HDR

SAN DIEGO and IMPERIAL VALLEY
GATEWAY STUDY

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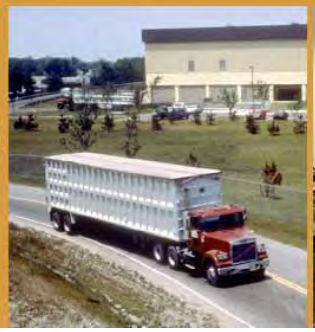
San Diego Association of Governments

Prepared by HDR|Decision Economics
In association with
Cambridge Systematics, Inc. and
Global Insight (USA), Inc.

SANDAG
San Diego's Regional Planning Agency

Photo by NASA



San Diego Association of Governments
(SANDAG)

Comprehensive Freight Gateway Study

Working Final Copy

March 25, 2010

Prepared by:

HDR Decision Economics

IHS Global Insight
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PREFACE

Intended Uses This Study

The goal of the Gateway Study is to give the San Diego Association of Governments (SANDAG), and the Imperial County Transportation Commission (ICTC) and other regional stakeholders access to thorough freight flow information as an estimation tool to better plan and manage a sustainable freight network. The Gateway Study is primarily intended to inform the Goods Movement Action Plan section of the 2050 Regional Transportation Plan by identifying current (2007 baseline) and future freight flows. Additionally, the Gateway Study will provide insights into how freight investments could impact freight flows, industrial development, and related economic activity in our region. It is envisioned that the Gateway Study will also be a useful tool for freight stakeholder partner agencies, Chambers of Commerce and trade promotion groups.

Forecasting Caveats

This forecast, just as any other forecasting tool, should be used as but one planning tool; a tool that should be used in conjunction with other real time information, comparisons with industry news, and regular re-calibration based upon changing economic conditions. Forecasting freight flows out to 2050 is *de facto* understood to be a static snapshot, and subject to many and varied unforeseeable policy and or market influences. Notwithstanding these caveats, HDR Decision Economics and their study team delivered this gateway forecast by analyzing the most comprehensive data sets available and synthesizing that complex information into an executive briefing format.

Forecast Consistency with National Projections and SANDAG Studies

The forecast presented in the Gateway Study is based on goods movement consistent with supply and demand factors including employment, output, and purchases by industry and county, and is consistent with the expected levels of economic growth at the national and regional levels. Accordingly, the forecast assumes that real Gross Domestic Product (GDP) will grow by 2.5 percent annually; that total civilian employment will rise at an average annual rate of 0.8 percent; and that the U.S. population will expand at an annual rate of 0.9 percent. The forecast is also consistent with SANDAG's projections for the region: annual growth in Gross Regional Product (GRP) of 2.6 percent; employment growth of 0.73 percent; and population growth of 0.8 percent.

Freight Movement and Prosperity

Globalization, just-in-time business processes, and mobile inventory will combine over the coming four decades to channel up to three times the current amount of freight into the region's transportation system. This signals a complicated set of challenges to the region's growth and to the realization of its goals for greater prosperity. On the one hand, inefficiency in the movement of freight threatens the rate of growth in economic productivity, thereby posing a risk to regional competitiveness, employment, and real household incomes. On the other hand, facilitating the unconstrained demand for freight transportation can bring with it high project costs accompanied by environmental and other social costs that pose community issues that must be managed. How to respond to the coming surge in freight transportation demand will thus require a delicate balance of planning decisions.

Economic Growth and Prosperity

A growing economy as measured by Gross Domestic Product (GDP) means employment, earning, and opportunities for a better standard of living. To be sure GDP doesn't account for everything we value (such as clean air and less crime) but achieving the region's goals for prosperity hinges on achieving some level of growth in output and productivity.

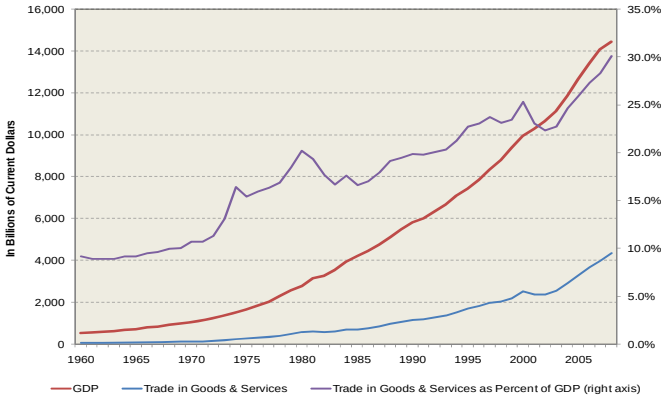
In recent years, planners and policy makers have looked at indicators beyond standard measures of economic performance (such as GDP growth, inflation, or employment) to assess and help promote the quality of life of their constituents. Both nationally and internationally,[1] policy agendas now focus on smart growth and sustainability, and stress the importance of protecting the environment or addressing social concerns, such as income disparity or the health impacts of air pollution. This is particularly true of the SANDAG region. Thus, the 2008 Regional Economic Prosperity Strategy report identified three main targets for the region: (1) Improving jobs diversity, (2) Closing earning gaps, and (3) Stabilization of the cost of living.

And to meet these goals while preserving air quality, road safety, and the overall well-being of its residents, the region will need to strike a balance in its planning decisions between output growth on the one hand and the containment of social costs brought about by unbridled growth in freight volumes on the other.

Economic Growth and International Trade

The last few decades have shown us that trade is an important driver of economic growth. Countries that effectively participate in international trade tend to attract foreign investments and experience higher economic growth than countries that fail to integrate into the global economy.[2] As shown in Figure ES-1, trade in goods and services in the U.S. as a percentage of GDP increased from 10 percent to 30 percent in the past 40 years. This suggests that international trade has become an integral part of the U.S. economy. While the growth in the past 30 years was fueled by a decline in transportation and communication costs, trade is expected to grow further as world economies become increasingly interdependent.

Figure ES-1: US GDP and Trade (1960-2008)



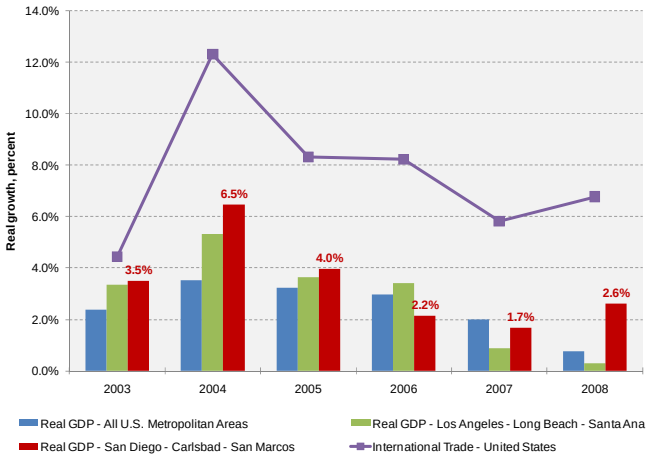
Source: Bureau of Economic Analysis

[1] See for example "*Report by the Commission on the Measurement of Economic Performance and Social Progress*," Joseph Stiglitz, Amartya Sen and Jean-Paul Fitoussi, 2009

[2] The economic literature provides ample evidence on the relationship between trade and economic growth; see for example "*Trade Liberalization and Growth: New Evidence*," Romain Wacziarg and Karen Horn Welch, NBER Working Paper No. 10152

At the regional level, international trade is intertwined into the economic fabric of both San Diego and Imperial Counties. Because of the integrated production and distribution process across the California/Mexico border, international trade not only benefits the national economy, but the regional economy as well. Economic growth in the region, which has recently outpaced national growth and growth in the neighboring Los Angeles Basin, has been closely related to international trade and more specifically to the NAFTA trade agreement. Figure ES-2 shows the growth rate of GDP for the U.S., Los Angeles, and San Diego Metropolitan Areas, against growth in international trade between 2003 and 2008. The figure suggests that while trade and GDP growth are generally correlated, the strongest correlation (during that period) is observed for the San Diego region.

Figure ES-2: Trade Growth and GDP Growth by Metropolitan Area



Source: Bureau of Economic Analysis

International Trade and Freight System Attributes

In recent years, trade has benefited from tremendous advancement in supply chain management and logistics. Manufacturers and shippers adopted technologies and business processes that permit firms to reduce costs by substituting transportation, e-commerce, and just-in-time deliveries for large inventories, multiple warehouses, and customer service outlets. Firms re-organize in response to transportation infrastructure improvements so as to reap the rewards of advanced logistics.[3] A reliable transportation network for efficient goods movement is, therefore, critical to facilitate trade and promote economic growth.

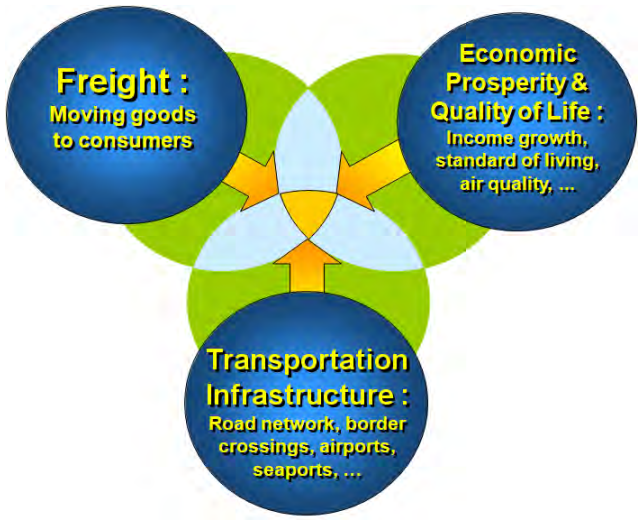
Today, as the region continues to reshape its growth strategy, decision makers, planners, and stakeholders alike are faced with a critical choice. This choice revolves around ways to better account for goods movement within the Regional Transportation Plan (RTP) and to facilitate output and productivity growth that are compatible with the region's goals for prosperity. Planning for adequate freight movement, which is increasingly challenging in today's dynamic environment, mainly means planning for convenient gateways as well as reliable network infrastructure. This planning is a necessary condition for achieving the region's goals.

The primary objective of this study is to develop an economic forecast of anticipated freight volumes moving in, around, and through the region by 2050, and to provide planners, decision makers, and freight stakeholders with a sound understanding of these forecasts and their implications. Secondary objectives include the identification and analysis of intermodal system issues impacting regional goods movement (including commercial border crossings, maritime and air cargo facilities, pipelines, rail, truck, and warehousing flows); and providing SANDAG and Imperial County Transportation Commission (ICTC) with a tool for managing a sustainable freight network.

The balancing of synergies between infrastructure planning, goods movement, and economic prosperity that this study seeks to assess, and promote, are illustrated in Figure ES-3.

[3] Carrier effects include reduced vehicle operating times and reduced costs through optimal routing and fleet configuration. Transit times may affect shipper in-transit costs such as for spoilage, and scheduling costs such as for inter-modal transfer delays and port clearance. These effects are non-linear and may vary by commodity and mode of transport. Source: "*Freight Benefit/Cost Study: Capturing the Full Benefits of Freight Transportation Improvements: A Non-Technical Review of Linkages and the Benefit-Cost Analysis Framework*," Federal Highway Administration, Office of Freight Management and Operations, May 2001.

Figure ES-3: Infrastructure Planning, Freight and Economic Prosperity



While relying on the Transearch database as the primary source of information, this study uses data from a variety of other sources, including the Port of San Diego, the San Diego International Airport, U.S. Customs and Border Protection (CBP), the Bureau of Economic Analysis, the California Department of Transportation (Caltrans), and a number of local and industry specific databases.

The Regional Freight System

The San Diego/Imperial Valley region possesses a wide array of transportation and infrastructure assets and is uniquely located between major production, trade, and population centers. Transportation systems include a number of infrastructural networks including Interstate and State highways, class I railroads, airport cargo systems, seaports, and freight-focused border crossing Ports of Entry (POEs). Currently, the highway system carries the vast majority of freight flows but the system is strained at key bottlenecks (e.g., POEs). Similarly, while their capacity could be expanded, air cargo facilities, rail facilities, and seaports appear to have limited potential for attracting freight demand.

The Region's Gateways

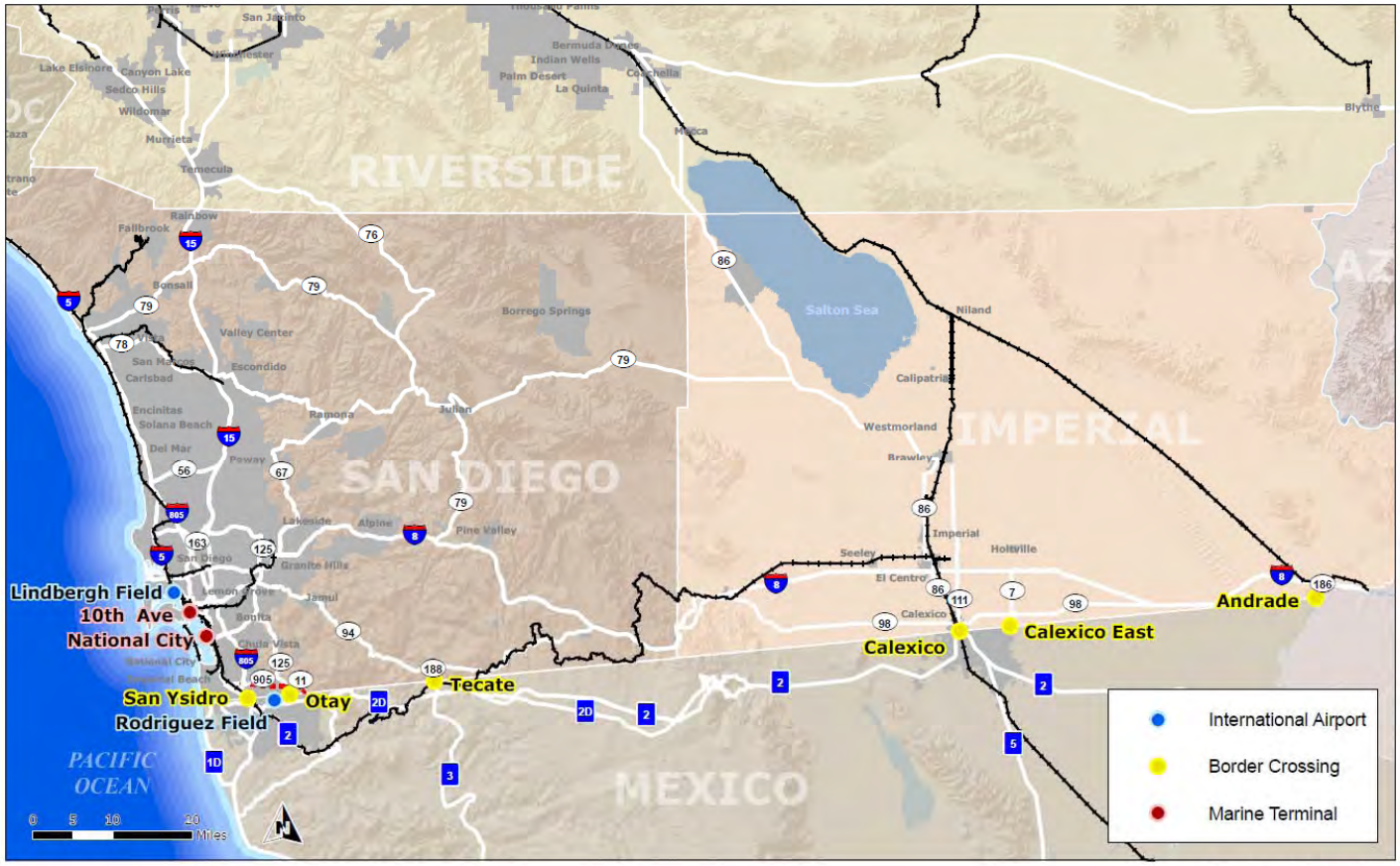
As it is normally the case for freight movement, gateways (or nodes) have been the primary bottlenecks and, therefore, a challenge for decision makers to address. The challenge stems from various perspectives which include governance over the gateway, costs, funding sources, and political support.[4] Addressing gateway capacity constraints is an ongoing process that is critical to regional and national economic performances alike.

In fact, studies for SANDAG and ICTC have found that the economic impacts of delays at the border are significant for both the regional and the national economies.[5]

[4] This is mainly related to gathering local support for an investment that may benefit other economies, as the gateway facilitate local and national freight flows.

[5] See SANDAG 2006, "Economic Impacts of Wait Times at the San Diego–Baja California Border," and IVAG 2007, "Economic Impact of Delays at the Border."

