridor planning can increase the benefits derived from investments made in the LATTS Strategic Highway System. Study analyses have demonstrated that a large portion of freight flows involving trade with Latin America is concentrated in a number of major corridors (as denoted by the "Rivers of Trade" characteristics discussed in an earlier section of this report). Considerable benefits could be derived by the removal of major bottlenecks that are local in nature but which affect the mobility of Latin American freight and other traffic on an overall corridor basis.

- **Institutional Relationships** - The Southeastern Transportation Alliance has provided a forum for the investigation and assessment of matters of mutual interest to Alliance members as it pertains to trade opportunities with Latin America and the accommodation of the resultant freight flows. Continuance of the Alliance, or something akin to it, would be useful in providing an institutional framework that allows the Region to "speak with one voice"

regarding matters of mutual interest. This framework also would facilitate corridor investment planning and other matters.

- **Trade Corridor Funding** – One of the "other" matters that could be usefully addressed by the Alliance is the pursuit of trade corridor funding as exemplified by the TEA-21 Section 1118 National Corridor Planning and Border Infrastructure Programs. Admittedly, this program has been heavily oversubscribed with applications far exceeding the level of funding which currently is available. Nevertheless, there is hope that the U.S. Congress has or will take notice of the significant interest in this program and the substantial economic development benefits that can be derived from investments which foster international trade (like the LATTS Strategic Highway System).

- **High Priority and Discretionary Project Funding** – Another matter that could be addressed by the Alliance is the possible pursuit of high priority and discretionary project funds from the federal government. These funds are earmarked for particular projects. While this practice by the U.S. Congress and U.S. DOT reduces the availability of formula – derived federal funding apportionments, it nevertheless has certain merits. This is particularly true for high cost projects which simply would be financially impossible if they are to be undertaken using more traditional funding sources. The importance of various components of the LATTS Strategic Highway System in terms of economic development and international trade, coupled with the travel benefits which would be gained by all personal and freight traffic (not just Latin American trade flows), would make projects on these facilities attractive candidates for high priority project funding.

- **Greater Priority for LATTS Projects** – This study has identified and documented the importance of the LATTS Strategic Highway System to trade with Latin America, other nations and domestically. It has also highlighted the significant impact of Latin American trade on the economic future of the Alliance Region. Highway deficiencies which impede efficient freight movements detract from the ability of the Alliance Region to serve growing volumes of Latin American trade and this, in turn, detracts from the inherent advantages the Alliance Region has to grow economically. Accordingly, all other considerations being equal, there is a strong justification to accord a high priority to projects on the LATTS Strategic Highway System.

Freight Mobility

The initiatives discussed above regarding the "Regional Competitiveness" objective will also support the LATTS objective regarding "Freight Mobility."

Enhancement of freight mobility through investments in the LATTS Strategic Highway System will result in substantial "pay backs" to the Alliance Region. To ensure that freight mobility receives the appropriate level of emphasis in capital programming for the highway system, it should be accorded explicit consideration in the investment decision-making process. Alliance members have, in recent years, begun processes which specifically address freight mobility considerations. These efforts should be continued and be enhanced as

appropriate so that freight projects, and the economic developments they engender, continue to receive the appropriate level of emphasis.

Interconnected Multimodal System

Freight transport is a large, complex and diverse industry. While LATTS has focused attention upon the Latin American component of freight flows, the study has shown that the highway system must serve much wider freight needs. In fact, only eight percent of the total needs on the LATTS Strategic Highway System are attributable to freight movements serving Latin American trade. As investment decisions are made regarding freight transportation, they must take into account all international and domestic freight needs.

An excellent way for Alliance members to address freight industry issues is to maintain continuing dialogue with the freight industry. Indeed, some of the Alliance members have formally established organizations which either focus upon the freight industry (e.g., freight advisory councils), or which include representatives from it (e.g., MPO advisory councils). Efforts which enhance dialogue with the freight industry will continue to be needed at all levels of interest (state, corridor, MPO, etc.) This will improve opportunities to determine the best things that can be done to the LATTS Strategic Highway System to ensure fulfillment of its role as a transportation mode and as a component of an interconnected multimodal system.

Efficiency

The efficiency of the trucking industry will be enhanced by the implementation of the strategic initiatives noted above. Additional initiatives such as those presented below will also support the LATTS objective regarding “Efficiency.”

- **Operational Improvements** – The efficiency of the trucking industry is significantly impacted by the operational features of the highway system. Therefore, traffic operations improvements should be considered in the overall mainline project mix. Highways with little or no access control can greatly improve freight traffic movement through upgraded intersection geometrics, signal phasing, wider/stabilized shoulders, at-grade rail crossing upgrades, access revisions, etc. These projects are less costly than adding capacity and usually require little or no additional right-of-way.

- **ITS Applications** - High-type facilities (e.g., interstate-type highways with access control) can benefit from the application of Intelligent Transportation System (ITS) technologies. An entire industry has developed around the development and application of ITS strategies, which focus on making better use of the existing facility through technology. This includes such initiatives as HOV lanes, incident detection/management, driver information systems, reversible lanes, ramp metering, weather/pavement condition monitoring, and commercial vehicle operation (CVO) facilities (weigh-in-motion, automated credential verification, etc.).

A more complete discussion regarding ITS in the LATTS Region is presented in the Appendix to this report. The LATTS review of ITS suggests that the full potential of ITS applications for Commercial Vehicle Operations (CVO) requires a coordinated approach that some of the Alliance members are just beginning to appreciate.

It is recommended by the LATTS ITS review that the Alliance work together to create a seamless CVO network throughout the Alliance Region (and eventually the nation as a whole). This would enable commercial vehicles to move freely across state borders through programs which involve sharing of weigh stations, use of the same screening technologies and a standardized commercial vehicle identification system.

- **Improved Communications** – Improved communications can provide benefits which are at the very heart of improved trade and freight transportation efficiency. Measures that could be undertaken include:
  - Improved communications between Alliance members;
  - Improved communications between all of the state, federal and local agencies which are responsible for portions of the freight transportation infrastructure;
  - Improved communications between the public agencies and the freight transportation industry; and
  - Improved communication with the general public, special interest groups, civic organizations, trade and commerce organizations, etc.

  The level of communication which is needed will not happen of its own accord. Instead, efforts must be directed at establishing and maintaining communication channels and continuing dialogue. If this is to occur, it must be at the initiative of the state transportation agencies comprising the Southeastern Transportation Alliance. These agencies will need to make specific staff resource allocations to ensure that the needed communications are achieved.

- **Improved Freight Profile** – There is a serious need to inform the general public, elected officials and various governmental organizations regarding key matters raised by LATTS. This would include the role of trade with Latin America in relationship with economic development potentials, the current status of the LATTS freight transportation system and its ability to cope with existing and projected demands, the implications of inefficient movement of freight (including damage to the Alliance Region's competitiveness for industry and trade), and the justifications for more emphasis upon the concerns and issues raised by this study. These efforts will increase the visibility of freight as an important element in the economic well-being of the Alliance Region and thus achieve greater levels of support for the strategic initiatives identified by this study.

Environment

The planning processes employed by the state transportation agencies which comprise the Southeastern Transportation Alliance include processes for

appropriately considering environmental impacts associated with transportation projects. Further, the initial element of this report section proclaimed that preservation of environmental qualities was one of the seven objectives that would support the Alliance goal to achieve economic development through improved transportation for trade.

By their nature, some of the investments needed on the Strategic Highway System will have a positive impact on the environment, most notably regarding vehicle emissions. Improvements in vehicle emissions will accompany investments (e.g., operational improvements), which reduce congestion and reduce the level of vehicle speed cycle changes.

Safety

Transportation agencies are systematically addressing safety issues as they conduct their capital programming processes. These efforts need to be continued since this study shows that truck volumes will increase for a number of reasons, including increased trade with Latin America. The considerable differences in the vehicle mass of automobiles and large trucks inherently involves safety risks. In planning investments for the LATTS Strategic Highway System, vehicle speed, size and weights should not be allowed to compromise the safety of travelers on the highway system. While the focus of the LATTS highway components was on truck mobility and efficiency, care must continue to be exercised to account fully for the impacts of trucks on the total traffic stream.

National Security

Although the LATTS Strategic Highway System focuses upon the need to serve trade with Latin America, this extensive system serves many other functions as well. One of these involves support for national security through the provision of an interconnected and agile transportation system that provides significant capability to serve major surges in freight (and personnel) movements and flexibility to adjust to changes in the nature and pattern of national security deployments. Consequently, implementation of the proposed investment strategies, while directly intended to foster economic growth, will also serve the needs of the nation's military forces in the fulfillment of their missions.

INTERMODAL HIGHWAY CONNECTOR STRATEGIES

The importance of Connectors to the efficient movement of freight has been demonstrated through several studies and is underscored by the FHWA's recent emphasis on this set of roadways. Unfortunately, Connector issues typically have a low overall public profile. Some actions could be taken to gain a better understanding of Connector issues and bring them to more prominence.

The strategic initiatives regarding intermodal highway connectors are principally associated with the LATTS objectives regarding an "Interconnected Multimodal System."

- **Capital improvements** - Capital improvements on Connectors tend to be lower in cost than mainline projects and generally are of higher benefit to

freight than passenger traffic. Connector improvements are less costly because of *scale* (the roadways are not access-controlled, thus less complex to engineer) and *scope* (projects usually focus on geometrics, safety, signalization, etc. that are on the low end of the cost spectrum). In general, these lower-cost projects are easier to implement and can be delivered faster than large-scale major urban projects. It has been argued that more efficiency gains for freight traffic can be realized through Connector improvements ("bang for the buck"). While this notion may be generally accepted, additional study is needed to reveal benefits vs. costs on a case-by-case basis.

- **Partnerships** - Most Connector miles are not owned by the State (Alliance) government, a situation which complicates implementation of improvements. As a general statement, local agencies often lack the engineering staff to prepare projects for letting, have fewer financial resources upon which to draw, do not have eminent domain (authority to condemn right-of-way for public purposes), and face intense stakeholder pressure to allocate scarce resources to more heavily-traveled roadways. Thus, the improvement of local jurisdiction Connectors will, to a greater extent, necessitate the formation of partnerships between state and local governments to effect change.

- **Needs Study** - The full scope of Connector deficiencies is unknown, as only a partial inventory of Connectors is available (and the data is not detailed enough to perform a complete needs assessment). Specific recommendations concerning intermodal connectors can begin to be developed only after the extent of the problems, current and future, are quantified after a full inventory is conducted. This should take future LATTS truck growth into account.

- **Costs** - Once all deficiencies are quantified, an estimate of capital improvement costs as measured against a common set of minimum tolerable conditions should be generated. This estimate should focus on both current and accruing improvement costs.

- **Process** - Using the principles developed under "best practice" Intermodal Management Systems (IMS), a capital improvement prioritization process model could be developed for use by the Alliance, as well as other state and local governments. Such a model could be "customizable" to allow entities to modify weightings and other factors to recognize local characteristics.

- **Financing for Intermodal Connectors** - State and local governments need ways to bring new kinds of capital resources into the process, as well as finding methods to utilize existing resources. A fiscal study could help begin this process, as well as provide a means for Congress to justify special consideration for intermodal connectors. Major progress was achieved by making the connectors eligible for NHS participation, but more needs to be done.

At least one Alliance state has taken specific steps to address the funding needs of intermodal connectors through the establishment of a special funding category and set-aside monies. This approach ensures that the state's capital programming process specifically addresses these facilities and provides funds for them.

APPENDIX I
OUTREACH AND COORDINATION

In the performance of this study, it was recognized that a major element should be a concerted and continuing effort to reach out to stakeholders who were not actively involved as study participants (i.e., the state transportation agencies constituting the Southeast Transportation Alliance and the Federal Highway Administration). Outreach activities were necessary (1) to inform various stakeholders about the study's purposes and findings and (2) to solicit feedback and input regarding issues, needs, concerns, etc., to which the study should be responsive. By undertaking these outreach activities, accountability to stakeholders was enhanced.

Accordingly, the Southeastern Transportation Alliance determined that, for the Latin American Trade and Transportation Study (LATTS) to be successful, a proactive public involvement process was essential during all stages of the project; i.e., early and continuous involvement. This approach ensured that there was public availability of study information and that there were ample opportunities for the provision of study inputs, comments and suggestions by the general public, major stakeholders and affected public agencies.

The Southeastern Transportation Alliance includes 14 state transportation agencies, in cooperation with the Federal Highway Administration. Study participants included multiple representatives of each of these organizations. Accordingly, another important communication need involved coordination of the efforts of the sizeable list of study participants. Traditional means of achieving coordination between study participants included periodic meetings of the Steering Committee and the Working Committee, progress reports, conference calls, etc. These traditional approaches were supplemented with other coordination measures, chief of which was the establishment and maintenance of a study participants web site.

The need for outreach and coordination required that an array of approaches be used to inform and to be informed. These approaches are discussed below.

NEWSLETTERS

As part of the LATTS effort to reach a wide audience, periodic newsletters were prepared in which the study background and purposes, study activities and findings, study organization, etc., were summarized. These newsletters also solicited comments, suggestions and other inputs and provided contact information regarding the transportation agency in each state, the Federal Highway Administration, and the consultant team.

Each of the Alliance members was provided with the newsletters and they made distribution of them according to their individual circumstances. Distributions were made to elected officials, federal, state and local governmental agencies,

universities, commercial and industrial organization, trade organizations, citizen organizations, special interest groups, and private citizens.

WEB SITE

Another means for sharing information and soliciting comments, suggestions and input information involved the use of the Internet. A LATTS web site was established early in the study for use by the general public and other interested parties. Web access information was provided in the study newsletters, at presentations and through other means. The site was updated periodically with the latest information concerning the study. The contents of this web site included:

- Project purpose and approach;
- Study newsletters;
- Contact information for study participants; and
- Executive Summary Report

A second web site also was maintained during the course of the study. The purpose of this web site was to facilitate information sharing and study coordination between study participants. In addition to information contained on the public web site, the study participant site contained, from time to time, draft materials of works still in progress and matters associated with study coordination and management activities.

TARGETED CONTACTS

The newsletters and public web site mentioned above were intended to reach a wide audience.

It also was important to LATTS that additional outreach efforts be undertaken regarding certain organizations whose missions are strongly associated with the focus of this study. The special attention accorded these organizations was for purposes of taking into account the concerns of these special interest groups and the issues they consider to be most pertinent to the scope of the LATTS project. Additionally, this effort solicited any information that the special interest groups considered relevant to the purposes of LATTS and which they wished for LATTS to take into account.

Two types of interest groups were contacted. The first type included those organizations whose mission is strongly associated with international trade and economic development. The second category involved those organizations whose mission is strongly associated with transportation matters which are most relevant to international trade.

Direct contact was made with each of the identified organizations. In these contacts, information was provided regarding the purposes of LATTS, study activities, study participants, etc. Feedback and inputs from each organization also was solicited.

STUDY PRESENTATIONS

Throughout the study, requests from various organizations regarding presentations concerning LATTS were honored to the maximum practical extent. These presentations were made at a variety of conferences and meetings such as the Southern Governors' Association, American Association of Port Authorities, Western Hemisphere Transportation Ministerial, Southern International Trade Council, etc. Additionally, presentations were made at Annual Meetings of the Southern Association of State Highway and Transportation Officials and other transportation conferences.

BRIEFING REPORTS

Executive summary-type reports were prepared for purposes of presentations to the Executive Board of the Southern Association of State Highway and Transportation Officials at the Annual Meetings held during the course of the study.

APPENDIX II
INTERNATIONAL ECONOMIC OVERVIEW AND MARKET POTENTIALS

Section B of the LATTS Main Report discussed the trade analyses that were undertaken in this study. An examination of existing trade flows was performed, followed by development of trade forecasts. The objective of these analyses was to characterize the size and composition of trade flows and to provide some indication of how much bigger they could become by 2020. The LATTS forecasts address trade flowing through the gateways of the Southeastern Alliance Region, between the US and Latin America, Asia, Europe and the rest of the world.

Fundamental to the development of LATTS forecasts was an understanding and quantification of economic conditions and outlooks regarding Latin American countries and other trading partners of the U.S. Additionally, the market potentials of these trading partners were assessed. This information provided a foundation upon which the LATTS forecasts were developed.

Presented in this Appendix are summaries of these economic and market potential reviews. The presentation is categorized as follows:

- Economic summary for all of Latin America;
- Economic and market potential reviews for each Latin American country (or groups of countries);
- Economic indicators for various world-wide regions; and
- Economic and international linkage reviews of various worldwide regions.

Because of the sequence of study tasks, these reviews and assessments were performed as an early activity in LATTS. The analyses were documented in the latter part of 1998. The latest data available at that time sometimes was for the years 1996 or 1997. With the passage of time, the information has become less timely than it was when it was produced. Further, it may be noted that the discussion sometimes makes forward-looking statements for what was then the near term future but which now is the recent past. Despite being overtaken by events, the information remains relevant for understanding the context and circumstances upon which LATTS forecasts were based.

Observations and discussions regarding foreign policy as contained herein are those of the study consultants and are not necessarily shared by the Federal Highway Administration or any other Alliance member.

LATIN AMERICA ECONOMIC SUMMARY

Key Findings

- *The region is expected to lead the world in terms of economic growth out to the year 2020.*
- *Continued political and economic reforms are key assumptions for this strong economic performance.*
- *Trade liberalization is paving the way for the creation of a major regional economic power with significant links to North America.*

A Global Growth Leader

The economic outlook for Latin America is positive. Given the success of privatization and trade liberalization programs, and the increased efficiency required in fierce open market competition, the average annual growth rate of the region's economy will exceed 4%. Due to the Asian currency crisis, Latin America is now expected to be the fastest growing region in the world over the next few years.

Emerging from an underdeveloped state, and having undergone political and economic reform, there is enormous pent-up consumer demand for various products, with spending levels and penetration rates well below those of countries with similar wealth. Income growth and restructuring will increase domestic demand for a wide range of value-added products.

Exhibit II-1

	Average Annual Growth, 1996-2020				
	Population (mil.)	Real GDP (95$ bil.)	Nominal GDP Per Capita ($)	Nominal Exports ($ bil.)	Nominal Imports ($ bil.)
Argentina	1.2%	5.2%	7.0%	10.0%	10.0%
Bahamas/Jamaica	0.9%	2.7%	4.7%	7.6%	4.5%
Bolivia	2.0%	5.2%	6.0%	6.8%	9.7%
Brazil	2.0%	4.1%	6.2%	8.8%	9.4%
Chile	1.5%	5.6%	8.2%	9.4%	9.7%
Colombia	1.5%	5.2%	5.7%	8.5%	8.5%
Cuba	0.5%	2.5%	4.9%	10.2%	9.5%
Dominican Rep	1.5%	2.1%	3.4%	9.6%	8.7%
Ecuador	2.1%	3.9%	4.0%	7.1%	7.6%
French Guiana/Guyana/Surinam	1.0%	2.4%	4.3%	4.9%	8.5%
Haiti	1.6%	1.5%	2.7%	4.2%	5.7%
Mexico	1.5%	4.4%	8.2%	13.1%	13.2%
Panama	1.3%	4.9%	6.5%	12.6%	8.0%
Paraguay	2.4%	5.0%	5.5%	7.3%	7.7%
Peru	1.9%	4.7%	2.1%	8.7%	8.5%
Uruguay	0.6%	4.5%	6.9%	6.5%	9.2%
Venezuela	2.3%	4.1%	5.1%	7.2%	10.0%
Other Caribbean	0.4%	2.6%	5.0%	1.8%	4.0%
Other Central America	2.0%	1.6%	2.5%	7.3%	7.2%
Latin America	1.8%	4.4%	6.1%	10.5%	10.3%
Canada	0.8%	2.3%	4.9%	8.5%	8.9%
Western Europe	0.4%	2.3%	4.9%	7.7%	7.7%
Asia	1.2%	3.6%	5.3%	8.3%	8.4%
Rest of World	2.2%	4.1%	4.3%	6.9%	7.0%
World*	1.3%	2.8%	4.6%	7.9%	8.0%

*The world total does not include Eastern Europe and the former Soviet Union, many countries in Asia, and most of Africa.

Exhibit II-2

	Levels, 1996				
	Population (mil.)	Real GDP (95$ bil.)	Nominal GDP Per Capita ($)	Nominal Exports ($ bil.)	Nominal Imports ($ bil.)
Argentina	35	296	8,428	18.6	22.7
Bahamas/Jamaica	3	8	3,003	3.1	4.7
Bolivia	9	7	875	1.3	2.0
Brazil	160	751	5,046	53.3	67.0
Chile	14	72	5,072	19.8	20.8
Colombia	36	81	2,372	13.5	17.0
Cuba	11	21	1,931	1.9	2.2
Dominican Rep	8	11	1,456	4.9	5.4
Ecuador	12	18	1,398	5.6	5.3
French Guiana/Guyana/Surinam	1	5	3,373	1.6	5.5
Haiti	7	2	327	0.2	1.0
Mexico	91	259	3,166	79.0	72.8
Panama	3	8	2,970	1.3	15.6
Paraguay	5	9	1,922	1.0	5.0
Peru	24	67	2,910	9.5	12.3
Uruguay	3	19	5,907	2.4	3.8
Venezuela	22	81	3,459	24.3	13.7
Other Caribbean	3	21	7,131	5.9	13.4
Other Central America	31	37	1,235	9.6	14.8
Latin America	477	1,773	3,262	256.9	305.1
Canada	30	589	20,175	235.2	212.2
Western Europe	447	9,194	20,609	2,722.6	2,542.6
Asia	2,885	8,508	2,735	1,705.4	1,704.6
Rest of World	334	550	1,674	184.4	187.0
World*	4,438	28,080	77,180	5,975.3	5,917.1

*World totals exclude Eastern Europe and the former Soviet Union, many Asian countries, and most of Africa.

The expansion and improvements in infrastructure will continue to provide opportunities for the engineering services industry as well as to providers of a variety of capital investment goods. Recognizing that shortfalls in infrastructure and supporting services can hamper economic development, more governments are willing to privatize state monopolies to attract foreign investment and technology and for greater efficiency. Technological developments, notably in telecommunications, have turned infrastructure industries previously dominated by natural monopolies into competitive industries with potentially profitable investment opportunities.

Over the 1997-2020 period, total real GDP in Latin America will grow by 4.4% annually, compared to 3.6% in Asia and an average rate of 2.8% for the world. Leading the pack are five countries with growth rates over 5%: Chile, Colombia, Bolivia, Argentina, and Panama. At the other side of the spectrum, Haiti and the Central American region both have growth rates below 2%.

Nominal GDP per capita is also higher in Latin America than in other emerging markets. In 1997, the average income in Latin America was $3,478. The equivalent average in Asia was $2,593. Growth in GDP per capita is also forecast to be faster in Latin America, at an average annual rate of 6.0% over the forecast period. Within the region, the countries with the largest average incomes were Argentina, the Caribbean region, and Uruguay. Chile, in fifth place in terms of per capita income levels, is forecast to have the fastest growth rate.

Brazil dominates in market size, both in population and total real GDP. Although Argentina has less than half the population of Mexico, it has a larger GDP. Mexico, however, is the clear leader in trading volume. In 1997, Mexico exported and imported more than $100 billion. With the highest growth rate in imports, and the second highest growth in exports, Mexico will grow to account for more than half of Latin American trade by 2020. Panama, with a specialization in re-exporting, will experience the fastest growth in exports over the forecast interval. Overall, trade in the Latin America region is forecast to grow over 10% annually, again placing it in first place among world regions.

Exhibit II-3

Latin America	1996	2000	2010	2020	Average Ann. Growth, 1996-2020	Share of World* 1996	Share of World* 2020
Population (mil.)	477	513	612	724	1.8%	10.6%	12.0%
Real GDP (95$ bil.)	1,773	2,114	3,322	4,999	4.4%	6.1%	9.1%
Nominal GDP Per Capita ($)	3,262	4,003	7,217	13,361	6.1%	--	--
Nominal Exports ($ bil.)	257	394	1,093	2,796	10.5%	4.2%	7.6%
Nominal Imports ($ bil.)	305	485	1,280	3,188	10.3%	5.0%	8.6%

*World totals exclude Eastern Europe and the former Soviet Union, many Asian countries, and most of Africa.

Recovery From the Peso Crisis

Although growth has slowed to some extent due to the Mexican peso crisis, a recommitment to the reform policies of the late 1980s and early 1990s has allowed most of the Latin American countries to weather the storm remarkably well. For this reason, continued economic development is expected for Latin America.

In the early 1990s, Latin America was one of the fastest growing regions in the world. A variety of economic, political, and social reforms were implemented that freed economies from government intervention, addressed severe poverty, and, in some cases, replaced military rule. As its economies progressed, Latin America enjoyed increases in capital flows and greater flexibility in international financial markets. Many of the newly elected government officials worked to restructure their national debt while at the same time embarking on trade liberalization and privatization programs to increase their country's presence in the world market place. The future success of these policies seemed almost certain until the Mexican peso crisis in December 1994. Economists and policymakers watched as much of their work came undone. Many of the countries in the region suffered from rapid capital flight, as foreign investors became cautious of exchange rate instability and severe inflation. Unemployment levels began to rise once again, and foreign account and fiscal deficits grew. The situation called for a recommitment to existing reform policies, because much of the work of the late 1980s and early 1990s would have to be redone.

Now, in the fourth year since the peso crisis, results vary, and most of the economies still show plenty of room for improvement. Mexico has shown significant progress in stabilizing its exchange rate and curbing inflation, but the tight money policies aimed at these objectives has, until this year, also slowed growth. Peru has had similar problems with sluggish growth, in addition to a large current account deficit that is expected to continue to grow until privatization yields higher output. Colombia and Venezuela have both made impressive gains in revitalizing growth, but these countries are plagued by political unrest that must be dealt with in order to restore investor confidence. Brazil has developed a comprehensive economic program involving everything from privatization and liberalization to the introduction of a new national currency, but still faces the challenge of banking system reform. The ability and effectiveness with which policymakers respond to these issues will determine the leaders in economic development in the years to come.

Trade Liberalization

Trade liberalization has helped to achieve greater stability in the region and boosted long-term growth. On the inflation front, the lowering of tariffs has contributed to price stability by forcing local producers to compete with cheaper imports. On the supply front, pressure is mounting for locally based producers to restructure and become more efficient in world markets by taking advantage of economies of scale and rationalizing costs. While formal tariffs have been removed on most products, non-tariff barriers are also beginning to fall. Rules on

issues such as technical standards, intellectual property, antitrust restrictions, and the environment are being harmonized. Customs procedures are also being simplified.

Trade liberalization and privatization remain the key elements to the reform strategies in Latin America. A primary example of the move toward free trade is Mexico's involvement with NAFTA. In the months following the Mexican peso crisis, Mexico relied heavily on its export revenues to pull it out of the recession, a large majority of which came from the United States and Canada. Spurred by the success of NAFTA, Mexico is currently negotiating free trade agreements to open their borders to other Latin American and European countries.

Chile seems to be following in Mexico's footsteps with its recent trade agreement with Canada. This agreement had been expected to be the preliminary step to Chile's eventual membership in NAFTA. However, the failure of the 1998-2000 effort to achieve "fast track" trade negotiation authority from Congress will delay this prospect. Chile has already shown an active interest in trade liberalization with its membership in the Asia Pacific Economic Cooperation group (APEC), as well as its efforts to become a member of Mercosur.

Mercosur is a free trade area comprised of Brazil, Argentina, Paraguay and Uruguay, with associate members Chile and Bolivia. Mercosur is a customs union that includes binding tariff preferences among members and a common external tariff on trade with non-members. With a population of 230 million and GDP of U.S.$1.2 trillion, Mercosur is now the world's fourth largest integrated market, after NAFTA, the EU and Japan.

Significant progress has been seen in the growth of trade: from $4.1 billion in 1990, intra-Mercosur trade quadrupled to about $20 billion in 1997. While trade has increased partly because of greater economic stability combined with the lifting of trade barriers, much of this trade is intra-industry trade as firms exchange products or components, taking advantage of the specialization possible through the larger market. Many member countries in other trade groups are now looking at the Mercosur bloc for opportunities for export growth, as well as access to the huge Argentine and Brazilian markets.

The Andean Pact, between Bolivia, Colombia, Peru, and Venezuela, has been reasonably effective as well. The Andean Pact has as its aim the establishment of a free trade zone, a common external tariff, and eventually a full common market. In 1995, Andean Pact countries achieved 8.8% growth in exports between member countries, and growth escalated into double-digit figures last year. Members follow various tariff reduction schedules rather than a single schedule. The Andean Pact incorporates a full range of services, including professional, financial, telecommunications, and transportation.

Several other trade agreements exist in the region. The Latin American Integration Association[1] (LAIA) includes almost all South American countries as well as Mexico. LAIA was established in 1980, and grew out of previous

[1] Also known as ALADI, for *Asociación Latinoamericana de Integración*.

economic integration agreements in the region. The goals of LAIA are to promote economic cooperation and market expansion in the region. They have established regional tariff preferences and a credit mechanism designed to finance intra-regional trade.

The Group of Three, between Colombia, Mexico, and Venezuela, had a representative market of over 151 million in 1997. It became effective on January 1, 1995, with the objective of eliminating tariffs among member nations over a ten-year period. A single tariff reduction schedule is applied to 90 percent of goods. Professional services and basic telecommunication services are included in the agreement.

CARICOM is a customs union involving most of the Caribbean islands as well as Belize, Guyana, and Suriname. The objective of the agreement is the creation of a common market. The CBI, which covers both Caribbean and Central American countries, allows tariff free imports of classified merchandise into the U.S. from member countries. At least 35% of the value of goods must be attributable to one or more beneficiary countries.

CARIBCAN is a program created by the Canadian government in 1986, for trade, investment, and industrial cooperation in the Caribbean region. The program extends duty-free access to imports from Commonwealth Caribbean countries. To qualify for duty free entry into Canada, a minimum of 60% of the value of the good must originate from a member nation.

Investment Attraction

The ability to create favorable investment climates will also be of paramount importance as Latin American countries vie for the attention of foreign investors. Privatization has become the major policy tool for this objective. The new governments in Latin America are staying away from government intervention in order to open their economies to private enterprise, and let the free market determine the most efficient allocation of resources. Privatization programs have been implemented in almost all of the countries in this region, and the effects of these programs are apparent in the increased levels of foreign investment, the boost to foreign reserves from the sale of public monopolies, and the downward pressure on prices due to increased competition.

ARGENTINA

- Recent economic reforms have set the stage for stable economic growth in the medium term; real GDP growth will average 5.1% over the next 23 years.
- With the highest nominal GDP per capita among Latin American countries and continued strong growth, Argentina has strong market potential.