Figure ES-4: Overview of Regional Gateways and Roadway Network



Among all the goods that passed through the Region's POEs in 2007, almost 97 percent (in volume) were carried by truck or by rail, through the land POEs. Our analysis of shipments' origins and destinations suggests that proximity between Mexico and its regional trading partners in the United States is a key factor for such an overwhelming portion of international freight passing through land POEs.

Otay Mesa / Mesa De Otay POE

The Otay Mesa Port of Entry (POE) is the largest commercial crossing along the California/Mexico border and handles the second highest volume of trucks and third dollar value of trade among all U.S./Mexico land border crossings.[6] It is located approximately 15 miles south of Downtown San Diego and 14 miles inland from the Pacific Ocean. On the U.S. side, the crossing connects with California State Route 905 (Otay Mesa Road, a four-to-six-lane local street), providing links to State Route 125, Interstate 805, and Interstate 5. The facility currently includes 13 passenger lanes, 1 SENTRI lane, 1 bus lane, 8 pedestrian lanes, 7 commercial lanes, 1 empty-truck-only lane, and 1 FAST lane.[7] It provides a full range of cargo processing functions, including inspection, collection, and verification.

Tecate POE

Tecate is a minor full service POE located approximately 40 miles east of San Diego and serving rural San Diego County. The Port provides service for pedestrians, passenger vehicles, commercial vehicles, and rail (the rail line crosses at Campo, located east of the Port). It currently includes 2 passenger lanes, 1 bus lane, 2 pedestrian lanes, and 1 commercial lane.[8] It connects with California State Route 188, a two-mile road providing access to State Route 94.

[6] Otay Mesa Chamber of Commerce, based on U.S. Customs data

[7] Caltrans District 11, California – Baja California Border Infrastructure Update, April 2008, page 14

[8] Caltrans District 11, California – Baja California Border Infrastructure Update, April 2008, page 20

Calexico East / Mexicali II POE

The Calexico East POE serves nearly all commercial truck traffic crossing between Imperial County and Mexicali. It is located roughly 130 miles east of San Diego and 60 miles west of Yuma, Arizona. The Portincludes 8 passenger lanes, 4 pedestrian lanes, 4 commercial lanes, 1 FAST lane, 1 bus lane, and 1 SENTRI lane.[9] It is served by California State Route 7, with direct connection to Interstate 8, about five miles to the north.

Andrade / Algodones POE

The Andrade POE is an important gateway for tourism between California and Baja California. This gateway is used primarily by pedestrians from the United States wishing to shop or use medical services in Algodones. The Port also accommodates privately owned vehicles, buses, and a limited amount of commercial traffic. It currently includes 2 passenger lanes, 4 pedestrian lanes, and 1 "informal" commercial lane.[10] Vehicular access to Interstate 8, two miles to the north, is provided by California State Route 186.

Rail POEs

Rail lines cross the California/Mexico border at three locations: San Ysidro, Tecate, and Calexico. The line between the San Diego Yard and the border with Mexico at San Ysidro is operated by the San Diego and Imperial Valley (SDIV) railroad, a subsidiary of Rail America, Inc. The Carrizo Gorge Railway (CZRY) owns the rights to operate limited service between the Mexican border at San Ysidro/Tijuana through Mexico to Division, near the Mexican border at Tecate. Finally, in Imperial County, Union Pacific Rail Road (UPRR) operates a line originating at the border crossing in Calexico, extending northerly to El Centro and Niland.

The Port of San Diego

The Port of San Diego is located approximately 10 miles from the Mexican border and is the first port in the U.S. for vessels coming from the west coasts of Mexico, and Central and South America. The Port's activity is split between two separate marine cargo terminals, both located within the San Diego Bay: the Tenth Avenue Marine Terminal (TAMT) and the National City Marine Terminal (NCMT).[11] TAMT is a 96-acre cargo complex located near Downtown San Diego, south of the Convention Center and north of the San Diego-Coronado Bay Bridge. Tenants at TAMT handle containerized and break-bulk fruit, dry bulk cargos including sand and cement, petroleum products, and various break-bulk and project cargos. The theoretical maximum capacity of TAMT is approximately 4.9 million metric tons per year. NCMT is further inside San Diego Bay, south of TAMT and approximately 10 nautical miles from the harbor entrance. The terminal is located at the end of Bay Marina Drive in the City of National City. Lumber and automobiles are the primary cargos currently moving through NCMT. The theoretical maximum capacity of NCMT is approximately 1.2 million metric tons per year.

Goods move in and out of the Port by road or by rail. TAMT and NCMT both have onsite rail, owned and maintained by the Port of San Diego. All rail services leaving the terminals are operated by Burlington Northern Santa Fe Railway (BNSF). California State Route 15 and Interstate 5 are in close proximity of the TAMT and NCMT. Though a portion of port traffic does travel via Interstate 5, it is used less frequently than State Route 15. California State Routes 54 and 94 are also near the Port, but are rarely used as long-haul trucking routes.[12]

San Diego International Airport

San Diego International Airport, also known as Lindbergh Field, is located in the northwest portion of the downtown area, within the City of San Diego. The airport is bounded by North Harbor Drive and San Diego Bay to the south, the Navy water channel and Liberty Station to the west, the Marine Corps Recruit Depot to the north, and Pacific Highway and Interstate 5 to the east.[13] Land in the vicinity of the airport is densely developed and has high developable value, making any future airport expansion unlikely.

With just 661 acres, San Diego International Airport is the smallest "major airport" site in the United States. It features a single 9,400-foot long east-west

[9] Caltrans District 11, California – Baja California Border Infrastructure Update, April 2008, page 28

[10] Caltrans District 11, California – Baja California Border Infrastructure Update, April 2008, page 30

[11] This description borrows heavily from the San Diego Unified Port District Maritime Business Plan Update, dated December 2008

[12] San Diego Unified Port District Maritime Business Plan Update, December 2008, pages 2-23

[13] San Diego International Airport Master Plan, Final Environmental Impact Report, April 2008, pages 2-3

runway supported by one full-length parallel taxiway on the south, and one partial-length parallel taxiway on the north. There are currently two main terminals and one commuter terminal, serving domestic and international passengers. Most support facilities are located north of the runway. They include general aviation facilities, air cargo facilities, related aviation support facilities, and rescue and fire fighting facilities. The cargo facilities are used by a limited number of operators, including commercial airlines, courier services, a single cargo company (Capital International Cargo), and the U.S. Postal Service. The largest cargo loading area is run by Federal Express; it occupies 11.0 acres of the airport's total cargo handling area of 16.6 acres. In 2005, cargo operations (departures and arrivals of cargo aircraft planes) represented about 3.5 percent of all airport operations.[14]

The Region's Freight Network

The region's freight network is comprised of the roads, rail lines, and pipelines that connect with the regional gateways for the distribution of goods locally, regionally, and nationally.

Regional Highway Network

San Diego County's roadway network supports high volumes of both vehicular travel and freight movement. The highway system carries nearly 98 percent of the goods that move in and out of the county. There are three major north-south corridors handling goods movement in the county: Interstate 5, Interstate 805, and Interstate 15. In addition, one toll road, California State Route 125, connects the Otay Mesa POE to other major north-south corridors. These routes carry significant volumes of truck traffic through San Diego County and further north to Orange and Riverside Counties. San Diego has one major east-west freeway, Interstate 8, connecting the county with Imperial County, to State Route 94 and State Route 905, and continuing east towards Arizona. In general, the east-west corridors are not as significant for freight movement as the north-south freeways. The importance of the north-south corridors stems from their connectivity to major POEs along the county's southern border with Mexico. This includes:

- Interstate 5, which connects to the San Ysidro POE (no freight is allowed to cross at this location)
- State Route 125 to the Otay Mesa Crossing
- State Route 188 to the Tecate POE

Imperial County has a well-developed roadway network that currently meets freight transportation needs. While the existing system is considered adequate, recent population growth and an increase in foreign trade will require infrastructure improvements in order to accommodate future demand. The highway system in Imperial County handles approximately 97 percent of total commodity flows across the county. There are three major north-south corridors handling freight within the county:

- State Route 7 from the Calexico East Border Crossing
- State Route 111 from the Calexico Border Crossing
- State Route 86

Additionally, there are two major east-west corridors that also handle truck freight:

- Interstate 8, which originates in San Diego County
- State Route 98, which parallels Interstate 8 through most of the county

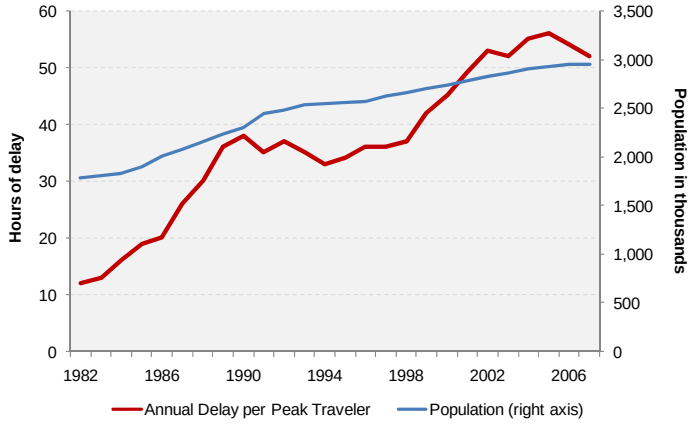
Calexico East is the only POE in Imperial County carrying significant volumes of freight, although Andrade POE is sometimes used for congestion relief at Calexico East.

While freight congestion is increasingly apparent at the region's major gateways, the level of service on large portions of the highway network has been strained by rapidly increasing population. Thus, statistics published by the Texas Transportation Institute (TTI) for the San Diego metropolitan area indicate that the percentage of peak travel in congested conditions increased from 27 to 84 percent between 1982 and 2007. Similarly, the average annual delay per peak traveler increased from 12 to 52 person-hours over the same period. And annual delays in the region are now significantly larger than the national average for areas of similar size (35 person-hours).[15]

[14] 7,400 out of 209,500 operations for the year; or 20 out of 570 daily; from San Diego International Airport Master Plan, Final Environmental Impact Report, April 2008, pages 2-13

[15] Texas Transportation Institute, Annual Urban Mobility Report, Performance Measure Summary for San Diego, 2008

Figure ES-5: Population Growth and Roadway Congestion in San Diego



Source: Texas Transportation Institute

Regional Rail Network

San Diego County is served by several companies that own and/or operate rail facilities within the county. In the northern part of the county along the I-5 corridor, Burlington Northern Santa Fe (BNSF) Railway operates a line owned by San Diego Northern Railroad (SDNR), which connects Santa Fe Depot in Downtown San Diego with the Orange County line to the North.

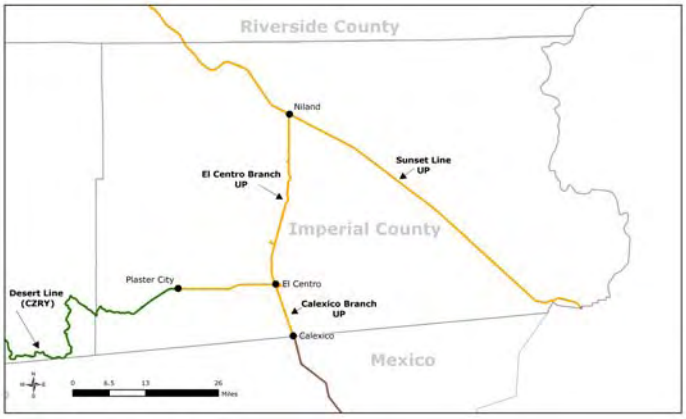
Figure ES-6: San Diego County Rail Lines

BNSF also operates on two segments of the system, from Oceanside to Escondido, and from Oceanside to Downtown San Diego and to the National City Marine Terminal.

In the southern portion of the county, San Diego and Imperial Valley Railroad (SD&IV) operates two short lines owned by Metropolitan Transit System (MTS) that connect the Santa Fe Depot in downtown San Diego with the San Ysidro POE and another with Santee to the east. Additionally, as stated earlier, the CZRY owns the rights to operate limited service between the Mexican border at San Ysidro/Tijuana through Mexico to Division (near the Mexican border at Tecate) and on to Plaster City in the western part of Imperial County. However, the portion between Division and Plaster City is currently closed for operations.

Imperial County is served by rail connections from Mexico, Riverside County, and Arizona. The UPRR line originates at the Calexico border crossing, extends north to El Centro and ultimately connects with UPRR tracks at Niland, heading north to Riverside County and southeast to Arizona.

Figure ES-7: Imperial County Rail Lines



The CZRY also owns the rights to operate on a small section of track in the western portion of Imperial County between the San Diego County line and Plaster City. UPRR picks up the CZRY at Plaster City and runs service to the east to El Centro to join the other UPRR lines.

Regional Pipeline System

There are two pipelines in San Diego, the Kinder Morgan (formerly SFPP, LP) for gasoline and aviation fuel, and the WestPac Pipelines and LLL (formerly Buckeye Petroleum) pipeline for aviation fuel.

The Kinder-Morgan pipeline extends south from the Los Angeles Basin through Orange County into San Diego, and also extends into Imperial County to serve Naval Air Facility El Centro.

The major Kinder-Morgan terminals are located in Mission Valley (which supplies the majority of the gasoline for San Diego County) and Imperial. These terminals are the facilities where gasoline is blended and then loaded onto trucks for final distribution to service stations.

The 4.3 mile WestPac pipeline system extends from the Tenth Avenue Marine Terminal to Lindbergh Field and supplies aviation fuel for the airport.

WestPac has a sublease from the Jankovich Company, and receives aviation fuel from the Kinder-Morgan pipeline.

Existing and Future Freight Movement

Freight Movement through the Region's Gateways

In 2007, 1.2 million trucks transported 13.2 million tons of goods, valued over $49 billion, through the Gateway Region's border crossings. In 2050, San Diego's border crossings will accommodate 4.4 million trucks and 39 million tons of goods, valued at $309 billion (an average annual growth of 5.3 percent in value, between 2007 and 2050). Seventeen million tons of goods will be handled at Imperial County's border crossings, valued at $143 billion (an average annual growth of 5.4 percent).

Table ES-1: Truck POE Freight Forecast

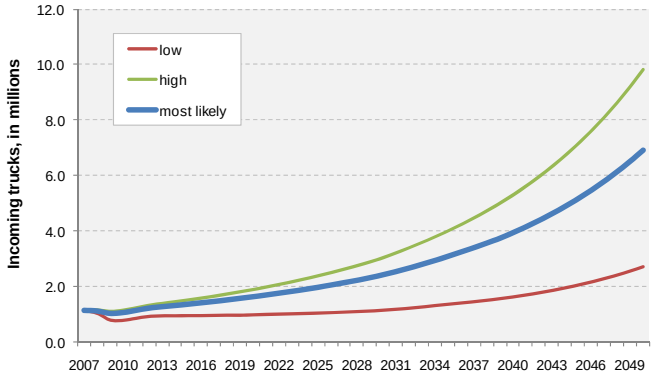
	2007 Estimate	2050 Forecast	Average Annual Growth
Otay Mesa / Mesa de Otay POE			
volume, million tons	8.4	35.5	3.4%
value, $billion	$30.7	$280.1	5.3%
loaded trucks, '000s	810.1	4,021.1	3.8%
Tecate POE			
volume, million tons	0.9	3.7	3.4%
value, $billion	$3.2	$29.3	5.3%
loaded trucks, '000s	84.8	420.9	3.8%
Calexico East / Mexicali II POE			
volume, million tons	3.9	16.9	3.4%
value, $billion	$14.6	$142.8	5.4%
loaded trucks, '000s	378.4	1,912.9	3.8%
Andrade / Algodones POE			
volume, million tons	0.01	0.03	3.4%
value, $billion	$0.02	$0.21	5.4%
loaded trucks, '000s	0.6	2.8	3.8%

Note: Estimates in volume and value include both imports and exports. Number of loaded trucks estimated from average payload factors; includes both incoming and outgoing loaded trucks.

Source: Team HDR analysis

The figure ES-8 summarizes our forecast for the total number of incoming trucks (loaded and empty) across the border with Mexico, between 2007 and 2050. The most likely forecast corresponds to the volume projections summarized in Table ES-1, supplemented with data on incoming empty truck containers reported by Customs. The low and high trajectories are based on historical growth rates, observed between 1995 and 2008.

Figure ES-8: Incoming Trucks at all Regional Land POEs (2007-2050)



Source: Team HDR analysis and U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data

Our estimates and forecasts for rail freight flows though the region are smaller relative to those for trucks. In 2007, over 16 thousand rail cars transported 1.5 million tons of goods, valued at $1.9 billion, through the Gateway Region's border crossings. Freight flows by rail through San Diego County will increase to 1.2 million tons in 2050, or just under $1.9 billion (an average annual growth of 1.7 percent in both volume and value). In Imperial County, it is projected that tonnage carried by rail will increase by 1.2 percent per year and by 2.4 percent in value. These projections imply that about 1.5 million tons of goods will be transported through Imperial County's border crossings by rail in 2050, worth just over $2.7 billion.