Exhibit II-4

Argentina	1996	2000	2010	2020	Average Ann. Growth, 1996-2020*	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	35.2	37.1	41.9	47.2	1.2%	7.4%	6.5%
Real GDP (95$ bil.)	296.4	371.2	610.8	991.4	5.2%	16.7%	19.8%
Nominal GDP Per Capita ($)	8,428	10,710	22,174	42,512	7.0%	--	--
Real Private Consumption (95$ bil.)	235.2	289.1	451.2	689.8	4.6%	--	--
Real Public Consumption (95$ bil.)	12.9	15.9	24.8	37.8	4.6%	--	--
Real Fixed Investment (95$ bil.)	49.9	77.5	157.3	271.1	7.3%	--	--
Nominal Exports ($ bil.)	18.6	25.8	69.9	184.2	10.0%	7.3%	6.6%
Nominal Imports ($ bil.)	22.7	37.1	99.4	224.3	10.0%	7.4%	7.0%
Exchange Rate (NCU/$)	1.00	1.00	1.00	1.00	0.0%	--	--
Rate of Inflation	0.2%	4.2%	3.6%	3.2%	3.4%	--	--

*The figure reported for rate of inflation in this column is the average annual growth rate in CPI, or the average rate of inflation in 1997-2020.

Economic Overview

Argentina holds one of the most plentiful baskets of natural wealth in the world including fertile lands, vast energy resources, and excellent ports. Decades of political mismanagement, however, punctuated by numerous coups, have reduced Argentina from one of the ten wealthiest nations before World War I to worse than 30th in real per capita income terms today.
Under President Menem, a host of neo-liberal economic policies were implemented. Trade liberalization, the institution of a currency board, a stable currency, relatively low interest rates, and privatizations helped to tame inflation and to provide greater economic stability, both boosting investment and the economy. Despite a recession due to capital flight during the Mexican peso crisis in 1995, President Menem stuck with the neo-liberal model and currency board. Argentines have since been rewarded with strong economic growth, but they have also suffered stubbornly high unemployment rates.

The economic reform bodes well for medium-term stability, but it does not insulate Argentina perfectly from the consequences of the Asian crisis. In fact, real GDP growth, which was previously expected to decelerate to 6% in 1998, will actually come down to about 4.8%. The main reason will be that, despite the strengthening of the financial sector in the last three years, the “Brazil factor” and generally jittery international markets have increased perceived risk in Argentina, pushing interest rates significantly above their pre-Asian crisis levels. Short-term growth prospects have been adversely affected by another less important factor: Brazil absorbs nearly 30% of Argentina’s total exports. The impact of the turmoil in Asia could also hurt an economy structurally dependent on foreign financial flows in numerous ways—in addition to the reduction in Brazilian imports that it will cause.

Despite the current nervousness in domestic and foreign financial markets, it remains unlikely that the peso’s peg to the dollar will be abandoned in the short run. Across political lines and in the investor community, the currency board that maintains the peg is still viewed as key to Argentina’s financial and macroeconomic health. In fact, there is a widespread perception that should the

worst scenario—a financial collapse in Brazil—occur, the government would swallow the bitter pill and let the economy go into recession, rather than tinker with the exchange rate regime.

The currency board regime, which limits the size of the money supply to foreign exchange reserves, will continue to keep inflation at bay. The monetary regime does present some risks, through its contribution to high unemployment rates and its vulnerability to speculative attack. At this time, it is likely that the board will remain a key part of economic policy, since all the leading political parties recognize its stabilizing force in the economy.

In the long run, despite the Asian crisis, the outlook for Argentina remains positive. Expectations are for continued strength in domestic investment and exports. Strong domestic investment and technology transfer are driving productivity gains, which in turn boosts industrial and agricultural production. Real GDP is expected to grow at an average annual growth rate of 5.1% over the next 23 years.

Market Potential

While the unemployment rate remains high, joblessness has been cut sharply by the roaring economy. There was a decline in the unemployment rate from 16.1% in May to 13.8% in October 1997. Trade liberalization, which has forced some companies to fold due to competition, and productivity growth, which has enabled greater output with fewer employees, have been two main causes of high unemployment. Argentina's inflexible labor laws are a third cause. Strong unions have made it difficult for companies to fire employees during downturns or when they do not perform well. Hence, the cost of hiring is higher as well.

Nominal GDP per capita, a rough measure of average personal income, is higher in Argentina than all other Latin American countries. At market exchange rates, it was $8,676 in 1997. The relatively high income supports growing private and public consumption, as well as strong investment growth. Nominal GDP per capita will grow at a rate of 7.2% over the next 23 years, ranking fourth among the Latin American entities covered in this study. Population growth will average 1.2% over the forecast period.

Argentina's shift from a country with a trade surplus to a trade deficit in recent years is evidence of the impact of economic reforms and trade liberalization. Trade liberalization, begun in the early 90s, has eliminated almost non-tariff barriers and import licensing requirements, and has substantially lowered duty rates. Regional trading partners still account for the largest percentage of trade, with LAIA partners accounting for the largest share. Brazil is the largest single-country trading partner. While trade with the U.S. has grown substantially in recent years, there remains stiff competition between the U.S. and the EU for market share in Argentina. Over the next 23 years, exports are forecast to have an annual average growth rate of 10.3%, and imports will increase at a rate of 9.9%.

Argentina's full membership in Mercosur has promoted strong intra-regional trade with its Mercosur partners. Most duties and non-tariff barriers were removed between Argentina and Brazil at the end of 1994, and with the rest of the members at the end of 1995. Argentina is also a member of the Latin American Integration Association, as well as the WTO.

BAHAMAS/JAMAICA

- The combined economy of the Bahamas and Jamaica will grow at an annual average rate of 2.6% over the forecast period.

Exhibit II-5

Bahamas/Jamaica	1996	2000	2010	2020	Average Ann. Growth, 1996-2020	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	2.9	3.0	3.2	3.6	0.9%	0.6%	0.5%
Real GDP (95$ bil.)	8.4	9.6	12.8	16.0	2.7%	0.5%	0.3%
Nominal GDP Per Capita ($)	3,003	3,576	5,618	9,028	4.7%	--	--
Nominal Exports ($ bil.)	3.1	4.3	8.9	18.1	7.6%	1.2%	0.6%
Nominal Imports ($ bil.)	4.7	5.3	8.3	13.6	4.5%	1.5%	0.4%

Economic Overview

The mainstays to the Bahamian economy are tourism and financial services. Indeed, the services sector accounts for approximately 90% of GDP. Recent slowdowns in the tourism industry, particularly from Europe, have led to slower growth in recent years. However, the tourism industry is improving in response to the healthy U.S. economy, as the majority of tourist visits are from the U.S.

The Jamaican economy is based on bauxite, tourism, and sugar. Economic instability in the country and mine closures in the bauxite industry, as well as low world prices, have slowed growth in recent years. An IMF program imposed on the country has helped slow inflation and stabilize the exchange rate, but at the cost of significantly slower growth and continued high unemployment. Economic reforms include the elimination of most price controls, streamlined tax schedules, and the privatization of government enterprises.

As in the Bahamas, a large percentage of the Jamaican labor force is employed in the services industry: roughly 40%. Another 22% of the labor force are employed in agriculture, and there is an estimated unemployment rate of 15%. The combined economy of Bahamas and Jamaica are forecast to grow at a relatively slow rate of 2.6% over the forecast period.

Market Potential

Real GDP per capita is below average in the region, ranking ninth among Latin American entities in the study. The large proportion of the labor force in the tourism industry—estimated at 40%—and the high unemployment rate (15%) limits income growth. Although nominal GDP per capita will grow at 4.6%

annually, in real terms it will increase only marginally. Population growth will be one of the slowest among Latin American countries.

The Bahamian dollar is fixed to the U.S. dollar, in efforts to provide a stable currency. The Bahamas export commodities such as pharmaceuticals, cement, rum, crawfish, and refined petroleum products. Manufactured goods, such as automobiles and electronics, comprise imports. The U.S. is the largest partner for both exports and imports, accounting for 22% and 39%, respectively in 1995. Most of the rest of the trade is conducted with European nations.

Over half of Jamaica's exports are bauxite products, with the remainder concentrated in food products such as sugar, bananas, and rum. Jamaica imports machinery and transportation equipment, construction materials, fuel, and food. The U.S. is again the primary trading partner for Jamaica, accounting for 43% and 57% of exports and import in 1995, respectively. Other major trading partners are the EU and Canada.

Exports from the Bahamas/Jamaica include tourism revenue, which is reflected in the strong growth forecast of 7.5% for this region. Imports will grow at a much slower rate of 4.5% in the next 23 years.

The Bahamas and Jamaica are both members of three Caribbean economic agreements: CARICOM, the Caribbean Basin Initiative (CBI), and CARIBCAN. Jamaica is also a member of the WTO and the Bahamas is an applicant.

BOLIVIA

- Economic reforms will enable Bolivia to achieve strong real GDP growth in the short term, after which it will moderate to an annual average growth rate of 5.1% over the forecast period.

- Bolivia is one of the poorest countries in Latin America. Strong GDP per capita growth will begin to improve the situation.

Exhibit II-6

Bolivia	1996	2000	2010	2020	Average Ann. Growth, 1996-2020*	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	8.7	9.6	12.0	14.1	2.0%	1.8%	1.9%
Real GDP (95$ bil.)	7.4	9.9	16.7	25.0	5.2%	0.4%	0.5%
Nominal GDP Per Capita ($)	875	1,127	1,971	3,561	6.0%		--
Nominal Exports ($ bil.)	1.25	1.63	3.12	6.13	6.8%	0.5%	0.2%
Nominal Imports ($ bil.)	2.01	3.17	7.97	18.42	9.7%	0.7%	0.6%
Exchange Rate (NCU/$)	5.07	5.75	6.41	6.61	1.1%	--	--
Rate of Inflation	12.4%	4.4%	3.5%	2.8%	3.6%	--	--

*The figure reported for rate of inflation in this column is the average annual growth rate in CPI, or the average rate of inflation in 1997-2020.

Economic Overview

Despite a tumultuous history of government instability, economic stagnation, monetary instability, and hyperinflation, Bolivia has managed to turn itself around. It has been relatively stable and democratic since the mid-1980s—not coincidentally, the period when it overcame hyperinflation. Despite Bolivia's considerable political risks, it is likely to make steady but slow progress in reforming its economy and consolidating its democracy; since its decision latitude is limited by its need for foreign aid and financial support from multilateral agencies, it cannot deviate far from its reform path.

Although Bolivia has become politically stable, its economic fortunes are still tied to only a few activities, and its infrastructure remains very poor. The country derives most of its export revenue and income from energy and mining—gold, silver, zinc, tin, and oil and natural gas. The country is the world's second-largest producer of tin. Export revenues are highly dependent on world commodity prices, which are notoriously cyclical.

In recent years, privatization has been a major success. Following the passage of the innovative *capitalización* law in March 1994, the government targeted six state-owned enterprises—electricity, telecommunications, air transport, railways, mining and smelting, and hydrocarbons—and successfully privatized five of them.

President Banzer's latest economic program seeks to promote economic stability, as well as to reduce corruption during his five-year mandate. The president is attempting to achieve his goals of increasing Bolivia's annual GDP growth rate to 7% through a series of cuts in government spending, a reduction in the government debt, and an increase in investment. The president also plans to complete the capitalization program, survey the public about corruption, and monitor investment commitments made by private firms. The plan is likely to face strong opposition, though, given the high social costs of adjustment programs since the 1980s. The government is facing a rise in social unrest and a reduction of its credibility as a result of its decision to suspend a promised yearly payment to the elderly.

Since 1987, Bolivia's currency, the boliviano, has been relatively stable, depreciating in line with the country's inflation differential with the United States. An improvement in the country's macroeconomic fundamentals helped to prevent the violent fluctuations recurrent in the 1970s and early 1980s. The falling oil prices along with a strengthening of the economy continue to bring stability to the boliviano and preserve it under moderate risk.

Bolivia's GDP growth, which has averaged around 5% over the last seven years, could rise gradually to 8-9% by the end of the decade, when the results of privatization and reform become more evident. The government has revised GDP growth figures for 1998 to 4.8% due to the possible effects of El Niño weather patterns on economic activity. The major risks to stable economic growth are a departure from current economic policies on the part of the new government and a collapse in the prices of Bolivia's primary commodity exports.

In addition, economic growth might be affected by the Central Bank's over-riding focus on inflation reduction.

One risk to the economic forecasts is the possibility that Bolivia may face sanctions by the U.S. if it does not maintain its efforts in combating illegal drugs. The setbacks of some of Colombia's drug cartels have raised Bolivia's profile as a cocaine producer, making it more difficult for the country to meet U.S. anti-narcotic demands. The cultural tradition of growing coca plants among the country's native inhabitants is an obstacle to efforts to reduce the overall importance of coca as a source of income to local peasants.

Market Potential

Population growth in Bolivia has been extremely rapid, averaging over 2.7% since 1990. The growth rate is forecast to decline over the next twenty-three years, to reach a more reasonable 1.3% in 2020. Over the entire period, population growth will average 2.0%.

Two-thirds of Bolivia's population consists of indigenous groups, the most prevalent the Aymará and the Quechua. Despite their large numbers, indigenous ethnic groups are subjected to discrimination by the white and mestizo minority. This problem could become an increasing source of risk, since indigenous groups are becoming more assertive about their rights.

The structure of Bolivia's society prevents a large segment of the population from participating fully in an industrial economy. As a consequence, incomes in Bolivia are lower than all other Latin American countries except Haiti. Per capita GDP in 1997 was $964 with market exchange rates. The small population and low incomes in Bolivia severely limit market potential. Despite rapid growth in per capita GDP, Bolivia's rank will remain near the bottom of Latin American countries.

Bolivia permits all goods to be imported freely, with the exception of goods controlled for public health or national security. A flat tariff of 10% applies to imported goods except capital goods, which face a 5% tariff.

Bolivia is a member of two Latin American trade associations. Within the LAIA, Bolivia has 'less developed' country status, which allows it to extend tariff concessions to only a limited list of commodities. Bolivia also has a special status under the Andean Pact, whereby it is allowed to keep its 10% tariff levels and still remain a part of the customs union. Recently, Bolivia became an associate member of Mercosur. Within ten years, tariff rates will be gradually reduced to zero on the majority of products. Bolivia is also a member of the WTO.

BRAZIL

- While economic stabilization has brought the economy under control and growing at just over 4%, it remains on uncertain foundations.

- Brazil represents one of the largest Latin American markets, with one-third of Latin American population and over 20% of all Latin American trade.

Exhibit II-7

Brazil	1996	2000	2010	2020	Average Ann. Growth, 1996-2020*	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	160.0	173.3	211.3	257.7	2.0%	33.6%	35.6%
Real GDP (95$ bil.)	751.1	869.4	1346.1	1961.8	4.1%	42.4%	39.2%
Nominal GDP Per Capita ($)	5,046	5,106	9,983	21,411	6.2%	--	--
Real Private Consumption (95$ bil.)	495.3	559.5	810.4	1126.5	3.5%	--	--
Real Public Consumption (95$ bil.)	123.2	138.5	208.6	312.6	4.0%	--	--
Real Fixed Investment (95$ bil.)	170.2	228.1	394.3	657.3	5.8%	--	--
Nominal Exports ($ bil.)	53.3	76.9	185.3	400.7	8.8%	20.7%	14.3%
Nominal Imports ($ bil.)	67.0	98.4	252.0	577.4	9.4%	22.0%	18.1%
Exchange Rate (NCU/$)	1.01	1.42	2.16	3.04	4.7%	--	--
Rate of Inflation	19.4%	8.3%	9.3%	10.8%	9.0%	--	--

*The figure reported for rate of inflation in this column is the average annual growth rate in CPI, or the average rate of inflation in 1997-2020.

Economic Overview

On most accounts, 1997 was an excellent year for the Brazilian economy. Price stability, real GDP growth in the 4-5% range, and political (and policy) stability had been elusive goals for Brazil since the early 1980s. During the past two years there has been a remarkable turnaround in business sentiment towards Brazil, which has translated into a surge in foreign direct investment. The question is now whether the success of the Real Plan can be maintained, and extended, to prevent a recurrence of Brazil's inflationary past and to help spur economic growth. There is still some considerable risk that the Plan might collapse; regarding the second issue, the current macroeconomic policy in Brazil limits growth without guaranteeing stability.

The way to reduce the economy's vulnerability and to enhance growth prospects is, according to the administration, to deepen structural reform. Some key steps in that direction have been taken since the Real Plan. Competition, for example, will increase as a result of greater trade openness, and by privatization and liberalization in such sectors as telecommunications, energy, and transportation. But a traditional source of macroeconomic imbalances has proven harder to deal with; fiscal reform has been dormant in congress for the past two years. Resistance to significant civil service and social security reform has been powerful, at times even within the ranks of the pro-government congressional forces.

An obvious source of potential problems is the overvaluation of the *real*, and its impact on the country's external accounts. Since the introduction of the *real* in 1994, the trade balance has gone from a surplus of over $10 billion to a deficit of roughly the same magnitude in 1997. While these numbers are still low in terms of the traditional measures (share of GDP), the deteriorating trend has fed fears that in the medium-term Brazil would find itself in a position similar to pre-peso crisis Mexico.

The government response has been to use demand management to contain cyclical deterioration of the trade account, while addressing the exchange rate misalignment through a policy of gradual nominal devaluation of the *real*. The strategy has been moderately successful. It has achieved a small real devaluation of the exchange rate, while maintaining the monthly trade balance within expectations. The cost is output losses and potential employment pressures in coming years, as job growth is hurt by restructuring and an expensive currency.

The gravest danger is that even those sacrifices do not guarantee macroeconomic stability. The experience of the Southeast Asian economies suggests that even with the large volume of reserves at its command, Brazil's central bank may quickly be overpowered by a panicking market, if a sufficiently large shock occurs; a sharp devaluation of the currency might then ensue. Although it is now less certain that such devaluation would bring back the sort of macroeconomic chaos that took place before the Real Plan, the central bank would rather see the economy contract than take that risk. Hence, there is a high risk of an economic downturn.

At least in the next year the economy will be shielded by the appeal of the privatization process and the relative success of Southern Cone integration in Mercosur. Because of both reasons, at least 50% of 1997 and 1998's current account deficit will be financed with FDI inflows. Relatively benign conditions will also help Brazil finance a good portion of the rest with long-term debt (according to some estimates as much as 30% of the current account deficit). But in the medium term, unless the reform process is strengthened by Cardoso (or his successor), macroeconomic stability will remain on weak foundations. Based on current trends, real GDP is forecast to continue to grow at an average rate just over 4% into the next century.

Market Potential

Contrary to the experiences of other countries that have undergone stabilization processes in recent history, the employment picture has been surprisingly stable. The urban unemployment rate at the end of August, 1998 was 6.0%. Although the national rate hides significantly higher unemployment in the industrial heartland of Sao Paulo (in the neighborhood of 15%, according to Union surveys), even there the data suggest that unemployment has remained rather stable for the past 12 months. The stability of unemployment has combined with price stability to boost the political fortunes of President Cardoso. Household purchasing power has increased at the lower end of the income distribution, and financial stability has made it possible for a vast number of Brazilians to access consumer credit for the first time in many years.

With over a third of the population in Latin America, and relative good economic strength, Brazil represents the largest single market in Latin America. Real private and public consumption should grow over 3.5% per year, while business investment will grow even faster at 5.6%. Brazil ranks fifth in terms of nominal GDP per capita levels among Latin American entities.

Currently Brazil accounts for just over 20% of total Latin American trade. While the LATTS base line forecast calls for exports and imports to grow at a healthy 8.6% and 9.3% respectively, stronger growth in other Latin American countries will erode Brazil's total share of Latin American trade.

Brazil is a member of the Latin American Integration Association (LAIA), Mercosur, and the WTO. Reduced tariffs among Mercosur members have greatly increased trade between member nations, as firms take advantage of the specialization possible through the larger market. At the same, increased interdependence increases the risk of transmitting economic shocks beyond national boundaries.

Brazil's interests in continued economic integration was evidenced in a recent Rio Group meeting. At the time, Brazil submitted a formal proposal to develop a South America Free Trade Zone, spanning the entire South American continent. The free trade zone would involve eliminations of non-tariff barriers between Mercosur countries and other South American nations and scheduled reductions in tariffs within ten years.

CHILE

- Chile is forecast to have the highest GDP growth rate among Latin American countries, at 5.6% annually through 2020.
- Chile continues to expand trade liberalization, with associate membership in Mercosur and a trade agreement with Canada.

Exhibit II-8

Chile	1996	2000	2010	2020	Average Ann. Growth, 1996-2020*	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	14.5	15.4	17.8	20.7	1.5%	3.0%	2.9%
Real GDP (95$ bil.)	71.7	91.8	160.4	265.2	5.6%	4.0%	5.3%
Nominal GDP Per Capita ($)	5,072	6,729	14,056	33,566	8.2%	--	--
Real Private Consumption (95$ bil.)	45.7	59.7	110.6	188.1	6.1%	--	--
Real Public Consumption (95$ bil.)	5.9	6.6	9.2	13.9	3.6%	--	--
Real Fixed Investment (95$ bil.)	17.8	25.3	44.3	75.7	6.2%	--	--
Nominal Exports ($ bil.)	19.8	27.9	74.3	171.9	9.4%	7.7%	6.1%
Nominal Imports ($ bil.)	20.8	27.5	74.1	193.6	9.7%	8.1%	6.9%
Exchange Rate (NCU/$)	412.6	466.8	529.1	551.1	1.2%	--	--
Rate of Inflation	7.4%	3.5%	4.7%	6.0%	4.6%		

*The figure reported for rate of inflation in this column is the average annual growth rate in CPI, or the average rate of inflation in 1997-2020.

Economic Overview

By achieving annual GDP growth of 7% over the past decade, Chile has rightfully gained the reputation for having the strongest and steadiest economy in Latin America. Sound fiscal and monetary policy, a transparent regulatory environment, and vast mineral reserves are the foundations for an attractive

investment environment. Despite occasional tensions between its military and civilian establishments, Chile has one of the most stable democracies in Latin America. The combination of sound economic policy and political stability will ensure that the Chilean economy will remain the region's most dynamic over the near term.

One of the most conspicuous aspects of Chile's economic strengths is the lack of conspicuous problems. Unlike many of its neighbors, Chile's current-account deficit is minimal, productivity is increasing, and the average real wage is increasing. These favorable trends give the Chilean government the flexibility to maintain its prudent economic policies as the economy thrives.

Low levels of government debt and a history of on-time repayment give the Chilean government and businesses relatively easy access to capital. Chile boasts the best Latin American Standard & Poor's foreign currency debt rating (A-). Inflation control and a fairly stable real exchange rate add to growth prospects. Recent interest rate cuts will soon stimulate investment, boosting both industrial production and employment. Mineral extraction, particularly copper, will remain the key area of development. While agriculture, forestry, and fishing will account for much of the rest of economic activity, manufacturing will continue to grow. Manufacturing has increased its share of total exports from 6% to 18% over the past decade. Chilean firms have begun to export cars, for example, and look forward to penetrating the Mexican consumer market soon.

Despite substantial diversification, primary commodities continue to account for the bulk of economic activity and exports. A sustained fall in commodity prices would have significant repercussions. The baseline forecast assumes weaker copper prices, but not a collapse that would drastically reduce export revenues.

Over the next 23 years, real GDP is forecast to grow at a rate of 5.6%, giving Chile the distinction of the highest growth forecast among the Latin American entities.

Market Potential

Chile also has one of the highest GDP per capita levels in Latin America. Although the country has a smaller population, approaching 15 million, consumptive capacity among that market is quite high. Real private consumption in Chile is forecast to grow at 6.1%, the highest rate among the largest countries in Latin America. GDP per capita growth is also the fastest in the region, sprinting ahead at an average pace of 8.2% per year, well above the average rate of inflation.

The government's continued pursuit of free trade will spur economic growth. Chile became an associate member of Mercosur in September 1996 and entered an initial bilateral trade agreement with Canada in 1997. Incorporation into NAFTA has been delayed by the failure of the 1998-2000 effort to obtain fast-track negotiating powers.

Chile's associate status in Mercosur has allowed it to join its free trade zone without adopting the common external tariff system. Beginning in the fall of 1996, tariffs on goods not subject to exceptions were reduced by 40%, with further reductions to proceed progressively over eight years until 2004. Tariffs for sensitive goods will be liberalized in 10 to 15 years. Chile has opted to exempt its wheat and wheat products market for 18 years. In compensation, Chile has allowed deeper penetration into its beef and rice markets, and has opened its dairy market to products from Mercosur.

Trade between Chile and Mercosur members falls under similar rules of origin as other members. Under the terms of the agreements, 60% of components of the goods must be of national origin, while 40% may originate from outside Mercosur.

COLOMBIA

- Colombia ranks second in real GDP growth in Latin America, averaging 5.3% through 1997-2020.
- Membership in several trade agreements will support trade growth of 8.5% through the forecast period.

Exhibit II-9

Colombia	1996	2000	2010	2020	Average Ann. Growth, 1996-2020*	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	35.7	38.1	44.4	51.5	1.5%	7.5%	7.1%
Real GDP (95$ bil.)	81.0	94.2	154.5	273.4	5.2%	4.6%	5.5%
Nominal GDP Per Capita ($)	2,372	2,978	5,920	8,978	5.7%	--	--
Real Private Consumption (95$ bil.)	55.2	62.0	89.1	134.6	3.8%	--	--
Real Public Consumption (95$ bil.)	10.4	12.3	18.6	28.0	4.2%	--	--
Real Fixed Investment (95$ bil.)	16.5	20.6	39.9	81.5	6.9%	--	--
Nominal Exports ($ bil.)	13.5	19.1	42.7	95.9	8.5%	5.3%	3.4%
Nominal Imports ($ bil.)	17.0	24.1	54.8	119.8	8.5%	5.6%	3.8%
Exchange Rate (NCU/$)	1,037	1,777	4,445	10,218	10.0%	--	--
Rate of Inflation	20.6%	18.4%	11.4%	7.0%	11.7%	--	--

*The figure reported for rate of inflation in this column is the average annual growth rate in CPI, or the average rate of inflation in 1997-2020.

Economic Overview

After 30 years of consistent year-on-year growth, the Colombian economy has slowed significantly. Real GDP growth fell to just 2.1% in 1996, a sharp drop from its 5.3% pace in 1995. Two factors contributing to this slowdown were the political unrest stemming from the President Samper controversy and the costs of Colombia's efforts to combat the drug trade. Political troubles have severely affected gross domestic investment. Although political pressure remains on President Samper, the crisis peaked in 1996. GDP growth will likely increase after 1997 to average 5.3% again in the forecast interval 1997-2020.

The fiscal cost of the war against drugs has been large, contributing to a deficit in the government accounts that in 1996 reached an estimated 4.5% of GDP. With the disruption of the major known drug cartels in recent years, some recent legal activities tied to cartel finances have suffered, damaging sectors of the economy such as the construction sector in the Cali area.

One risk to the economic forecast is increased political instability. The controversy surrounding Samper's administration has mostly subsided for the remainder of his term and it is expected that the next president will be better received by the United States and foreign investors. Although violence will still be a problem in Colombia, it is likely that the U.S. government will take the opportunity of a new Colombian administration to restore U.S.-Colombia relations to a healthier level of cooperation in matters of mutual interest. This likely turn of events makes U.S. drug-related sanctions even less probable, and will likely boost business confidence and investment. However, if political instability continues, it could lead to a decline in foreign direct investment. British Petroleum, for example, has recently indicated that it will relocate its South American headquarters to Venezuela. Should others follow, the attractiveness of Colombia even for high-yield investments would likely diminish.

Market Potential

With a population of 36.3 million in 1997, Colombia represents the third largest market in Latin America in terms of consumer size. However, a relatively low GDP per capita and slow growth in average incomes diminishes the market potential.

Real consumption rates will experience mild growth, mostly as a result of faster growth in private consumption, which will increase from 2.1% in 1997 to an estimated 3.2% in 1998. Growth in private consumption is expected to continue to increase, averaging 3.9% through 2020, while public consumption growth will remain reasonably steady at 4.2%. CPI inflation will rise slightly to 19.1% this year, but is forecast to then decline steadily thereafter, to reach 7.0% by 2020. Moderating forces on price increases are relatively weak domestic demand and the relative stability of the exchange rate, which will depreciate roughly 15% on average. Demand for industrial goods should continue to increase, as real fixed investment demand grows at an increasing rate, averaging 7.0% growth over the next 23 years.

The export sector has under performed significantly in recent years. Nominal export growth fell to 2.4% in 1996 despite high oil prices and increased oil production. In fact, a side effect of the strong oil sector has been a strong—and during part of 1996—an appreciating peso. This occurred as a result of both high oil prices and increased investment in the industry.

Exports will recover to a growth rate of 9.0% in 1998 despite the continued real appreciation of the peso. The recovery from the non-oil sectors of the economy will come at a good time, now that oil prices have declined from their 1996 highs. Investment in the oil sector will nonetheless remain important, with volumes

increasing considerably in coming years. Through 1997-2020, both exports and imports are forecast to grow at a healthy average pace of 8.5%.

Colombia's position on the northern section of South America is a strategic location to take advantage of trade linkages both to the north and the south. As a result, Colombia is a member of the Andean Pact, the LAIA, and the Group of Three free trade agreement between Colombia, Mexico, and Venezuela. It also has an agreement with CARICOM.

CUBA

- Cuba is recovering from the deep recession induced by the loss of Soviet aid. Annual economic growth of 2.3% is expected over 1997-2020.
- Tourism has become the most important sector in Cuba.
- Exports are forecast to grow strongly as economic reform eases trading practices.

Exhibit II-10

Cuba	1996	2000	2010	2020	Average Ann. Growth, 1996-2020*	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	11.0	11.2	11.9	12.5	0.5%	2.3%	1.7%
Real GDP (95$ bil.)	20.7	21.1	30.0	37.4	2.5%	1.2%	0.7%
Nominal GDP Per Capita ($)	1,931	2,069	3,574	6,020	4.9%	--	--
Nominal Exports ($ bil.)	1.87	2.67	7.66	19.29	10.2%	0.7%	0.7%
Nominal Imports ($ bil.)	2.23	3.06	8.16	19.65	9.5%	0.7%	0.6%
Exchange Rate (NCU/$)	1.00	1.30	1.75	2.42	3.7%	--	--
Rate of Inflation	6.7%	5.7%	6.0%	5.9%	5.9%	--	--

*The figure reported for rate of inflation in this column is the average annual growth rate in CPI, or the average rate of inflation in 1997-2020.

Political Factors

Cuba's economic and risk outlook remains unfavorable due to the rigidity of its Communist government.

The premeditated shooting down of a private aircraft owned by the Hermanos al rescate exile group in 1996 has prolonged and intensified the U.S. embargo against Cuba and deterred some foreign investment. The United States certainly has the capability to inflict far more damage to Cuba's economy than its existing sanctions, and Castro has demonstrated a brazen tendency to provoke the United States. Nevertheless, the probability of far more severe sanctions is not high. Under current conditions, a dramatic change in the U.S. policy is unlikely.

Developments over the last 20 months indicate that most foreign investors with major investments in Cuba are ignoring the threats of U.S. sanctions under the Helms-Burton Act, while those with small stakes have pulled out or at least will

refrain from further investments. A number of firms with major investments in the United States have already divested their interests in Cuba rather than face U.S. sanctions, but in most cases, there are foreign investors willing to step in and fill their places.

Internal Problems

There have been some signs of increased internal social tensions as a result of the growing gap between emerging private-sector entrepreneurs and other Cubans, who in many cases resent their lower incomes. While gradual economic liberalization will likely continue, the government's periodic slogans on "ideological firmness" and statements that it will allow only economic reforms that are supportive of "the objectives of socialist society" could deter private investment and reduce the economy's potential.

Until the 1980s, crime was not a major problem in Cuba. Since the collapse of the Soviet Union and the loss of Russian aid, however, crime has been rising at an alarming rate, although reliable statistics are hard to come by. The government blames the rise on "decadent capitalist" influences, and has launched a number of campaigns to counter it through both additional security efforts and restraint of capitalism. The increasing crime rate is driven by the large number of young people in the population and the decreasing legitimacy and influence of the Communist Party's security and social institutions. Nevertheless, the impact of crime on foreign business is not yet very high, because in most cases such enterprises are located in isolated enclaves and are much better protected by the state security forces than local businesses. This will change, however, as the role of foreign business in the Cuban economy expands and the enterprises can no longer be easily isolated from the local population.

Economic Outlook

After contracting by as much as 45% during 1989-93 due to Soviet aid cuts, Cuba's economy expanded more strongly in recent years due to a rebound in exports and an expansion of tourism. An extremely tight monetary and fiscal policy since the Soviet collapse in 1991 has managed to drastically cut Cuba's fiscal and external debt to manageable levels. During the second half of 1996, the government increased liquidity and provided more goods in government-run local currency stores. These actions reflect an easing of monetary and fiscal policy designed to relieve the population's hardship after nearly seven years of sacrifice. As the economic recovery continues, austerity will be eased further.

Cuba has been hesitantly encouraging the country's embryonic private sector by slowly adopting more liberalized economic policies, particularly in urban services and small-scale farming. Foreign investors can now hold 100% stakes in companies, and 170,000 Cubans (about 5% of the labor force) have been permitted to become self-employed. The emphasis, however, has been mainly on facilitating large-scale foreign investment in foreign tourism enclaves, which are largely insulated from the Cuban society. The country now accepts the U.S. dollar as a legitimate form of exchange, but heavily taxes dollar incomes both

directly and through excessive charges for licenses and using government facilities.

Tourism has been a stronger mainstay of the economy than sugar exports; about one million tourists visited Cuba in 1996, and this number climbed by 20% in 1997. Tourism earnings were $1.3 billion in 1996 and $1.5 billion last year, far surpassing the sugar industry's export earnings. Cuba's tropical location and scenic beauty give it a huge potential for further tourism development, but it will not be fully realized as long as U.S. economic sanctions remain. Furthermore, despite success in getting short-term credit and some debt relief, Cuba continues to suffer from a shortage of medium- and long-term credit. Reliance on short-term, high-interest credit is a major obstacle to more rapid economic progress. The U.S.'s long-standing policy of opposing Cuban membership in multilateral institutions such as the IMF and World Bank further handicaps access to funds.

Cuba's balance of payments situation will gradually improve because of increasing trade and investment flows from Europe, Canada, and Latin America. Cuba's official exchange rate for the peso remains fixed at one peso per U.S. dollar. For most personal transactions, however, there is a more realistic parallel market rate that has been 20-22 peso/dollar in recent years. The risk of a major depreciation is high because of the volatility of the parallel rate and a high likelihood that Cuba will eliminate its overvalued official fixed rate within the next five years.

In the absence of a military blockade, the Cuban economy will continue its gradual recovery in the longer term. Average real GDP growth of 2.3% is expected over the next 23 years. The risk of a recession is low as long as there is no major retrenchment in economic reform or a major collapse in sugar prices. The economic stabilization policy, with gradually easing monetary and fiscal policy, will likely continue as long as Fidel Castro is in power. After he is gone, the likelihood of a more radical policy change—such as rapid economic liberalization—will increase, as will the risk of economic instability, since a power vacuum will be highly likely.

Market Potential

Per capita income in Cuba is below the average for Latin American countries, but higher than several of its Caribbean and Central American neighbors. Real GDP per capita is forecast to grow at 4.7% over the forecast period.
Cuba's merchandise export revenue is dominated by sugar, which will have an output of only 3.5 million tons in 1997-98, compared with 4.25 million tons in 1996-97. As in the past, the government intends to overcome the setbacks in 1998-99 by exhorting sugarcane workers to heroic efforts. Such appeals stopped being effective many years ago, however, and are highly unlikely to work this time either.

The trade market, however, is expected to grow faster, as economic reform eases trading practices. Current expectations are that exports will increase at an annual average rate of 10.0%, and imports at 9.3% over the next two decades.

Due to its political isolation, Cuba is not included in any of the several economic and trade agreements in the region. Cuba has been prevented from even joining international institutions such as the IMF and the World Bank. However, Cuba is an observer to LAIA and a member of the WTO.

DOMINICAN REPUBLIC

- Real GDP growth will average only 2.1% annually through 2020.
- Extremely low incomes and a nominal GDP per capita growth that lags inflation limit consumer market potential.

Exhibit II-11

Dominican Republic	1996	2000	2010	2020	Average Ann. Growth, 1996-2020	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	7.7	8.3	9.6	11.1	1.5%	1.6%	1.5%
Real GDP (95$ bil.)	11.0	12.0	14.7	18.0	2.1%	0.6%	0.4%
Nominal GDP Per Capita ($)	1,456	1,598	2,155	3,257	3.4%	--	--
Nominal Exports ($ bil.)	4.9	7.9	19.8	44.3	9.6%	1.9%	1.6%
Nominal Imports ($ bil.)	5.4	7.7	18.9	40.2	8.7%	1.8%	1.3%

Economic Overview

The Dominican Republic occupies two-third of the island of Hispanola in the Caribbean. The Dominican Republic began economic reforms in the mid-1990s, which stabilized the exchange rate, reduced inflation, and contributed to strong GDP growth. However, a large external debt, bankrupt state enterprises, and a troubled manufacturing sector have prompted the government to further economic reforms to increase the competitiveness and market-orientation of the economy. The currency was devalued, income taxes were cut, sales taxes were increased by 50%, and import tariffs were reduced. Investment to the economy increased after a new law in 1996 permitted repatriation of capital dividends.

Agriculture remains a dominant sector in the economy, accounting for 13% of GDP in 1995 and nearly half the labor force. Services account for 55% of GDP and, combined with government, employ 32% of the labor force.

Without a strong sector stimulating the economy, real GDP is forecast to grow at a slow pace. The growth rate will average 2.1% annually over the next 23 years, with growth slowing after five years to a steady rate.

Market Potential

The Dominican Republic is one of the poorest countries in Latin America, with a nominal GDP per capita of $1,493 in 1997. Relatively slow growth of 3.5% over the forecast period will limit the potential of a consumer market in the Dominican Republic. In fact, the Dominican Republic will see its rank in GDP per capita fall from 15th place in 1997 to 17th in 2020, as Bolivia and Ecuador overtake it due to much faster growth in average incomes.

Trade is an important component of the Dominican economy, with the U.S. being the dominant partner. In 1995, 82% of Dominican exports and 66% of its imports were bound for the U.S. The European Union is the second largest partner for Dominican trade. Nominal exports and imports are forecast to continue to grow quickly over the forecast period, rising at a rate of 9.3% and 8.6%, respectively.

The Dominican Republic is a member of the Caribbean Basin Initiative and the WTO. As well, the Dominican Republic is an observer in CARICOM and the LAIA.

ECUADOR

- Economic concentration in natural resources and political instability limits growth to 3.9% through 2020.
- With slow nominal GDP per capita growth and high inflation, GDP per capita levels will remain low.

Exhibit II-12

Ecuador	1996	2000	2010	2020	Average Ann. Growth, 1996-2020*	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	11.7	12.8	15.8	19.2	2.1%	2.5%	2.6%
Real GDP (95$ bil.)	18.5	21.9	32.4	46.4	3.9%	1.0%	0.9%
Nominal GDP Per Capita ($)	1,398	1,593	2,351	3,601	4.0%	--	--
Real Private Consumption (95$ bil.)	12.5	15.0	22.5	33.0	4.1%	--	--
Real Public Consumption (95$ bil.)	2.4	2.6	4.1	6.1	4.0%	--	--
Real Fixed Investment (95$ bil.)	3.5	4.0	6.3	9.6	4.3%	--	--
Nominal Exports ($ bil.)	5.6	6.4	13.3	29.2	7.1%	2.2%	1.0%
Nominal Imports ($ bil.)	5.3	6.0	13.6	30.6	7.6%	1.7%	1.0%
Exchange Rate (NCU/$)	3,189	7,545	33,139	119,115	16.3%	--	--
Rate of Inflation	24.4%	23.7%	17.8%	16.4%	18.5%	--	--

*The figure reported for rate of inflation in this column is the average annual growth rate in CPI, or the average rate of inflation in 1997-2020.

Economic Overview

Ecuador's strengths are oil, agriculture, and fishing; while low productivity, insufficient education, and poor infrastructure hold back the country from stronger growth. On the other hand, Ecuador has maintained a stable economic environment, avoiding the sharp economic swings experienced over the past ten years by Latin America's largest economies.

Political instability has aggravated Ecuador's economic problems over the past year. The economic repercussions have not been disastrous, but they have hurt Ecuador's prospects. The government deficit has widened. Domestic subsidies for electricity and public transportation remain high, while tax evasion is rampant. Inflation has increased and growth in fixed investment is waning.

Inflation will remain in double digits, but be stable, while the peso continues to depreciate in line with consumer prices, hence keeping the real exchange rate fairly steady. With the domestic economy gaining some momentum, the current account deficit will worsen. Rising domestic demand will raise imports more rapidly than exports can potentially grow. Currency instability across Asia plus concerns in Latin America will deter any dramatic inflows of capital. Hence, the Ecuadorian government will work hard to keep its external balances within reasonable shape.

The exploitation of natural resources will remain the country's key driver of economic growth. Ecuador is the world's largest exporter of bananas and is slowly increasing its oil production. After years of neglect, the government is working toward improving the capacity of oil pipelines. Tourism—particularly to the Galápagos Islands—also draws revenues. The focus on natural resources, however, keeps Ecuador from developing into a wealthier nation. The lack of diversification leaves the national economy susceptible to sharp swings in commodity prices, as well as adverse weather patterns.

Growth will rebound in the next few years. In large part, this is simply due to the current point of Ecuador's business cycle: the inventory draw-down over the past two years has led to a need for greater production. This, along with strength in the country's oil and agricultural sectors, will help the economy return to 4%-plus annual growth over the next few years. Slowing growth rates after 2000 will hold average annual GDP growth down to 3.9% through 2020.

Market Potential

Ecuador is one of the poorer nations in South America, with annual nominal per capita income of less than $1,500. Ecuador's small population and low GDP per capita limit the market potential. Strong population growth and relatively slow GDP growth will hold down GDP per capita growth to 4.0% over the next 23 years. However, continued high inflation rates will erode any improvements in real income.

Ecuador is a member of the LAIA, the Andean Pact, and the WTO, and has a trade agreement with Chile.

FRENCH GUIANA / GUYANA / SURINAME

- These three countries, dependent on agriculture and mining, will experience relatively slow economic growth over the LATTS forecast period.
- Evidence of French Guiana's French department status is seen in its high GDP per capita, while its neighbors are among the poorest in the region.

Exhibit II-13

French Guiana/Guyana/Suriname	1996	2000	2010	2020	Average Ann. Growth, 1996-2020	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	1.41	1.47	1.62	1.78	1.0%	0.3%	0.2%
Real GDP (95$ bil.)	4.63	5.25	6.92	8.27	2.4%	0.3%	0.2%
Nominal GDP Per Capita ($)	3,373	3,948	6,041	9,328	4.3%	--	--
Nominal Exports ($ bil.)	1.56	1.84	2.97	4.95	4.9%	0.6%	0.2%
Nominal Imports ($ bil.)	5.49	7.86	18.23	39.11	8.5%	1.8%	1.2%

Economic Overview

French Guiana is in fact a department of France, and is administered by that government. The economy of this region is closely tied to the French economy through subsidies and imports. Its primary industries are fishing and forestry. A French space center is also an important component of the local economy.

Guyana, one of the poorest countries in the Western Hemisphere, has experienced steady, strong economic growth in recent years. Modest inflation and a more realistic exchange rate, as well as expansion in agricultural and mining sectors have all contributed to growth. Infrastructure problems and a large external debt continue to influence future expansion.

After dismal economic conditions only a few years ago, Suriname has regained positive trends. The government's move to economic reforms, including a unified exchange rate and tight monetary policy, have conquered inflation and eased the budget deficit. They also initiated the release of substantial development aid from the Netherlands, which was held up pending economic reforms. The Surinamese economy is vulnerable to movements in the bauxite industry, which accounts for more than 15% of GDP and 65% of export revenue.

Combined, real GDP for this region was $4.9 billion in 1997, edging out the more populous Haiti for the second lowest level in Latin America. However, three-quarters of the GDP for this region are earned by tiny French Guiana, which also has the lowest population. The average growth rate for the three countries is forecast at 2.3% over the next 23 years.

Market Potential

These three countries, even combined, have the smallest population of all the Latin American entities considered here. Neither will population growth be

relatively fast in the future, increasing at an average rate of only 1.0% over the next 23 years. Out-migration is the main reason for slow population growth.

While this cluster's average nominal GDP per capita ranks 8th among Latin America entities, this conceals large discrepancies among the three countries. French Guiana had a nominal GDP per capita of $24,639 in 1997, while Suriname had only $1,207 and Guyana just $902.

Exports of fish and fish products—mostly shrimp—account for over half of French Guiana's revenue. It is equally dependent on imports of food and energy. Trade is primarily with France: 71% of exports and 64% of imports in 1995.

Guyana's exports are primarily agricultural and mineral; key products are sugar, gold, bauxite, rice, and shrimp. The U.S. became the leading destination in 1995, edging out Canada for the largest share of Guyanan exports. Together, the U.S. and U.K. account for half of Guyanan imports, which tend to be manufactured goods, energy, and food. Guyana also imports substantial amounts from its Caribbean neighbors, principally Trinidad & Tobago.

As mentioned, the majority of exports from Suriname are alumina or products from the bauxite industry. The remainder are agricultural products. Export markets are more diversified than Suriname's neighbors, with the largest single destination the EU. Food, petroleum, and capital equipment are imported into Suriname. Venezuela accounted for almost half of imports in 1995.

While Guyana and Suriname account for the majority of exports in the combined region, French Guiana comprise nearly three-quarters of imports in the region. As almost all exports from these regions are commodities subject to economic fluctuations, modest growth in exports is forecast. Growth in nominal exports will average 4.9% annually. Imports will continue to grow strongly at 8.5% per year over the next two decades.

Guyana and Suriname are both members of CARICOM. Guyana is also a part of CARIBCAN and the CBI. Both are members of WTO.

HAITI

- Extreme poverty, lack of economic reforms, and political quagmires hold growth to an average 1.3% over the forecast period.
- Haiti is dependent on imports of food and manufactures, two-thirds of which come from the U.S.

Exhibit II-14

Haiti	1996	2000	2010	2020	Average Ann. Growth, 1996-2020	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	6.6	7.0	8.3	9.6	1.6%	1.4%	1.3%
Real GDP (95$ bil.)	2.1	2.1	2.6	3.0	1.5%	0.1%	0.1%
Nominal GDP Per Capita ($)	327	331	448	623	2.7%	--	--
Nominal Exports ($ bil.)	0.22	0.23	0.36	0.59	4.2%	0.1%	0.0%
Nominal Imports ($ bil.)	0.97	1.16	2.19	3.65	5.7%	0.3%	0.1%

Economic Overview

Haiti is among the poorest countries in the world. About 75% of the population live in abject poverty. Roughly two-thirds of Haitian employment is in agriculture, primarily in small-scale subsistence farming. A 1996 estimate placed the unemployment rate at 60%—almost no jobs have been created since President Preval took office in February 1996. Haiti's inability to come to agreement with international sponsors has prevented its access to much needed development assistance.

Haiti's sporadic economic development has led to negative growth forecasts through 2000. By then the economy is expected to reshape itself for positive growth in subsequent years. Over the LATTS forecast period, real GDP growth is forecast to average 1.3% annually.

Market Potential

The extreme poverty of Haiti is evident in its nominal GDP per capita of $343 in 1997. Relatively robust population growth and slow economic growth will combine for slow growth in average income. An average annual growth rate of 2.6% will not succeed in doubling average nominal income by 2020.

Imports are an important component of the Haitian economy. Food and food products account for nearly a quarter of imports, while machines and manufactures and petroleum products are other dominant sectors. Exports are made up of coffee and light manufactures—primarily textiles and apparel. Two-thirds of Haitian trade is with the U.S.

Haiti is a member of the Caribbean Basin Initiative and the WTO, as well as an observer in CARICOM.

MEXICO

- Mexico is almost completely recovered from the peso crisis in 1994, and economic and political practices position it for stable, sustainable growth in the future.

- Mexico's membership in key trade agreements and rapid growth in trade will propel it to account for almost half of all trade in Latin America by 2020, more than double its share of population or real GDP.

Exhibit II-15

Mexico	1996	2000	2010	2020	Average Ann. Growth, 1996-2020*	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	90.7	97.5	113.8	130.8	1.5%	19.0%	18.1%
Real GDP (95$ bil.)	258.9	323.2	502.8	733.7	4.4%	14.6%	14.7%
Nominal GDP Per Capita ($)	3,166	5,089	10,754	20,963	8.2%	--	--
Real Private Consumption (95$ bil.)	172.5	209.6	324.7	503.2	4.6%	--	--
Real Public Consumption (95$ bil.)	29.9	35.0	50.7	73.7	3.8%	--	--
Real Fixed Investment (95$ bil.)	51.1	87.6	150.0	227.9	6.4%	--	--
Nominal Exports ($ bil.)	79.0	151.3	523.7	1520.7	13.1%	30.8%	54.4%
Nominal Imports ($ bil.)	72.8	153.4	486.2	1412.2	13.2%	23.9%	44.3%
Exchange Rate (NCU/$)	7.6	9.7	13.3	16.8	3.3%	--	--
Rate of Inflation	34.4%	11.3%	7.6%	7.5%	8.3%	--	--

*The figure reported for rate of inflation in this column is the average annual growth rate in CPI, or the average rate of inflation in 1997-2020.

Economic Overview

National accounts data confirm that the recovery of the Mexican economy is gathering momentum. Real GDP grew faster than 7% in 1997. Thus far, the recovery has been export- and investment-driven: nominal exports grew 27% last year, while real investment expanded 22% during the same period.

Mexico stands out among most major emerging markets as the world economy faces the consequences of the Asian crisis. The problems in Asia have led to a generalized retrenchment of international investors from emerging financial markets. This has led to asset deflation in markets from Thailand to Brazil. However, the strength of Mexican fundamentals makes the Mexican market a prime candidate to benefit from a potentially significant redistribution of international investment portfolios in the next few months. Even in the absence of such reallocation, though, privatization, foreign direct investment, and portfolio investment will suffice to finance the demands of the resurging Mexican economy in the near term.

In the short run, the Asian crisis does marginally increase the potential for significantly slower growth. But unlike Asian and other Latin American economies, where such potential comes from the direct impact of the crisis on investment and consumption, in Mexico's case the impact of the Asian crisis is indirect. The key link, in fact, is through the impact of the Asian devaluations and subsequent slowdowns on the U.S. economy, which will most likely be modest, reducing U.S. real GDP growth from a previously anticipated 2.5% in 1998 to 2.0%. Indeed, the expectation of lower economic growth will have the side benefit of preventing a rise in U.S. interest rates at least through the second half of 1998, when there is actually some probability that those rates should fall to maintain growth near its potential rate.

Positive economic signs in Mexico at the beginning of 1998 are external accounts that are roughly in balance, clear advances in political reform, and—critically—a rather prudent macroeconomic policy that has broad support across political lines. Given the improvement of medium-term risk and the opportunities offered by NAFTA, Mexico has the potential to enter a phase of accelerated,

sustained growth. Real GDP is expected to continue to grow at a rate of 4.3% over the long term.

Market Potential

Mexican (nominal) GDP per capita is above the Latin American average, and is forecast to grow at one of the fastest rates in the region, at 7.8% per year. With a population of over 90 million in 1997 and a population growth rate of 1.5% per year, the Mexican market is a key target in Latin America. Indeed, it accounts for 19% of the Latin American market and 15% of regional GDP.

Real consumption had been a relative laggard in Mexico's economic recovery, growing only marginally from the very depressed levels it reached in 1995. This has been changing in the last few months, however. After growing only 2% year-on-year during the first quarter of 1997, real private consumption growth accelerated to 6.9% and 7.8% in the second and third quarters, respectively, for a total annual increase of 6.3% in 1997. This was insufficient for a complete rebound, however; real consumption levels in 1997 were still below those of 1994, before the peso crisis erupted. Nevertheless, real private consumption will likely continue to grow at an annual average rate of 4.5%, closing the gap by 1998.

Part of the reason for the rebound in private consumption is the rapid decline of unemployment. The unemployment rate has dropped to levels near those that prevailed prior to the peso crisis, thanks to very fast growth in the industrial sector. The rate of unemployment and partial employment, which includes those unable to work more than 15 hours a week, has dropped significantly, to around 7.9% in November 1997.
The pick-up in consumption is essential for the sustainability of the ongoing economic expansion, since other sources of growth will likely play a lesser role in 1998. Exports will still grow at a respectable rate, but stronger competition from Asia and a weaker U.S. economy will almost certainly translate into a slower pace of sales abroad. Investment will also continue to grow strongly, but it will decelerate as well compared to 1997. Although real investment is finally reaching pre-crisis levels, it will likely be dampened somewhat by slower export growth, slow growth in commercial lending, and reduced international liquidity.

Mexican trade, as a share of Latin American trade, surpasses its population share in Latin America. Mexican trade accounts for over a third of Latin American exports and nearly as much imports. Average growth of over 12% per year is forecast for nominal exports. Exports have grown very rapidly since Mexico's entrance into NAFTA, as did imports before the peso crisis. Import growth, however, has recovered, and will combine with exports to account for almost half of all trade in Latin America in 2020.

Mexico's links with both North America and Latin America are reflected in its trade associations. Mexico's entrance into the North American Free Trade Agreement in 1992 was a much anticipated and debated event, linking an emerging market with two of the strongest economies in the world. As duties

between the three NAFTA countries continue to fall, a significant redistribution of industrial location is taking place between the countries.

International linkages have also been forged south of Mexico's border. Mexico is a member of the Latin American Integration Association, and is a founding member of the recently formed Group of Three, which includes Colombia and Venezuela. As well, Mercosur is a member of the WTO and an observer in CARICOM.

PANAMA

- Panama ranks fifth in economic growth among Latin American entities, with an average annual growth rate of 5.0%; however, this may be threatened by increasing political risks in the short term.

- Panama has positioned itself as a key re-exporter of manufactured goods, pushing up nominal export growth to a leading rate of 12.6% per year.

Exhibit II-16

*The figure reported for rate of inflation in this column is the average annual growth rate in CPI, or the average rate of inflation in 1997-2020.

Panama	1996	2000	2010	2020	Average Ann. Growth, 1996-2020*	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	2.7	2.9	3.3	3.7	1.3%	0.6%	0.5%
Real GDP (95$ bil.)	7.8	9.3	15.2	24.6	4.9%	0.4%	0.5%
Nominal GDP Per Capita ($)	2,970	3,590	6,498	13,419	6.5%	--	--
Nominal Exports ($ bil.)	1.32	2.20	7.23	22.73	12.6%	0.5%	0.8%
Nominal Imports ($ bil.)	15.64	20.73	44.96	99.85	8.0%	5.1%	3.1%
Exchange Rate (NCU/$)	1.0	1.0	1.0	1.0	0.0%	--	--
Rate of Inflation	1.3%	1.9%	2.5%	2.5%	2.3%	--	--

Economic Overview

However, there are several political risks that could endanger Panama's outlook. Investor confidence in the country's political stability could decline when the United States withdraws its military forces in 1999. At the same time, increasing political polarization over the issue of extending the U.S. military presence could undermine the government's popularity and result in legislative deadlock. With elections planned for 1999, the government is becoming increasingly more partisan-like and the opposition parties are looking for allies to oppose the ruling PRD. The ruling party's desire to extend the presidential term is likely to generate intense resistance among other political parties.

Panama could also face sanctions from the United States if it continues to allow international smugglers to use its territory and businesses with impunity for narcotic trafficking and money laundering operations. Panama suffers from a high level of corruption and crime, aggravated by the presence of many narco-traffickers in the country. The increase in violent and property crime could deter

foreign investment and tourism. Indeed, the problem is already a major obstacle to the recovery of Panama's financial and tourism industries.

As long as U.S. troops remain in Panama, the country's political risk is considered to be minimal. After 1999, political risk will depend on the extent of U.S. presence, if any. In spite of nationalist pressure on the Balladares administration, the United States might remain in at least Howard Air Base, but it is highly uncertain in what capacity.
Currently, the Panamanian economy is recuperating from slow growth in the last couple of years. The economy is expected to expand by 4.7% this year, compared with 4.0% in 1997 and 1.6% in 1996. Inflation was reduced to 1.2%, and unemployment decreased to 13%. While most of the expansion occurred in the mining sector, which grew by more than 17%, other sectors like trade and fishery reported increases of around 15% and 14%, respectively. Over the next 23 years, growth should average 5.0%, as foreign investment picks up and the military bases evacuated by U.S. troops attract developers.

Panama's open economy, close ties to the United States, and prudent economic policies are key factors in healthy growth forecasts. Since General Noriega's removal and the abolition of the national army in 1989, the country has benefited economically from the presence of U.S. troops, which has helped to rebuild investor confidence in the country's political stability and economic viability. The government of President Ernesto Balladares has implemented sound policies that have stabilized the economy and attracted foreign investment. By avoiding political partisanship over economic policy, President Balladares has overcome the problems of legislative deadlock and policy paralysis faced by his predecessor.

Market Potential

Panama is a small country and had a population of just 2.7 million in 1997. Incomes in Panama are quite low compared to western standards, but are the highest of the Central American and Caribbean countries surveyed here. Real GDP per capita is forecast to grow at a rate of 6.6% over the forecast period, bringing the mean income in Panama above the average for Latin America.

Potential tension between two of Panama's larger trading partners—Hong Kong and Taiwan—may impact the country's investment and export outlook. While Panama is Hong Kong's main port of entrance into Latin America (approximately 35% of the exports into the region pass through Panama), Taiwan has been steadily increasing its investments in the country. Tensions between the two countries could cause a decrease in the use of Panama's ports, and a consequent decrease in Panamanian exports.

Panama's non-manufacturing merchandise exports, which consist primarily of commodities—particularly bananas and coffee—are vulnerable to price volatility. The country's manufacturing exports are largely re-exports from the country's Colón Free Trade Zone. Higher export incentives and lower export taxes have been increasing the country's re-exports. In addition, the privatization of the

country's ports last year cut servicing costs by about one-half, increasing the port's international appeal.

Due to the increasing potential for re-exports, Panama has the highest growth rate in exports in the Latin American countries examined here. Similar to trade growth in recent years, exports are forecast to grow at an average annual rate of 12.6%, while imports will increase by 8.1% annually throughout the forecast period.

Panama is a member of the Caribbean Basin Initiative. The CBI, which covers both Caribbean and Central American countries, allows tariff-free imports of classified merchandise into the U.S. from member countries. At least 35% of the value of goods must be attributable to one or more beneficiary countries. As well, Panama is an observer in the LAIA and a member of the WTO.

PARAGUAY

- Economic reforms and integration within Mercosur contribute to an average annual expansion of 4.9% in the economy.

Exhibit II-17

Paraguay	1996	2000	2010	2020	Average Ann. Growth, 1996-2020*	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	5.0	5.5	7.1	8.8	2.4%	1.0%	1.2%
Real GDP (95$ bil.)	9.3	12.0	20.2	30.2	5.0%	0.5%	0.6%
Nominal GDP Per Capita ($)	1,922	2,390	4,055	6,898	5.5%	--	--
Nominal Exports ($ bil.)	1.02	1.39	2.80	5.54	7.3%	0.4%	0.2%
Nominal Imports ($ bil.)	4.96	6.71	14.17	29.13	7.7%	1.6%	0.9%
Exchange Rate (NCU/$)	2,063	2,518	4,286	6,418	4.8%	--	--
Rate of Inflation	9.8%	9.5%	8.1%	6.8%	8.1%	--	--

*The figure reported for rate of inflation in this column is the average annual growth rate in CPI, or the average rate of inflation in 1997-2020.

Economic Overview

While Paraguay's economy has achieved modest growth in recent years and the government is continuing to pursue economic reforms, much of the economic activity in the country is uncounted and unregulated. Paraguay is characterized by having a large informal economy that consists of re-exports of consumer goods to neighboring countries and thousands of microenterprises. A large percentage of the population still derive their living from agricultural activity, often on a subsistence basis.

The government has continued to pursue economic reforms including integration within Mercosur. Real GDP growth is expected to grow above 6% in the next few years, before falling over the forecast period. The average annual rate over the period 1997-2020 is forecast at 4.9%.

Market Potential

Paraguay has the highest population growth among Latin American countries. As a result, despite strong economic growth, nominal GDP per capita will not grow faster than the average rate of inflation.

Paraguay's exports are primarily agricultural. Mercosur partners and other Latin American countries are the destination for more than two-thirds of exports. Imported commodities are capital and consumer goods, as well as fuel and food products. The majority of imports are from Brazil, the EU, and other Latin America countries.

Paraguay is a member of the LAIA, Mercosur, and the WTO.

PERU

- Substantial improvements have been made in Peru's economic growth and inflation, but Peru still faces high medium-term risk to continued achievements.
- Extremely slow growth in nominal GDP per capita will drop average income in Peru to fourteenth place in Latin America by 2020.

Exhibit II-18

Peru	1996	2000	2010	2020	Average Ann. Growth, 1996-2020*	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	24.0	26.0	31.2	37.3	1.9%	5.0%	5.2%
Real GDP (95$ bil.)	66.7	82.1	133.2	202.6	4.7%	3.8%	4.1%
Nominal GDP Per Capita ($)	2,910	3,085	3,769	4,766	2.1%	--	--
Real Private Consumption (95$ bil.)	50.8	58.2	85.5	129.5	4.0%	--	--
Real Public Consumption (95$ bil.)	3.5	4.0	5.5	7.5	3.3%	--	--
Real Fixed Investment (95$ bil.)	16.7	22.4	39.1	55.9	5.2%	--	--
Nominal Exports ($ bil.)	9.5	14.0	30.6	70.5	8.7%	3.7%	2.5%
Nominal Imports ($ bil.)	12.3	16.7	37.9	87.9	8.5%	4.0%	2.8%
Exchange Rate (NCU/$)	2.45	3.58	7.23	11.85	6.8%	--	--
Rate of Inflation	11.8%	8.3%	6.3%	4.6%	6.3%	--	--

*The figure reported for rate of inflation in this column is the average annual growth rate in CPI, or the average rate of inflation in 1997-2020.