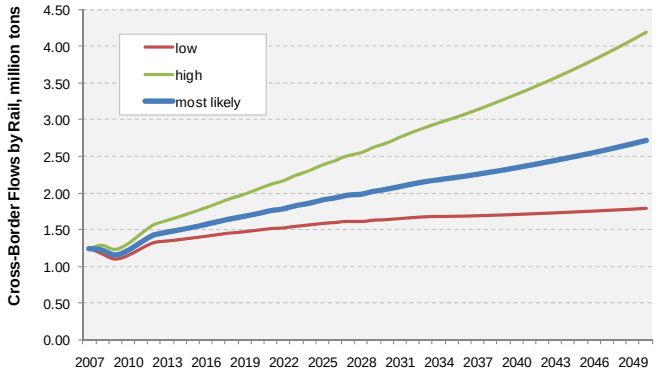
Table ES-2: Rail POE Freight Forecast

	2007 Estimate	2050 Forecast	Average Annual Growth
San Diego County Rail POE			
volume, million tons	0.6	1.2	1.6%
value, $million	$918.2	$1,908.0	1.7%
loaded railcars, '000s	6.3	20.1	2.7%
Imperial County Rail POE			
volume, million tons	0.9	1.5	1.2%
value, $million	$987.5	$2,760.9	2.4%
loaded railcars, '000s	9.7	39.3	3.3%

Source: SD Freight Rail Consulting

Projections for the volume of freight passing by rail through the California/Mexico border are illustrated in Figure ES-9.

Figure ES-9: Freight Flows by Rail through the California / Mexico Border (2007-2050)



Source: Team HDR analysis

In 2007, the Port of San Diego handled over 2.8 million tons of goods, valued at $7.4 billion. In 2050, the region's marine terminals will handle about 6 million tons of goods, valued at over $14 billion. Relative to 2007, the projected increases in tonnage and value are 1.7 percent and 1.5 percent respectively, for every year during the study period.

Table ES-3: Port of San Diego Freight Forecast

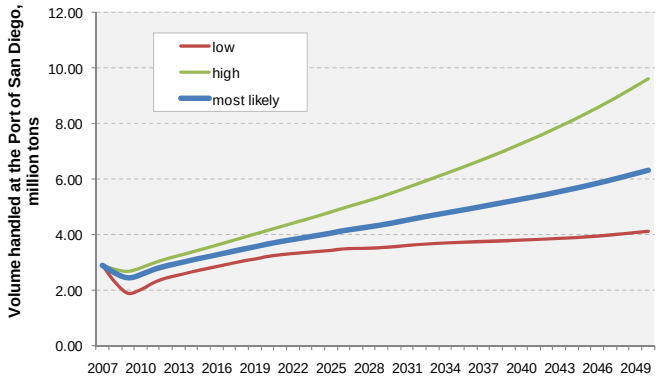
	2007 Estimate	2050 Forecast	Average Annual Growth
Port of San Diego Total			
volume, million tons	2.9	6.1	1.7%
value, $million	$7,480.8	$14,270.1	1.5%
loaded trucks, '000s	118.7	320.4	2.3%

Number of loaded inbound and outbound trucks estimated from average payload factors.

Source: Team HDR analysis

Forecasts of annual freight volumes handled at the Port between 2007 and 2050 are shown in Figure ES-10.

Figure ES-10: Freight Volumes Handled at the Port of San Diego (2007-2050)



Source: Team HDR analysis

Goods movement by air through Lindberg Field is expected to increase from 155 thousand tons ($352 million) in 2007 to 237 thousand tons ($765 million) in 2050. This represents a 1.0 percent annual increase in volume and a 1.8 percent annual increase in value.

In 2007, Imperial County moved just 1 ton of goods, valued at about $210,000. Tonnage is expected to grow at almost 3 percent annually, reaching 3 tons in 2050 (and over $1.3 million in value).

Table ES-4: Airport Freight Forecast

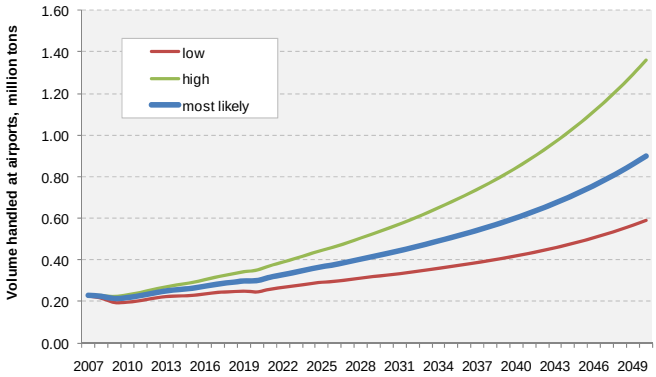
	2007 Estimate	2050 Forecast	Average Annual Growth
All Airports in the Region			
volume, thousand tons	155.0	236.8	1.0%
value, $million	$351.9	$765.0	1.8%
loaded trucks, '000s	13.9	23.9	1.3%

Number of loaded trucks estimated from average payload factors

Source: Team HDR analysis

Figure ES-11 illustrates unconstrained demand projections for freight at the region's airports. These projections are constantly higher than our preferred forecast presented in Table ES-4.

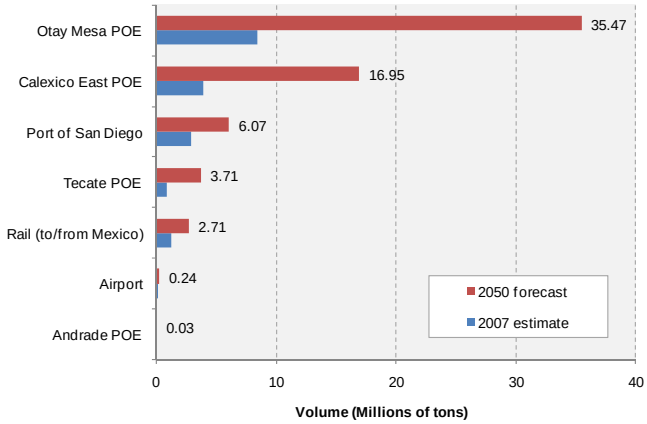
Figure ES-11: Unconstrained Freight Demand at the Region's Airports (2007-2050)



Source: Team HDR analysis

Figure ES-12 provides a summary of goods movement through the region's gateways in 2007, and its expected growth through 2050. The figure shows that the distribution of freight flows by gateway will remain roughly the same, and that the share of trucks in total flows will remain constant, at about 94 percent.

Figure ES-12: Summary of Freight Volumes by Gateway, 2007 Estimate and 2050 Forecast



Note: Sum of inbound, outbound, and through flows, passing through the region's gateways

In aggregation, the region's international gateways will handle over 65 million tons of goods in 2050. This means that in the next 40 years or so, freight shipments passing through the gateways will increase at a rate of 3.1 percent a year from the 2007 estimate of about 17 million tons.

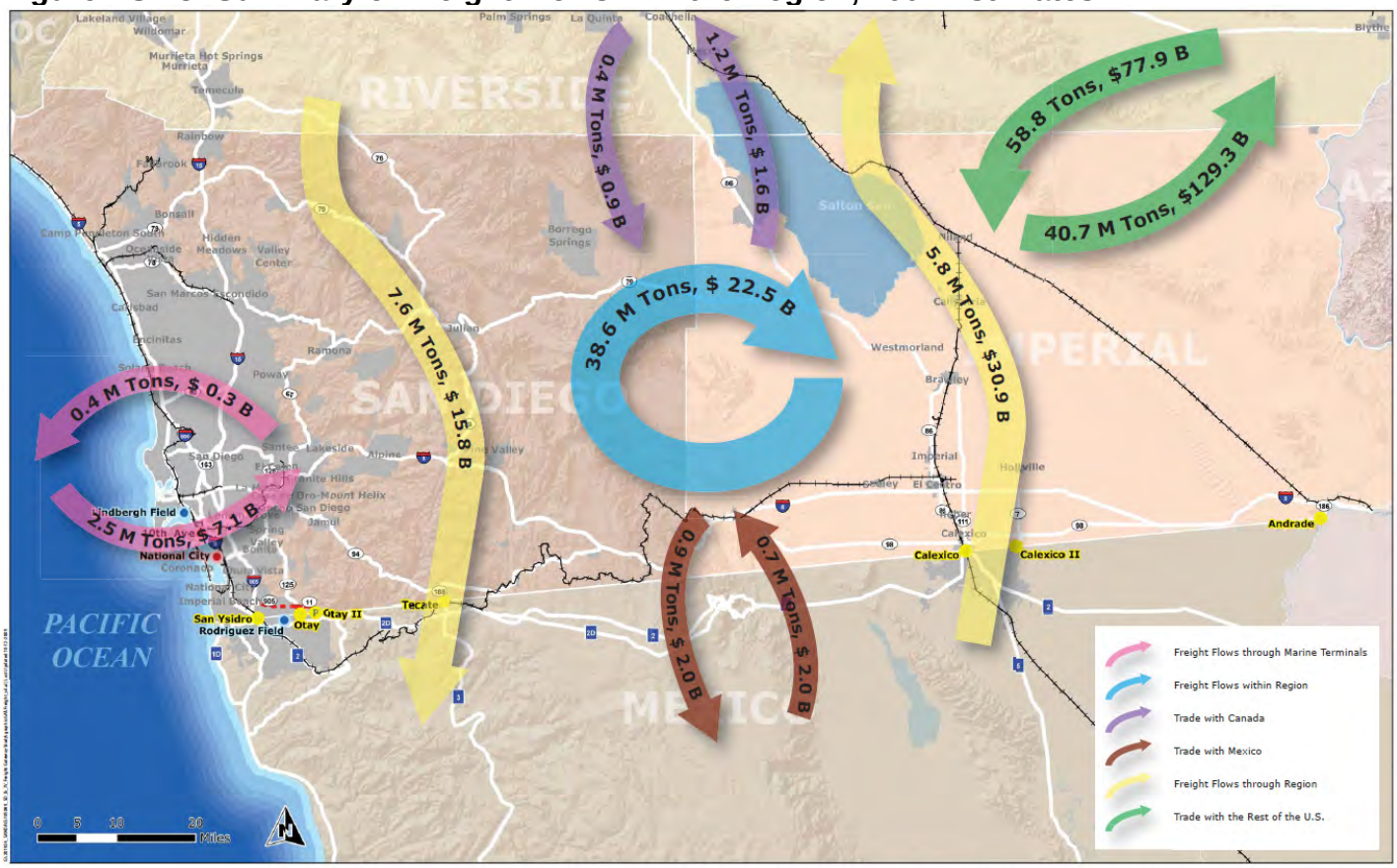
Overall Freight Movement

San Diego's regional freight flows in 2007 were dominated by domestic shipments: inbound[16] flows originating in other regions or states of the United States (including the rest of California) represented 38 percent of total freight volume (59.9 out of 154.7 million tons); outbound flows with destination in other regions or states accounted for 26 percent of the total. Inbound, outbound, through, and internal flows for the region are illustrated in Figure ES-13.

In 2007, over 89 percent of the 8.3 million tons of U.S. exports to Mexico through the Gateway Region originated *outside* San Diego and Imperial Counties. Similarly, of the 6.2 million tons of Mexican imports through the region's POEs, only about 10 percent remained within the region, while the rest was shipped across the nation.

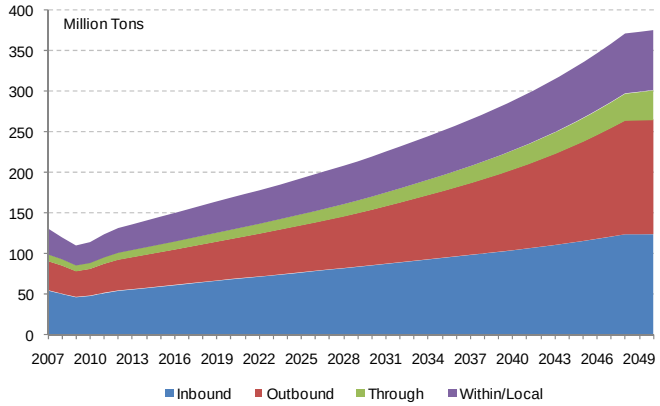
[16] Freight flows are defined as follows: **Inbound flows**: Freight originating in another county and terminating (or being transshipped) in San Diego or Imperial County. **Outbound flows**: Shipments originating in San Diego or Imperial County and terminating in another county. In line with inbound flows, some outbound commodities may have originated elsewhere and were simply transshipped in San Diego or Imperial County (to a final destination). **Through flows**: Traffic that does not originate nor terminate in San Diego or Imperial County, but simply passes through the counties on the way to/from other places. **Local flows**: Freight movements originating in one county and terminating in the other. They are typically presented in conjunction with flows "within" an individual county (with origin and destination in San Diego County; or with origin and destination in Imperial County).

Figure ES-13: Summary of Freight Flows "in" the Region, 2007 Estimates



Freight forecast for San Diego County is illustrated in Figure ES-14. The chart shows that the county is expected to have rebounded from the current downturn by 2012, with growth in annual tonnage exceeding 5 percent a year. Growth in overall freight volume will then slow down to about 2 percent per year.

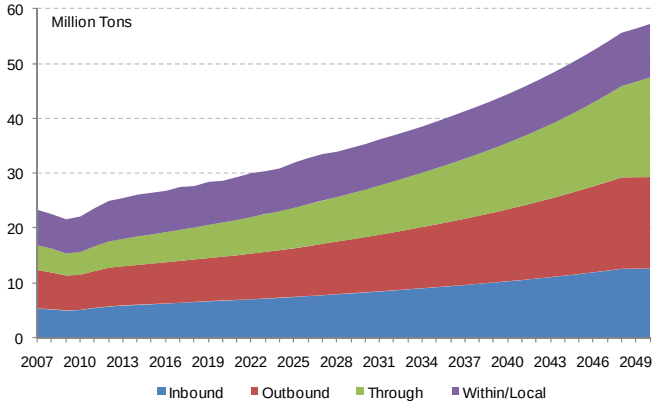
Figure ES-14: Freight Volume in San Diego County (2007-2050)



Source: Team HDR analysis

Freight statistics for Imperial County show that "through" traffic dominates goods movement. The forecast, illustrated in Figure ES-15, indicates that goods movement for the county will almost triple in the next 40 years.

Figure ES-15: Freight Volume in Imperial County (2007-2050)



Source: Team HDR analysis

In 2007, over 85 percent of all regional freight flows were "in" San Diego County (in volume). By 2050, the share of the county in total regional flows will increase by about 2 percentage points to 88 percent.

Trucks are expected to remain the main mode of transportation for goods movement "in" the region, growing at an average annual rate of 2.4 percent in volume and 4 percent in value. Trucks will transport over 97 percent of the total volume of freight in 2050. And truck traffic on the region's road network and through the region's POEs will increase nearly fourfold during the study period. The distribution of total freight flows by mode of transportation is shown in Table ES-5.

Table ES-5: Regional Freight Distribution by Mode

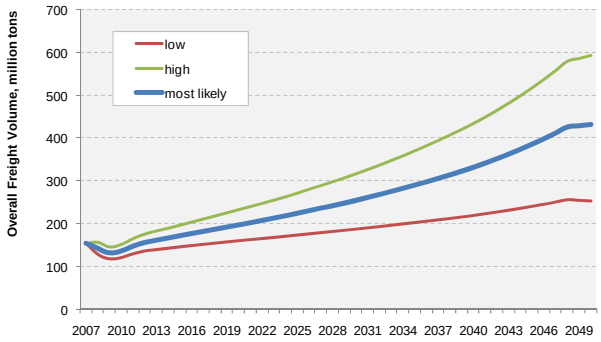
Mode	In volume (million tons)		
	2007 Estimate	2050 Forecast	Average Annual Growth
Truck	150.3	419.9	2.4%
Rail	3.1	8.4	2.3%
Water	1.0	3.2	2.8%
Air	0.2	0.2	1.0%
Pipeline	0.001	0.001	-0.5%
Other	0.1	0.4	2.8%
Grand Total	154.7	432.2	2.4%
Port	2.9	6.1	1.7%

Note: To avoid double counting, freight flows in and out of the port by truck or rail are only recorded under truck or rail, not water. The water mode in the above table represents coastal shipping. Total freight flows in and out of the port amounted to 2.9 million tons in 2007 and are projected to grow to 6.1 million tons in 2050, as shown in the last row of the table.

Source: Team HDR analysis.