Economic Overview

Peru has moved decisively to overcome what only a few years ago seemed like insurmountable obstacles. The government's fierce anti-insurgency campaign left the guerrillas of both the Sendero Luminoso (Shining Path) and the Movimiento Revolucionario Tupac Amaru (MRTA) on the defensive, with their military threats greatly reduced. The government's repeated claim of having eliminated the MRTA is an exaggeration, however. In fact, both insurgent groups are still active in many areas. The recent hostage crisis, while an isolated incident, was a blunt reminder of this reality. High-level corruption among the military and police forces remains a significant impediment to controlling crime as well as insurgency and terrorism.

A new challenge facing Peru is El Niño. The government has so far spent in excess of $110 million fighting El Niño's effects. Damages are estimated at $60 million, relatively low because of preventive measures that were initiated. These costs come at a time when tax revenues will be reduced as a result of fewer exports to Asia. Rather than tighten fiscal expenditures or cut back on his vote-winning expenditures, Fujimori will likely ask congress to approve additional funds.

Despite El Niño, Peru posted one of the highest growth rates in Latin America. GDP growth for 1997 was 5.3% and inflation came in at 9.5%. This is a substantial improvement over the 1996 figures of 2.8% growth and 11.5% inflation. The trade deficit is expected to widen due to falling metal and commodity prices, and El Niño's devastation of the fishing sector, Peru's second-largest export industry. The fishing industry fell 73.7% year-on-year in December.

More importantly, Peru's achievements have yet to stand the test of time. Political violence has waned, but it could return if growth slows and current social spending plans lose funding. The government is moving in the right direction by emphasizing a social agenda, liberalizing investment laws, and controlling inflation—but more time is needed for these measures to restructure the economy. While Peru has a relatively moderate short-term risk for a Latin American country, its medium-term risk is high.

Two of the largest constraints to domestic growth are the current-account deficit and government debt. In 1996, the government engineered an economic slowdown that made a marginal improvement in the trade balance, but reduced GDP growth by more than half: from 7.0% in 1995 to 2.8% in 1996.

In the next year, and in a slightly declining trend during the next five years, Peru's currency will remain vulnerable given the magnitude of the foreign flows now required to finance the external gap and the returning concern about guerrilla activity. Foreign currency inflows remain strong, and Peru's ability to obtain fresh commercial financing has been boosted by the signing of a Brady deal. While the current-account deficit has improved, it remains at high levels in the midst of nervous international markets—a risky combination.

The inflation rate has fallen from more than 7,400% in 1990 to 9.5% in 1997. Inflation reduction remains an important item in the government's agenda. Further reductions will be slower, however, due to capital inflows and the government's planned increases in social spending.

In the next few years, real GDP will grow at a pace faster than 5%, after which it will decline gradually. On average over the long term, real GDP is forecast to increase at 4.7%.

Market Potential

Peru's nominal GDP per capita is well below the Latin American average. At $2,973 in 1997, it ranks 14th out of the Latin American entities considered here. Peru is also forecast to have the slowest growth in nominal GDP per capita of all the countries in this forecast. Real public and private consumption will also increase relatively slowly, while fixed investment will grow somewhat faster at 5.1% per annum.

The recent trend in exports has been quite positive. Private firms have helped raise productivity and investment, particularly in key mining sectors. However, in the medium term, the preservation of security is necessary for investment in the minerals and agricultural sectors. It is also important to maintain stable and predictable inflation and interest rates. The current outlook for these variables is positive. Nominal exports and imports are forecast to increase at an annual rate of 8.5% in the next 23 years, an average rate for Latin American economies.
Peru is a member of the LAIA and the Andean Pact, however it did not participate in the most recent negotiations of the Andean Pact.

URUGUAY

- Recent political and economic restructuring in Uruguay have brightened its economic outlook, for a forecast average of 4.5% in GDP growth over the next 23 years.

- Nominal GDP growth per capita ranks fifth among Latin American entities, growing at a pace of 6.9%.

Exhibit II-19

Uruguay	1996	2000	2010	2020	Average Ann. Growth, 1996-2020*	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	3.2	3.3	3.5	3.7	0.6%	0.7%	0.5%
Real GDP (95$ bil.)	18.5	22.0	36.8	53.5	4.5%	1.0%	1.1%
Nominal GDP Per Capita ($)	5,907	7,381	14,890	29,019	6.9%	--	--
Nominal Exports ($ bil.)	2.42	2.97	5.72	10.87	6.5%	0.9%	0.4%
Nominal Imports ($ bil.)	3.75	5.39	13.68	31.29	9.2%	1.2%	1.0%
Exchange Rate (NCU/$)	7.97	13.34	18.84	19.79	3.9%	--	--
Rate of Inflation	28.3%	10.6%	4.9%	3.4%	6.8%	--	--

*The figure reported for rate of inflation in this column is the average annual growth rate in CPI, or the average rate of inflation in 1997-2020.

Economic Overview

From being one of the most developed economies in Latin America in the past, Uruguay has lost much ground. Since 1950, its average economic growth has been well below the regional average. The causes of Uruguay's economic stagnation during the last four decades are numerous: a bloated public sector, an excessive tax burden, lax monetary and fiscal policy, capital flight and emigration, declining competitiveness, unfavorable terms of trade, party factionalism, and political instability.

In recent years, however, Uruguay has made some efforts to reform its economy and to move toward sustainable development. President Julio María Sanguinetti, who was inaugurated in March 1995, is far more committed to fiscal reform and economic restructuring than were his predecessors. Moreover, he has been more successful in getting both his political and economic programs through the divided national assembly. The results were very positive for the business community and foreign investors. A new constitutional arrangement improves the prospects for further economic reform after the next national elections in 1999.

Uruguay's greatest economic assets are its highly skilled work force, well-developed infrastructure, and attractive tourism resources. In addition, its proximity to the two largest South American economies and its membership in Mercosur enhances its investment potential beyond its own relatively small economy. Uruguay's economy faces a number of risks, however. Its dependence on neighboring countries' markets means that its economic growth is hurt by recessions in those nations, particularly in Argentina. Its generous system of state-funded social and health benefits is a major burden on the economy, even after recent reforms. The country's propensity for holding referendums on every major political issue reduces the government's latitude for dealing with problems that require tough—and often unpopular—action. The division of political power in the national assembly among numerous small political factions, loosely grouped into three broad coalitions, rules out strong governments capable of decisive action. This limited decision latitude is further restricted by the tendency of the labor unions to oppose government austerity and restructuring through strikes.

After a three-year economic boom during 1992-94, when annual GDP growth averaged nearly 6%, the economy slid into recession in 1995, contracting by 2.4%, due to an austere budget, recession in Argentina, and a slowdown in Brazil (Uruguay's two major trading partners). The recovery last year was a surprisingly strong 4.8%, but the outlook for 1998 has turned negative as a result of likely slowdowns in Brazil and Argentina—also Uruguay's primary sources of tourist income—as well as a possible reduction in exports to Asia, and a decrease in agricultural output from heavy rainfall due to El Niño. Over the forecast interval 1997-2020, average annual growth of 4.5% in real GDP is expected.

Market Potential

Uruguay's double-digit unemployment rate is a major source of concern for the government and a potential danger to the country's macroeconomic stabilization program. Although still very high, unemployment has maintained its gradual downward trend in recent months, falling from 12% in December 1996 to 10.8% in October 1997.

With the decrease in unemployment, per capita incomes will increase. Slow population growth and strong GDP growth contributes to a strong increase in GDP per capita in the future; nominal GDP per capita will grow at 6.9%. At over

$6,200, Uruguay's nominal per capita GDP is already high by regional standards. Trade in Uruguay is forecast to grow even faster.

Nonetheless, Uruguay is a small country, with a population of only 3.2 million in 1997. While incomes, domestic consumption, as well as imports and exports are increasing, Uruguay will remain a small market compared to its neighboring Latin American economies.

Uruguay is a member of Mercosur, the LAIA, and the WTO.

VENEZUELA

- As Venezuela lags most other South American countries in economic liberalization, only moderate GDP growth, 4.2%, is forecast for the next 23 years.
- Oil continues to dominate government revenues and exports.

Exhibit II-20

Venezuela	1996	2000	2010	2020	Average Ann. Growth, 1996-2020*	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	22.2	24.3	30.5	38.2	2.3%	4.7%	5.3%
Employment (mil.)	7.1	8.2	11.2	15.3	3.2%	0.4%	0.3%
Real GDP (95$ bil.)	81.4	94.8	147.6	215.5	4.1%	--	--
Nominal GDP Per Capita ($)	3,459	4,879	7,408	11,489	5.1%	--	--
Real Private Consumption (95$ bil.)	52.0	61.8	88.5	125.3	3.7%	--	--
Real Public Consumption (95$ bil.)	6.0	7.1	10.8	16.4	4.3%	--	--
Real Fixed Investment (95$ bil.)	10.6	14.1	25.6	37.1	5.4%	--	--
Nominal Exports ($ bil.)	24.3	27.8	59.9	129.0	7.2%	8.0%	4.0%
Nominal Imports ($ bil.)	13.7	25.0	60.2	135.3	10.0%	4.5%	4.2%
Exchange Rate (NCU/$)	417.5	991.4	6418.2	40,221	21.0%	--	--
Rate of Inflation	99.4%	24.3%	23.3%	23.5%	22.8%	--	--

*The figure reported for rate of inflation in this column is the average annual growth rate in CPI, or the average rate of inflation in 1997-2020.

Economic Overview

Egregious government mismanagement has long been the most critical economic problem in Venezuela. In seven of the past ten years, the fiscal accounts have been in deficit, averaging 3.4% of GDP over the entire period. Moreover, government spending has often focused on short-term gain rather than long-term growth prospects. Indeed, a significant portion of expenditures has consistently subsidized local industry and domestic consumption. Venezuela lags most other South American countries in economic liberalization. On the positive side, though, the country's democratic institutions remain strong and stable despite the turmoil of the early 1990s and the hardships caused by the economic crisis.

The depth of the economy's malaise forced the Caldera administration to start moving toward economic reform. With the help of the IMF—which forced the

government into it as a prerequisite for a standby agreement signed in April 1996—Caldera began to implement reforms under the program Agenda Venezuela. The removal of exchange controls, along with inflation reduction and the expansion of privatization, have improved business sentiment and attracted more foreign capital. Venezuela's initial success at reform and improvements in its fiscal and trade accounts was rewarded by a Standard & Poor's upgrade of its foreign currency debt rating from B to B+ (still below the country's high of BB- four years ago). This pat on the back will not only attract more attention from foreign investors, but also reduce the cost of future borrowing. Although the government has now turned to deal with the costly severance-pay system and salary indexation to inflation, the political will to pursue further economic reforms is questionable.

Oil accounts for two-thirds of government revenue. Venezuela, already with a reputation as OPEC's largest quota buster, is unlikely to reduce its output to abide by OPEC's quota, because it cannot afford to forego the revenue that such a step would imply. Venezuela's excessive reliance on oil revenues makes its economy highly vulnerable to sudden drops in oil prices.

The central bank reported that the economy registered 5.1% economic growth for 1997. The oil economy expanded 8.8% and the non-oil economy reported 3.3% gains, although employment growth was mainly in the non-oil sector. Government officials expect GDP to increase 5.4% in 1998, but with the oil market prospects poor for the remainder of the year and much of the world economy entering a slower growth phase, the potential for even slower expansion is significant. The privatization program has continued to move faster than expected, but still at a modest pace. Although Venezuela has managed to reduce its inflation from 103% in 1996 to 51.4% in 1997, it still has one of the highest inflation rates on the continent.

The current anti-inflationary strategy rests, for the most part, on the use of the nominal exchange rate as an anchor for domestic prices. Monetary policy, which was extremely tight after the introduction of the stabilization package, has struggled to prevent the money supply from increasing at fast rates, given the rapid reserve buildup that has taken place since May 1996. The anti-inflationary strategy has been limited, to some extent, by its reliance on central-bank instruments to reduce market liquidity.

In the long run, Venezuela's economic prospects largely revolve around economic reform—not just oil prices and volumes. Inflation control and economic diversification are two necessary keys to success. Due to the government's unwillingness to pursue more substantive reforms, there is a moderate growth outlook for Venezuela. Although the oil sector will continue to bring ups and downs, overall GDP growth should average around 4.2% per year.

Market Potential

Population growth in Venezuela is forecast to grow at an annual rate of 2.3%, a rate second only to Paraguay. While nominal GDP per capita is also forecast to grow very strongly, real income will be eroded by the high rate of inflation in

Venezuela. Real public consumption is forecast to grow slightly faster than private consumption. Real fixed investment will increase the most rapidly, at an average pace of 5.1% through 2020.

Manufacturing exports are relatively insignificant in Venezuela. Given the overwhelming weight of oil in Venezuelan exports, the risk of a large decline in export volumes is closely associated with conditions in the international oil markets. Manufacturing and agricultural exports will continue to be damaged by the strong bolívar. The current outlook for Venezuelan exports is a nominal growth of 7.8% per year, while a strong currency will help imports grow at 9.9% annually.

The risk of a damaging trade conflict is small but not negligible, as recent frictions with Andean-pact partner Colombia suggest. The lifting of exchange controls in 1996 improved trade flows with neighboring countries, particularly Colombia. Recent moves to initiate talks with Mercosur regarding eventual membership should also contribute to keeping this risk moderate over the five-year horizon.

Venezuela is a member of the Andean Pact, the Group of Three, the WTO, and has an agreement with CARICOM.

OTHER CARIBBEAN ECONOMIES

- Economic growth will continue at an annual average pace of 2.5% over 1997-2020.

Exhibit II-21

Other Caribbean Countries	1996	2000	2010	2020	Average Ann. Growth, 1996-2020	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	3.0	3.0	3.1	3.4	0.4%	0.6%	0.5%
Real GDP (95$ bil.)	21.0	23.6	30.7	38.7	2.6%	1.2%	0.8%
Nominal GDP Per Capita ($)	7,131	8,598	13,833	23,181	5.0%	--	--
Nominal Exports ($ bil.)	5.94	5.93	7.04	9.15	1.8%	2.3%	0.3%
Nominal Imports ($ bil.)	13.44	14.84	22.11	34.27	4.0%	4.4%	1.1%

*The figure reported for rate of inflation in this column is the average annual growth rate in CPI, or the average rate of inflation in 1997-2020.

Economic Overview

Economic growth will continue at an annual average pace of 2.5% over 1997-2020.

Market Potential

Many of the Caribbean islands have GDP per capita levels very high for the region, due to their attraction as financial havens and tourist destinations. Bermuda, the Cayman Islands, the British Virgin Islands, and Martinique have the highest GDP per capita. The forecast growth rate for GDP per capita growth is 2.8%.

Exports and imports are forecast to grow only moderately at 2.0% and 4.1%, respectively.

Most of the Caribbean islands are part of CARICOM, the CBI, and CARIBCAN.

OTHER CENTRAL AMERICA ECONOMIES

- Combined, Central American countries have among the lowest GDP per capita levels in Latin America.
- GDP growth is forecast at a slow pace of 1.7% over the forecast period.

Exhibit II-22

Other Central American Countries	1996	2000	2010	2020	Average Ann. Growth, 1996-2020	Share of Latin America 1996	Share of Latin America 2020
Population (mil.)	30.5	33.6	41.3	49.2	2.0%	6.4%	6.8%
Real GDP (95$ bil.)	36.9	39.0	47.6	54.6	1.6%	2.1%	1.1%
Nominal GDP Per Capita ($)	1,235	1,283	1,630	2,228	2.5%	--	--
Nominal Exports ($ bil.)	9.57	13.76	27.79	52.25	7.3%	3.7%	1.9%
Nominal Imports ($ bil.)	14.78	20.79	43.13	77.81	7.2%	4.8%	2.4%

*The figure reported for rate of inflation in this column is the average annual growth rate in CPI, or the average rate of inflation in 1997-2020.

Economic Overview

Other Central American countries are Belize, Guatemala, Honduras, Nicaragua, El Salvador, and Costa Rica. Within the region, there are differences in population size, GDP per capita, and trade levels. Belize is the smallest country in population, and its colonial history separates it somewhat from the rest of the region. Guatemala is the largest Central American country in terms of population and economy, but has a lower income level due to past civil conflicts and the agrarian focus of large segments of its population. Costa Rica, with the smallest population other than Belize, has had the steadiest economic growth in the region and had avoided the civil conflicts that other countries in the region have suffered.

With substantive economic reforms still needed in most of the region, relatively slow economic growth is forecast in the region. The combined regional economies are forecast to grow at an average rate of only 1.7% over the next two decades. Growth will peak in 2000 at 2.8%, after which the forecast rate will decline.

Market Potential

Combined, the Central American region has one of the slowest GDP per capita growth rates in Latin America, ranking sixteenth out of nineteen. At a country

level, Belize and Costa Rica have the highest GDP per capita in Central America, while Honduras and Nicaragua have the lowest.

All of the countries import more than they export, with Costa Rica and Guatemala the dominant exporters. Over 1997-2020, exports are forecast to grow at an annual average pace of 7.2%, while the larger import value grows slightly slower at 7.0%.

All Central American countries are members of the Central American Common Market and the Caribbean Basin Initiative. Guatemala, Honduras, Nicaragua, and El Salvador form the System of Central American Integration. As well, Belize is a member of CARICOM and CARIBCAN.

WORLD REGIONS

CANADA OVERVIEW

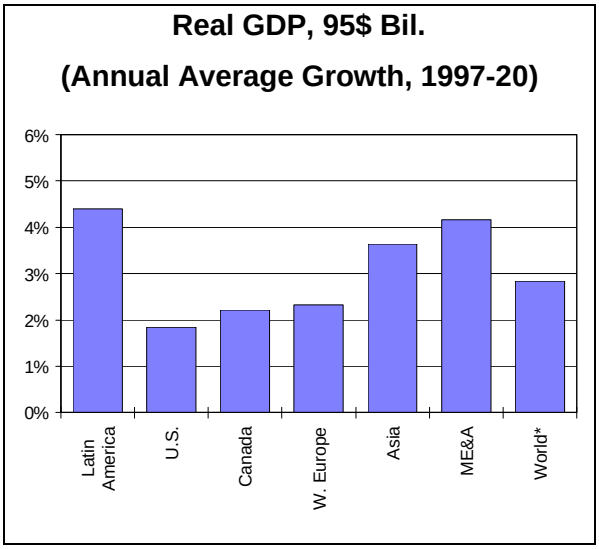
Economic Overview

The Canadian economy is moving ahead steadily. Very loose monetary conditions have provided the spark needed for the economy to lift itself from its lethargic performance of 1995 and 1996. The economy expanded at a 3.8% annual rate during 1997 and should continue to grow well this year, at 3.5%. Over the next 23 years, the Canadian economy is forecast to grow at an average annual pace of 2.2%—marginally slower than Western Europe, but faster than the U.S.

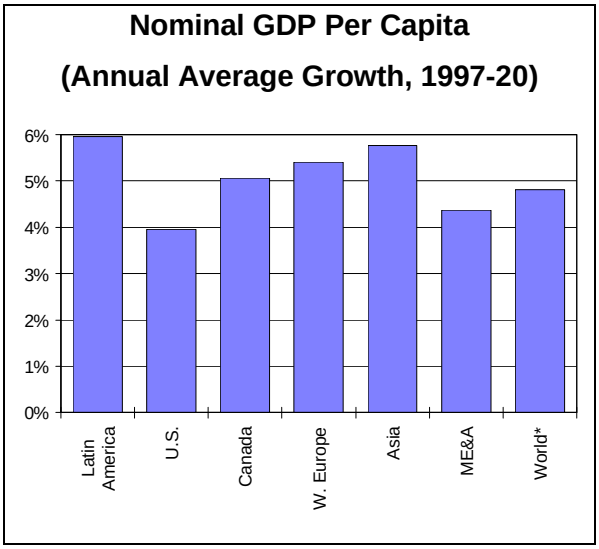
Interestingly enough, since growth in Canada has been quite strong relative to its performance in recent years, imports have risen enough so as to cause net exports to become a drag on the economy. Another important development is the strong employment gains in the past year; more than 300,000 positions were added to the economy, which will add to the expansion's durability, since personal disposable income will increase.

Federal deficits are falling as a result of increased tax revenues, and a surplus of $1.7 billion for the current fiscal year is expected—the first federal surplus in almost 30 years. The government's financial requirements will become a financial source, allowing it to retire some existing debt.

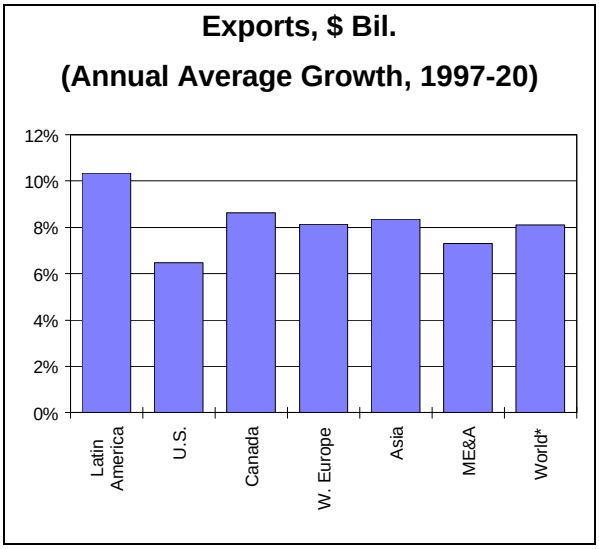
Exhibit II-23
FORECAST GROWTH RATES: 1996 – 2020
VARIOUS ECONOMIC INDICATORS



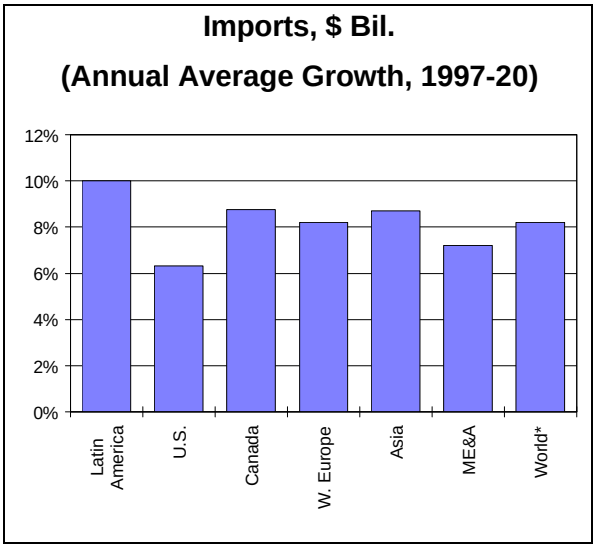
*World totals exclude Eastern Europe and the former Soviet Union, many Asian countries, and most of Africa.



*World totals exclude Eastern Europe and the former Soviet Union, many Asian countries, and most of Africa.



*World totals exclude Eastern Europe and the former Soviet Union, many Asian countries, and most of Africa.



*World totals exclude Eastern Europe and the former Soviet Union, many Asian countries, and most of Africa.

Exhibit II-24

Canada	1996	2000	2010	2020	Average Ann. Growth, 1996-2020	Share of World* 1996	Share of World* 2020
Population (mil.)	30	31	34	36	0.8%	0.7%	0.6%
Real GDP (95$ bil.)	589	661	863	1,013	2.3%	2.1%	1.8%
Nominal GDP Per Capita ($)	20,175	23,387	40,639	63,756	4.9%	--	--
Nominal Exports ($ bil.)	235	309	760	1,667	8.5%	3.9%	4.5%
Nominal Imports ($ bil.)	212	306	719	1,647	8.9%	3.6%	4.4%

Earlier in the 1990s, the high real cost of labor relative to its productivity kept firms from hiring. This imbalance was largely due to faster growth in wages and salaries relative to labor productivity during the previous decade. The process of rebalancing labor costs and productivity has, for the most part, been completed. Therefore, it has become cost-effective for firms to start hiring again. It is anticipated that the surge in employment over the past year will be sustained as firms take advantage of the large pool of available workers, many of whom have reentered the work force. Strong employment growth will bolster personal incomes and allow consumers to continue to spend even after their pent-up demand has been satiated.

Much of the strong gain in machinery and equipment (M&E) investment has been due to the explosion in computer equipment and other office equipment spending. The rebound in non-office equipment investment, however, has significantly lagged in this cycle compared with its performance in the 1980s. Consequently, there is likely to be a significant, albeit delayed, bounce-back in demand for non-computer assets as the private-sector rebound continues. Some of the business investment normally spent on other types of equipment, though, has been diverted to office equipment. This implies that the ultimate rebound in non-computer equipment, although substantial, will be less buoyant than in the past. Overall investment has been boosted by the current low-inflation/low-interest-rate environment.

International Linkages

Canada's export exposure to Asia is small—only about 8% of total exports go to that region—so the Asian crisis will have a minimal direct impact on the economy. The crisis may have a greater indirect effect on Canada through its effect on the United States. Since a significant portion of U.S. trade (20%) is with the Asian countries, the U.S. economy will see a stronger impact from the crisis. Indeed, the 1998 forecast for U.S. growth has been downgraded by 0.3% due to the Asian crisis. The slower-growing U.S. economy will affect the Canadian economy, since over 82% of Canada's trade is with the United States. Nominal export and imports are forecast to grow at an annual average rate of 8.6% and 8.8%, respectively.

WESTERN EUROPE OVERVIEW

Exhibit II-25

Western Europe	1996	2000	2010	2020	Average Ann. Growth, 1996-2020	Share of World* 1996	Share of World* 2020
Population (mil.)	447	456	477	497	0.4%	10.1%	8.2%
Real GDP (95$ bil.)	9,194	10,116	12,708	15,986	2.3%	32.7%	29.0%
Nominal GDP Per Capita ($)	20,609	22,985	37,866	64,484	4.9%	--	--
Nominal Exports ($ bil.)	2,723	3,486	7,366	16,046	7.7%	45.6%	43.4%
Nominal Imports ($ bil.)	2,543	3,198	6,778	15,129	7.7%	43.0%	40.8%

**World totals exclude Eastern Europe and the former Soviet Union, many Asian countries, and most of Africa.*

Economic Overview

Although the four main EU economies—Germany, France, the UK, and Italy—continue to post different growth patterns, with economic activity in the UK decelerating while the other countries are still on the upward phase of the business cycle, overall real GDP growth in the EU continues to strengthen.

The improvement of overall growth performance in the EU in 1997 reflects mainly a positive contribution of net real trade to European growth, and a slow improvement in the domestic sector's contribution to growth. On the domestic front, real private consumption was buoyant in the UK and Italy in 1997, but has been nearly stagnant elsewhere.

The continued rise in unemployment in European countries—it stands at 10% in western Germany and 12.9% in France—plus moderate pay rises and a tightening of fiscal policy as both countries struggle to meet the public deficit target for EMU, has meant very low (negative in Germany) real income growth. The moderate outlook for growth over the forecast period, combined with continued fast productivity growth in manufacturing and accelerating productivity growth in the services sectors, will lead to only slow improvements in the labor markets.

Business investment spending is expected to be the main engine of domestic activity in 1998, in particular investment in machinery and equipment. Despite the recent hikes in interest rates, monetary policy remains relatively loose, and all underlying conditions for investment have improved.

Economic growth will remain strong in 1998, at 2.6%, and then decline gradually. Over the forecast period 1997-2020, real GDP growth will average 2.3%.

International Linkages

As Europe's exposure to world demand is moderate in general (much of its trade is intra-Europe), and much of Europe's external trade is oriented towards other industrialized countries, the direct impact of changes in import demand from Asia on Europe's exports will be limited. The impact on corporate profits of European

companies will also be moderate, since European ownership in Asia is much less than either Japan or the United States. The two effects that will drive Europe's response to the Asian crisis are the reduction in world trade growth and the appreciation of effective exchange rates, which reduces export price competitiveness. The limited impact of the Asian crisis on European growth also stems partly from the fact that the engine of European growth over the coming years was already anticipated to come mainly from domestic demand—both private consumption and investment—as opposed to trade.

As mentioned above, the improvement in GDP growth in the EU has been largely trade-led. Both German and French exports increased by more than 10% in 1997, while UK export growth remained stable at close to 7%—a strong performance given the appreciation of sterling. In comparison, Italy's exports grew only slowly, due to the appreciating lira and to high domestic demand growth. For the Western Europe region as a whole, both nominal exports and imports are forecast to grow at a steady pace just over 8% per year through 2020.

ASIA OVERVIEW

Exhibit II-26

Asia	1996	2000	2010	2020	Average Ann. Growth, 1996-2020	Share of World* 1996	Share of World* 2020
Population (mil.)	2,885	3,052	3,463	3,885	1.2%	65.0%	64.4%
Real GDP (95$ bil.)	8,508	9,366	13,650	19,820	3.6%	30.3%	36.0%
Nominal GDP Per Capita ($)	2,735	2,701	4,943	9,412	5.3%	--	--
Nominal Exports ($ bil.)	1,705	2,148	5,084	11,448	8.3%	28.5%	31.0%
Nominal Imports ($ bil.)	1,705	2,047	5,066	11,884	8.4%	28.8%	32.0%

*World totals exclude Eastern Europe and the former Soviet Union, many Asian countries, and most of Africa.

Economic Overview

Political risks in Asia have escalated as the increased frequency of labor conflicts and higher potential for major urban riots take their toll. The unprecedented regional economic decline has also raised the scope for increased crime and corruption as unemployment increases, incomes diminish, and the economic pie shrinks dramatically in size. On the positive side, supply-side shortages and cost-push pressures will be eased due to the easing of domestic demand.

There is little doubt that Thailand, South Korea and Indonesia will experience deep recessions this year. Indonesia is likely to suffer through an especially painful downturn because it has failed to implement the reforms mandated by the IMF. The threat of hyperinflation looms large; there have been food shortages and panic buying. Imports have collapsed as usable reserves and trade financing has dried up.

Korea's financial crisis has eased considerably recently. The Korean *won* has made a dramatic recovery since late December, albeit with some volatility. The economic crisis in South Korea has overshadowed the economic problems of North Korea and the ever-present dangers of a military clash between the two states. Yet, these two issues could easily become the gravest threats to South Korea's economic future. A government collapse in the North could lead to chaotic mass migration to the South; and any minor military clash could easily escalate into a major war that would destroy most of South Korea's economy.

Asia's financial turmoil will have a major impact on Malaysia's real economy through 1999. Malaysian exports—25% of which go to ASEAN countries and 40% to Asia as a whole—could also decline as a result of the drop in regional demand. The weakness in surrounding economies will deny Malaysia the opportunity to export its way out of the slowdown. To make the situation worse, Malaysia's foreign exchange income from primary commodity exports will decline substantially due to weak international prices.

While China is unlikely to suffer through a full-blown recession, the risk of a large cyclical downturn is quite high. Domestic demand has been quite weak, export growth is about to come to a grinding halt because of the real effective appreciation of the renminbi, and foreign direct investment has already shrunk. The restructuring of the manufacturing sector, if it happens, could lead to a large rise in unemployment. These, in turn, could trigger more social unrest, although short-term political risks in China are still quite low.

Japan's economic situation remains dismal. Up till now, Japan's recovery has relied on the strength of exports. The rapid depreciation of Southeast Asia's currencies since July 1997 has made Japanese goods relatively more expensive, threatening near-term export growth. At the same time, domestic demand remains limp and the government seems unwilling to take the necessary corrective action. The Japanese have made it clear that the political constraints binding them are inescapable at this point in time, and that they remain determined to prevent a more expansionary policy. The economy will thus continue to rely on exports at a time when Asian export markets remain weak or are heading into recession.

Taiwan's real economy will suffer a relatively minor setback this year, compared with most other Asian nations. With 55% of Taiwan's exports going to Asian countries, the expected drop in regional import demand could have a significant negative impact on its exports. The island's prudent macroeconomic policies and good fundamentals should minimize any contagion effects on its financial markets, however.

India's recent elections have not resolved its fragmented politics. Risks to economic activity have accelerated in response to the Asian crisis and domestic political uncertainty. Industrial output has failed to exhibit any significant signs of a pick-up. Nevertheless, India is unlikely to catch a full case of the "Asian flu."

Australia's economy will ease from its 1997 level, reflecting the weakening outlook for the country's commodity exports and sharply lower Asian tourist

arrivals. In contrast, domestic demand will continue to show signs of burgeoning growth in the first half of 1998, as consumer and business confidence maintain their current momentum. Weak export demand and the impact of falling commodity prices, however, will eventually undermine business confidence and increase the risk of a slowdown in overall economic growth. New Zealand has been caught in a situation where domestic demand is outstripping output growth; a situation made worse by weak export growth prospects.

As a region, real GDP growth will fall to 1.5% in 1998, then gradually improve to 3.2% by 2000. Over the entire forecast period, it will average 3.6%—below the growth forecast for Latin America, but still well above the world average.

International Linkages

The slowdown in Southeast Asia should have a significant impact on the rest of the world. Japan will be hit the hardest: roughly half of its exports go to Asia. Since about one-third of U.S. exports go to Asia (including Japan), U.S. growth is likely to be reduced by 0.3-0.5 percentage points. But less than 10% of Europe's exports are bound for Asia; therefore, the impact of the Asian downturn on European growth will be quite modest. Overall, the direct and indirect effect of the Asian crises could reduce real world GDP growth by as much as half a percentage point.

The benefits of cheaper currencies will be harder to realize than during the Mexican crisis of 1994-95, since Asian countries tend to trade heavily with each other. Export potential will also be limited for commodity-exporting nations by falling world prices for commodities. Even though a reversal in the trade-oriented outward orientation that has reaped rich rewards for the region's economies in the past is not anticipated, enforceability of contracts is expected to face new pressure and default risks rise as ailing banks and companies struggle to balance their asset/liabilities ratios. In the near term, export and import growth rates for the region will fall from highs over 6% to 2% in 1998. Improvement is expected by 1999, and growth rates will increase over the forecast period. On average, growth in nominal exports and imports is forecast at 8.3% and 8.7% respectively over 1997-2020.

REST OF WORLD OVERVIEW

Exhibit II-27

Middle East & Africa	1996	2000	2010	2020	Average Ann. Growth, 1996-2020	Share of World* 1996	Share of World* 2020
Population (mil.)	334	368	462	569	2.2%	7.5%	9.4%
Real GDP (95$ bil.)	550	630	956	1,438	4.1%	2.0%	2.6%
Nominal GDP Per Capita ($)	1,674	1,787	2,809	4,630	4.3%	--	--
Nominal Exports ($ bil.)	184	205	424	920	6.9%	3.1%	2.5%
Nominal Imports ($ bil.)	187	218	444	938	7.0%	3.2%	2.5%

*World totals exclude Eastern Europe and the former Soviet Union, many Asian countries, and most of Africa.

Economic Overview

Iran's short-term economic outlook has deteriorated because of a sharp fall in oil prices, but the country's long-term outlook has improved as a result of President Seyyed Mohammad Khatemi's pragmatism and further improvement in Iran's relations with Arab nations, the United States, and other Western Countries. Meanwhile, Israel's economic picture continues to worsen. Recent revised data show that real GDP grew by only 1.9% in 1997, compared with 4.5% in 1996. The slowdown has largely been due to a sharp drop in investment since Prime Minister Netanyahu took over Israel's government.

Iraq remains one of the riskiest countries in the world, largely due to the pathological tendencies of its president, Saddam Hussein. During the last quarter, once again, violations of the terms of the 1991 Gulf War cease-fire agreement by Iraq caused a crisis that ended only after a U.S. military show of force. As in previous such incidents, Iraq's actions undermined its diplomatic efforts to have the U.N. sanctions lifted; but they helped the country gain public sympathy in the Third World, particularly among Arab and Muslim populations. The crisis also helped Saddam's regime gain revenues by manipulating prices of foreign currencies and essential commodities in the local market.

Algeria's risks continue to be very high, given its social and political turmoil, coupled with its over-dependence on volatile energy and agriculture sectors. Although Algeria's social and political situation went from bad to worse during the last quarter, the country's economy remained relatively strong.

International Linkages

Exports from the region will be affected by lower oil prices—which will have a large impact on government revenues and import capabilities. Nominal growth in exports, recovering from negative growth in 1997, will improve to 3.8% in 1998, and struggle back to approximately 8.0% by 2005, for an average growth rate of 7.3% over 1997-2020. Imports will rise more gradually, from 2.4% in 1998, to achieve an average of 7.2% over the forecast period.

Exhibit II-28
ADDITIONAL FORECAST EXHIBITS
FOR THE UNITED STATES ECONOMY

U.S.	1996	2000	2010	2020	Average Ann. Growth, 1996-2020	Share of World* 1996	Share of World* 2020
Population (mil.)	266	275	298	323	0.8%	6.0%	5.3%
Real GDP (95$ bil.)	7,466	8,231	10,241	11,801	1.9%	26.6%	21.4%
Nominal GDP Per Capita ($)	28,725	32,997	48,591	73,458	4.0%	--	--
Nominal Exports ($ bil.)	871	1,121	2,415	4,055	6.6%	14.6%	11.0%
Nominal Imports ($ bil.)	966	1,259	2,380	4,327	6.4%	16.3%	11.7%

*World totals exclude Eastern Europe and the former Soviet Union, many Asian countries, and most of Africa.

Exhibit II-29
ADDITIONAL FORECAST EXHIBITS
FOR THE WORLD ECONOMY

World* (Excluding E. Europe, FSU, many Asia & most Africa)	1996	2000	2010	2020	Average Ann. Growth, 1996-2020	Share of World* 1996	Share of World* 2020
Population (mil.)	4,438	4,695	5,346	6,034	1.3%	100.0%	100.0%
Real GDP (95$ bil.)	28,080	31,118	41,740	55,057	2.8%	100.0%	100.0%
Nominal GDP Per Capita ($)	77,180	87,861	142,064	229,102	4.6%	--	--
Nominal Exports ($ bil.)	5,975	7,663	17,143	36,932	7.9%	100.0%	100.0%
Nominal Imports ($ bil.)	5,917	7,514	16,666	37,114	8.0%	100.0%	100.0%

*World totals exclude Eastern Europe and the former Soviet Union, many Asian countries, and most of Africa.

APPENDIX III
TRADE POLICIES IN LATIN AMERICA

During the 80's and 90's, a tremendous movement toward free trade in Latin America occurred. This change in trade policies has resulted from a number of factors. First, earlier attempts at trade reform did not include radical changes in trade philosophies toward trade liberalization and these policies did not achieve the success that many of these countries had hoped. Secondly, research has long shown a significant benefit from a liberalized trade policy. Third, Southeast Asia was experiencing a great deal of benefits from their liberalized trade policies, and therefore, Latin American needed to move towards a more open economy to compete with Southeast Asia. Fourth and finally, the World Bank used monetary incentives to encourage greater openness in trade policies for Latin American countries. As a result, Latin America has seen a steady decline in tariff rates and the abolishment of a number of trade barriers. In this section, the transition of the various Latin American governments is described. This discussion is not an all-inclusive discussion, as it only highlights selected countries.

Comments and observations regarding foreign policy as contained herein are those of the study consultants and are not necessarily shared by the Federal Highway Administration or any other Alliance member.

ARGENTINA

Argentina has experienced strong growth in their economy in the last decade as the result of their efforts to reduce inflation and creating a stable currency. Like many Latin American countries, this stability has been achieved through establishing a fixed exchange rate, reducing inflation, and through the privatization of a number of government agencies. As a result, Argentina has created stability within the economy that represents an attractive trading partner for the U.S.. By 1995, the U.S. exports totaled nearly $4.5 billion and the U.S. imports totaled $2.3 billion.

With its transition to a more market based economy, Argentina has created a more open economy with less barriers to trade. Argentina, along with a number of South American countries, established the Mercosur Agreement in 1991 with common tariff rates that ranges from 0 to 20 percent for different goods. This and other agreements involving Argentina have helped reduce the average tariff rates to all countries to less than 10 percent and has helped abolish the import licensing system. As part of these agreements, greater flexibility in the financial service industry has also occurred.

However, a number of barriers still exist, especially for the U.S.. Duties have been placed on a number of goods including automobiles, textiles, and apparel. In addition, heavy tariffs and quotas have been established for specific industries including the automobile assembly industry. In order to become a truly open economy, these issues need to be addressed.

BAHAMAS

The Bahamas is a developing country in which the economy is based primarily on tourism, financial services, and agriculture. Like many countries, the stability of its currency is critical to its economic success. In order to ensure stability of the currency, the Bahamas currency is pegged to the U.S. dollar at an exchange rate of 1:1.

While trade has been growing with the Bahamas, barriers to trade still present an obstacle for trade. These barriers include duties and tariffs that are placed on imports to protect domestic industries. Traditionally, duties have been a major source of revenue for Bahamas and still represents a significant barrier to trade. Bahamas' major trading partner is the U.S. as it accounted for nearly 55 percent of all imports into the Bahamas.

Due to the movement towards a duty free Western Hemisphere in recent agreements, the government is trying to restructure the way the government raises revenue. As part of this movement, duties have been reduced on a whole host of items including construction materials, liqueurs, jewelry, watches, perfumes, table linens, and non-leather designer handbags. In addition to duties, tariffs and occasionally bans are placed on goods that are produced domestically. Tariffs have primarily been placed on produce such as bananas, romaine lettuce, yellow squash, and zucchini. On occasions, flowers and citrus plants, and vegetables have been banned because of the potential diseases they could bring into the country. Despite these barriers, the Bahamas is considered a relatively open market.

BOLIVIA

Bolivia is one of the poorest countries in Latin America. It has primarily suffered from economic instability and inadequate infrastructure that has stunted the growth of the economy. To address the economic problems of the country, a major movement toward a free economy has occurred by creating a flexible exchange rate[1], reducing regulations on banks, eliminating import requirements, privatizing a number of pubic operations, and by joining the IMF. Today, Bolivia is experiencing lower inflation rates, with steady growth in the economy as the result of this movement towards an open market.

Bolivian economy represents a trading partner that has relatively few barriers and none that is specific to the U.S.. In the past, import licenses were required for specific goods. However, these licensing requirements have mostly been eliminated. Also in 1990, the Bolivian government reduced tariffs from 16 to 10 percent for all goods except capital goods, which has a tariff rate of 5 percent. In order to encourage exports, the central government provides tax rebates to producers that produce goods that are eventually exported.

[1] The exchange rate of the country is set daily by an agency (BOSLIN) within the Bolivian Central Bank. To set the exchange rate, the BOSLIN has a daily auction of dollars and therefore, the exchange rate responds to market forces.

BRAZIL

In the past, Brazil's economy has been marred by high inflation and instability. As late as July of 1994, inflation was as high as 50 percent per month. Recently, however, a major reconstruction of the economy has occurred including the privatization of a number of public agencies, the reduction of market barriers, the provision of a stable currency, and the attraction of foreign investments and foreign currency by maintaining high real interest rates. Together, these policies have managed to gain a stable and prospering economy with inflation rates as low as 1 percent per month.

However, these reforms have resulted in large fiscal deficits for the central government and have contributed to a negative trade balance. In order to work toward a balanced fiscal budget, the government has instituted limitations on spending that has severely reduced discretionary spending, which may have long term consequences with an under-investment in infrastructure.

In hopes of reducing trade deficits, a number of trade barriers, including tariffs, quotas, duties, import licensing, and discriminatory governmental policies have been instituted. Each of these policies has led to significant barriers to trade. For example, tariff rates as high as 70 percent on some goods (including automobiles, motorcycles, and shoes) have made imported goods very expensive and reduced the demand for these goods.[2] Quotas have also been used to reduce trade barriers for certain industrial goods (including automobiles) and on informatics products. In addition, discriminatory government procurement policies remain a barrier to trade for U.S.. producers. Other government policies that have created strong barriers are the sanitary and phytosanitary standards for agriculture products including chicken, beef, and sheep. While recent agreements have been made in regard to the trade of fruit, and grain between the U.S. and Brazil, there are still significant barriers to trade for these products. Trade in the service industry has been limited by foreign capital restrictions provided under the 1988 Constitution. Furthermore, foreign legal services including accounting, management consulting, architectural, and engineering have been hindered by forced local partnerships and limitations on foreign directorship. Together, these policies have created significant barriers of trade to one of the largest Latin American economies.

The Brazilian government has also tried to reduce the trade deficit by encouraging exports through a subsidization policy. The Brazilian government has offered incentives such as tax and tariff exemptions for equipment and materials imported for the production of goods for export. Other incentives include excise and sales tax exemptions on exported goods, excise tax rebates on materials used in manufacturing export products, interest rate guarantees that allows exporters to gain financing rates that at world market rates, and incentives that allow exporters to be exempt from certain taxes. These subsidies, along

[2] As late as 1990, the tariff rates on certain items were as high as 105 percent. However, through the pressure of GATT, the average tariff rate has been reduced to about 11 percent.

with the practices of imported goods, present a barrier to free trade between the U.S. and Brazil.

On a positive note, Brazil has been part of a number of trade agreements. For example, Brazil is part of the Southern Common Market (Mercosur) partners, which has caused Brazil to lower their tariffs with member countries that averaged 14 percent in 1995. Other agreements have been in the works with other Latin American countries that should reduce the barriers among Latin American countries, but will maintain substantially high barriers for trade with the U.S.. However, the negotiation of agreements is a positive sign for a reduction of barriers and may allow the U.S. to tap into this large Brazilian market in the future.

CHILE

Chile has a rapidly growing economy that draws upon a vast pool of natural resources including copper, forestry products, fresh fruit, and fishery. Chile also enjoys a strong credit rating that has created an influx of foreign investment. Like many other Latin American countries, it has moved toward privatization that has strengthened the Chilean economy. Unlike many other Latin American countries, Chile has experienced fiscal surpluses. In addition, the Central Bank has maintained a strong policy of reducing inflation gradually while maintaining steady growth in the economy. The Central Bank has also kept a very close watch on the exchange rate and they have grave concerns about large volumes of outside currency flowing into the country. To maintain stable exchange rate, the Central Bank buys and sells dollars.

In terms of trade, Chile has been at the forefront of trade reform. Chile has relatively few trade barriers and continues to make strides toward free trade. They are part of a number of agreements including WTO, MERCOUSUR nations, and ALADI (Latin American Integration Association). These agreements have made significant steps in reducing barriers such as high tariff rates and creating duty-free goods. Through this trading policy, the average tariff level has been reduced to less than 11 percent with very little variation from industry to industry (Rajapitrana, 1994). Additionally, Chile has no significant licensing requirements, which makes it easier for goods to be imported.

However, agriculture products are still widely protected by a complex pricing system in which a tariff is levied against certain commodities (includes wheat, wheat flour, edible oils, and sugars) when the world price falls below a “floor” level price. Chile also have policies for specific goods that makes it difficult for U.S. exports including tariffs, quantity restrictions, product standards, testing, certification, and labeling. These requirements have virtually eliminated the importation of poultry products, meat, and fruits into the country. The lack of clear copyright laws does not provide protection for software as well.

COLOMBIA

Colombia is among the group of countries that has been moving toward a free market through the privatization of a number of public agencies and the

liberalization of their trade policy. Much of the movement in free trade has occurred as the result of trade agreements including the WTO, Andean Pact, and the G-3 agreement.

As the result, a number of barriers of trade have been abandoned or reduced in Colombia including the elimination of a number of import licensing requirements on most products, a substantial decrease in tariff rates, a more transparent investment rules, and more simplified procedure of importing and exporting goods into the U.S..

However, several trade barriers still persist for certain products including bureaucratic regulations and product standards along with licensing and registration requirements. License requirements have mostly pertained to agriculture products that include wheat, poultry meat, malting barely, corn, rice, sorghum, wheat flour, oilseeds and their products, soybeans, soybean meal, and soybean oil. Additionally, powdered milk, wheat, malting barely, yellow and white corn, crude palm and soybean oils, white rice, soybeans, white and raw sugars, chicken pieces, and pork meat are subject to a variable import tariff 'price band" system. Finally, intellectual property rights are not well established and substantially hurts the software industry within the U.S..

COSTA RICA

In 1996, U.S. exports to Costa Rica totaled over $1.8 billion while it imports from Costa Rica totaled over $2 billion. This is substantial for an economy that has a GDP that is under $10 billion annually. Based upon these statistics, it is obviously that trade is critical to the economy of Costa Rica, and therefore, Costa Rica has entered into a number of international trade agreements, including GATT, WTO, and CACM. Through these agreements, a significant number of trade barriers have been eliminated. For example, by being a member of the CACM, Costa Rica has eliminated trade duties and reduced it tariff rates on goods with the member countries.

In spite of its membership into these international agreements, a number of trade barriers remain for specific products (i.e. agriculture products). These trade barriers are mostly in the form of custom procedures, required standards and certificate requirements. The standards and requirements that have been placed on imports have affected the trade of pharmaceuticals, fertilizers, pesticides, hormones, veterinary preparations, vaccines, poisonous substances, bulk grain, fresh horticulture products, frozen meats, and mouthwashes. In addition to these requirements, Costa Rica has required food products to be labeled in Spanish, which creates another obstacle in trade.

In some cases, the elimination of one barrier is just replaced with another barrier. Recently, Costa Rica instituted a new tariff to replace the elimination of quantitative restrictions that was placed on products such as pork and related by-products, poultry, seeds, rice, wheat, corn (white and yellow), beans, tobacco, sugar, sugar cane and related products, dairy products, and coffee. Consequently, it may be just as difficult to export these products as it was before the quantitative restrictions were eliminated.

Despite these requirements, Costa Rica is overall an open economy with relatively few barriers and they should continue to be a strong trading partner with the U.S..

DOMINICAN REPUBLIC

While the Dominican Republic may represent a rather small market among the Latin America countries in terms of the overall economy (GDP of $12.4 billion in 1996), it is a significant trading partner with exports to the U.S. totaling $3.6 billion and imports from the U.S. totaling $3.2 billion. Consequently, the Dominican Republic trade policy is important to the trading relationship between the U.S. and Dominican Republic.

Currently, the Dominican Republic's trade policy is somewhat restrictive. These restrictions include a complex custom procedure and high tariff rates. On most products, the Dominican Republic has a tariff rate of 5 to 35 percent range and have tariff rates of up to 80 percent on certain products including home appliances, alcohol, perfumes, jewelry, automobiles, and auto parts. Like most Latin American countries, the Dominican Republic does not have sufficient intellectual property rights to protect the interest of U.S. software makers.

To continue to grow as a trading partner, many of these restrictions must be addresses and probably will be when they become more involved in international agreements like the WTO and GATT. In addition, it is important that the Dominican Republic has a healthy economy. Therefore, not only are trade policies important, but polices that may affect the macroeconomic stability (i.e. Central Bank and fiscal policies) of the economy are important to the future trade relations with Dominican Republic.

ECUADOR

Due to large fiscal debts of the 1970's, the economy of Ecuador experienced a sharp recession in the 1980's that led to macroeconomic instability. By the 1990's, the government embarked on a major reform movement to create greater stability. However, these reforms encountered difficulties in terms of political scandals and the turmoil it had with Peru. Consequently, the economy is still experiencing unstable inflation, exchange, and interest rates. This instability has severely hurt the economy's ability to grow.

In the past, the economy of Ecuador has largely been dependent upon petroleum products, along with the exports of bananas, shrimp, and other primary agriculture products. Consequently, these products have often been protected through custom procedures, import license requirements, sanitary and phytosanitary requirements, tariffs, and non-tariff surcharges. Through negotiation, many of these restrictions have been reduced. However, Ecuador has been slow to implement the revisions. In addition to the barriers for trade of goods and services, the protection of intellectual property rights has also been a problem within Ecuador.

EL SALVADOR

The Salvadoran economy has struggled recently because of tax hikes, price hikes of public services, excessive fiscal debts, high inflation rates, and their instability of their currency. As a result of their unstable economy, El Salvador has traditionally experienced large trade deficits. These trade deficits have been a major concern for the Salvadorian government and they have often responded with protective trade policies.

Despite their troubled economy and sometime protective trade polices, the U.S. has found El Salvador to be a lucrative trading partner in recent years. U.S. exports have increased over 60 percent since 1991, accounting for almost 51 percent of El Salvador's total imports. This growth can primarily be attributed to El Salvador's lower tariffs rates that now range between 1 and 20 percent and which are expected to fall even further.

However, higher duties still remain on automobiles, alcoholic beverages, textiles, and some luxury items. A 10 percent VAT and a surcharge of 40 percent of the import duty is placed on most imports from non-Central American countries. In addition, the Salvadorian government has placed rigorous standards on poultry that have effectively created a ban on U.S. poultry to El Salvador. Imports on other fresh foods are also subject to rigorous health standards that requires a "certificate of free sale". This certificate verifies that the product has been approved by U.S. health authorities for public sale. El Salvador also requires basic grain and dairy products to have import licenses. Finally, El Salvador has had a very difficult time protecting U.S. intellectual property rights. However, there has been recent attempts of improving the situation.

Despite the cumbersome requirements for some products, El Salvador is considered a relatively open market with few restrictions. El Salvador continues to make progress in it is trade policy as it is a member of the WTO and the Summit of the Americas/Free Trade Area of the Americas (FTAA).

GUATEMALA

Like most other Latin American countries, Guatemala has been moving toward a more open economy through a number of agreements including CACM and GATT. These agreements have reduced tariff rates that are now between 5 and 20 percent and have reduced a number of other non-tariff barriers. In addition, price band for corn, rice, sorghum have been eliminated, which has helped U.S. exporters of these products.

However, other barriers still remain. For example, quotas still remain for poultry that has significantly reduced the exportation of poultry while licensing for such products as apples remain ambiguous and has significantly hurt U.S. apple exporters. In addition, the procedure for custom valuation has been a significant trade barrier in the past.

HAITI

Haiti has a struggling and undiversified economy that is based primarily on agriculture products. In order to strengthen the economy, the government is currently undergoing macroeconomic reform that includes stronger control over money supply, a free floating exchange rate, trade liberalization, privatization of industries, and decentralization of government. While the full impact of the reform has not been felt, these reforms have led to lower inflation rates and created some growth toward greater stability.

During the 90's Haiti faced economic sanctions from the U.S.. This created economic pains as the Haitian economy has been, and continues, to be very dependent upon its relationship with the U.S.. Once the U.S. sanctions were lifted with Haiti, economic trade resumed.

The primary barrier to trade with Haiti in the past was high tariffs. Recently these tariff rates have been lowered by the Haitian government which has created significant benefits to U.S. exporters.

HONDURAS

In the past, Honduras had a number of restrictions to foreign trade. However, with their greater participation in international agreements including CACM, their tariffs have been reduced to 5 to 20 percent for most goods and they have recently eliminated their licensing requirements.

Despite these improvements, Honduras still has significant barriers for chicken parts in the form of sanitary and phytosanitary requirements, and significant barriers for yellow corn, sorghum, rice, and soybeans through the use of price bands. In addition, Honduras has a discriminatory policy that imposes a steep tax on certain automobiles based upon engine size. In addition to these barriers, Honduras is especially poor at protecting intellectual property rights and have a government procurement practice that is less than transparent and seems to favor domestic firms.

JAMAICA

Jamaica has experienced a slow growth in its economy over the last several years for a number of reasons including a high rate of crime, widening trade deficits, high debt servicing costs, low rates of investment, lack of competitiveness in exporting goods, and a tight monetary policy. The tight monetary policy is part of an effort by the Bank of Jamaica to create greater stability in the currency and to create lower inflation. Together, these factors have created slow growth in the economy, which in turn has slowed their growth in trade. The health of the trade sector is highly important to the overall economy as exports represents about 26 percent of their GDP, while imports represents about 55 percent of their GDP. In 1996, the U.S. exports totaled over1.5 billion, which represents over half of their imports, while the exports to the U.S. totaled to just over $840 million.

In effort to strengthen the trade sector of the economy, Jamaica became a member of the WTO in 1995. Generally, Jamaica is considered an open economy with few trade barriers. However, many exporters to Jamaica have complained about the bureaucratic procedures and inadequate facilities and staff for importing goods. Jamaica has respond by creating less bureaucratic import procedures and have allowed for preclearance for imports. In addition, investments have been made to computerize the system to facilitate quicker import procedures.

Other significant gains have been made in the protection of intellectual property rights. However, piracy of software, video, and music still is widespread and may only be reduced through more resources.

While, there are some hindrances to trade with Jamaica, overall Jamaica is considered an open economy with few restrictions to trade.

MEXICO

Mexico is one of U.S.'s strongest trading partners in the world and there are a number of reasons for this strong relationship. First and foremost is its proximity. Second is its market size. Mexico has one of the largest markets in Latin America with a nominal GDP of $328 billion in 1996. A third reason for the strong relationship is NAFTA.

NAFTA has made a number of significant changes to the trading relationship with the U.S.. As part of the agreement, several industrial tariffs and most agricultural tariffs are in the process of being eliminated. These tariffs are to be eliminated over a 10 year period, with the remaining tariffs eliminated in the following 5 year period. In addition to industrial exports, NAFTA has also created greater access to a number of service industries including Insurance, Telecommunications, and Financial Services. Furthermore, Mexico has committed itself to the highest level of protection of intellectual property rights. Finally, U.S. firms have been given greater access to the governmental procurement market in Mexico.

While NAFTA has been highly important to the development of trade for Mexico, other trade agreements have also been important including GATT and WTO. Each of these agreements has created a greater push toward the elimination of licensing requirements. However, Mexico still requires licenses for nearly 200 products, in which most of them are agriculture products. For instance, exporters have experienced a number of problems in gaining licensees for construction grade lumber. In addition, many products are required to have certificates of origin, with the intention of eliminating apparel and footwear produced in China. This certificate of origin has created a number of problems for U.S. producers who use Chinese producers as part of their production process.

The problems of trade with Mexico does not stop there. U.S. exporters have also complained about the extensive customs procedures that have reduced the efficiency of exporting to the Mexican market. These procedures seem to be targeted towards textiles, footwear, beer, and consumer electronics. Finally,

phytosanitary standards have also affected the exportation of grains, citrus, cherries, and cling peaches.

While there are a number of barriers to trade with Mexico, it is a relationship that continues to grow through international negotiation. Critical to the future growth of the relationship is the continued growth of the Mexican economy. Mexico is continuing to recover from the 1994 currency crisis that required U.S. intervention. Due to the currency crisis, Mexico moved from an exchange rate band mechanism to a free floating exchange rate with only an occasional intervention by the Central Bank of Mexico. Mexico has also undergone a privatization movement that should pay off dividends in the future in terms of economic growth. Through their efforts of strengthen the economy and reducing their trade barriers, Mexico should continue to grow as a trading partner.

NICARAGUA

Nicaragua is in the midst of going from a centralized economy to a market-oriented economy. This process has been a long and difficult one, but it is recently showing positive signs of growth in the economy due to its transition. Nicaragua continues to struggle in developing into an industrialized nation as their economy is mostly based upon agriculture that is complimented by only a small manufacturing industry. Most of their consumer goods are produced abroad and are imported into the country. Consequently, there has been a strong push by the government to develop an economic base for stronger exports. Nicaragua has also become a member of CACM and WTO, which has created a push towards greater free trade that includes a reduction of tariff rates, eliminating non-tariff barriers and foreign exchange rate controls. As a result, exports grew by 81 percent between 1994 and 1996. One of the beneficiaries of this increased trade is the U.S., as it remains Nicaragua's largest trading partner.

However, Nicaragua remains one of the least open economies of Latin America. Despite being a member of WTO and CACM, Nicaragua continues to have a number of barriers including a temporary protection tariff of 5 to 10 percent on about 900 items, a specific consumption tax of approximately 15 percent on 750 items, a 5 percent stamp tax, and 15 percent value added tax. Due to outside pressure, a tax reform law was passed in 1996 that specified that import fees in the form of taxes could not exceed 35 percent. The barriers do not stop there. Price band mechanisms have been established for yellow corn, rice, and soybeans. In addition, outside investments into Nicaragua have been slow as investors are still reeling from the lack of protection they received on their investments during the Sandinista era. Also, there has been a clear lack of protection for intellectual property protection.

PANAMA

Panama's economy has been growing at a rather slow pace relative to other Latin American countries with a number of its industries actually having a decline in growth. The Panama economy is based primarily on a well-developed service industry, which makes up 70 percent of the GDP. Manufacturing makes up about 19 percent of the economy, while fishing, forestry, and agriculture makes up most of the rest of the economy.

In attempt to jump-start the economy, the government is in the midst of a reform movement to liberalize trade, privatize state-owned operations, institute fiscal reform, and encourage job-creation wherever they can. However, their attempts at creating a stronger economy has been severely hurt by the downsizing of the U.S. military in Panama as the military's investment as accounted for as much as 4 percent of the nations GDP in certain years.

Trade with Panama is influenced by a number of factors including its exchange rate. Currently, Panama has a fixed exchange rate with the U.S. dollar. While fixed exchange rate reduces the risk of currency exchange fluctuations, it does mean that the price and availability of products are more dependent upon transportation costs and tariff and non-tariff barriers. These barriers have traditionally made Panama one of the most protected countries in Latin America. In the past, a number of special advantages in the form of subsidies have been given to specific domestic agricultural and industrial industries. These subsidies are gradually being eliminated in hopes of creating more investments into industries for which they have a competitive advantage rather than an artificial advantage. In addition, non-tariff barriers have been a significant obstacle to trade. By controlling the marketing of agriculture products, including rice, corn, beef, dairy products, soybeans, and wheat, the Ministry of Agriculture has significantly reduced the importation of these products. The Ministry has required permits for the importation of animal products, animal by-products, and seeds while placing quotas and stringent phytosanitary requirements for a number of other agriculture. However, Panama is in the process of becoming members of the WTO, which should reduce the barriers of trade in the future and help protect intellectual property rights.