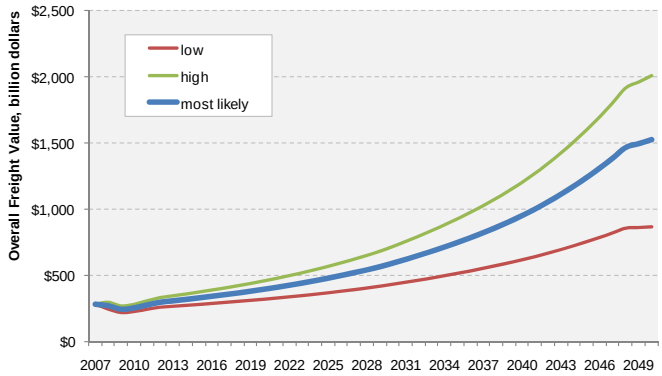
Figures ES-16 and ES-17 summarize our forecast of total regional freight in terms of tonnage and value, respectively. In both charts, the central line corresponds to the most likely forecast (also shown in Table ES-5).

Figure ES-16: Forecast of Total Goods Movement in Volume (2007-2050)



Source: Team HDR analysis

Figure ES-17: Forecast of Total Goods Movement in Value (2007-2050)



Source: Team HDR analysis

Freight forecasts by commodity are determined partly by the relative performance of domestic industries. As suggested by the American Trucking Association,[17] high-technology manufacturing will be the key in driving freight movement. This in turn may be an important source of growth for "secondary traffic," or shipments to and from warehouses or distribution centers, as links within the supply chain between manufacturers and consumers.

As reported in Table ES-6, secondary traffic is projected to grow by 4.5 percent annually and will become the largest category by 2050 in both volume and value terms. It is also projected that there will be significant growth in the amount of electrical machinery, equipment, and supplies being shipped. Also noticeable is the increase in the amount of waste and scrap materials being transported: both volume and value are projected to rise by over 4 percent per year.

[17] "U.S. Freight Transportation Forecast To… 2015." Economic Forecast and Analysis prepared by Global Insight Inc., American Trucking Association, 2003

Table ES-6: Regional Freight Distribution by Commodity - 2050 Top 10 Ranking

Commodity Groups	In volume (million tons)			In value ($ billion)		
	2007 Estimate	2050 Forecast	Average Annual Growth	2007 Estimate	2050 Forecast	Average Annual Growth
Secondary Traffic *	13.8	92.9	4.5%	$92	$577	4.4%
Nonmetallic Minerals, except Fuels	23.0	59.8	2.2%	$0	$573	2.0%
Electrical Machinery, Equipment, or Supplies	4.4	57.6	6.2%	$38	$85	6.5%
Clay, Concrete, Glass, or Stone Products	35.6	39.1	0.2%	$21	$73	0.0%
Food or Kindred Products	11.3	28.5	2.2%	$6	$42	2.1%
Waste or Scrap Materials	4.3	24.4	4.1%	$1	$30	4.0%
Petroleum or Coal Products	12.6	22.7	1.4%	$1	$25	1.5%
Farm Products	12.2	21.9	1.4%	$9	$20	1.2%
Transportation Equipment	4.8	13.3	2.4%	$32	$15	2.3%
Machinery – Other than Electrical	2.7	12.5	3.6%	$9	$15	3.7%

*Note: * Traffic movements originating in warehouses or distribution centers, or drayage movements of intermodal rail or air freight. This typically does not include "goods deliveries:" shipments to or from retail (excluding mail-order and warehousing), offices, service establishments, and residences. Details on the types of items being moved are not available.*

Source: Team HDR analysis

Freight Outlook and Challenges

The forecast presented in this report is based on goods movement consistent with supply and demand factors including employment, output, and purchases by industry and county. The forecast is, therefore, consistent with the expected levels of economic growth at the national and regional levels. Accordingly, our forecast implicitly assumes that real GDP will grow by 2.5 percent annually; that total civilian employment will rise at an average annual rate of 0.8 percent; and that the U.S. population will expand at an annual rate of 0.9 percent. Our forecast is also consistent with SANDAG's projections for the Gateway Region: annual growth in Gross Regional Product (GRP) of 2.6 percent; employment growth of 0.73 percent; and population growth of 0.8 percent.

Key findings of the study include:

- Total freight flows "in" the Gateway region (including inbound, outbound, internal, and through flows) will grow by 2.4 percent annually in volume, and 4.0 percent in value.
- Otay Mesa will remain the largest international gateway for the region, followed by Calexico East; both are expected to see growth of over 3 percent per year in volume.
- Trucks will continue to be the dominant mode of transportation, carrying over 96 percent of total freight volume.
- Inbound and outbound domestic flows will continue to account for most "regional" freight flows, with 31 and 39 percent of total freight volume, respectively (70 percent combined).
- San Diego County and the rest of California will remain the primary origins and/or destinations of shipments passing through the region's land POEs. About three-fourths of the combined volume of imports and exports will originate or terminate in the region or state.
- Trade with NAFTA partners, Canada, and Mexico, will continue to grow fast, with the value of shipments to Mexico projected to increase by 4.5 percent annually and the value of shipments to Canada by 4.2 percent.
- Approximately 65 percent of the tonnage handled "in" the region will originate from or terminate in the rest of California.
- San Diego will continue to serve as a "hub" for the majority of regional freight flows, whether as an origin, a destination, or a trans-shipment location. Trans-shipping activities (and flows from/to warehouses and distribution centers) are expected to grow by over 4.0 percent annually.
- Electrical machinery, equipment, and supplies, as well as waste and scrap materials are expected to be the fastest growing commodity groups in the region.
- Over half of the shipments arriving or departing from the Port of San Diego are - and will continue to be -

carried by trucks. Most of these shipments have an origin or destination in the Gateway Region or the State of California. Shipments with an origin or destination in other states are mainly carried by rail.

- The main commodities handled at the Port will consist of transportation equipment, farm products, and waste or scrap material.
- Due to constraints on airport capacity expansion, commodity flows by air are not expected to grow significantly.
- Rail carries - and will continue to carry - about 2 percent of overall freight flows. Most of the commodities carried by rail consist of transportation equipment, food or kindred products, and petroleum coal products.

While this forecast for freight movement at the Port, airport, and rail yards accounts for capacity constraints, freight flows by truck are less capacity-constrained; truck movements tend to be more flexible in terms of routing (e.g., use of alternative roadways or POEs) and time of travel (e.g., earlier or later departure times). Determining a maximum capacity is, therefore, extremely hazardous. This study, however, acknowledges that there are several challenges to goods movement in the region. In general, land costs and land use conflicts present costly challenges to increasing freight capacity. More specific examples include:

- Lack of direct freeways to Otay Mesa POE, Port of San Diego, rail yards, and intermodal facilities
- Lack of dedicated truck lanes or truck bypass routes
- I-5, I-805, and I-15 are nearing capacity levels
- Limited capacity on the rail system and transfer of goods from TAMT put additional trucks on the highways that could be possibly served by rail
- Un-utilized rail yard at TAMT in addition to inadequate intermodal facilities, train storage tracks, warehouses, etc
- Shared rail capacity on the MTS-owned facilities from downtown to the Mexican border to the south and from downtown to the City of Santee to the east, limits the hours of service for freight movements
- Single track sections of the freight rail system on the Los Angeles to San Diego (LOSSAN) corridor which is an impediment to expanded and safer freight and passenger ops on the line
- Limited ability to develop cargo handling or cargo storage facilities around Port terminals, border crossings, warehouse districts, etc.
- Wharf capacity at NCMT to maximize automotive traffic as well as strategic military moves
- Limited air cargo service in Imperial County
- Air cargo capacity at Lindbergh Field is limited due to it being a single runway airport with passenger service that will soon breach the limits of the single runway
- Limited warehouse space at Lindbergh Field. UPS, USPS, and FedEx all currently sort cargo off site

Freight Policy and Regional Prosperity

The reliable movement of goods and services is the lifeblood of the regional and national economy. The regional transportation planning and the regional prosperity strategies acknowledge that freight facilitation is an integral part of the economic growth and sustainability of the Region.

Freight movement, however, is often addressed as a double-edge sword. On one hand, it is recognized as a catalyst to regional and national growth, but on the other hand, freight movement has been viewed as a burden to the region's facilities and network, contributing to delays, accidents, and environmental impacts. The two views are, indeed, real and present a constant tension in regions that host freight operations.

The freight forecast planning tool may assist planners to plan effectively while minimizing negative impacts. It may also help decision makers understand key issues that need to be addressed in order to balance competing transportation needs and reach consensus on strategies for more efficient and sustainable freight movement. More specifically, in order to ensure that the growth underlying the prosperity goals established for the region materializes, challenges to the freight system must be addressed. Therefore, to prevent the erosion of the region's prosperity and welfare, the following mitigation approaches, among other strategies, could be considered:

- Incorporating freight needs into the current modeling tools and planning processes used by the region to better anticipate future needs
- Regular interaction and collaborative planning with freight stakeholders to develop and/or implement mutually beneficial solutions to expand capacity at strategic freight facilities
- Addressing the challenges associated with the projected number of trucks on the Region's roadways with a view to improve the reliability of the network for both truck and personal vehicles alike
- Addressing delivery and servicing issues through traffic management

- Sustaining and or growing current use of rail and encouraging coastal shipping for freight
- Encouraging the development of new rail freight terminals and improving access to existing terminals

1 INTRODUCTION: FREIGHT DYNAMICS IN THE GATEWAY REGION

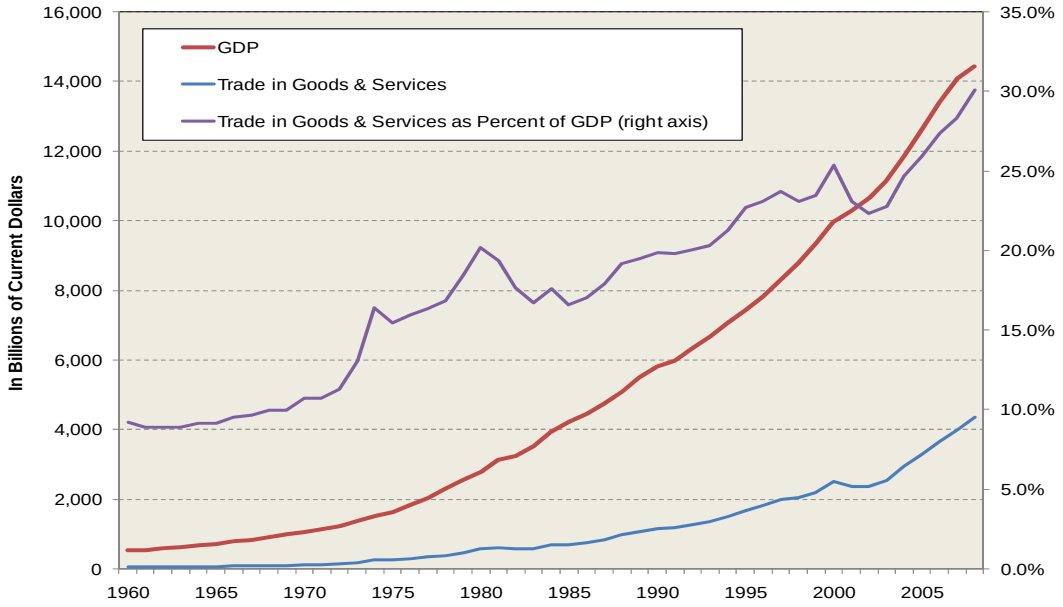
Transportation networks and services do not only reflect how resources, goods, and services are allocated but can also impact these distributions. In the short run, the health of the economy can affect the condition and volume of freight transportation. In the long run however, it is the capacity of regional transportation systems to accommodate market expansion and restructuring which most impacts the sustainability of economic growth.

1.1 Understanding Freight Movement

As the U.S. economy grows, demand for goods, services, and related freight transportation activity from all sectors will increase. This includes heavy shipping industries like farming and mining, as well as sectors such as e-commerce and the government, which also impact demand for the movement of goods. The American freight transportation network has been experiencing tremendous growth in the past decades due to changes in the makeup of the economy and expansion in international trade.

As shown in the figure below, trade in goods and services as a percentage of GDP increased from 10 to 30 percent in the past 40 years. This suggests that international trade has become an integral part of the U.S. economy. While the growth in the past 30 years was fueled by a decline in transportation and communication costs, trade is expected to grow further as world economies become increasingly interdependent.

Figure 1: U.S. Gross Domestic Product and International Trade (1960-2008)



Source: Bureau of Economic Analysis

According to the Freight Analysis Framework (FAF)[18], the volume of domestic trade will increase by over 90 percent between 2002 and 2035, and the volume of imports and exports will more than double over the same period. As a result, there is growing pressure to maintain, upgrade, and expand the current freight transportation network to meet the demands of various U.S. and international markets.

In order to remain competitive, firms are demanding more timely and flexible delivery services that require the current freight system to become more efficient and reliable. The interconnectedness of various modes of transportation is growing in importance, especially at international gateways such as border crossings, airports, or seaports. For example, imports and exports passing through California's land ports of entry grew by 241 and 254 percent respectively between 1995 and 2008 [19] – more than 2.5 times the growth experienced by the State of California as a whole.[20] Furthermore, the U.S. Department of Transportation (USDOT) projects that goods movement through Southern California could more than triple by 2030.[21]

1.2 The Role of Freight Movement in the Regional and National Economy

The relationship between freight transportation and economic growth has long been recognized as an important element in any national or regional development policy.

Enhancing freight transportation networks can lead to significant economic impacts by lowering transportation costs and improving service, particularly with today's just-in-time (JIT) inventory practices. Network improvements can help increase distances traveled and the speed of delivery, to further expand supply and distribution networks, resulting in market development and economies of scale.

Figure 2 illustrates the relationship between transportation infrastructure improvements and economic growth. Improving freight transportation services by reducing transit times and improving reliability enhances inventory and supply chain management. The effects of these time savings and cost reductions can trickle through the economy via additional efficiency gains due to changes in companies' logistics set-ups, also known as "reorganization" effects.

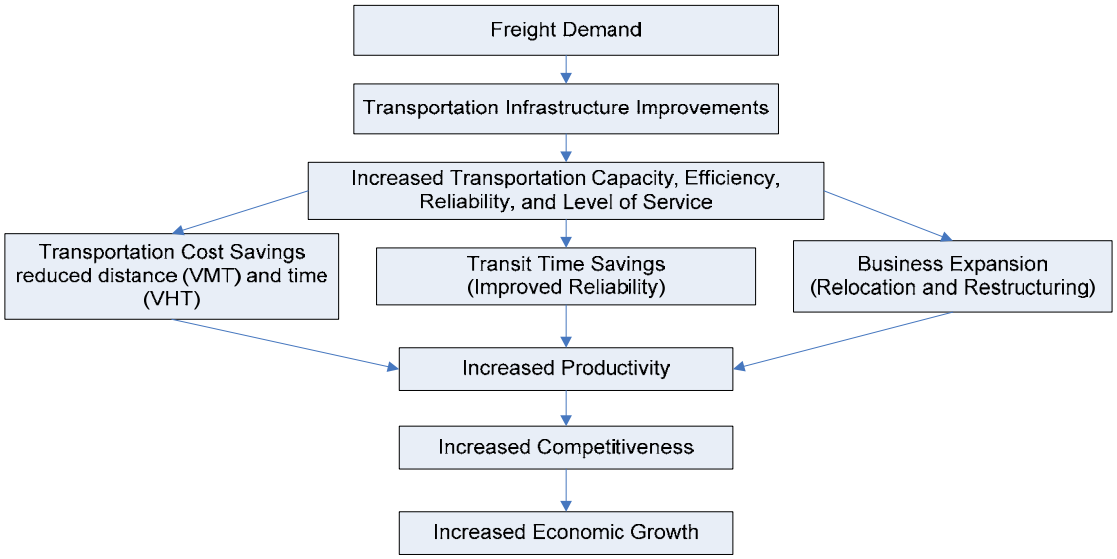
[18] Freight Story 2008, Office of Freight Management and Operations, FHWA, USDOT, http://ops.fhwa.dot.gov/freight/freight_analysis/freight_story/fs2008df

[19] Growth in exports to and imports from Mexico by truck, in value; U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data

[20] Growth in Gross State Product in current dollars; U.S. Bureau of Economic Analysis, Regional Economic Accounts

[21] And according to the forecast presented in Chapter 4, total freight flows through the Gateway region will increase from 155 million tons in 2007 to 432 million tons in 2050.

Figure 2: Freight Transportation & Economic Growth



The time and cost savings generated by investments in the freight transportation network enhance the overall performance of logistics systems, which can increase productivity in manufacturing and distribution. This enhanced productivity reflects a more efficient use of labor, capital, and materials, all of which lead to higher production. The concept of productivity enhancement is fundamental in economic theory as it is a key determinant of economic growth and changes in the standard of living, as exhibited by the close relationship between Gross Domestic Product per capita and growth of labor productivity.