PARAGUAY

While the economy has been growing at a rather slow rate (2 percent annually) in recent years, economic indicators, including a relatively low inflation rate and debt level, are suggesting stronger growth for the future. Despite these positive signs for future growth, a number of barriers that present themselves as obstacles to future growth including special interest political and economic groups who that are resisting reform along with a very poor telecommunication system.

In the past, as much as 70 percent of the government's revenue has been collected from Customs. While this has reduced the tax liability of corporations and individuals within Paraguay, it has significantly hurt Paraguay's ability to trade with other countries and created higher prices for consumer goods. In addition, high interest rates have made it difficult to finance exports and imports into the country and have hurt overall trade.

In addition, U.S. producers of software, audio, videotapes, video games, and books have had very little success in entering the Paraguay market because of widespread piracy. Finally, the U.S. has also had a very difficult time obtaining governmental procurements because of a lack of transparency in the decision making process and because of a large amount of competition from Asian and

regional producers. However, there has been some movement toward more free trade by being part of the Mercosur agreement.

PERU

Over the last decade, Peru has become an open economy through a number of policy changes that included a simplified tax structure, greater stability of inflation and interest rates, reduced exchange rate controls, and the privatization of a number of industries. Due to these policy changes, Peru has become a much more attractive place for investment and trade opportunities.

Currently, the U.S. is Peru's largest trading partner with the volume of trade increasing dramatically over the last decade as the result of major changes in their trade philosophy. From 1990 to 1996, tariff rates decreased from average rate of 80 percent to 16 percent in 1996. In 1996, 95 percent of imports had a tariff rate of 15 percent while the remaining 5 percent had a tariff rate of 25 percent.

For the most part, Peru's non-tariff barriers were eliminated through the use of a number of free trade agreements. However, import surcharges are applied to selected goods including wheat, rice, corn, sugar, and milk products. These surcharges are calculated monthly according to prevailing international prices for each commodity. These surcharges are in the process of being eliminated as well.

SUMMARY

As evident through this previous discussion, there has been a strong movement towards free trade across the Latin American countries. This movement has been a result of a number of international agreements, a free market attitude within Latin America, and healthier Latin American economies. Due to this movement toward free trade, a number of Latin American countries have become significant trade partners. In **Exhibit III-1**, the exports and imports between the U.S. and individual Latin American countries are highlighted. In the table the dollar value of exports to the Latin American country from the U.S. and the total dollar value of imports from the Latin American country to the U.S. is included. This list of countries are not intended to be all-inclusive, but rather a sample of trade patterns with Latin American countries.

Exhibit III-1
1996 TRADE PATTERNS
(in billions of dollars)

Country	*Exports to the U.S.*	Imports from the U.S.
Argentina	$2.30	$4.50
Bahamas	0.16	0.69
Bolivia	0.28	0.23
Brazil	8.70	12.60
Chile	2.20	4.00
Colombia	4.20	4.70
Costa Rica	2.00	1.80
Dominica Republic	3.60	3.20
Ecuador	1.90	1.20
El Salvador	1.08	1.07
Guatemala	1.50	1.65
Haiti	0.14	0.48
Honduras	1.40	1.30
Mexico	73.10	56.20
Jamaica	0.84	1.50
Nicaragua	0.35	0.26
Panama	0.30	1.40
Paraguay	0.04	0.91
Peru	1.20	1.80

Source: U.S. State Department

Exhibit III-2 displays the goods that have been severely hit by trade barriers to particular Latin American countries from the United States. In the table, tariffs, standards and procedures, customs and particular bans, duties, and quotas are described for each country. **Exhibit III-3** contains the common external tariff rate for each country (according to the trade agreement which the particular country is in) for commodity groups that are important to the Southeastern Transportation Alliance. Once again, these tables do not include all countries, but just a sample of the countries.

Based upon this examination, it is rather apparent that Latin America and North American countries are moving closer towards free trade. Whether a more comprehensive agreement, such as FTAA, occurs or not depends upon the level of commitment of all countries and intense negotiations. However, many Regional Agreements have been made in the course of the last few years that has significantly reduced trade barriers.

Exhibit III-2
TRADE RESTRICTIONS

Country	Tariffs and Duties	License Requirement and standards	Bans and Customs	Quotas
Argentina	Tariff range of 0 to 24 percent with an average rate of 12 percent; Heavy tariffs for automobiles.	Is in the process of eliminating	NA	Quotas for pulp, paper, and automobiles
Bahamas	The basic ad valorem rate 35 percent, however, a number of goods have a higher rate including agriculture goods, cigarettes, automobiles, etc.	NA	Bans have been placed on flowers, citrus plants, and vegetables.	NA
Bolivia	Recently reduced tariffs from 16 to 10 percent for most goods with capital goods having a tariff of 5 percent.	Must have weight clearly marked.	10 percent flat rate applied to CIF border value	NA
Brazil	Tariffs rates as high as 70 percent have been placed on goods including shoes, motorcycles, and automobiles. Brazil has actually had an increase in tariff rates with rates ranging between 5 and 30 percent and will generally vary over time based on the revenue needs of the treasury.	Sanitary and phytosanitary measures have been used on various agriculture products including chicken, beef, and sheep.	NA	Quotas for various items including automobiles
Chile	Average tariff rate of 11 percent as a flat rate of 11 percent is applied to most goods. Price band tariffs on various agriculture products including wheat, wheat flour, edible oils, and sugars.	Chile uses product standards, testing, certification, and labeling which have reduced the importation of poultry products, meats, and fruits.	NA	Quantity restrictions on various items.
Colombia	Price bands on various agriculture products including powdered milk, wheat, malting barely, yellow and while corn, crude palm and soybeans oils, white rice, soybeans, white and raw sugars, chicken pieces, and pork meat Three step tariff rate of 5 percent of raw materials, intermediate goods, and capital goods that are not produced domestically, 10-15 percent rate for these goods that are produced domestically, and 20 percent for all finished goods.	Bureaucratic regulations, product standards, licensing requirements, and registration requirements have been placed on various agriculture products including wheat, poultry, malting barely, corn, rice, sorghum, wheat flour, oilseeds, soybeans, soybean meal, and soybean oil.	NA	NA

Exhibit III-2 (cont')
TRADE RESTRICTIONS

Country	Tariffs and Duties	License Requirement and standards	Bans and Customs	Quotas
Costa Rica	Placed on various items. Recently, new tariffs have been placed on pork and related by products, poultry, seeds, rice, wheat, corn, beans, tobacco, sugar, sugar cane, dairy products, and coffee. Costa Rica applies the Common External Tariff rate of the CACM for most goods of 5- 20 percent.	Standards and requirements have been placed on various items including pharmaceuticals, fertilizers, pesticides, hormones, veterinary preparations, vaccines, poisonous substances, bulk grain, fresh horticulture products, frozen meats, and mouthwashes.	Customs are placed on various items. Custom rates range from 1 to 28 percent.	Have been recently eliminated
Dominican Republic	Tariff rates range from 5 to 35 percent on most goods with some goods having as high as 80 percent including home appliances, alcohol, perfumes, jewelry, automobiles, and auto parts.	Follow U.S. standards and requirements.	NA	NA
Ecuador	Tariff rates ranges from 0 to 20 percent with most consumer goods, intermediate, and raw material having a 20, 15, and 5 percent tariff rates. In many cases, price bands have been placed on agriculture products. Especially high tariffs are placed on automobiles. Most consumer goods have a 20 percent tariff rate, while intermediate goods and capital goods are imported at 10 and 5 percent.	Import license requirements, sanitary and phytosanitary requirements have been placed on various items including processed foods, cosmetics, pharmaceuticals, consumption goods, and agriculture commodities.	Bans have been placed on used goods. Custom procedures have been placed on various items especially agriculture products and can be cumbersome.	NA
El Salvador	Tariff rates range between 1 and 20 percent. Tariff rates on raw material along with capital and intermediate goods have generally been reduced to zero.	Rigorous standards have been placed on poultry and fresh foods while basic grains and dairy products must have import licenses. On most other goods, no licenses have been required.	Usual goods are banned for safety reasons.	Higher duties on alcoholic beverages, textiles, some luxury items, and automobiles.
Guatemala	Tariff rates are generally between 5 and 20 percent, which is the CET of (CACM). Has a price ban mechanism of 5 -45 percent (in the process of eliminating). In addition, there is stipulated duty of 20 percent for chicken parts that are less than 300 metric tons and 42 percent for exports greater than 300 metric tons.	Licensing is required for apples and wheat flour. No other significant requirements.	NA	NA

Exhibit III-2 (cont'd)
TRADE RESTRICTIONS

Country	Tariffs and Duties	License Requirement and standards	Bans and Customs	Quotas
Honduras	Tariff rates of 5 to 20 percent on most goods that are in the process of being dropped to 1 to 15 percent. Price bands have been placed on yellow corn, sorghum, rice, and soybeans. High taxes are placed on automobiles depending on engine size.	Onerous phytosanitary requirements for agriculture products that restricts US exports. Labeling is required to have the name of the product, name of manufacture, origin, list of ingredients, expiration date, net content, and sanitary registration.	Custom procedures are burdensome. Bans have been placed on sugar, rice and cement.	NA
Jamaica	Jamaica currently adheres to the CET rate of the Caricom of 0 to 20 percent on goods (an additional 5 percent in the case of agriculture products). In addition to the CET, all goods carry a 15 percent general consumption tax.	Bureaucratic procedures and inadequate facilities for importing have made trade more difficult. In addition, licensing is required for powdered milk, refined sugar, plants, perfume, pharmaceuticals, vegetable saps, certain chemicals, and motor vehicles and parts.	Usual goods are banned because of safety and ethical reasons.	NA
Mexico	Tariffs are being eliminated over a 10 to 15 year time frame. Tariffs will be phased out based on the product. Products are classified in one of three groups: Group A, B, or C. Products in Group A had their tariff phased out in 1994, Group B had their tariff phased out this year (1998), and Group C will have their tariff phased out in 2003.	Licenses are required for nearly 200 products. Phytosanitary standards have also been placed on grains, citrus, cherries, and cling peaches.	Extensive custom procedures that seem to target textiles, footwear, been, and consumer electronics.	NA
Nicaragua	Temporary protection tariff of 5 to 20 percent. A specific consumption tax of 15 percent on nearly 750 items. A percent stamp tax. A 15 percent value added tax. These taxes cannot exceed 35 percent. Nicaragua quotes an average tariff rate of 14.5 percent.	In general, standards and licensing has not presented a significant barrier to trade.	NA	NA
Panama	Panama has the highest tariff and duty rates of any Central America country with an average rate of 40 percent. Currently, the maximum tariff rates for industrial imports is 40 percent and the maximum tariff rate for agriculture goods is 50 percent.	Require permits for animal products, animal by-products, and seeds. Stringent phytosanitary requirements for a number of other agriculture products. Labeling has the standard requirements.	NA	NA

Exhibit III-2 (cont'd)
TRADE RESTRICTIONS

Country	Tariffs and Duties	License Requirement and standards	Bans and Customs	Quotas
Paraguay	Applies the CET of the Mercosur agreement of 0 to 20 percent.	Requires no major import licenses.	Paraguay applies significant customs to imports.	NA
Peru	Two tier tariff program with rates of 12 and 20 percent. Agriculture goods have a two tier program of 15 and 25 percent. 95 percent of all non-agriculture imports have a tariff rate of 12 percent, while the remaining 5 percent has a tariff rate of 20 percent. In addition, most imports are subject to a value added tax of 18 percent on the same basis as domestically produced goods.	Some unreasonable phytosanitary requirements have been made for agriculture products. Imported products must have brand name, country of origin, and expiration date.	Excessive delays are often encountered within the customs office.	NA
Uruguay	Three basic tariffs: (1) 6 percent on capital goods not produced in Uruguay; (2) 15 percent on intermediate goods; (3) 20 percent on finished goods.	Labels must be in Spanish and have the country of origin, expiration date, and name of importer.	Occasionally, bans are placed on food items.	NA
Venezuela	Ave tariff rate of 10 percent. The tariff rate of Venezuela has four tiers: 5, 10, 15, and 20 percent, with all imports facing an additional 16.5 percent tax. Eventually, Venezuela wants to move all goods to a flat 15 percent. Venezuela has an especially high tariff on automobiles of 35 percent. Price bands are also applied on agriculture products. In addition, Venezuela has used contervailing duties on certain products including clothing.	Has sanitary and physanitary requirements and has on occasions refused to issue certificates for the importation of poultry and poultry products, and pork products. Venezuela has a local content requirement of 30 percent.	Bans have been placed on chicken products. A custom rate of 1 percent is also applied to all goods.	Very few quantity restrictions.

NA does not mean that these restrictions are not a barrier, it simply means that no evidence of this type of barrier being used by the government was found

Source: US State Department and US Department of Commerce.

Exhibit III-3
TARIFF TABLE

Country	Farm Product		Petroleum and Coal		Pulp and Paper		Lumber and Wood		Nonmetallic minerals		Machinery		Primary Metals		Food and Kindred Products		Overall	
	range	ave	range	ave	range	ave	range	ave	range	ave	range	ave	range	ave	range	ave	range*	ave
Argentina	0-16	9	0-2	1	2-24	12	2-17	6	0-17	4	0-24	0	0-24	12	16	16	0-24	12
Bahamas																	0-160	35
Barbados																	0-20	
Bolivia	5-20	11	5-10	7.5	0-20	10	5-15	10	5-10	5	5-15	10	5-20	10	15-20	17.5	NA	10
Brazil	0-16	9	0-2	1	2-24	12	2-17	6	0-17	4	0-24	0	0-24	12	16	16	NA	11
Chile																	NA	11
Colombia	5-20	11	5-10	7.5	0-20	10	5-15	10	5-10	5	5-15	10	5-20	10	15-20	17.5	0-35	12
Costa Rica	0-274																5-20	12
Dominica																	5-35	NA
Republic																		
Ecuador	5-20	11	5-10	7.5	0-20	10	5-15	10	5-10	5	5-15	10	5-20	10	15-20	17.5	0-20	12
El Salvador																	1-20	9
Guatemala																	5-20	11
Haiti																	0-15	NA
Honduras																	5-20	18
Mexico	0-25	10	0-10	5	0-5	1	0-7.5	3	0-2.5	0	0-10	3	0-10	4	0-10	5	0-10	NA
Jamaica	0-35																0-20	NA
Nicaragua																	5-20	15
Panama																	0-50	40
Paraguay	0-16	9	0-2	1	2-24	12	2-17	6	0-17	4	0-24	0	0-24	12	16	16	0-20	8
Peru	5-20	11	5-10	7.5	0-20	10	5-15	10	5-10	5	5-15	10	5-20	10	15-20	17.5	0-25	13
Uruguay	0-16	9	0-2	1	2-24	12	2-17	6	0-17	4	0-24	0	0-24	12	16	16		15
Venezuela	5-20	11	5-10	7.5	0-20	10	5-15	10	5-10	5	5-15	10	5-20	10	15-20	17.5	0-40	12

The tariff rates for each of the countries are based upon the common external tariff rate of trade agreements.

Source: U.S. Department of Commerce.

* Most goods fall in the range for each country.

APPENDIX IV
PORT TERMINAL PLANNING MODULES

Section D1 of the main report discusses the development of estimates of investment needs for the LATTS Strategic Port System. As noted therein, based on the results of the Capacity Analysis of existing facilities, the Future Facility Needs Assessment for each type of terminal was conducted. For purposes of these analyses, idealized facility modules tailored to the LATTS Region were developed. These modules were used as tools, or guidelines in comparing the current Maximum Practical Capacities (MPC's) of the existing terminals to the trade forecasts.

For purposes of the LATTS analysis, the primary focus was on the quantity of new terminals that will be needed to fulfill future requirements. Therefore, where shortfalls occur, the approximate quantities of new terminals required was determined based upon the terminal planning modules.

Key data from the 'idealized terminal modules' were used in the Future Facility Needs Assessment. The modules were 'customized' to represent cargo terminals typically associated with the LATTS Region. This recognizes the existing conditions that are unique to the size and design of cargo terminals in the Southeast and Gulf regions of the U.S. For example, the average container terminal size for this region is smaller than typical facilities found in other regions of the U.S. (i.e. West Coast). These smaller terminal modules were developed to represent the average sized terminals throughout the entire LATTS Region.

For purposes of the future facility needs assessment, the medium (baseline) cargo projection was compared to the Sustainable Practical Capacity (SPC). For practical planning purposes, sustained (SPC) throughput is often assumed to approximate 75%-80% of the terminals MPC.

Typical terminal modules were developed for Container, Neo-Bulk, Break-Bulk, Dry-Bulk and Liquid-Bulk facilities. The modules represent typical East Coast and Gulf coast maritime terminals for each cargo type. Due to the wide variety of terminal characteristics for each type of cargo, the modules were sized in comparison to average terminals found on the East and Gulf coasts.

The primary use of the modules was to provide a direct correlation between identified capacity needs (short tons/year) and the additional infrastructure required to accommodate such a need. For example, if future container cargo projections are higher than a terminal's container capacity, then there is a need for improvements. Therefore, if 3,980,000-tons/year terminal capacity is needed and each mixed storage container module has a throughput capacity of 1,592,000 Tons/Year, then approximately 2.5 mixed storage container terminal modules would be needed.

In addition to correlating the cargo tonnage projections to the needed infrastructure improvements, the modules also provided information (industry standards) for calculating throughput capacities of maritime terminals for which inadequate information was available. If the only available information about a certain terminal was the cargo type, storage mode, number of berths, berth type and terminal size (acreage), a conceptual throughput capacity was determined using industry standard data from the modules.

In the following discussions, each module summary is accompanied by a plan drawing of the module and a brief description of the module's infrastructure criteria. The characteristics shown in the following module summaries were used to develop the look-up tables in the database.

CONTAINER MODULE

The small container module shown on **Exhibit IV-1** was designed to represent the needs of a typical East and Gulf coast container terminal with wheeled, grounded or other/mixed storage to provide the maximum level of customer service. Where possible, two or more contiguous modules are recommended. The major terminal components include:

- One berth, able to accommodate container vessels of 800 to 1,150 feet in length.
- Two 100-foot-gauge container gantry cranes at a marginal wharf.
- An administration building, maintenance and repair facility and fenced parking for both longshore and administrative personnel.
- An eight-lane split terminal gate for weighing loads and documenting cargo interchange transactions.
- Approximately 25 to 30 acres of paved and striped outdoor storage with the following average per acre static capacities:
  - Wheeled 90 TEU/Acre
  - Grounded (RTG) 200-250 TEU/Acre
  - Other/Mixed 150 TEU/Acre
- Assumes an average dwell time of 6-8 days per container and 7.5 tons per TEU.

This 40-acre container module is used for the transfer of Lift On/Lift Off (Lo/Lo) and Roll On/Roll Off (Ro/Ro) containerized cargo. **Exhibit IV-2** outlines additional specifications of the module's infrastructure requirements.

NEO-BULK MODULE

This module was designed to represent the needs of an average East and Gulf coast neo-bulk terminal with moderate throughput levels for a variety of cargoes. The major terminal components include:

Exhibit IV-1: Typical Container Terminal Planning Module

Approximate Area: **40 Acres**
Approximate Storage Area: **30 Acres**

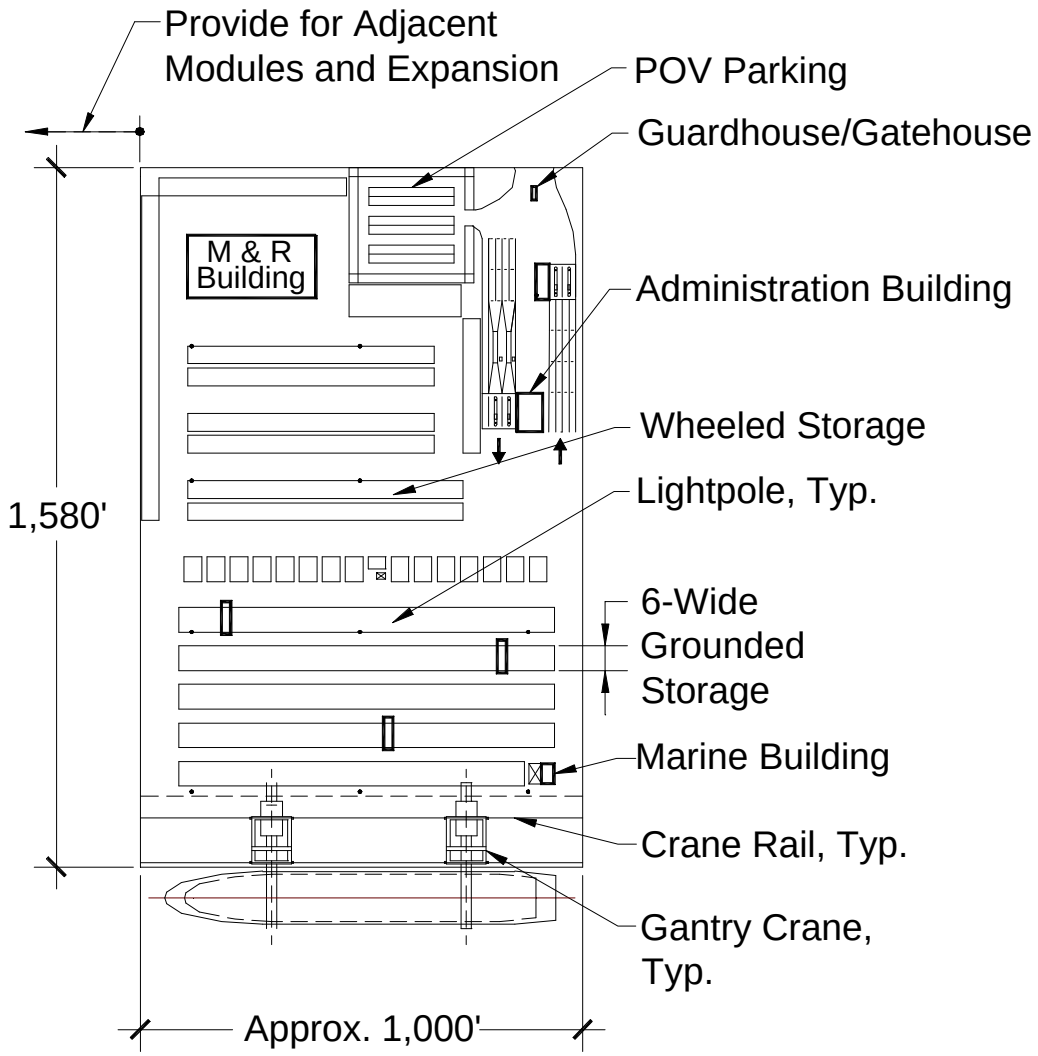


Exhibit IV-2: Container Terminal - Facility Data

Gross Terminal Area: Storage Capacity Area:	40 Acres 30 Acres
Throughput Capacity (Short Tons/Yr.):	Wheeled = 880,000 Short Tons/Yr. Grounded = 1,739,000 Short Tons/Yr. Other/Mixed = 1,467,000 Short Tons/Yr. Average. = 1,400,000 Short Tons/Yr. (187,000 TEU/Yr.)
Wharf Apron Configuration	Length: 800' - 1,150 - Width: 160'
Storage Area/Storage Requirements	Wheeled Storage: 675 Short Tons/Acre Grounded Storage: 1,500 Short Tons/Acre Other/Mixed Storage: 1,125 Short Tons/Acre
Surge Capacity	Off-Site Storage
Crane Configuration/ Crane Capacity	2-100' Gauge Container Cranes
Building Areas	Gate Buildings: 7,500 s.f. Maintenance Building: 41,000 s.f. Administration Building: 18,000 s.f.
Gate Geometry	Four Inbound, Four Outbound Lanes

- A single berth (could be shared with another module), able to accommodate vessels up to 600 feet in length.
- A 60,000-square-foot transit shed/warehouse with a static storage capacity of approximately 3,500 short tons for cargo requiring protection from the weather. The shed includes forklift access and truck loading docks.
- 6-acres of paved outdoor storage with a storage capacity of approximately 16,200 short tons. This storage area consists of approximately 4 acres for wheeled (automobile) storage and 2 acres of open storage

Typical terminal operations data for a neo-bulk terminal were used to design this module. On average, this module can be expected to turn its storage capacity over approximately 10 to 20 times per year.

The 10-acre neo-bulk module shown on **Exhibit IV-3** is used for handling cargo such as lumber, paper, steel and autos. **Exhibit IV-4** outlines the module's facility data and infrastructure requirements.

Exhibit IV-3: Neo-Bulk Terminal Module

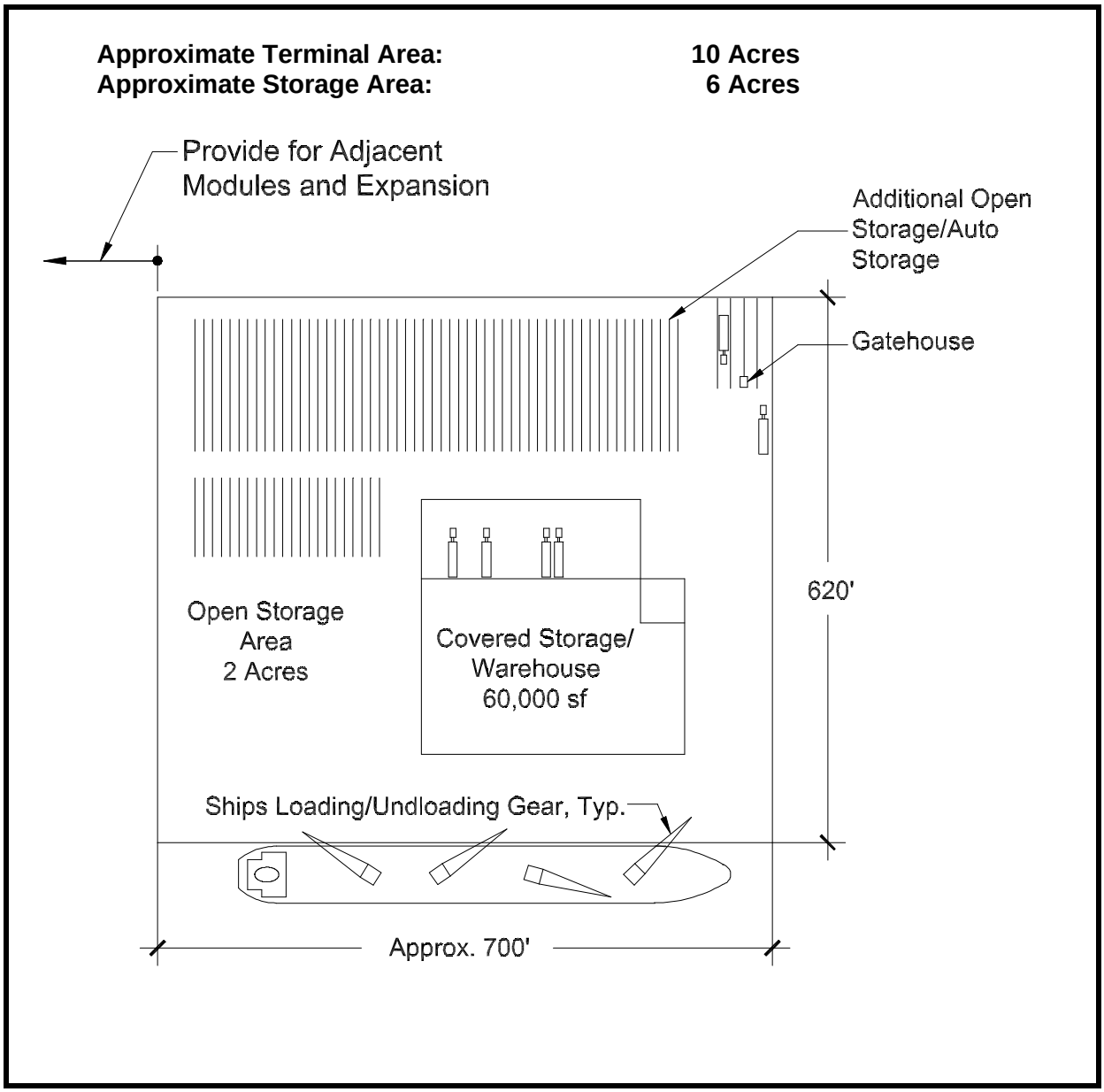


Exhibit IV-4: Neo-Bulk Terminal - Facility Data

Gross Terminal Area: Storage Capacity Area:	10 Acres 6 Acres
Throughput Capacity (Short Tons/Year)	Outside = 202,000 Short Tons/Yr. Warehouse = 140,000 Short Tons/Yr. Mixed = 178,000 Short Tons/Yr.
Wharf Apron configuration	Length: 700', Width: 100'
Storage Area/Storage Requirements	Outside Storage: 2,700 Tons/Acre Mixed Storage: 2,600 Tons/Acre Warehouse Storage: 2,500 Tons/Acre
Surge Capacity	Included in Storage Area
Crane Configuration/ Crane Capacity	Ship's Gear or two 50-ton Mobile Cranes
Building Areas	Maintenance and Administrative Space Included Inside Transit Shed/Warehouse
Gate Geometry	Two Inbound Lanes, Two Outbound Lanes

BREAK-BULK MODULE

Typical operations for break-bulk terminals were used to design this module. On average, this module can be expected to turn its storage capacity over approximately 10 to 20 times per year.

This module was designed to represent the needs of an average East and Gulf coast break-bulk terminal with moderate throughput levels for a large variety of cargoes. The major terminal components include:

- A single berth (could be shared with another module), able to accommodate vessels up to 600 feet in length.
- A 120,000-square-foot transit shed/warehouse with a static storage capacity of approximately 7,000 short tons for cargo requiring protection from the weather. The shed includes forklift access and truck loading docks.
- 4 acres of paved, outdoor storage with a storage capacity of approximately 10,800 short tons.

The 10-acre break-bulk module shown on **Exhibit IV-5** is used for handling palletized cargo such as sacks, cartons, crates, drums and bags. **Exhibit IV-6** outlines the module's facility data and infrastructure requirements.

DRY BULK MODULE

The 20-acre dry bulk module is shown in **Exhibit IV-7** and is used for dry bulk cargoes such as feed, grain, sand & gravel, scrap metal, coal, coal/coke, clinker and fertilizer. The module is shown with the capability to accommodate outside storage, silo storage or a mix of both. The three storage modes that are considered in this module have a range of static storage capacities as noted in the diagram. **Exhibit IV-8** outlines the module's facility data and infrastructure requirements.

This module was designed to represent the needs of an average dry bulk terminal with moderate throughput levels. The major terminal components include:

- A single berth (could be shared with another module), able to accommodate vessels up to 900' in length.
- Mobile ship loaders and/or reclaimers with the capacity to (un)load 500 to 1,200 tons per hour.
- Silo or open storage areas.
- A truck transfer and parking areas.

Typical terminal operations data for a dry bulk terminal were used to prepare this module. On average, this module can be expected to turn its storage approximately 5 to 10 times per year. Throughput levels may vary significantly with this module.

Exhibit IV-5: Break-Bulk Terminal Module

Approximate Terminal Area: **10 Acres**
Approximate Storage Area: **7 Acres**
(Including Warehousing)

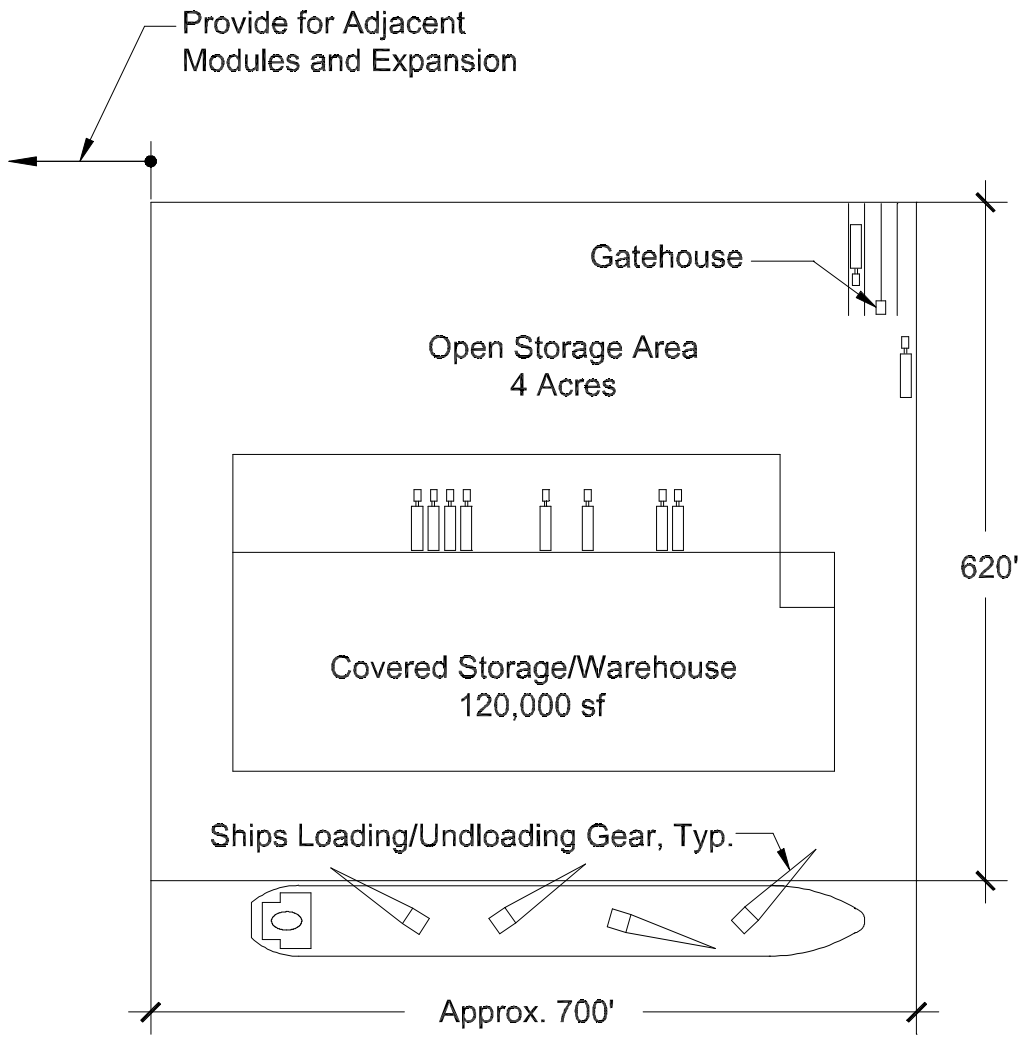


Exhibit IV-6: Break-Bulk Terminal - Facility Data

Gross Terminal Area: Storage Capacity Area:	10 Acres 6 Acres
Throughput Capacity (Short Tons/Year)	Outside = 148,000 Short Tons/Yr. Warehouse = 187,000 Short Tons/Yr. Mixed = 142,000 Short Tons/Yr.
Wharf Apron configuration	Length: 700', Width: 100'
Storage Area/Storage Requirements	Outside Storage: 2,700 Tons/Acre Mixed Storage: 2,600 Tons/Acre Warehouse Storage: 2,700 Tons/Acre
Surge Capacity	Included in Storage Area
Crane Configuration/ Crane Capacity	Ship's Gear or two 50-ton Mobile Cranes
Building Areas	Maintenance and Administrative Space Included Inside Transit Shed/Warehouse
Gate Geometry	Two Inbound Lanes, Two Outbound Lanes

Exhibit IV-7: Dry Bulk Module

Approximate Terminal Area: **20 Acres**
Approximate Storage Area: **10 Acres**

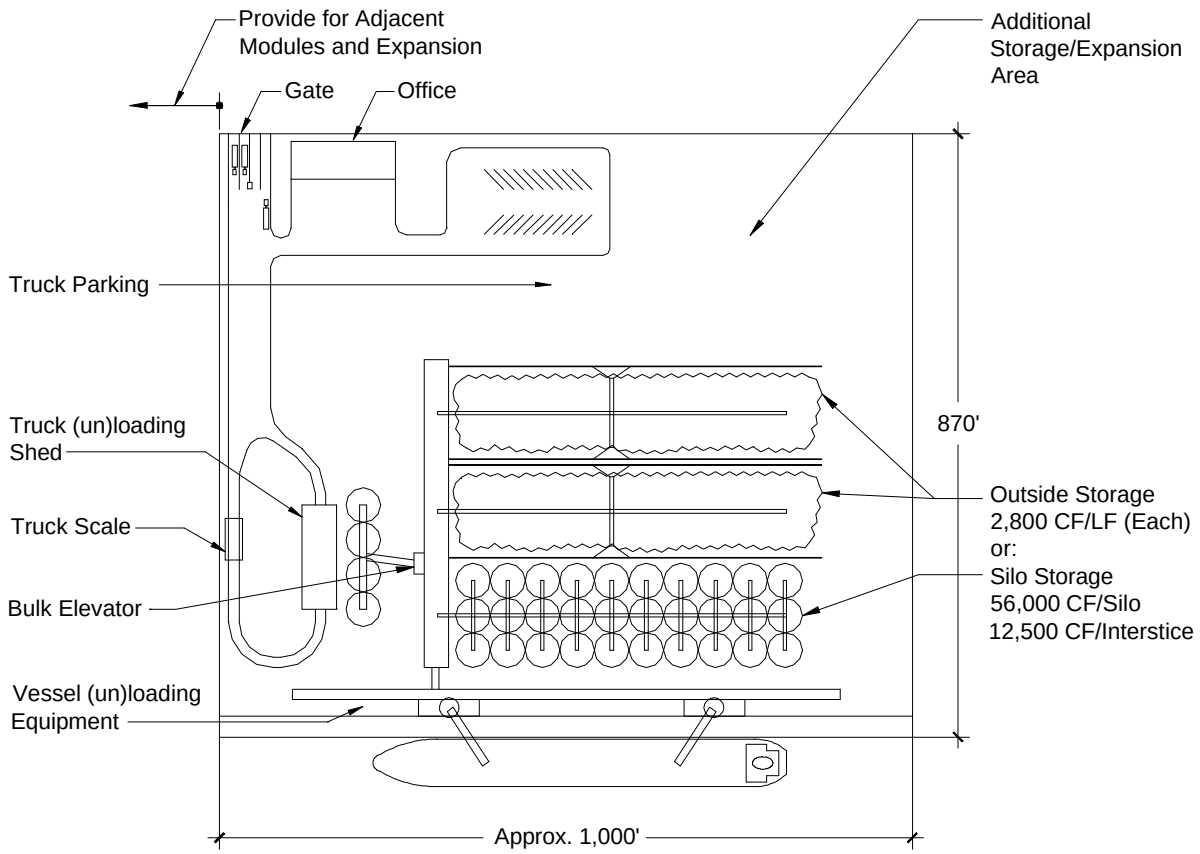


Exhibit IV-8: Dry Bulk Terminal - Facility Data

Gross Terminal Area: Storage Capacity Area:	20 Acres 10 Acres
Throughput Capacity (Short Tons/Year)	Outside = 2,218,000 Short Tons/Yr. Silo = 2,218,000 Short Tons/Yr. Mixed = 1,684,000 Short Tons/Yr.
Wharf Apron Configuration	Length: '1000', Width: 100'
Storage Area/Storage Requirements	Outside Storage: 32,700 Tons/Acre Mixed Storage: 21,800 Tons/Acre Silo Storage: 43,600 Tons/Acre
Surge Capacity	Included in Storage Acres.
Crane Configuration/ Crane Capacity	Two ship loaders with 1,000 - 1,200 TPH rated capacity each.
Transfer Equipment	Two stacker reclaimer units (one per conveyer system) with 1,000 TPH capacity
Building Areas	Truck (un)loading Shed: 2,000 s.f. Administration and Parking: 5,000 s.f.
Gate Geometry	Two inbound Lanes, Two outbound Lanes

LIQUID BULK MODULE

The 20-acre liquid-bulk module shown on **Exhibit IV-9** could be used for handling liquid bulk cargoes such as LNG, petroleum, molasses, chemicals and vegetable oil. **Exhibit IV-10** outlines the module's facility data and infrastructure requirements.

This module was designed to accommodate the needs of an average liquid-bulk terminal on the U.S. East and Gulf coasts. The major terminal components include:

- A single berth (could be shared with another module), able to accommodate vessels up to 900 feet in length.
- A cargo manifold, which could include recessed risers or some type of permanent, articulated pipe assembly.
- Nine tanks, each having a total liquid-bulk cargo capacity of 115,000 U.S. barrels or approximately 14,500 short tons.
- A four-lane truck-loading area with an office building.

Typical terminal operations data for a petroleum liquid bulk terminal were used to prepare this module. On average, this module can be expected to turn its storage capacity over 2-5 times per year. Throughput levels may vary significantly with this module.

Exhibit IV-9: Liquid Bulk Terminal Module

Approximate Terminal Area:	**20 Acres**
Approximate Storage Area:	**12 Acres**

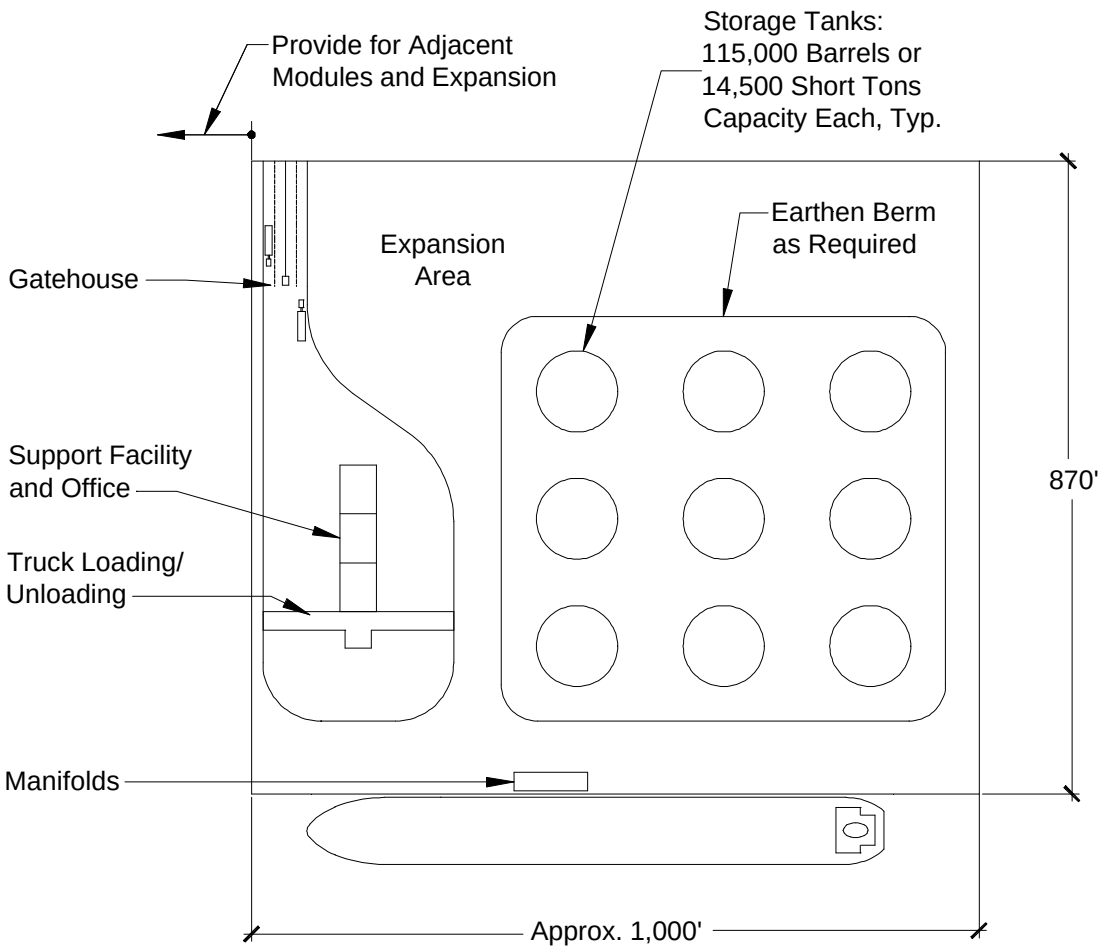


Exhibit IV-10: Liquid Bulk Terminal – Facility Data

Gross Terminal Area: Storage Capacity Area:	20 Acres 12 Acres
Throughput Capacity (Short Tons/Year)	Tank = 2,048,000 Short Tons/Yr.
Wharf Apron configuration	Length: 1000', Width: 100'
Storage Area/Storage Requirements	Tanks (each): 115,000 Barrels (14,500 Short Tons)
Surge Capacity	Included in storage area
Transfer Equipment	Liquid Bulk Manifold
Building Areas	Support Facility and Office: 4,000 s.f.
Gate Geometry	Two Inbound Lanes, Two Outbound Lanes

APPENDIX V
PORT CONCEPTUAL DEVELOPMENT COST ESTIMATES

In developing the conceptual construction estimates for the five marine terminal modules, the following assumptions were taken into consideration:

- Taxes and customs fees are not included.
- Construction permitting costs are not included.
- Environmental mitigation and permitting costs are not included.
- Construction management fees and administration fees, staking and surveying, materials lab and testing fees, and other construction consultant fees are not included.
- The cost of removing possible underground structures is not included.
- Off-site construction and bringing utilities to the site are not included.
- Cost for Relocating existing utilities is not included.
- Channel dredging and fill costs are not included.
- Property acquisition and related costs are not included.
- Administrative costs associated with move-in and start-up are not included.
- Insurance and bonding costs are not included.
- Fuel, electricity, telephone and water bills are not included.
- Integrated computer systems for managing, controlling and operating the terminal is not included.
- Terminal operations and maintenance costs and special warranties are not included.
- A 20% contingency has been added to the construction estimates to account for some of the differences in material costs, permitting costs and any costs not revealed at this conceptual level of the terminal's design.

Exhibits V-1 through **V-5** present the cost estimates for the five marine terminal modules**.**

Exhibit V-1
CONCEPTUAL DEVELOPMENT COST – CONTAINER MODULE

Latin American Trade & Transportation Study (LATTS)
Conceptual Cost Estimate
NEW 40 ACRE CONTAINERIZED CARGO TERMINAL

DATE: June 16, 2000

CONCEPTUAL DEVELOPMENT PLAN CONSTRUCTION COSTS

Task No.	Item No.	Item	Quantity	Unit	Unit Cost	Item Cost	Remarks
1	**Approximate Itemized Costs - New Containerized Cargo Terminal Module**						
	1	Clear and Grub	1	LS	$330,000	$330,000	Assumes typical demolition and removal, but no hazardous material
	2	Civil Site Work	40 1,742,400	ACRE SF	$3	$5,227,200	Assumes 30 acres graded and paved for storage areas, includes fencing, signage, etc.
	3	Dredging	0 0	SF CY	$8	$0	Berth Dredging included in Wharf Cost
	4	Fill	0 0	ACRE SF	$8	$0	Not Applicabble
	5	Bulkheading	0	LF	$2,000	$0	Included in Wharf Cost
	6	New Concrete Wharf Construction	1,000	LF	$10,000	$10,000,000	Construct New Concrete Wharf Structures, Crane Rails, Paved Backlands, etc.
	7	Site Electrical	40	AC	$35,000	$1,400,000	Lighting, Electrical Sub-Stations, etc.
	8	Cathodic Protection	1	LS	$400,000	$400,000	Assumes Passive Cathodic Protection System
	9	Site Mechanical	40	ACRE	$30,000	$1,200,000	Includes SD/FW/DW/SS.
	10	Yard Light Standards	12	EA	$50,000	$600,000	Assume 100' light poles
	11	Gate Site Work	4 174,240	ACRE SF	$10	$1,742,400	Includes Scales, Pre-Check Booths, Conc. Curbs & Other Utilities, etc.
	12	Gate Facility	7,500	SF	$75	$562,500	Canopies and/or Other Structures
	13	Administration Building	18,000	SF	$110	$1,980,000	Administrative Building
	14	Maintenance & Repair Building	41,000	SF	$75	$3,075,000	M & R Building
	15	Marine Building	7,000	SF	$50	$350,000	Marine Building
SUB-TOTAL ALL TASKS						**$26,867,100**	
INCLUDE CONTINGENCY OF					20%	$5,373,420	
TOTAL CONSTRUCTION COST						$32,240,520	
TOTAL BUDGET ESTIMATE FOR CONTAINER TERMINAL (Rounded)						**$32,000,000**	

Exhibit V-2
CONCEPTUAL DEVELOPMENT COST – BREAK-BULK MODULE

Latin American Trade & Transportation Study (LATTS)
Conceptual Cost Estimate
NEW 10 ACRE BREAK-BULK CARGO TERMINAL

DATE: June 16, 2000

CONCEPTUAL DEVELOPMENT PLAN CONSTRUCTION COSTS

Task No.	Item No.	Item	Quantity	Unit	Unit Cost	Item Cost	Remarks
1	**Approximate Itemized Costs - New Break-Bulk Cargo Terminal Module**						
	1	Clear and Grub	1	LS	$100,000	$100,000	Assumes typical demolition and removal, but no hazardous material
	2	Civil Site Work	4 174,240	ACRE SF	$2.6	$453,024	Assumes 4 acres graded and paved for storage areas, includes fencing, signage, etc.
	3	Dredging	0 0	SF CY	$8	$0	Berth Dredging included in Wharf Cost
	4	Fill	0 0	ACRE SF	$8	$0	Not Applicabble
	5	Bulkheading	0	LF	$2,000	$0	Included in Wharf Cost
	6	New Concrete Wharf Construction	700	LF	$7,500	$5,250,000	Construct New Concrete Wharf Structures
	7	Site Electrical	10	AC	$35,000	$350,000	Lighting, Electrical Sub-Stations, etc.
	8	Cathodic Protection	1	LS	$200,000	$200,000	Assumes Passive Cathodic Protection System
	9	Site Mechanical	10	ACRE	$30,000	$300,000	Includes SD/FW/DW/SS.
	10	Yard Light Standards	6	EA	$25,000	$150,000	Assume standard 60' light poles
	11	Gate Site Work	0.25 10,890	ACRE SF	$10	$108,900	Includes Scales, Conc. Curbs & Other Utilities, etc.
	12	Gate House	200	SF	$75	$15,000	Guard Booths, Canopies and/or Other Structures
	13	Covered Storage/Warehouse	120,000	SF	$85	$10,200,000	Administrative offices and maintenance functions included inside warehouse
	14	Maintenance & Repair Building	0	SF	$85	$0	Not Applicabble
SUB-TOTAL ALL TASKS						**$17,126,924**	
INCLUDE CONTINGENCY OF					20%	$3,425,385	
TOTAL CONSTRUCTION COST						$20,552,309	
TOTAL BUDGET ESTIMATE FOR BREAK-BULK CARGO (Rounded)						**$20,600,000**	

Exhibit V-3
CONCEPTUAL DEVELOPMENT COST – NEO-BULK MODULE

Latin American Trade & Transportation Study (LATTS)
Conceptual Cost Estimate
NEW 10 ACRE NEO BULK CARGO TERMINAL

DATE: June 16, 2000

CONCEPTUAL DEVELOPMENT PLAN CONSTRUCTION COSTS

Task No.	Item No.	Item	Quantity	Unit	Unit Cost	Item Cost	Remarks
1	**Approximate Itemized Costs - New Neo Bulk Cargo Terminal Module**						
	1	Clear and Grub	1	LS	$100,000	$100,000	Assumes typical demolition and removal, but no hazardous material
	2	Civil Site Work	6 261,360	ACRE SF	$2.4	$627,264	Assumes 6 acres graded and paved for storage areas, includes fencing, signage, etc.
	3	Dredging	0 0	SF CY	$8	$0	Berth Dredging included in Wharf Cost
	4	Fill	0 0	ACRE SF	$8	$0	Not Applicabble
	5	Bulkheading	0	LF	$2,000	$0	Included in Wharf Cost
	6	New Concrete Wharf Construction	700	LF	$7,500	$5,250,000	Construct New Concrete Wharf Structures
	7	Site Electrical	10	AC	$35,000	$350,000	Lighting, Electrical Sub-Stations, etc.
	8	Cathodic Protection	1	LS	$200,000	$200,000	Assumes Passive Cathodic Protection System
	9	Site Mechanical	10	ACRE	$30,000	$300,000	Includes SD/FW/DW/SS.
	10	Yard Light Standards	6	EA	$25,000	$150,000	Assume standard 60' light poles
	11	Gate Site Work	0.25 10,890	ACRE SF	$10	$108,900	Includes Scales, Conc. Curbs & Other Utilities, etc.
	12	Gatehouse	200	SF	$75	$15,000	Guard Booths, Canopies and/or Other Structures
	13	Covered Storage/Warehouse	60,000	SF	$85	$5,100,000	Administrative offices and maintenance functions included inside warehouse
	14	Maintenance & Repair Building	0	SF	$75	$0	Not Applicabble
SUB-TOTAL ALL TASKS						**$12,201,164**	
INCLUDE CONTINGENCY OF					20%	$2,440,233	
TOTAL CONSTRUCTION COST						$14,641,397	
TOTAL BUDGET ESTIMATE FOR NEO BULK TERMINAL (Rounded)						**$14,600,000**	

Exhibit V-4

CONCEPTUAL DEVELOPMENT COST –DRY BULK MODULE

Latin American Trade & Transportation Study (LATTS)
Conceptual Cost Estimate
NEW 20 ACRE DRY BULK CARGO TERMINAL

DATE: June 16, 2000

CONCEPTUAL DEVELOPMENT PLAN CONSTRUCTION COSTS

Task No.	Item No.	Item	Quantity	Unit	Unit Cost	Item Cost	Remarks
1	**Approximate Itemized Costs - New Dry Bulk Cargo Terminal Module**						
	1	Clear and Grub	1	LS	$200,000	$200,000	Assumes typical demolition and removal, but no hazardous material
	2	Civil Site Work	20 871,200	ACRE SF	$2.7	$2,352,240	Assumes 10 acres graded and paved for open storage areas, includes fencing, signage, etc.
	3	Bulkheading	0	LF	$2,000	$0	Included in Wharf Cost
	4	New Concrete Wharf Construction	1,000	LF	$7,500	$7,500,000	Construct New Concrete Wharf Structures
	5	Site Electrical	20	AC	$35,000	$700,000	Lighting, Electrical Sub-Stations, etc.
	6	Cathodic Protection	1	LS	$300,000	$300,000	Assumes Passive Cathodic Protection System
	7	Site Mechanical	20	ACRE	$30,000	$600,000	Includes SD/FW/DW/SS.
	8	Yard Light Standards	6	EA	$25,000	$150,000	Assume standard 60' light poles
	9	Silo Storage Tanks	30	EA	$50,000	$1,500,000	Assumes 50,000 CF Storage Capacity Each
	10	Conveyors/Elevators, etc.	1	LS	$500,000	$500,000	Assumes conventional conveyors or elevators, etc.
	11	Gate Site Work	2 87,120	ACRE SF	$2	$174,240	Includes Scales, Conc. Curbs & Other Utilities, etc.
	12	Gate House	200	SF	$75	$15,000	Guard Booths, Canopies and/or Other Structures
	13	Administration Building / Office	5,000	SF	$110	$550,000	Administrative Building
	14	Truck (Un)Loading Shed	2,000	SF	$75	$150,000	Truck (Un)Loading Shed
SUB-TOTAL ALL TASKS						**$14,691,480**	
INCLUDE CONTINGENCY OF					20%	$2,938,296	
TOTAL CONSTRUCTION COST						$17,629,776	
TOTAL BUDGET ESTIMATE FOR DRY BULK CARGO (Rounded)						**$17,600,000**	

Exhibit V-5

CONCEPTUAL DEVELOPMENT COST – LIQUID BULK MODULE

Latin American Trade & Transportation Study (LATTS)
Conceptual Cost Estimate
NEW 20 ACRE LIQUID BULK CARGO TERMINAL

DATE: June 16, 2000

CONCEPTUAL DEVELOPMENT PLAN CONSTRUCTION COSTS

Task No.	Item No.	Item	Quantity	Unit	Unit Cost	Item Cost	Remarks
1	**Approximate Itemized Costs - New Liquid Bulk Cargo Terminal Module**						
	1	Clear and Grub	1	LS	$200,000	$200,000	Assumes typical demolition and removal, but no hazardous material
	2	Civil Site Work	20 871,200	ACRE SF	$2.50	$2,178,000	Assumes 12 acres graded and paved for tank storage areas, includes fencing, earthen berm, etc.
	3	Bulkheading	0	LF	$2,000	$0	Not Applicabble
	4	New Wharf Construction	1,000	LF	$4,250	$4,250,000	Construct New Pile Supported Mooring Structures
	5	Site Electrical	20	AC	$35,000	$700,000	Lighting, Electrical Sub-Stations, etc.
	6	Cathodic Protection	1	LS	$300,000	$300,000	Assumes Passive Cathodic Protection System
	7	Site Mechanical	20	ACRE	$30,000	$600,000	Includes SD/FW/DW/SS.
	8	Yard Light Standards	6	EA	$25,000	$150,000	Assume standard 60' light poles
	9	Storage Tanks	30	EA	$200,000	$6,000,000	Assumes 115,000 Barrel Storage Capacity Each
	10	Pipelines/ Manifolds, etc.	1	LS	$1,000,000	$1,000,000	Assumes conventional pipelines, manifolds, etc.
	11	Gate Site Work	2 87,120	ACRE SF	$2.50	$217,800	Includes Scales, Conc. Curbs & Other Utilities, etc.
	12	Gate House	200	SF	$75	$15,000	Guard Booths, Canopies and/or Other Structures
	13	Administration Building / Office	4,000	SF	$110	$440,000	Administrative Building
	14	Covered Storage/Warehouse	0	SF	$85	$0	Not Applicabble
SUB-TOTAL ALL TASKS						**$16,050,800**	
INCLUDE CONTINGENCY OF					20%	$3,210,160	
TOTAL CONSTRUCTION COST						$19,260,960	
TOTAL BUDGET ESTIMATE FOR LIQUID BULK CARGO (Rounded)						**$19,300,000**	

APPENDIX VI
INTELLIGENT TRANSPORTATION SYSTEMS

In 1991, Congress passed the Intermodal Surface Transportation Efficiency Act (ISTEA) which called for the creation of an economically efficient and environmentally sound transportation system that will move people and goods in an energy efficient manner and will provide the foundation for a competitive American transportation industry. The passing of ISTEA led to a focus on research and development of advanced technologies such as information processing, communications, control, and electronics to improve the transportation system. Passage of the Transportation Equity Act for the 21st Century (TEA-21) in 1998 provided further support of development of Intelligent Transportation Systems (ITS) strategies.

Transportation technology helps freight transport to become more productive and efficient. ITS integrate advanced computer information processing, communications, sensor, and electronics technologies and management strategies to increase the safety and efficiency of the surface transportation system. The essence of ITS involves system integration to yield greater productivity, connectivity, safety, and environmental compatibility[1].

NATIONAL ITS ARCHITECTURE

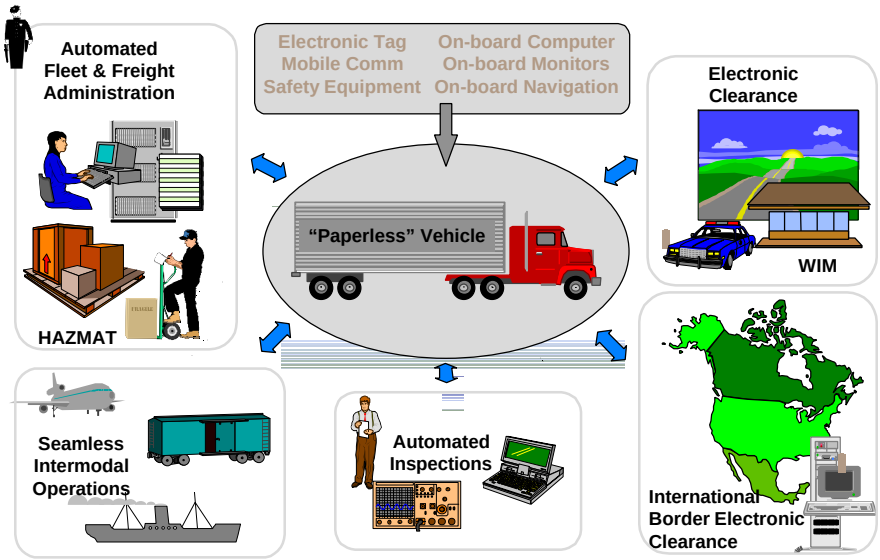
A large portion of current work occurring in the ITS field is with commercial vehicle operations (CVO). A Commercial Vehicle Information Systems and Networks (CVISN) is a collection of information systems and communications networks that provide support to CVO. The Federal Motor Carrier Safety Administration (FMCSA), formerly part of the Federal Highway Administration (FHWA), has developed a national ITS architecture intended to organize and manage ITS/CVO deployment and communicate the ITS/CVO program to all states deploying ITS/CVO strategies. Part of the architecture is development of an ITS/CVO Business Plan, which states in the LATTS Region, with the exception of three Alliance members, are in the process (or have completed the process) of developing. **Exhibit VI-1** shows the vision of safe and efficient commercial vehicle operations through ITS application.

ITS AND THE LATTS GOAL

The goals of ITS are to improve highway safety, simplify operations for all aspects of travel, and save time, money, and lives. These goals tie directly to the objectives for meeting the goal of the LATTS Region. ITS provide the means for increased efficiency, freight mobility, and an interconnected multimodal system while improving safety and environmental impacts.

[1] *Statewide Goods Movement Strategy*, State of California, August 1998.

Exhibit VI-1
CVISN VISION: SAFE AND EFFICIENT COMMERCIAL VEHICLE OPERATIONS



There are several opportunities for ITS applications in the LATTS Region. The following discussion details those ITS programs in terms of technical infrastructure and organization infrastructure. Given the large amount of commercial vehicle trade occurring at border crossings, the issue of ITS use at these locations has been emphasized in a separate discussion.