The effects of improving freight transportation can be classified into different groups, some of which have been used to quantify benefits for the purpose of performing Cost-Benefit Analyses for freight transportation projects. Immediate cost reductions to carriers and shippers, including gains to shippers due to shorter transit times and better reliability, represent the first group of quantifiable benefits. A second group includes gains associated with reorganization effects (improved logistics), leading to lower prices and higher output. These in turn can result in product/service improvements, or in the development of new products/services (third group).

Finally, investments in freight transportation can lead to higher employment and income, which in turn help stimulate the economy. Thus, nationwide, employment in for-hire transportation establishments (primarily serving freight) has increased by 53 percent between 1980 and 2007.[22]

In San Diego, employment in transportation and public utilities grew by 40 percent between 1990 and 2002, outpacing national growth for that period.[23] Growth in goods

[22] As a percentage of total U.S. labor force, employment in for-hire transportation has remained constant (at about 3.5 percent); U.S. Department of Transportation, Freight Facts and Figures 2008.
[23] "International Trade: Mexico's Maquiladora Decline Affects U.S.-Mexico Border Communities and Trade; Recovery Depends in Part on Mexico's Actions". U.S. General Accounting Office 2003

movement also provided the region with more employment opportunities in the middle of the pay scale, thereby helping contain the increasing gap in average wages, an ongoing concern for regional policy makers.[24]

The cost of freight transportation has decreased over the past two and a half decades, primarily as a result of industry restructuring and innovations in supply chain management. However, recent trends such as rising oil prices, growing environmental concerns, or reductions in public funding available for capacity expansion, may lead to higher costs and impede growth in goods movement in the near future. In particular, capacity issues are leading to congestion problems across major freight corridors. Congestion significantly impacts the supply chains of high-value, time-sensitive commodities, and contributes to higher freight costs, which may ultimately result in higher consumer prices across the economy.[25] Consequently, strategic investments in major freight corridors are essential to contain and/or mitigate rising transportation costs.

1.3 Characteristics of and the Challenges to the Regional Freight Network

Uniquely located between major production, trade, and population centers, the San Diego and Imperial Valley region – the Gateway region – possesses a wide array of transportation infrastructure assets. These include major ports of entry along the border with Mexico, interstate highways and state routes, Class I railroads, seaport operations terminals, pipelines and a modern air cargo system.

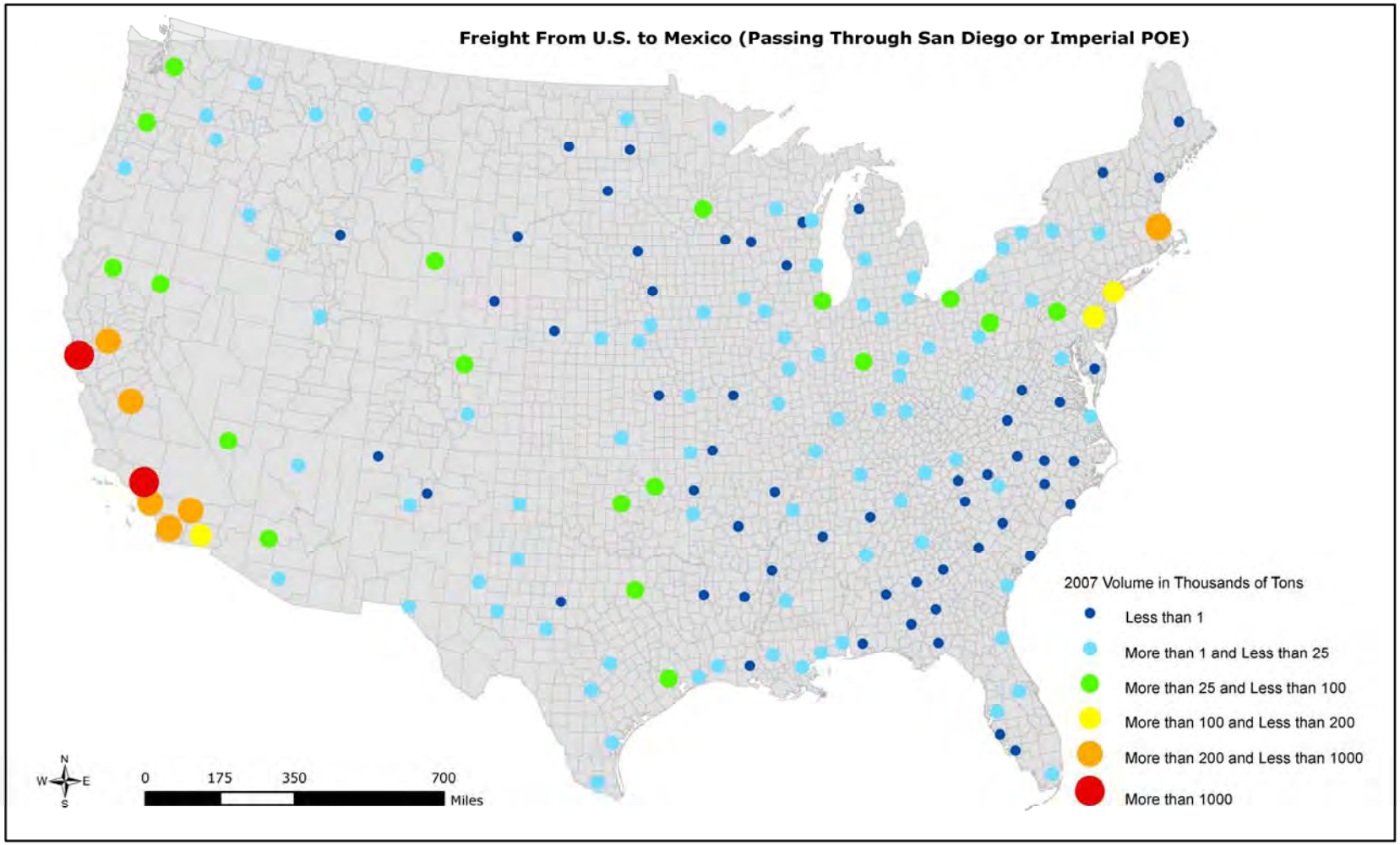
The fact that the region hosts a deepwater seaport and is also adjacent to the US Mexican border contributes greatly to its unique role as a link in global supply chains and a region that facilitates international trade. The border crossings especially are crucial assets for the physical movement of goods, as they serve as gateways to and from the Nation's NAFTA trading partner, Mexico. Goods movement corridors, including highways, pipelines and rail lines are equally important, as they facilitate the circulation of goods between producers and consumers located on both sides of the border.

The integration of production and distribution processes across the California / Mexico border, contributes to strong economic interdependencies; goods movement in the border region contributes to a highly blended economy. Additionally, the growth in international trade not only benefits the national economy, but the regional economy as well. Figures 3 and 4 below illustrate both the origins and destinations for goods passing through the land border Ports of Entry.

[24] According to the San Diego Unified Port Business Plan, for example, 1,817 jobs were directly generated by activities at the marine terminals; with a combined wage and salary income of $98.2 million and an average salary of $54,032 (page ES-7).

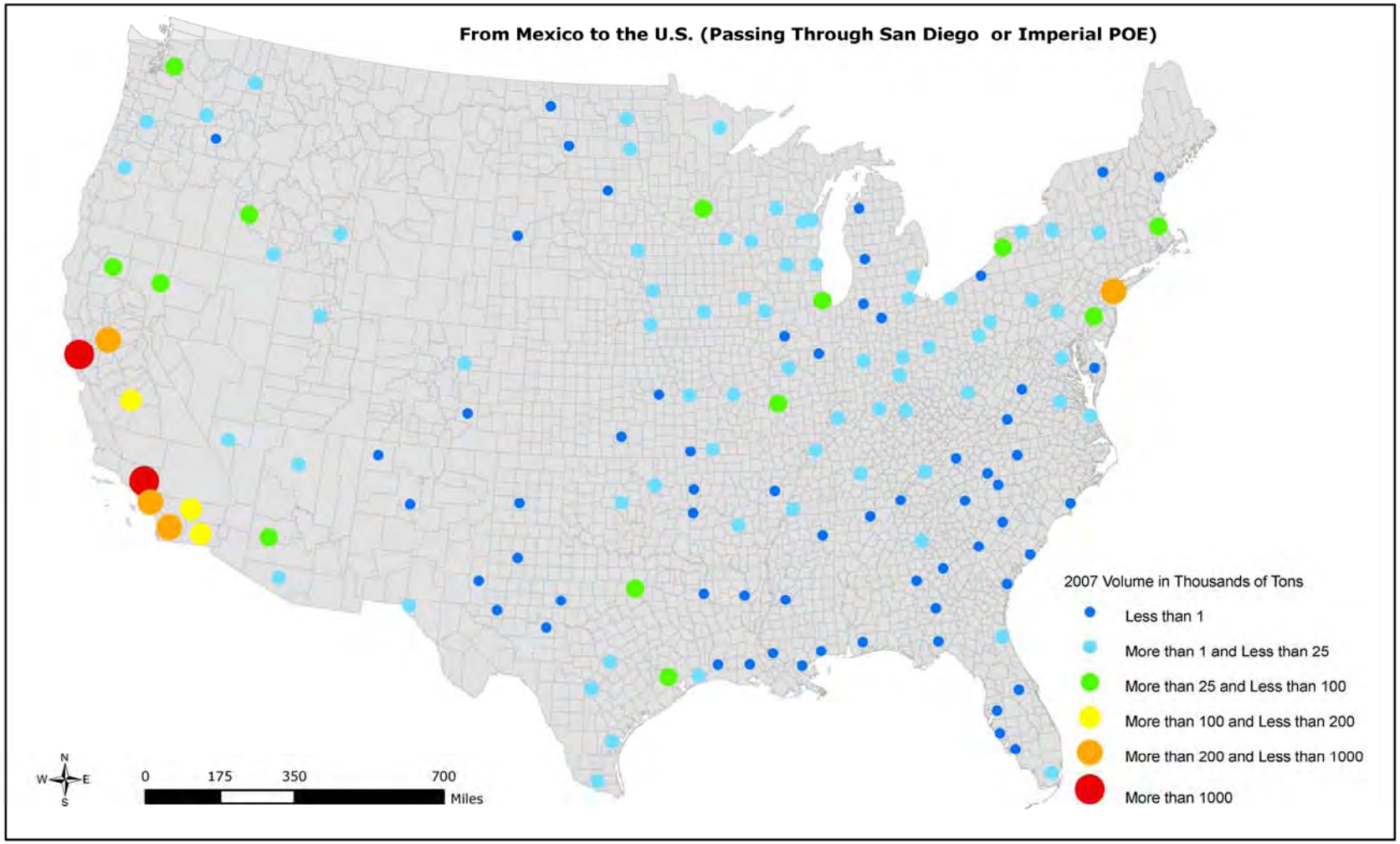
[25] According to U.S. Department of Labor statistics, truck transportation prices increased by 13 percent between 2003 and 2006, while those for rail transportation increased by 25 percent and those for air cargo by 11 percent. Reported in: Freight Story 2008, Office of Freight Management and Operations, FHWA, USDOT

Figure 3: Origin of Freight Flows from the U.S. to Mexico, passing through the Region's Land Ports of Entry



Source: Team HDR analysis

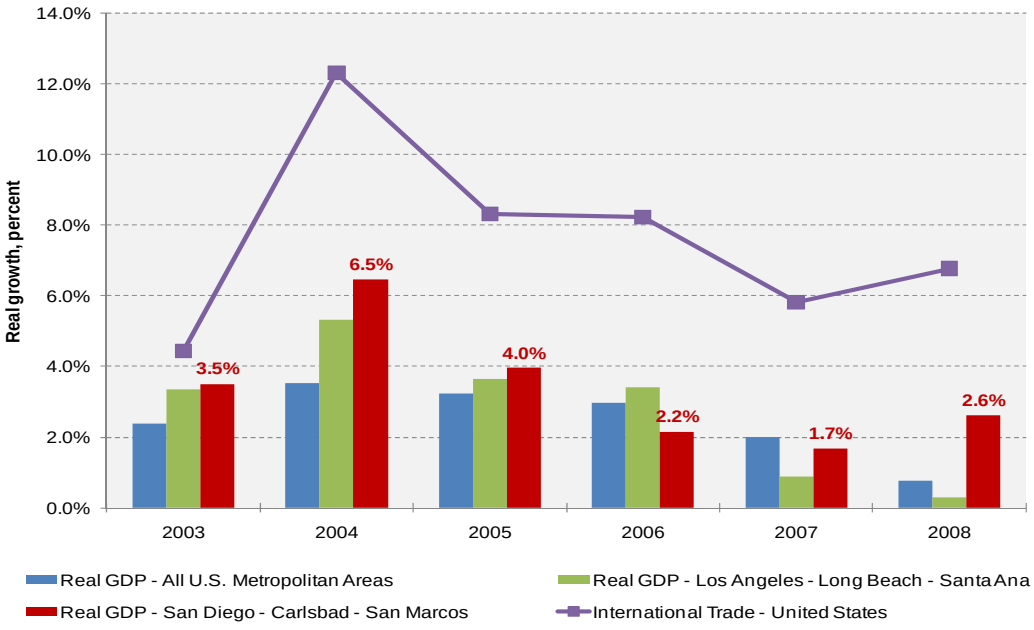
Figure 4: Destination of Freight Flows from Mexico to the U.S., passing through the Region's Land Ports of Entry



Source: Team HDR analysis

In addition, economic growth in the region, which has recently outpaced national growth and growth in the neighboring Los Angeles Basin, has been closely related to international trade and more specifically to NAFTA. The figure below shows the growth rate of GDP for the U.S., Los Angeles, and San Diego Metropolitan Areas, against growth in international trade between 2003 and 2008. The figure suggests that while trade and GDP growth are generally correlated, the strongest correlation (during that period) was observed for the San Diego region.

Figure 5: Economic Growth in the San Diego Metropolitan Area and Growth in International Trade (2003-2008)



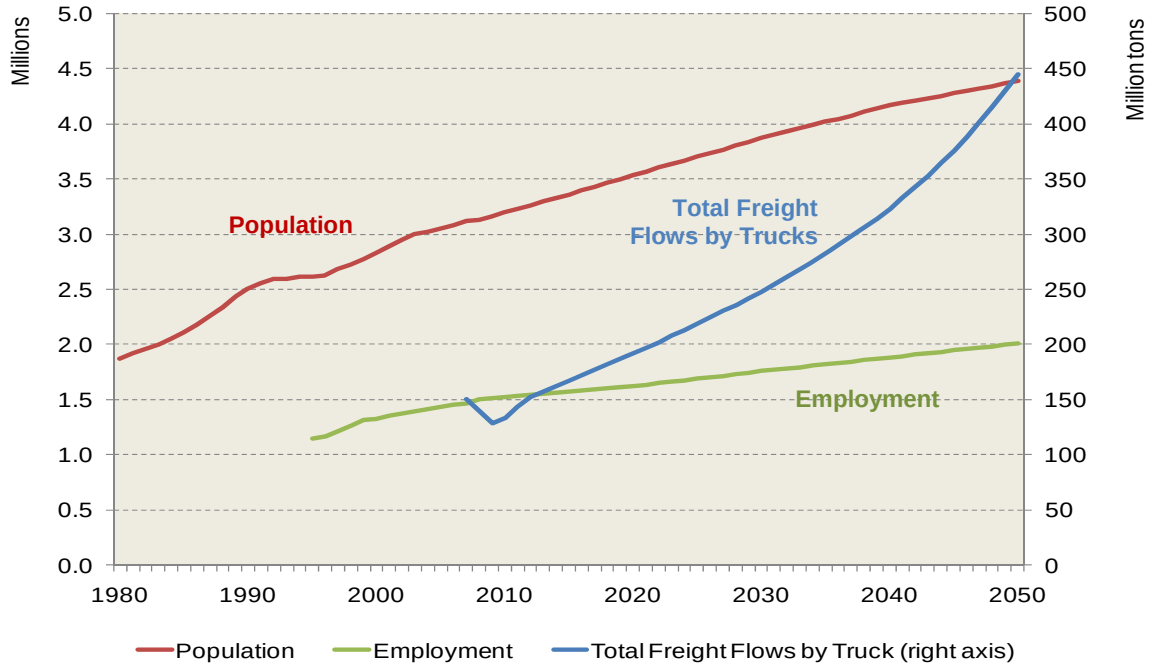
Source: Bureau of Economic Analysis, U.S. Department of Commerce

A well functioning freight system (gateways and links between the gateways) is also essential to satisfying local demand for consumer products and maintaining standards of living. This is particularly true for a **terminating market area such as** the Gateway region. Thus, in 2007, according to freight statistics developed for this study (and presented in Chapter 3), goods movement terminating in the region ("inbound" freight flows) outweighed goods movements originating in the region ("outbound" freight flows) by a factor of 1.5. Accommodating the projected growth in population and employment - and the associated growth in consumption – implies more inbound freight flows and overall freight volumes.