ITS technologies have been successfully implemented in many cases, and while cost/ benefit information is limited, it is generally accepted that ITS technologies can provide significant benefits at a relatively low cost, when implemented appropriately. Due to their role in managing congestion, ITS technologies have most often been applied in urban areas. Typical installations include driver information technologies, vehicle detector stations, closed circuit television, and traffic control technologies.

Large urban areas such as Los Angeles were on the forefront of many ITS applications, but ITS has since become the domain of many medium sized cities, as well. Generally speaking, ITS implementation is often a gradual process and because it must meet growing and changing travel demands, no city is likely to ever complete its ITS network. With that caveat, it is worth noting that many of the urban areas within the LATTS Region have implemented or are planning to implement ITS. Many of the plans are the result of Early Deployment Studies funded largely by the Federal Highway Administration. Typical ITS components

utilized in and planned for the LATTS Region include freeway monitoring such as vehicle detectors and closed circuit television, and motorist information, such as changeable message signs and highway advisory radio.

ITS APPLICATION IN THE LATTS REGION

Analysis of the LATTS highway, rail, airport and port strategic systems found that the current network serving Latin American trade, as well as other traffic, is constrained. The highway network is constrained in urban areas, not primarily because of trade from Latin America, but because of all traffic traveling on the existing network, whether it be local commuter and commercial vehicle traffic, or through commuter and commercial vehicle traffic. Latin American trade comprises only a small portion of total traffic within urban areas. In order to improve efficiency of Latin American trade, improvements must be made for all traffic traveling on the highway network. Therefore, ITS applications discussed in this section may or may not tie directly to Latin American trade in terms of movement of goods. However, any improvement to traffic movement through the LATTS strategic system will inevitably result in improvement for Latin American trade.

ITS are also applied in rural areas. However, the existing LATTS Strategic System is not constrained in rural areas. With the exception of rural weigh-in-motion (WIM) station locations, ITS applications would not provide very large benefits in rural areas. The various ITS applications available are discussed in the Technical Infrastructure section of this Appendix.

The other key constraint in the LATTS Region where ITS are applicable is at gateways (airports, ports, international and state border crossings). The transfer of information is essential at these locations. ITS can improve the efficiency of information transfer so that delays in goods shipments are reduced. Issues associated with interoperability, or the transfer of information efficiently at gateways whether it be across international or state borders, is discussed in the Organizational Infrastructure section. As stated previously, improving operations at border crossings is so critical to the LATTS Region that border crossings are discussed in a separate section.

ITS TECHNICAL INFRASTRUCTURE

Exhibit VI-2 summarizes ITS technologies. The list represents a range of ITS applications, including proven technologies such as changeable message signs, as well as innovative technologies that are still in development, such as automated highway systems. Each technology is described in more detail in the following paragraphs[2].

[2] *Recommended Corridor Investment Strategies,* Task J Report, I-35 Trade Corridor Study, prepared by HNTB Corporation/Wilbur Smith Associates Team, July 12, 1999.

Exhibit VI-2
ITS TECHNOLOGIES

- Driver Information
- In-vehicle Route Guidance
- Vehicle Detector Stations
- Closed Circuit Television Monitoring
- Traffic Control Technologies
- Traveler Services Information Technologies
- Emergency Notification Technologies
- Electronic Payment Technologies and Services
- Weigh-In-Motion Scales
- Weather Monitoring Stations
- Automated Highway Systems
- Incident Management ("mayday" system)
- Pre-Trip Travel Information Technologies
- En-Route Transit Information
- Ride Matching and Reservations Technologies
- Public Transportation Management Technologies

Driver information technologies provide information about congestion and construction activities, as well as information about detours, weather, and hazardous roadway conditions. A wide variety of technologies may be used to communicate with the driver, including changeable message signs, highway advisory radio, commercial radio and television traffic reports, in-vehicle monitors, roadway hotlines, and Internet sites with roadway speed and congestion data. Driver information is valuable not only in urban areas where congestion reports are common, but also in rural areas where construction and weather information may be most critical, and in the outlying suburbs where information may allow corridor travelers to avoid congestion before entering the urban area.

In-vehicle route guidance technologies provide turn-by-turn directions that allow travelers to easily navigate in unfamiliar cities. Guidance technologies may be paired with traveler information technologies and with real-time congestion data for additional capabilities.

Vehicle detector stations, including induction loops, radar, transponder readers and other technologies, provide information to be used to monitor congestion and other roadway conditions. Detector stations are especially important on roadway segments that experience regular congestion, and at high volume interchanges and other critical junctions.

Closed circuit television (CCTV) monitoring provides visual verification of congestion detected through detector stations and other sources, as well as additional information that may be helpful to emergency response vehicles in the event of an accident.

Traffic control technologies include adaptive signal systems on arterials and at freeway interchanges and freeway ramp metering. These technologies may be used to assure minimal delay to corridor traffic.

Traveler services information technologies provide information regarding corridor services and facilities both en-route via an in-vehicle terminal or at highway rest stops and for pre-trip planning via the internet or via terminals at corridor hotels, motels and major activity centers.

Emergency notification technologies cover a range of possibilities, including roadside call boxes, a single cellular phone number to report emergencies, and "mayday" systems which allow automated collision notification. Emergency notification is of particular interest in rural areas. In urban areas, the prevalence of cellular phones has contributed to the timeliness and frequency, but not always the accuracy, of emergency notification for accidents and incidents.

Electronic payment technologies utilize electronic tags such as transponders to allow travelers to pay for transportation charges on a debit or credit basis. Ideally, the collection of all tolls and other transportation charges could be integrated to allow a single transponder and billing system to be used. Electronic payment technologies would also allow innovative operating strategies such as congestion pricing to be implemented with minimal delay to motorist.

Weigh-in-motion scales (WIMs) allow commercial vehicles to be weighed in mainline traffic. Vehicles equipped with transponders could be cleared through the fixed scale without leaving mainline traffic. A transponder reader at roadside picks up the vehicle's unique identity from its transponder, checks associated credentials and permit status, and electronically clears the vehicle for weigh station bypass. Only those vehicles with problems or without transponders would be directed off-road to the fixed scale for further inspection or static weighing. WIM scales are an example of an ITS application which is used effectively in rural areas.

Weather monitoring stations utilize roadway and mounted sensors to record and evaluate temperature, wind, pressure and other weather related data. A shared database would allow storms to be tracked and weather information and advisories to be shared.

Automated highway systems provide automated control of instrumented vehicles on instrumented highways, thus increasing safety and efficiency. While these benefits are appealing and such systems should be considered in the long term for the region, implementation is not likely in the near future due to technology limitations.

Incident management refers to the identification and response to freeway accidents and incidents. An incident management program may include an emergency number for reporting incidents, freeway service patrols, planned diversion routes and enhanced cooperation and coordination between neighboring jurisdictions and responding agencies. Although incident management does not require ITS technologies, detection and surveillance equipment may be used to increase the efficiency of incident management activities. The need for an incident management program is often identified

during ITS planning activities, and many agencies are involved in both incident management and ITS programs.

Although not currently implemented widely, ITS technologies also have an important role in rural areas, most notably to contribute to driver safety and security. The LATTS highway system has a large rural component, for which a **"mayday" system** might beneficially be developed and implemented. Current technologies may favor a cellular or satellite based system. However, if fiber optics is widely implemented, then a fiber–based system may be more practical.

Also, a **comprehensive and coordinated weather monitoring system** should be considered for possible implementation. This system could utilize existing weather stations as well as new stations where needed, and could be coordinated throughout the region. This system would be used to warn motorists of dangerous weather in the Region, and could be coordinated with other driver and traveler information in the Region. Weather information is of interest throughout the Region, not only in the northern portion where winter storms are common, but also as far as south as Texas and Florida, where wind, fog, snow, and ice storms may have disastrous consequences due not only to their severity, but also to the fact that maintenance agencies may be ill equipped to deal with them.

Transit systems may also utilize ITS technologies to enhance service and efficiency. ITS may be used to enhance coordination with multiple transit providers in an area, as well as to provide information to travelers about transit options. Possible technologies include the following.

Pre-trip travel information technologies provide travelers with information about all available modes prior to departure. This information could be provided via the Internet, or at terminals or kiosks at hotels and major activity centers.

En-route transit information provides information to transit patrons during the trip, including real-time information for connecting transit services.

Electronic payment services, either debit or credit, allow transit patrons to travel without cash. Eventually, such services could be coordinated among multiple jurisdictions in the corridor.

Ride matching and reservations technologies include computers that utilize carpool and vanpool databases to allow commuters to share a ride. Algorithms reflect commuter preferences, such as smoking, as well as trip origin and destination. Recent programs have incorporated "instant" matches for the same day, utilizing pages, whereas more traditional programs intend to match commuters in a longer time frame, often mailing potential rideshare matches and letting the commuters contact one another by phone.

Public transportation management technologies automate the operations and management of transit systems. The most common application is an automatic vehicle location (AVL) system to track vehicles identifying schedule deviations

and potential solutions. AVL systems, which may be satellite (global positioning system, GPS) or transponder based, also may provide audio or video monitoring, enhancing security on-board transit vehicles.

ITS ORGANIZATIONAL INFRASTRUCTURE

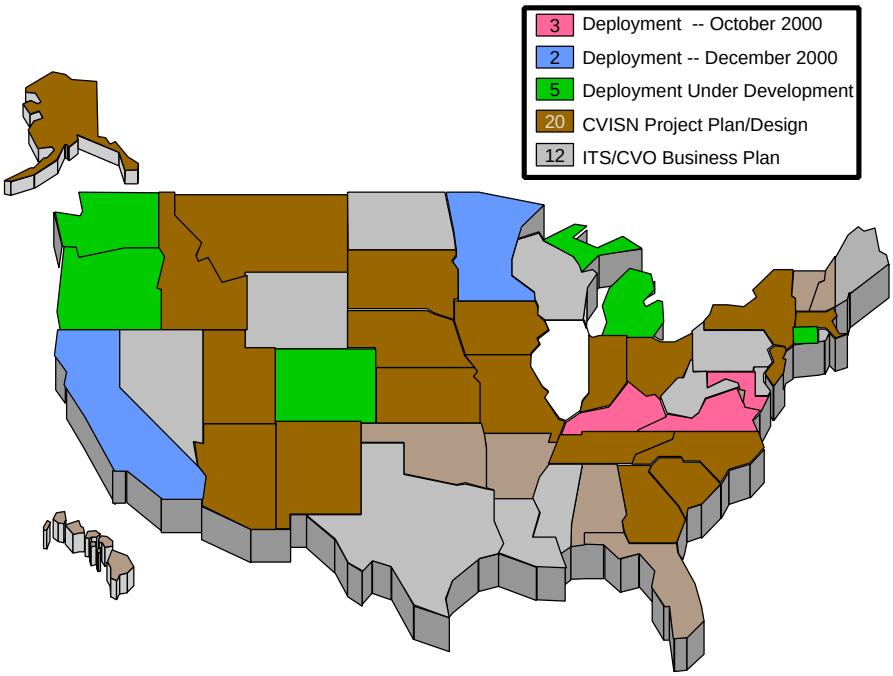
The numerous ITS technologies already in place and planned for implementation illustrate that ITS is likely to play an important role in the LATTS Region. It is recommended that in addition to state ITS initiatives, the cities along regional corridors work together to create a seamless network of ITS applications, to whatever extent is practicable. This does not require that all cities implement the same technologies, but does imply that cities strive for a compatible user interface for those technologies that they do implement. This would provide continuity for the user so that driver expectations regarding uniform technologies are met, as well as enhance the safety and utility of the system. This would apply to driver information technologies, traveler services information technologies, emergency notification technologies, and electronic payment technologies.

Several years ago, the FHWA initiated the Commercial Vehicle Information Systems and Networks (CVISN) prototype and model deployment. CVISN is focused on developing the technical infrastructure required to automate CVO credentialing, clearance and safety assurance functions. CVISN continues to develop organizational infrastructure, i.e., the standards, protocols and communications systems that will allow states and motor carriers to routinely exchange and access the information required to support electronic credentialing, clearance and safety assurance. CVISN is not a new database or system, but is rather a way for existing systems to exchange existing information electronically through the use of standards developed in CVISN and commercially available communications systems. CVISN also assists states in other regulatory or administrative functions required to execute the goals of CVISN. The central vision of CVISN is that by the year 2005, most CVO business and safety assurance transactions will be conducted electronically. State business plans help position each state to take advantage of and leverage the technologies being developed through the CVISN programs. The Business Plan provides the framework for the organizational and institutional infrastructure that is necessary to accommodate and implement the opportunities for technological change brought about by CVISN[3]. **Exhibit VI-3** shows the status of each state in the CVISN deployment program as of February, 2000.

States throughout the southeast have prepared CVO/ITS plans concurrently. Key steering committee members from each state met periodically during the planning process to exchange information and ideas. Regional coordination provides opportunities for individual states to integrate their own activities with those of other states and to leverage other state's investments in transportation corridors.

[3] *Louisiana CVO/ITS Business Plan,* prepared by the Louisiana CVO/ITS Steering Committee and Parker-Young, June 1998.

Exhibit VI-3
STATUS OF STATES IN THE CVISN DEPLOYMENT PROGRAM



ITS/CVO program areas include (1) Safety Assurance – to assure the safety of commercial drivers, vehicles, and cargo through access to information on inspections and crashes, and automated inspections and reviews; (2) Credentials Administration – to improve deskside procedures and systems for the applications, purchase, and issuance of credentials, and data exchange; (3) Electronic Screening – to facilitate the electronic identification of size, weight, safety, and credentials data, including automated screening and clearance of commercial vehicles and international electronic border clearance; and (4) Carrier Operations – in the public sector, to manage the flow of commercial vehicles, including travel information, hazmat incident response; in the private section, to lead in the deployment of fleet and vehicle management technology to improve motor carrier safety and productivity[4]. CVISN includes standards for communication technologies to promote interoperability and efficiency. TEA-21 requires that ITS projects funded from the Highway Trust Fund must be consistent with the National ITS Architecture and applicable standards.

[4] *Commercial Vehicle Information Systems and Networks (CVISN) Briefing,* presented by the Federal Motor Carrier Safety Administration, February 2, 2000.

ITS AT BORDER CROSSINGS[5]

Implementation of the North American Free Trade Agreement (NAFTA) provisions and partial achievement of the Agreement's objectives have greatly impacted commercial vehicle operations and enforcement of the laws and regulations affecting such operations. As a result of NAFTA, there is an increase in the number of foreign vehicles in the U.S., leading the U.S. to expand its presence along the borders and within the country at a time when resources are becoming more scarce. ITS/CVO technologies will enable the U.S. to make more efficient use of available resources by readily identifying who is complying with the safety standards. U.S. enforcement efforts can then be targeted on those carriers, drivers, and vehicles that are not in compliance.

One of the purposes of the LATTS was to provide general direction for deploying ITS/CVO technologies to their most effective use at the border crossings. This required identification of those aspects of the current border crossing system that constrain the flow of commercial traffic and that may be amenable to the use of ITS/CVO technologies.

Commercial vehicles crossing the U.S., Canada, and Mexico borders are subject to laws and regulations pertaining to the vehicle, operator and cargo. The current process involves several sequential steps, each requiring a vehicle to stop. The stopping points often become congested with long queues developing. Each stopping point adds time to the total journey. The current process also includes a large number of parties, each requiring an exchange of data, some of which is exchanged multiple times. This redundant process is inefficient since much of the data could be shared among the stakeholders at the various stopping points.

To the extent that ITS/CVO technologies and information systems can reduce the number of required stops or the time spent stopped, or improve upon the overall flow of information, they constitute potential tools for facilitating trade traffic, improving the effectiveness of border processes, and promoting international trade.

Vision of Border Crossings

The primary mission of the International Border Clearance Program (IBCP) is to promote the use of ITS/CVO technologies and information systems so as to 1) facilitate enforcement of Federal Motor Carrier Safety Regulations (FMCSRs), 2) expedite the movement of safe and legal commercial vehicles at the Mexican and Canadian borders, and 3) to the extent possible, meet the needs of the multiple agencies and border stakeholders, such as Customs, Immigration, Agriculture, and carriers and brokers of the three nations. The vision of the program is of a “seamless, non-stop border for safe and legal commercial traffic.” Realization of this vision would permit commercial vehicles to transit a border crossing at speed. Achieving a non-stop border will require each agency to

[5] *ITS/CVO Cross-Border Strategic Plan,* prepared by the Motor Vehicle Projects Office, Cambridge, MA, prepared for the FHWA and U.S. Department of Transportation, July 1996.

develop non-stop procedures. ITS/CVO technology options can play an important role in supporting the non-stop procedures of each of the border stakeholders. However, to be most effective, stakeholder coordination is needed to avoid duplication of efforts and requirements and to ensure compatibility among the technologies and systems adopted.

The goals of the IBCP are to apply ITS/CVO technologies and systems so as to:

1. Facilitate safe and legal commercial traffic,
2. Improve the border crossing process, and
3. Support the growth in international (North American) trade.

Operational Concept

The International Border Clearance Program (IBCP) Operational Concept makes the following three assumptions: 1) all underlying border requirements will continue to apply, 2) participation in the automated programs will be voluntary, and 3) the system will maintain the capability to accommodate non-automated traffic. To participate in the automated border crossing a vehicle must be equipped with an Automated Vehicle Identification (AVI) tag that contains the required carrier, vehicle, operator, and cargo information as defined by each of the border authorities. As the vehicle approaches and crosses the border, the AVI tag will be queried multiple times to identify the vehicle and possibly to extract other information. The operational concept is composed of several elements.

Pre-border Activities

The automated process presumes that a substantial amount of the business transactions have taken place prior to the vehicle arriving at the border. Most of the information flows can be accomplished electronically. In many cases, the current process requires that the same or similar data be supplied to two or more agencies. In this operational concept, the data requirements are coordinated among agencies to permit a one-stop filing of information.

Tolls

Toll payment can be automated when vehicles approaching the toll area are weighed and classified by Weigh-In Motion (WIM) and Automated Vehicle Classification (AVC) systems. This information will be combined with the vehicle's identification established by AVI readers. Tolls will be automatically calculated and deducted from the carrier accounts. Vehicle drivers will receive a signal indicating that the toll has been paid or that the balance is low. Enforcement systems, such as license plate readers, will help to track accounts with insufficient funds.

Automated Primary Clearance

This function can be completely automated when vehicles traveling in a by-pass lane are queried by an AVI reader to identify the vehicle for Customs and INS purposes. This information will be associated with data pre-filed with the

inspection services. Data pre-filed by the shipper or customs broker with the Federal Inspection Services will allow the inspection services to make a decision either to inspect or release prior to the arrival of the vehicle at the border. Clearance decisions can be made by each agency independently and then combined into single decision that is relayed back to the driver using roadside and in-cab signals. If all agencies give a positive clearance decision, the vehicle will be given a green light to proceed into the country. If any one agency wants to inspect the vehicle, the operator will be given a red light and directed to the secondary inspection area.

Secondary Inspection

This function is not significantly changed under the IBCP operational concept. However, vehicles participating in the automated system should need fewer referrals to secondary inspections for purely administrative purposes. For those vehicles directed to the secondary inspection area, inspection may be expedited because 1) changes will be implemented electronically and will be faster than with the current manual processes, and 2) advanced technologies can be employed to increase the effectiveness of current processes.

Safety Function

This function is being added to the current process. However, the automated system will permit safe and legal vehicles to proceed without stopping at the border. The general process involves vehicles being queried by an AVI reader for the vehicle identification and any transportation safety information that has been written to the vehicle tag. This information can then be linked to other safety data such as those accessible through the Commercial Vehicle Information System Network (CVISN) concept and any information that may be developed through a safety pre-clearance process.

Border Crossing System Architecture

The IBCP will result in the development of a seamless border crossing system, the International Border Clearance System (IBCS), that will allow all border requirements to be satisfied without requiring safe and legal vehicles to stop. The system implements multiple ITS/CVO technologies to meet the program objectives and integrates the individual components of the border crossing process.

The integrated system design is dependent on the establishment of system specifications by the owners of the various border processes. There are three functional components that compose the system: 1) automated toll collection, 2) automated primary clearance, and 3) automated border safety. For borders with toll facilities, this system provides an automated toll collection alternative that eliminates the need for qualified vehicles to stop for toll payment. The primary inspection component is automated, thereby enabling safe, legal, and compliant traffic to travel through a border at speed while satisfying all the Federal Inspection Services' entry requirements. Vehicle safety requirements are incorporated into the border crossing process and are automated to eliminate the

necessity for vehicles to stop at safety inspection facilities. The advantages of an integrated system accrue from shared use of devices and information.

System configurations will vary among border crossings based on actual conditions, such as toll requirements, physical safety inspection requirements, and land availability. The system employs various ITS/CVO technologies that can be classified into the following seven categories based on function: 1) Electronic Data Interchange 2) Automated Vehicle Identification (AVI), 3) RF, Signal, and Signage Communication with the Driver, 4) Vehicle Detectors, 5) Enforcement Equipment, e.g., automated license plate readers, 6) On-site Measurement, WIM and AVC, and 7) Roadside Processors. Individual computer systems are needed by each of the border agencies, but these are specific to each agency and not included among the joint use technologies.

Electronic Data Interchange

Expediting the flow of information is central to the success of an automated, integrated border system. Automation of the primary inspection function depends upon having commercial data available before the shipment reaches the border. This can most effectively be done by using Electronic Data Interchange (EDI) between traders and the inspection services. Properly designed EDI systems will enable information to be sent to all appropriate parties with a single submission. Transportation functions will depend upon ready access to safety and credential data. For this function, the IBCP relies upon the ongoing CVISN development. For functions that do not require advanced notification, information can be carried on the vehicle. However, unlike paper-based system, these data can be carried on the transponders and read from roadside readers.

Automated Vehicle Identification (AVI)

Being able to correctly identify each participating vehicle is critical to the functionality of the IBCP. The vehicle identification, when linked to Customs, INS, Transportation and other databases, provides the basis for permitting the vehicle to enter the country without stopping for an inspection. Through the use of transponders, readers and antennas, specific vehicle identification information can be sent and received. Type III AVI transponders would contain such information as unique ID number identifying the carrier and the tractor, unique shipment number, the driver's INS ID number and PIN, variable information relating to the cargo and other vehicle components, and toll account information.

Communication with the Driver

Information is received from the shipper prior to the vehicle arriving at the border crossing and is then verified when the vehicle crosses the AVI reader at the border crossing. The system must communicate with the vehicle to direct the driver to the appropriate lane. For the system to communicate this information to the driver, a variety of technologies can be implemented such as conventional signs and variable message signs. The use of red light/green light devices both in-cab and at the roadside can also be used to direct the operator through the bypass lane or to the primary inspection booth.

Vehicle Detectors

Vehicle detectors, e.g., inductive loops, aid in managing the flow of traffic and associated data as commercial vehicles transit the dedicated lane. They are also used to trigger enforcement systems for unauthorized or non-compliant traffic in the dedicated lanes.

Enforcement Equipment

The IBCS is designed for those carriers who are considered low-risk. There are, however, many scenarios when enforcement equipment may be necessary. If an unauthorized vehicle travels through the bypass lane the roadside processor will trigger an enforcement system. Technologies such as license plate readers and video cameras will be implemented into the enforcement system.

Weigh-in-Motion (WIM) and Automated Vehicle Classification (AVC)

At toll facilities that use a weight-based toll structure, WIM and AVC equipment would be installed in advance of an upstream AVI antenna and reader. AVC systems use inductive loops and pressure sensors to classify vehicles by parameters such as number of axles and distance between axles. WIM systems determine vehicle weight from measurements on axles as they travel across sensors. These two types of equipment would determine the vehicle's axle and gross weights while the vehicle is in motion. The information would be passed to a downstream AVI roadside reader. The implementation of WIM and AVC technology creates a non-stop process at the toll facilities and generates information for other agencies interested in weight and vehicle class data.

Roadside Processor

The roadside processor is the interface between the border agencies' computer systems, the automated lane at the crossing, and the vehicle. It receives vehicle information from the AVI roadside reader, the vehicle detector, the exit detector, and the various independent inspection services' computer systems. It processes the information and provides data to the driver feedback system. The roadside processor also provides lane control through driver feedback. By interfacing with the various independent computer systems, the roadside processor enables the multiple release decisions of the border agencies to be summarized into a red light/green light message to the vehicle driver.

Customs, INS and the other regulatory agencies will maintain independent computer systems that support their specific regulatory functions. Linking these systems to the IBCP through the roadside processor ties the total border crossing process together. With this interface, information is exchanged yet each agency continues to be responsible for its own system. The development by the Treasury Department of the International Trade Data System will also provide support to the separate agency functions.

SUMMARY AND CONCLUSIONS

This discussion has examined a number of emerging technologies and their potential application to the LATTS Region. Intelligent transportation systems

(ITS) can play an important role in maximizing the efficiency and safety of highway travel in the LATTS Region. Recognizing this, many states have plans to or are already deploying freeway management systems and other ITS components that enhance operations. It is recommended that the Alliance members work together to create a seamless network of ITS applications. This goal for a seamless network dovetails with the U.S. Department of Transportation's objective for national compatibility and interoperability of ITS deployments, which is supported by requirements that federally funded projects containing ITS elements be consistent with the National ITS Architecture and approved standards.

ITS applications primarily should be located in the urban areas of the Region and at border crossings. Applications in the rural areas should also be considered. The most notable rural ITS application at this time is a "mayday" emergency notification system, which can contribute to enhanced safety and security.

As part of the assessment of ITS within the Alliance Region, the current status and planned program for ITS being undertaken by individual Alliance members were reviewed. The separate LATTS reports for each Alliance member describe the ITS program of the respective Alliance members as it existed at the time this review was undertaken. Most Alliance members have an established plan and proposed methodology for deployment of ITS within the state/commonwealth. These plans closely parallel the goals as set forth within the national ITS/CVO program. However, many of the Alliance members are currently working only within their representative state and little state-to-state interaction is being undertaken. Thus, the overall goal of seamless travel has not been fully realized.

ITS plays a vital part in CVO management, and it can also play an instrumental role in CVO activities within the LATTS Region as a whole. Recognizing the role of ITS within CVO management, most states are already in the process of implementing technologies that will greatly improve the way that CVO business is conducted and the manner in which commercial vehicles are moved through their respective states. These programs will greatly enhance the efficiency and safety of commercial vehicles operating within individual states.

ITS is an ever changing field of technological advances in the transportation of goods via the nation's infrastructure. The ongoing development of ITS technologies and especially CVISN advancements will only serve to further enhance CVO within the LATTS Region.

Exhibit VI-4 is a summary of Alliance members' current ITS/CVO activities (as of the time of this review). This exhibit breaks down the Alliance member's programs into three distinct categories, all vital to achieving the CVISN goal of seamless travel. The **intrastate** (in-state) programs are the initial step into full CVISN development. These programs set the framework for state-to-state interaction. Many of these programs are designed to technologically bring the states up-to-date. Most of the Alliance members have the same general set of

Exhibit VI-4
ALLIANCE MEMBERS ITS/CVO ACTIVITIES

	INTRASTATE	INTRA- W/ POSSIBLE INTER-	INTERSTATE	STATE TOTALS
ALABAMA	0 0 0	0 0 0	1 0 0	**1**
ARKANSAS	0 0 0	0 0 0	1 0 0	**1**
FLORIDA	7 0 0	1 0 0	0 0 0	**8**
GEORGIA	3 0 0	0 0 0	0 0 0	**3**
KENTUCKY	6 0 0	2 0 0	4 0 1	**13**
LOUISIANA	20 1 3	2 0 2	2 0 0	**30**
MISSISSIPPI	8 0 0	3 0 0	1 0 0	**12**
NORTH CAROLINA	4 0 0	1 0 0	1 0 0	**6**
PUEROT RICO	0 0 0	0 0 0	0 0 0	**0**
SOUTH CAROLINA	7 0 0	1 0 0	0 0 0	**8**
TENNESSEE	12 0 0	3 0 0	1 0 0	**16**
TEXAS	4 1 1	1 0 0	0 0 0	**7**
VIRGINIA	15 0 1	5 0 3	1 0 0	**25**
WEST VIRGINIA	6 0 0	1 0 0	0 0 0	**7**
PROGRAM TOTALS	**99**	**25**	**13**	

LEGEND

Project Timeframe
- ITS Programs Scheduled to be Implemented Prior to 2005
- ITS Programs Scheduled to be Implemented After 2005
- Date Not Determined

Project Classifications
- INTRA – ITS Programs Within Member State
- INTER – ITS Programs Between Member States

program goals. However, the steps taken to reach these goals can vary greatly from state to state. When completed, the combination of these programs will set the course for CVISN deployment.

The **intrastate programs with interstate implications** are those programs that are currently planned for in-state use, but either will report to a national clearinghouse (IRP, IFTA) and then be distributed to other states, or could have national implications at a later date (national identification system). The current goal of these programs is to ensure that each state has a statewide reporting method in place. At some point in the future, the statewide programs could be tied into a national or neighboring state's program, allowing for state-to-state interaction.

The third group of programs, **interstate programs**, are those programs already designed for state-to-state interaction. This set includes the joint weight stations that many states already have planned, and other programs where individual states are working jointly to enable more efficient travel across state borders. These programs are in direct correlation to the CVISN goal of seamless state-to-state travel.

The role of ITS for CVO operations within the LATTS Region as a whole requires an approach that many of the states are just now beginning to realize. Alliance members must be willing to complete projects and programs jointly with one another to create a seamless CVO network within this Region and eventually the nation as a whole. This would enable commercial vehicles to move freely between state borders via sharing of weigh stations, use of the same screening technologies, and a standardized commercial vehicle identification system. It is recommended that the LATTS member states continue to work toward this common goal.

In summary, ITS/CVO operations are part of the means by which the goals of the LATTS Region can be achieved. ITS will aid the Region in enhancing the regional competitive position for Latin American trade with an efficient, safe, and interconnected system. Each of the Alliance members has started working toward an ITS/CVO plan that will greatly enhance commercial vehicle travel within the entire LATTS Region. By taking these plans further and including a regional component, the Alliance Region as a whole will benefit from safe and more efficient movement of commercial vehicles.

GLOSSARY OF ACRONYMNS

AVC – Automated Vehicle Classification
AVI – Automated Vehicle Identification
AVL – Automated Vehicle Location System
CCTV – Closed Circuit Television
CVISN – Commercial Vehicle Information Systems and Networks
CVO – Commercial Vehicle Operations
EDI – Electronic Data Interchange
FHWA – Federal Highway Administration
FMCSA – Federal Motor Carrier Safety Administration
FMCSRs – Federal Motor Carrier Safety Regulations
GPS – Global Positioning System
IBCP – International Border Clearance Program
IBCS – International Border Clearance System
ISTEA – Intermodal Surface Transportation Efficiency Act
ITS – Intelligent Transportation Systems
NAFTA – North American Free Trade Agreement
TEA-21 – Transportation Equity Act for the 21st Century
WIM – Weigh-In-Motion

The Consultant Team

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