The relationship between population, employment and total projected freight flows in the Gateway region is illustrated in Figure 6, below. Over the next 40 years, the **unconstrained** growth in overall goods movement (in volume) is expected to outpace the

growth in both population and employment; with freight flows projected to increase by 2.4 percent annually, population by 0.8 percent and employment by 0.7 percent.[26]

Figure 6: Freight Flows, Population and Employment in the Gateway Region



Sources: HDR analysis, SANDAG's 2050 Regional Growth Forecast

Currently, the highway system carries the vast majority of regional freight, but the system is strained at key bottlenecks. Congestion at the border crossings between California and Mexico is hindering the region's economic growth. Thus, according to SANDAG's Economic Impacts of Wait Times at the San Diego-Baja California Border Study, POE infrastructure inadequacy cost the U.S. and Mexican economies US$6 billion in 2005 alone. Facing strong growth in international trade and in the demand for goods movement, adjustments must be made to the region's infrastructure capacity.

But other factors are restraining the region's aspirations for prosperity and improvements in standards of living. One of the main problems is the limited growth in regional income, attributed to an increasing proportion of low-wage employment. There has also been a widening gap between average wages for high and low earners. A relatively high inflation rate has exacerbated the economic standing for a majority of the population, since it has raised the cost of living especially in housing.[27] The region also lacks urban development that is consistent with "smart growth" principles and helps contain sprawl, roadway congestion, and carbon footprints.

[26] Average annual compound growth rates between 2007 and 2050; San Diego County and Imperial County combined; freight flows by truck only.
[27] "Building a Foundation to Achieve Global Competitiveness: San Diego Regional Economic Prosperity Strategy," Volume 1 and 2, SANDAG, March 2008.

In summary, regional policy makers are faced with a complicated set of challenges to the region's growth and to the realization of its goals for greater prosperity. On the one hand, inefficiency in the movement of freight threatens the rate of growth in economic productivity, thereby posing a risk to regional competitiveness, employment and real household incomes. On the other hand, facilitating the unconstrained demand for freight transportation can bring with it environmental and other social costs that diminish overall economic prosperity. How to respond to the coming surge in freight transportation demand will thus require a delicate balance of planning decisions.

1.4 Policies and Potential Impacts of Goods Movement in the Region

Gateway region policy makers face the complex task of enhancing mobility for the region's residents and workers, and at the same time promoting international trade through improving the efficiency at airports, seaports, and border crossings. The types of infrastructure investments that will maximize economic growth must be identified. In conjunction with enhancing efficiency at international gateways, the corresponding strategies must accommodate growing processing needs to reduce congestion and waiting times. Finally, firms need to take advantage of scale economies as well as agglomeration economies from consolidating production and warehousing facilities[28], as a more efficient and improved transportation system will ultimately provide support for improved freight networks..

When considering options for improving the region's standard of living, planners and policy makers in the Gateway region are interested in promoting a wider understanding of the impact of improving freight infrastructure, policies and services, and in addressing related economic, environmental, and social issues. For example, what investments would help support trade among sectors of the economy associated with higher wage employment and higher value products? Should the region aim at promoting value-adding activities? And if so, what types?

Strategies for improving the region's transportation system generally fall into two categories: i) policy actions that can promote local business connections or access to labor and other inputs; and ii) infrastructure investments that can alleviate bottlenecks, improve efficiencies or lower costs. Whatever combination of strategies is pursued, regional policy makers should focus on how to improve the region's comparative advantage (e.g., proximity to Mexico's manufacturing industry, high quality of labor force, attractive location for tourism) while ensuring that their policies are consistent with the strategies and initiatives pursued on the other side of the border.

[28] Freight Transportation: Improvements and the Economy. FHWA, USDOT.

To address the need for implementing an efficient and reliable transportation system to better serve the region's growing population, SANDAG is seeking to better integrate existing transportation networks under their **Regional Transportation Plan** (RTP).[29]

In response to the need to maintain and improve the region's access to domestic and international markets, SANDAG is working on completing an updated Goods **Movement Strategy** as part of the 2050 RTP. This plan aims at assessing the region's goods movement system, and identifying opportunities and needs for freight system optimization.

Often federal funding opportunities are limited for freight improvements; in the San Diego and Imperial County region this is particularly true for pressing border infrastructure needs.. Through innovative financing mechanisms such as public-public partnerships, SANDAG, Caltrans, and the General Services Administration and U.S. Customs and Border Protection, together with representatives from Mexico are creating innovative infrastructure investment partnerships Similarly, the freight infrastructure challenges for the Airport and the Seaport often relate to landside access issues, and again unique partnerships and blended funding solutions much be crafted.

SANDAG will cooperate with partner organizations such as the San Diego Regional Economic Development Corporation, the San Diego Regional Chamber of Commerce, the Otay Mesa Chamber of Commerce, the San Diego World Trade Center, the Imperial Chamber of Commerce or the Imperial Valley Economic Development Corporation, and work towards informing the public about goods movement and the infrastructure needed to accommodate trade.

It is important that freight infrastructure investments be prioritized and allocated efficiently. Such planning not only requires a clear understanding of existing capacity and current capacity utilization, but more importantly, an accurate and reliable forecast of future transportation and infrastructure needs.

1.5 Plan of this Report

After this introductory chapter, Chapter 2 provides a detailed description of existing infrastructure and capacity constraints in the region. Chapter 3 provides estimates of existing freight flows in addition to an overview of our methodology and a list of data sources. 2050 freight flow forecasts can be found in Chapter 4. These forecasts rely on a number of forecast and policy assumptions. Data tables and references are provided in appendices at the end of the report.

[29] "Building a Foundation to Achieve Global Competitiveness: San Diego Regional Economic Prosperity Strategy," Volume 1, SANDAG, March 2008.

2 REGIONAL FREIGHT INFRASTRUCTURE PROFILE

This chapter presents an overview of the freight infrastructure for San Diego County, Imperial County as well as the Baja California region. The chapter is subdivided into three major sections; San Diego County Infrastructure, Imperial County Infrastructure and the infrastructure for the northern portion of the state of Baja California, Mexico. Within each section, the freight infrastructure is broken down into five major categories, namely, roads, rail, ports, airports and warehouse facilities. A more detailed inventory of regional infrastructure is provided in Appendix A.

2.1 San Diego County Freight Infrastructure

2.1.1 Road Network and Ports of Entry

San Diego County's roadway network supports flows from the freight gateways as well as the internal distribution of goods. The regional highway network is the metaphorical circulatory system for high volumes of both vehicular travel and freight movements. According to the analysis presented in Chapter 3, the highway system carried nearly 98 percent of the goods that move in and out of the region in 2007. While the existing infrastructure is considered adequate, population growth and an increase in foreign trade activity over the past few decades have resulted in a reduction in the overall level of service.

2.1.1.1 Land Ports of Entry

The Gateway region is connected to Baja California via six land ports of entry (POE).

The **Otay Mesa / Mesa de Otay**[30] Port of Entry is the largest commercial crossing along the California/Mexico border and handles the second highest volume of trucks and third dollar value of trade among all U.S./Mexico land border crossings. It is located approximately 15 miles south of downtown San Diego and 14 miles inland from the Pacific Ocean. On the U.S. side, the crossing connects with California State Route 905 (Otay Mesa Road, a four-to-six-lane local street), providing links to State Route 125, Interstate 805 and Interstate 5. The facility currently includes 13 passenger lanes, 1 SENTRI lane, 1 bus lane, 8 pedestrian lanes, 7 commercial lanes, 1 empty-truck-only lane, and 1 FAST lane. It provides a full range of cargo processing functions, including inspection, collection and verification.

Tecate is a minor full service Port of Entry located approximately 40 miles east of San Diego and serving rural San Diego County. The port provides service for pedestrians, passenger vehicles, commercial vehicles, and rail (the rail line crosses at Campo, located east of the Port). It currently includes 2 passenger lanes, 1 bus lane, 2 pedestrian lanes,

[30] Based upon documented border congestion at the Otay Mesa POE and a projected 3.4% CAGR for Otay Mesa, SANDAG and Caltrans are developing plans for a new Otay Mesa East POE in 2013-2014.

and 1 commercial lane. It connects with California State Route 188, a two-mile road providing access to State Route 94.

Finally, the POE at **San Ysidro** in San Diego County (which connects directly to Interstate 5) is not intended for commercial traffic.

2.1.1.2 Roadway Network

In 2007, over 127 million tons of goods, valued at almost $225 billion, were transported in San Diego by trucks. There are three major north-south corridors handling goods movement in San Diego County: Interstate 5, Interstate 805, and Interstate 15. In addition, a toll road, State Route 125, connects the Otay Mesa POE to other major north-south corridors. These routes carry significant volumes of truck traffic through San Diego County and further north to Orange and Riverside Counties. San Diego has one major east-west freeway, Interstate 8, connecting the county with Imperial County, to State Route 94 and State Route 905, and continuing east towards Arizona.

Figure 7: Major Truck Routes in San Diego County

Source: SANDAG

In general the east-west corridors are not as prominent for freight movement as the north-south freeways. The importance of the north-south corridors stems from their connectivity to major POEs along the county's southern border with Mexico. This includes: [31]

[31] Source: CALTRANS

- I-5, with a direct connection to the San Ysidro POE, and Annual Average Daily Truck Traffic (AADTT) of about 7,200;
- I-15, a major truck artery carrying about 11,440 trucks a day;
- SR-125, with a connection to Otay Mesa (5,210 trucks per day), via SR-905; and
- SR-188, connecting to the Tecate POE (630 trucks).

2.1.1.3 Gaps in Existing Road Infrastructure

The lack of roadway capacity across the region is illustrated by the increase in the Texas Transportation Institute's (TTI) travel time index for San Diego, which has gone up from 1.23 in 1997 to 1.37 in 2007.[32] Similarly, the ranking of San Diego in terms of shortest average daily commute travel time among metropolitan areas in the U.S. dropped from 6th in 2000 to 8th in 2004.[33] While the lack of investment[34] in roadway capacity across the region (as measured by freeway lane-miles relative to vehicle traveled miles), is a contributing factor to recurring congestion and longer travel time, demand side pressures are also significant due to population growth and increases in trade.

Some of the more noticeable gaps in the San Diego County system include the following:

- Lack of a direct freeway connection to the Otay Mesa POE (being planned);
- Lack of a direct freeway connection between the Port of San Diego Marine terminals at Tenth Avenue Marine Terminal (TAMT) and National City (being planned);
- Lack of direct freeway connections to the airport cargo terminal (Lindberg Field);
- Lack of direct freeway connections to rail yards and intermodal facilities;
- Lack of dedicated truck lanes, passing lanes, and truck bypass routes across the region;
- Segments of I-5, I-805, and I-15 in San Diego County have reached capacity levels and are considered bottlenecks;
- Limited capacity on rail systems for transfer of goods from Tenth Avenue Marine Terminal, places additional trucks on the highway for movements that could be served by rail; and
- Extremely high land use costs around the working waterfront and no land use protections for freight related infrastructure.

[32] The TTI Travel Time Index measures congestion, with the ratio representing travel time in the peak period to travel time in free-flow.
[33] The ranking is established by SANDAG.
[34] Annual average highway investment from 1992 to 2002 for the region is only about 83 percent of the state and nation's average of $34,346 per 1,000 persons; "Building a Foundation to Achieve Global Competitiveness: San Diego Regional Economic Prosperity Strategy," Volume 2, SANDAG, March 2008.

2.1.2 Rail Infrastructure

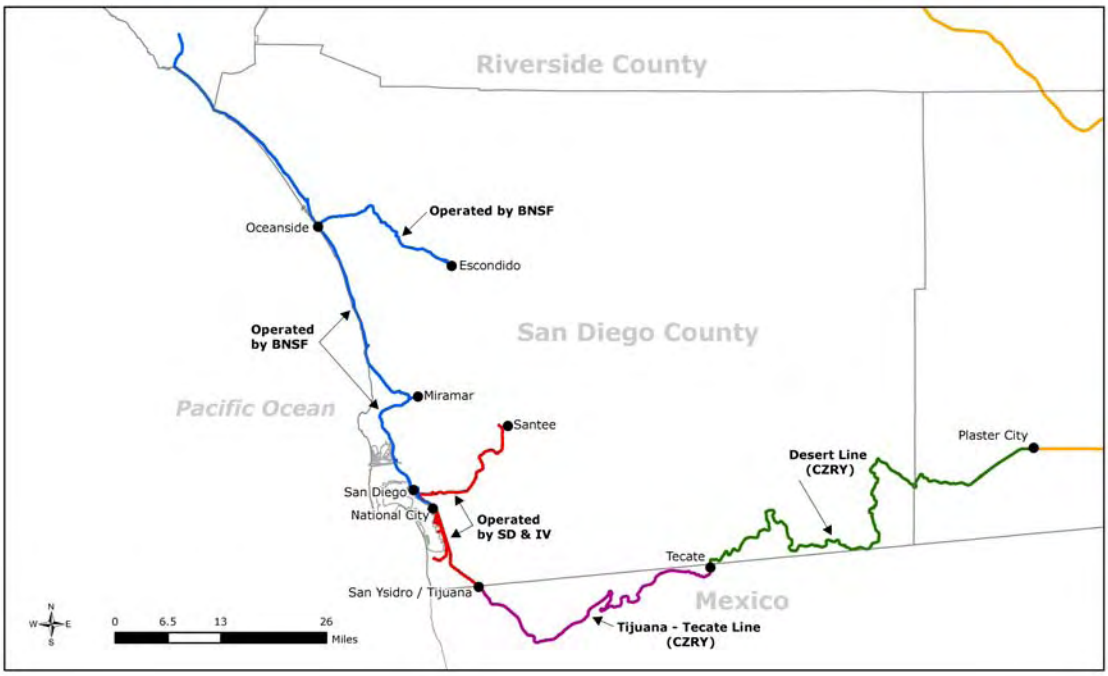
Rail carries a smaller percentage of total regional freight than trucks, but the rail yards and mainline infrastructure are both important and strategic. Our analysis indicates that in 2007 the value of freight transported by rail in the region amounted to less than 2 percent of overall freight flows (see Chapter 3). Existing services include Burlington Northern Santa Fe's (BNSF) automotive and "manifest" trains [35] from San Diego to the north, and San Diego County and Imperial County's (SD&IV) short line trains from San Diego to the south and the east.

2.1.2.1 Existing Rail Lines and Ports of Entry

San Diego County is served by several rail companies that own and/or operate rail facilities within the county.

In the northern part of the county along the I-5 corridor, BNSF operates on a line owned by North County Transit District (NCTD) and Metropolitan Transit System (MTS), which connects Santa Fe Depot in downtown San Diego with the Orange County line to the North. Specifically, BNSF operates on two segments of the system, from Oceanside to Escondido, and from Oceanside to downtown San Diego and to the National City Marine Terminal (this segment is owned by BNSF).

Figure 8: Rail Lines in San Diego County



Source: Team HDR

[35] A manifest train is a freight train with a mixture of car types and cargoes; it is also known as a mixed freight train.

In the southern portion of the county, San Diego and Imperial Valley Railroad (SD&IV), a subsidiary of Fortress Investment Group (formerly Rail America Inc), operates two short lines owned by Metropolitan Transit System (MTS). One line connects the Santa Fe Depot in downtown San Diego with the San Ysidro border crossing and freight yard; another with the City of Santee, to the east.

Additionally, the Carrizo Gorge Railway (CZRY) owns the rights to operate limited service between the Mexican border at San Ysidro/Tijuana through Mexico to Division (near the Mexican border at Tecate) and on to Plaster City in the western part of Imperial County. The section between Tijuana and Tecate is owned by the Mexican government while the section between Tecate and Plaster City is owned by MTS. However, the portion between Division and Plaster City is currently closed due to bridge repairs.

2.1.2.2 Gaps in Existing Rail Infrastructure

Freight trains in the county move along corridors shared with multiple transit agencies. Thus, BNSF shares the heavily utilized LOSSAN Corridor[36] with Amtrak Intercity Rail, Coaster commuter rail services and Metrolink. BNSF also shares tracks with light rail service SPRINTER between Oceanside and Escondido. Similarly, SD&IV shares the South Line, from downtown San Diego to San Ysidro, with trolley commuter services operated by MTS.

The dual use of tracks, often in very congested urban areas with limited ability to lay new tracks, is a major constraint on existing operations and a challenge for future growth. Freight service on the South Line, for example, is currently restricted by federal regulations to two trains operating each night within a window specified by San Diego Trolley, Inc. Furthermore, this operating window is often impacted by maintenance activities.[37]

Although there are projects planned to increase mainline throughput, carload capacity is primarily limited by the capacity of the rail yards. The BNSF San Diego yard has an estimated manifest capacity of around 1.75 million tons per year, while auto capacity is estimated at 500 thousand tons per year. In terms of cross-border rail movement, current capacity is estimated at about 1.6 million tons per year.[38]

To summarize, a number of gaps – or deficiencies – within the existing system are evident. They include:

- Shared passenger and freight rail lines on Metropolitan Transit System (MTS) owned tracks from downtown San Diego to the Mexican border and to the City of Santee, resulting in short operating windows which limit rail car throughput;

[36] Along the Los Angeles - San Diego corridor, the second busiest passenger corridor in the U.S.
[37] Trade Corridors Improvement Fund (TCIF), San Diego / Border Region Project Nominations, SD&AE South Line Goods Movement Improvements, pages 1-2
[38] South Line Rail Goods Movement Project Study Report

- Underutilized rail yard[39] at Tenth Avenue Marine Terminal and inadequate truck/rail transfer facilities including train storage tracks, and warehousing;

- Single track sections for freight on the LOSSAN corridor;

- Limited facilities to stage trains near the Mexican border at San Ysidro (being developed); and

- Limited ability to develop new truck/rail facilities near border crossings and warehouse districts.

Proposed rail improvements in the county could improve the performance of the network in the short term. These proposed projects include:

- Increasing storage capacity at the San Ysidro yard (being planned);

- Improving the signaling system for the South Line (being planned);

- Double tracking bottlenecked areas served currently by single track in the Los Angeles - San Diego (LOSSAN) Corridor (a few segments being planned); and

- Automobile handling improvements at the National City Marine Terminal.

2.1.3 Seaport Infrastructure

2.1.3.1 Existing Seaport Infrastructure

The Port of San Diego is located approximately 10 miles from the Mexican border and is the first port in the U.S. for vessels coming from the west coasts of Mexico, and Central and South America.

The Port's activity is split between two separate marine cargo terminals, both located within the San Diego Bay: the Tenth Avenue Marine Terminal (TAMT) and the National City Marine Terminal (NCMT).[40] The port is designated by the Department of Defense as a strategic port, which may be called upon to support military activities.

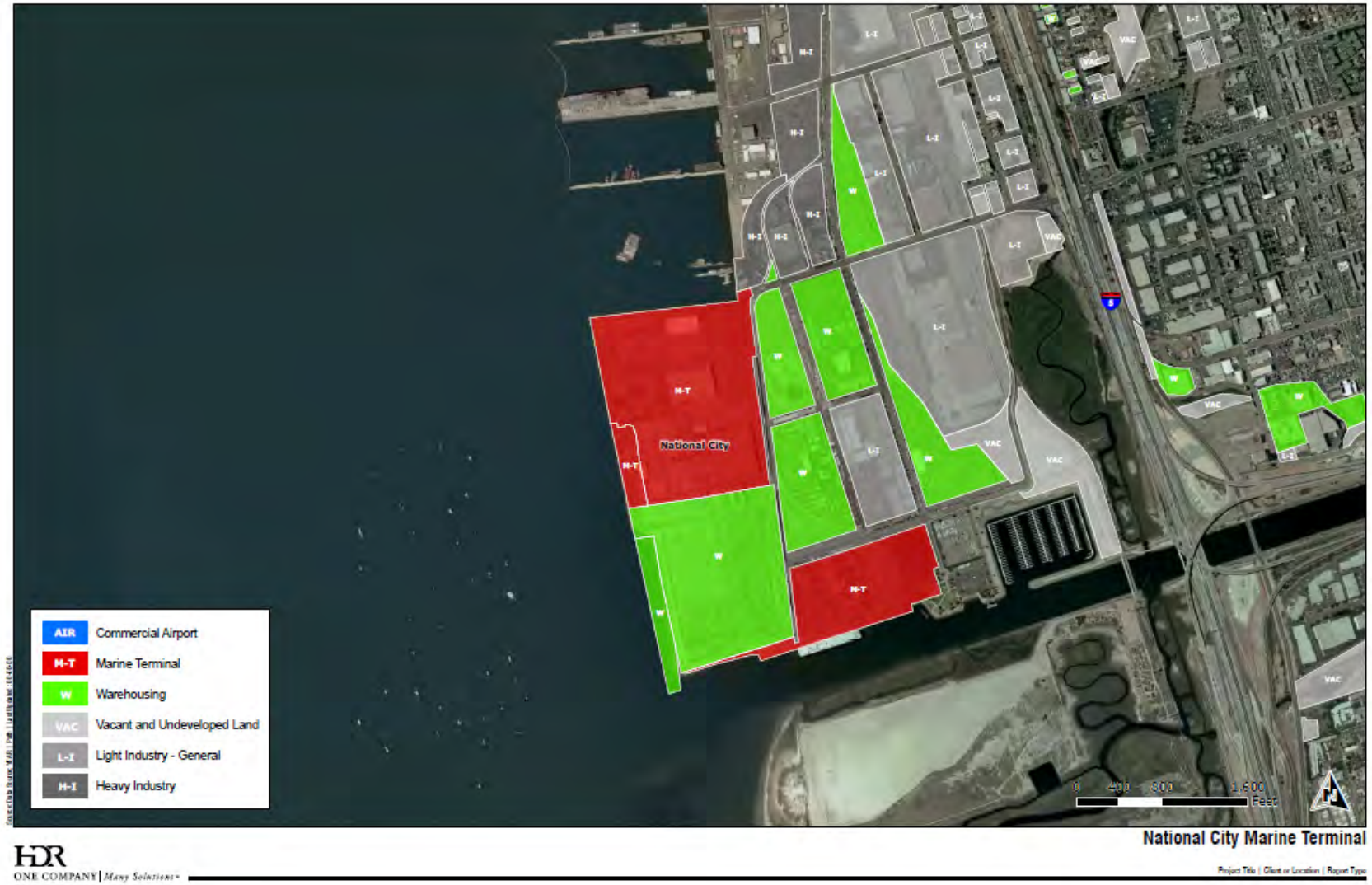
TAMT is a 96-acre cargo complex located near downtown San Diego, south of the Convention Center and north of the San Diego-Coronado Bay Bridge. It houses 23 acres of warehouses and transit sheds and 8 berths, with another 25 acres of paved open space for lay down of steel and project cargo. Tenants at TAMT handle containerized and break-bulk fruit, dry bulk cargos including sand and cement, petroleum products, and various break-bulk and project cargos. The theoretical maximum capacity of TAMT is approximately 4.9 million metric tons per year.

[39] Utilization partly depends on the type of cargo. The tracks are not currently used because windmill components are the preferred cargo at this time, and those components are stored on the tracks.
[40] This description borrows heavily from the San Diego Unified Port District Maritime Business Plan Update, dated December 2008

NCMT is further inside San Diego Bay, south of TAMT and approximately 10 nautical miles from the harbor entrance. The terminal is located at the end of Bay Marina Drive in the city of National City. It covers 125 acres and houses 8 berths. Lumber and automobiles are the primary cargos currently moving through NCMT. The theoretical maximum capacity of the terminal is approximately 1.2 million metric tons per year.

Figure 9: Tenth Avenue Marine Terminal

Figure 10: National City Marine Terminal

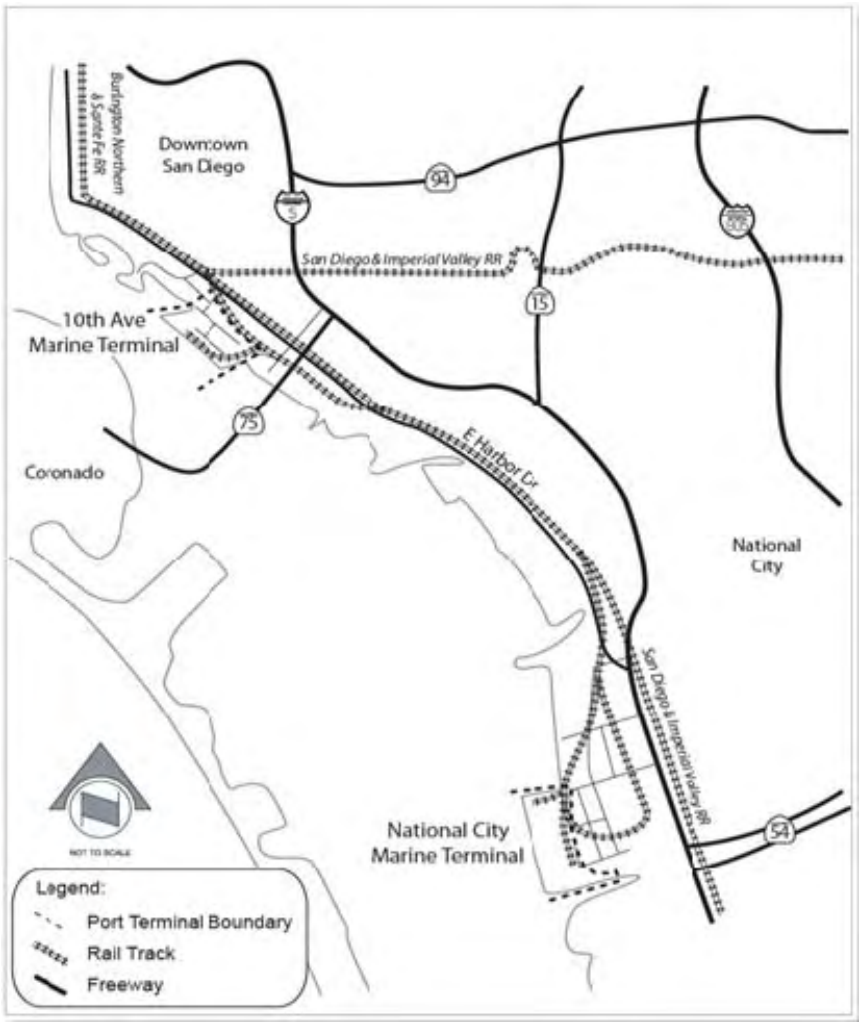


Goods move in and out of the Port by road or by rail. TAMT and NCMT both have on-site rail, owned and maintained by the Port of San Diego.

All rail services leaving the terminals are operated by BNSF.

California State Route 15 and Interstate 5 are in close proximity of the TAMT and NCMT. Though a portion of port traffic does travel via Interstate 5, it is used less frequently than State Route 15. California State Routes 54 and 94 are also near the Port, but are rarely used as long-haul trucking routes.[41]

Figure 11: Transportation Network Serving TAMT and NCMT



Source: San Diego Unified Port District Maritime Business Plan Update 2008

[41] San Diego Unified Port District Maritime Business Plan Update, December 2008, page 2-23

2.1.3.2 Gaps in Existing Seaport Infrastructure

The San Diego Unified Port District is aggressively working to increase cargo capacity, a few gaps in the current infrastructure require attention in order to accommodate cargo growth. According to the 2008 Port Business Plan Update,[42] some of the most noticeable gaps include:

- Limited freeway access to existing marine terminals (being addressed by port access improvement at 10th Avenue, 32nd Street, Civic Center and Bay Marina Intersections);
- Insufficient open-air storage area and underutilized covered storage buildings at TAMT;
- Effectiveness of truck loading and weighing processes at TAMT is not maximized (although this is not constraining the Port's ability to increase freight movement); and
- Wharf expansion required at NCMT to maximize automotive import throughput (being addressed with a NCMT wharf expansion project).

2.1.4 Airport Infrastructure

2.1.4.1 Existing Airport Infrastructure

The San Diego International Airport, also known as Lindbergh Field, is located in the northwest portion of the downtown area, within the City of San Diego. The airport is bounded by North Harbor Drive and San Diego Bay to the south, the Navy water channel and Liberty Station to the west, the Marine Corps Recruit Depot to the north and Pacific Highway and Interstate 5 to the east.[43] Land in the vicinity of the airport is densely developed and has high developable value, making any future airport expansion unlikely. The figure below shows an aerial photograph of the San Diego International Airport facilities.

[42] San Diego Unified Port District Maritime Business Plan Update, 2008
[43] San Diego International Airport Master Plan, Final Environmental Impact Report, April 2008, page 2-3

Figure 12: San Diego International Airport, Lindbergh Field

With just 661 acres, the San Diego International Airport is the smallest "major airport" site in the United States. It features a single 9,400-foot long east-west runway supported by one full-length parallel taxiway on the south, and one partial-length parallel taxiway on the north. There are currently two main terminals and one commuter terminal, serving domestic and international passengers. Most support facilities are located north of the runway. They include general aviation facilities, air cargo facilities, related aviation support facilities and rescue and fire fighting facilities.

The cargo facilities are used by a limited number of operators, including commercial airlines, courier services, a single cargo company (Capital International Cargo), and the U.S. Postal Service. The largest cargo loading area is run by Federal Express; it occupies 11.0 acres of the airport's total cargo handling area of 16.6 acres.[44]

In 2005, cargo operations (departures and arrivals of cargo aircraft planes) represented about 3.5 percent of all airport operations.[45] Air cargo operations are constrained due to limited expansion opportunity, as the airport is located in the downtown area. San Diego had been seeking to relocate the airport for over two decades, to a location that would allow for expansion of both passenger and freight facilities.[46]

Regional access to the airport is provided by Interstate 5 and Interstate 8. Approximately 66 percent of traffic accesses the airport via the interstates, with 34 percent accessing to/from I-5 South, 17 percent to/from I-5 North, and 15 percent to/from I-8 East. The remaining 34 percent of airport traffic accesses the airport via local streets with 22 percent heading south along North Harbor Drive, Pacific Highway and Kettner Boulevard. I-5 runs adjacent to the north side of the airport and access to and from I-5 is provided from Grape and Hawthorn Streets to the south and Laurel / India Streets and Pacific Highway to the north. I-5 provides access to the local streets that bound the airport: North Harbor Drive to the south which provides access to the terminal facilities, Pacific Highway to the northeast which provides access to facilities in the north, and Rosecrans Street to the west.[47]

The table below provides an overview of congestion levels around the airport, through estimates of level of service for selected roadway segments. The table was derived from traffic estimates compiled for the 2008 Final Environmental Impact Report.

[44] Federal Express has begun construction of a $26 million distribution center in Otay Mesa. The center will occupy 165,000 square feet of land and employ more than 200 workers.

[45] 7,400 out of 209,500 operations for the year; or 20 out of 570 daily; from San Diego International Airport Master Plan, Final Environmental Impact Report, April 2008, page 2-13

[46] Most recently, the San Diego County Regional Airport Authority (created in 2001 by California State Assembly Bill AB 93) selected Marine Corps Air Station Miramar as its preferred site for a replacement airport. On November 7, 2006, San Diego County residents defeated an advisory relocation, which included a joint use proposal measure (source: Wikipedia).

[47] Destination Lindbergh, by Jacobs Consultancy, Final Report, March 2009, page 2-26

Table 1: Estimated Level of Service at Selected Roadway Segment around the San Diego International Airport

	Segment	Capacity (ADT)	Volume (ADT)	Level of Service
North Harbor Drive	Between Rental Car Access Road and Laurel Street	60,000	80,000	F
Grape Street	Between Kettner Boulevard and Interstate 5	25,000	30,000	F
Hawthorn Street	Between Kettner Boulevard and Interstate 5	25,000	28,000	F
India Street	Between Sassafras Street and Washington Street	12,000	20,800	F
Pacific Highway	Between Palm Street and Laurel Street	50,000	19,000	A
Laurel Street	Between Pacific Highway and Kettner Boulevard	30,000	23,300	D
Rosecrans Street	Between Quimby Street and Barnett Avenue	45,000	42,000	E

Source: Destination Lindbergh, by Jacobs Consultancy, Final Report, March 2009, pages A-4 to A-14; based on Final Environmental Impact Report, San Diego International Airport, Airport Master Plan, by HNTB, April 2008

2.1.4.2 Gaps in Existing Airport Infrastructure

Constrained by its urban core location, the San Diego International Airport faces many challenges to providing adequate goods movement through the region. Air cargo capacity used in this analysis is based on the **Destination Lindbergh Study**, which estimates current capacity at just over 157 thousand tons. The Destination Lindbergh Study also identifies the following deficiencies:

- Lindbergh Field has a unique runway that accommodates both passenger and cargo services; clearly passenger demand is likely to command the most capacity and will soon reach the limits of the single runway; and
- Limited warehousing space on the Terminal forces UPS, USPS and FedEx and other air freight carriers to move and sort cargo off site.[48]

The inherently constrained footprint of Lindbergh Field is contributing to air cargo limitations. Planned short-term air infrastructure improvements include the development of an Intermodal Transportation Center (ITC) on the north side of the airport (with direct access to the airport via Interstate 5) as well as additional warehousing space and air cargo parking aprons.

[48] Overall, cargo capacity at Lindbergh Field is expected to increase to 225 thousand tons by 2030 for both freighter and underbelly cargo.

2.1.5 Warehousing Infrastructure

San Diego County's major warehousing district is in the Otay Mesa area; but significant warehousing and distribution facilities can also be found at Miramar - Sorrento Mesa and in the Port District. Of these three locations, two have rail access (Miramar and the Port District); the service is limited due to land use costs and/or land use conflicts. For instance, direct rail connectivity could be improved at Tenth Avenue Marine Terminal (TAMT).

TAMT has 1 million square feet of warehousing space and transit sheds, which includes nearly 300,000 square feet of refrigeration and cold storage facilities. The terminal also has roughly 32.5 acres of open-air storage, which are currently occupied by Dole Fresh Fruit Company and are used for windmill parts. NCMT has 174 acres of open air storage for lumber and automobiles. It also has over 800,000 square feet of storage for dry and refrigerated cargos.

The Otay Mesa port of entry has bonded warehouses and Foreign-Trade Zone warehouses that permit in bond merchandise (i.e., merchandise considered to be under Customs jurisdiction because it has not entered U.S. commerce) to be stored, transferred, manipulated and/or destroyed. These bonded facilities are closely tied to the maquiladoras (factories) in Mexico.[49] Trucks originating from - or destined for - the Otay Mesa border area move materials, intermediate goods and finished products between assembly plants in Mexico and storage or repackaging facilities in the San Diego region, as well as to destinations outside the county.

[49] Source: Twin Plant News, http://twinplantnews.com

Figure 13: Warehousing Facilities in the Otay Mesa Border Crossing Area

2.1.6 Pipeline System

There are two pipelines in San Diego, the Kinder Morgan (formerly SFPP, LP) for gasoline and aviation fuel, and the WestPac Pipelines, LLL, (formerly Buckeye Petroleum) pipeline for aviation fuel.

The Kinder-Morgan pipeline extends south from the Los Angeles Basin through Orange County into San Diego, and also extends into Imperial County to serve Naval Air Facility El Centro.

The major Kinder-Morgan terminals are located in Mission Valley (which supplies the majority of the gasoline for San Diego County) and Imperial. These terminals are the facilities where gasoline is blended and then loaded onto trucks for final distribution to service stations.

The 4.3 mile WestPac pipeline system extends from the Tenth Avenue Marine Terminal to Lindbergh Field and supplies aviation fuel for the airport. WestPac has a sublease from the Jankovich Company, and receives aviation fuel from the Kinder-Morgan pipeline.

2.2 Imperial County Freight Infrastructure

2.2.1 Road Network and Ports of Entry

Imperial County has a well-developed roadway network that currently meets freight transportation needs. While the existing system is considered adequate, recent population growth and an increase in foreign trade will require infrastructure improvements in order to accommodate future demand projections. The highway system currently handles over 95 percent of all commodity flows across the county: in 2007, over 22 million tons of goods (valued at almost $50 billion) were transported by truck.

The County is connected to Mexico through three (land) ports of entry: Calexico, Calexico East, and Andrade. Only the last two accommodate commercial truck traffic.

The **Calexico East / Mexicali II** Port of Entry serves nearly all commercial truck traffic crossing between Imperial County and Mexicali. It is located roughly 130 miles east of San Diego and 60 miles west of Yuma, Arizona. The port includes 8 passenger lanes, 4 pedestrian lanes, 4 commercial lanes, 1 FAST lane, 1 bus lane, and 1 SENTRI lane. It is served by State Route 7, with direct connection to Interstate 8, about five miles to the north.

The **Andrade / Algodones** Port of Entry is an important gateway for tourism between California and Baja California. This gateway is used primarily by pedestrians from the United States wishing to shop or use medical services in Algodones. The port also accommodates privately owned vehicles, buses, and a limited amount of commercial traffic. It is sometimes used for congestion relief at Calexico East. The Port currently includes 2 passenger lanes, 4 pedestrian lanes, and 1 “informal” commercial lane. Vehicular access to Interstate 8, two miles to the north, is provided by State Route 186.

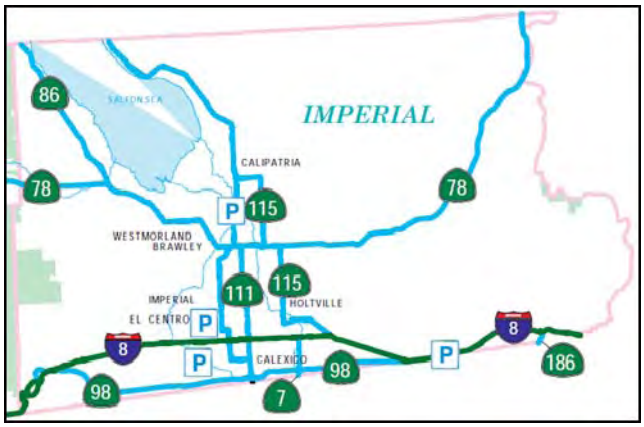
There are three major north-south freight corridors within the county:

- State Route 7 from the Calexico East border crossing;
- State Route 111 from the Calexico border crossing; and
- State Route 86.

There are also two major east-west corridors:

- Interstate 8 which originates in San Diego County; and
- State Route 98 which runs parallel to Interstate 8 through most of the county.

Figure 14: Major Truck Routes in Imperial County



Source: Adapted from CALTRANS District 11, Truck Networks on California State Highways, November 2009

According to the Imperial County "2007 Transportation Plan Highway Element" some of the most noticeable gaps in the county's truck network include:

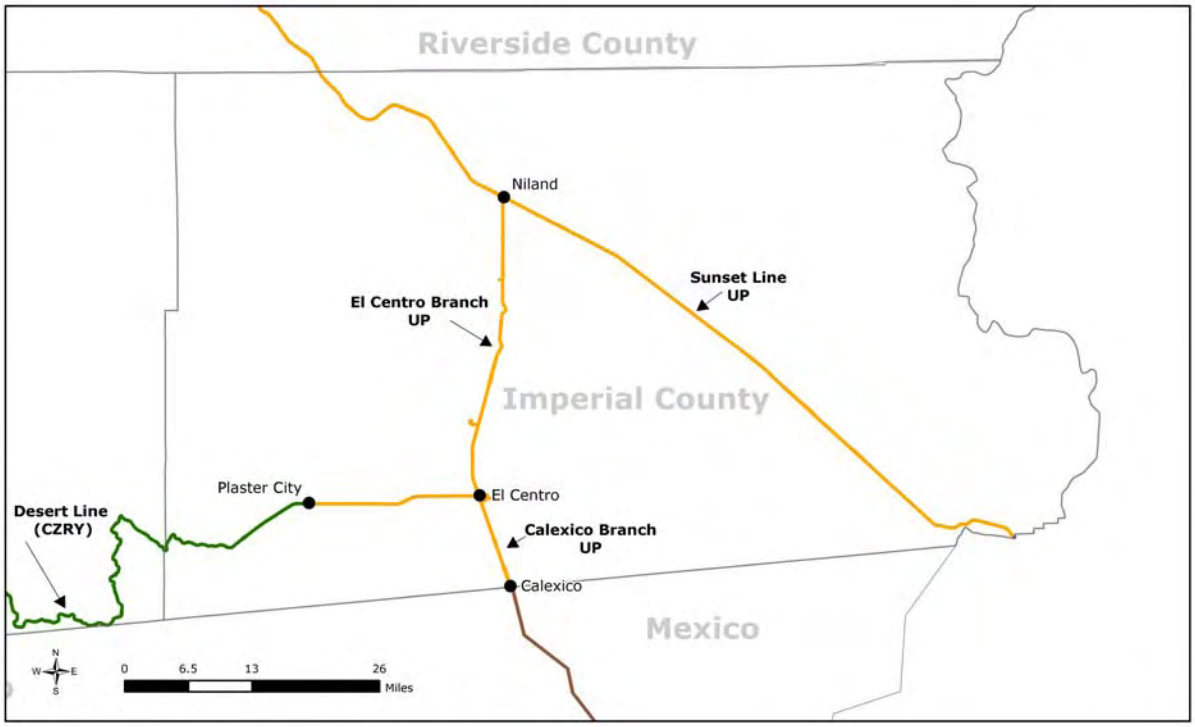
- Lack of direct freeway connections to rail yards and intermodal facilities;
- Lack of dedicated truck lanes, passing lanes, and truck bypass routes; and
- High truck traffic through urban areas including Brawley and Westmorland.

2.2.2 Rail Infrastructure

Imperial County is served by rail connections from Mexico, Riverside County, and Arizona. Commodity flows by rail account for about 3 percent of total commodity flows in the county. This compares to 2 percent for San Diego County (and about 40 percent nationally).

Union Pacific Rail Road (UPRR) owns and operates a line originating at the Calexico border crossing, extending north to El Centro and ultimately connecting with other UPRR tracks at Niland, heading north to Riverside County and southeast to Arizona (Sunset Line). UPRR also owns and operates the section between Plaster City and El Centro. That section is in service, and connects with other UPRR lines at El Centro. Finally, the Carrizo Gorge Railway (CZRY) owns the rights to operate on a small section of tracks in the western portion of the county between the San Diego County line and Plaster City. As noted previously, that section is closed for operations.

Figure 15: Imperial County Rail Lines



Source: SD Freight Rail Consulting

2.2.3 Seaport Infrastructure

Imperial County has no seaport operations, but the county does export products through the Ports of Los Angeles and Long Beach. It also utilizes the Unified Port of San Diego for inbound and outbound cargo shipments.

2.2.4 Airport Infrastructure

Imperial County has a small private passenger airport facility that is not currently capable of handling large volumes of freight. The Imperial County Airport is currently limited to courier services such as Federal Express and UPS, as well as limited automotive parts from Detroit. However, according to the Imperial County 2007 Transportation Plan, the county may ultimately consider development of a dedicated cargo airport.[50]

2.2.5 Warehousing Infrastructure

Imperial County has a number of warehousing facilities adjacent to the Calexico POE and near the junction of the UPRR tracks north of El Centro at Niland.

Trucks originating from and destined for the Calexico area move goods between the Maquiladora industries located on both the United States and Mexican sides of the border at Calexico and Mexicali as well as to other destinations within Imperial County, including El Centro.

[50] 2007 Airport Feasibility / Site Analysis Study for Imperial County, California

Figure 16: Warehousing Facilities in the Calexico Border Crossing Area

Figure 17: Warehousing Facilities in the Calexico East Border Crossing Area

2.3 Baja California Freight Infrastructure

2.3.1 Road Network

According to State and Federal transportation infrastructure agencies (Secretaría de Infraestructura y Desarrollo Urbano (SIDUE) and Secretaria de Comunicaciones y Transportes (SCT), respectively), Baja California has approximately 11,000 kilometers of major roads ("*carreteras*") approximately 2,770 kilometers of which are paved, and approximately 15 percent of which are four-lanes. Most of the four-lane segments are concentrated in the populated areas of the State's five municipalities (Mexicali, Tecate, Tijuana, Rosarito, and Ensenada). Major roads are typically managed under either State or Federal jurisdiction.

Figure 18: Major Roads in Baja California

Source: Secretaria de Comunicaciones y Transportes

There are four major highways in the State. Highway 2 stretches east-west and connects the Tijuana, Tecate, and Mexicali ports of entry along the border with California. From Mexicali, Highway 2 continues east, to San Luis Rio Colorado in Sonora, and the POE there. Highway 1 runs north-south and connects Tijuana with coastal cities and the Port of Ensenada. Highways 3 and 5 also run north-south, with connections to border crossings at Tecate and Mexicali, respectively.

One of the largest road infrastructure projects recently completed in Baja California was the Tijuana - Rosarito Expressway or "*Corredor 2000*" project. This four-lane freeway runs for about 40 kilometers from East Tijuana and the Tijuana - Tecate toll road, along the southern portion of Tijuana, connecting to the Rosarito - Ensenada toll road and Popotla.[51]

Both the State and Federal governments have a variety of road infrastructure improvement projects for the coming years, in particular to address congestion in rapidly growing urban areas (Tijuana and Ensenada).

2.3.2 Rail Infrastructure

There are a total of approximately 220 kilometers of rail line in Baja California. And the state is connected to the United States via two separate rail lines.

The first line, between Tijuana and Tecate, is currently administered by the State of Baja California, with an operational agreement with Carrizo Gorge Railway, Inc. It connects to BNSF and SD&IV lines in San Diego County, and to an SD&IV line in Imperial County, extending from Campo to Plaster City. Recent improvements have allowed for freight services to run between San Diego, Tecate and Plaster City (crossing the border into Mexico at Tijuana, and crossing back into the U.S. at Tecate). This line is used almost exclusively for either imports (into Tecate) or trans-shipments of minerals from Plaster City.

[51] This major infrastructure investment (estimated at US$200 million) includes four nodes and ten bridges, and is expected to greatly facilitate passenger vehicle and cargo trips to the current Otay Mesa I and future Otay Mesa II border crossings – as well as travel between the cities of Tijuana, Rosarito, Tecate and Ensenada.

Figure 19: Tijuana – Tecate Short Line

Source: Administradora de la Via Corta Tijuana-Tecate

The second rail line passes through the Calexico/Mexicali port of entry. It extends throughout the U.S. via connections to Union Pacific's lines at Calexico, and throughout Mexico via connections to Ferromex's lines, heading south-east out of Mexicali.

Major proposals for improving Baja California's rail infrastructure appear to be in planning stages only. Specific projects include:

- Punta Colonet: should the Punta Colonet Marine Port be developed (see Section 2.3.3), it is likely that rail infrastructure will be improved, with rail service between Punta Colonet and possibly Mexicali and Tecate;
- El Sauzal: proposals to create a rail line connecting the existing El Sauzal Port (north of the Port of Ensenada) to Tecate have been prepared; and
- Tijuana Intermodal Terminal: some rail improvements may be funded, should this project move forward.[52]

[52] The Tijuana Intermodal Terminal would combine trucking, a rail spur, Customs facilities, and a Foreign Trade Zone designation in a 130+ acre logistics park adjacent to the existing Toyota factory in Tijuana. This project has received some funding from the U.S. Trade & Development Agency (for a feasibility study).

2.3.3 Seaport Infrastructure

Baja California enjoys a strategically important location for seaport infrastructure in Mexico, with a strong focus on tourism (cruise ships) and a secondary focus on commercial shipping.

Figure 20: Container Ship at Puerto de Ensenada

Source: Administración Portuaria Integral de Ensenada

Baja California currently has five seaports: Puerto de Ensenada (the second-largest cruise ship destination on Mexico's Pacific Coast and the fifth busiest container port in Mexico);[53] Puerto del Sauzal de Rodríguez (for cabotage); Puerto de Rosarito (used primarily for PEMEX-related petrochemicals); Puerto Isla de Cedros (an island off of Baja California's coast specializing in mineral exports, primarily salt); and Puerto de San Felipe (used primarily for tourism, personal boating and fishing).

Within the coming decade, the expansion of existing infrastructure and likely construction of a new seaport are expected to increase both cruise ship and commercial shipping activities significantly.

Puerto de Ensenada is being expanded, with the addition of a new wharf and terminal capacity. It has also started a dredging process that will allow deeper draw for commercial vessels. The port ultimately projects a capacity of up to 500,000 TEUs annually.[54]

The federally envisioned "Punta Colonet" project is a proposed new seaport to be located approximately 80 miles south of Ensenada and 150 miles south of Tijuana. The Federal Government has already reserved 205 acres of land and over 6,600 acres of water surface area for the project. As conceived, Punta Colonet would accommodate up to 6 million TEUs of cargo by 2020. New rail infrastructure is planned as part of the project with likely connections to the U.S. somewhere between Mexicali, Yuma, Nogales, or Santa Teresa. Possible connections may also be developed with the Tijuana – Tecate Short Line at Tecate. New road infrastructure and possible intermodal facilities may be developed in the Tijuana and/or Tecate region (or potentially as far east as Jacumba) to accommodate additional truck traffic related to the port's activities.

[53] In 2007, the port handled over 127,000 TEUs (nearly 50 per cent of which, it is estimated, related to maquiladora shipments).

[54] No significant improvements are expected at the other four existing ports.

2.3.4 Airport Infrastructure

Airport infrastructure in Baja California comprises four main airports, only two of which (Tijuana and Mexicali) are currently able to accommodate larger aircrafts.[55]

- **Tijuana – General Abelardo L. Rodriguez International Airport (TIJ)**: the largest and busiest of Baja California's airports, TIJ is located in the Mesa de Otay region of Tijuana, directly across the border from San Diego. The airport covers an area exceeding 900 acres, with a main terminal of approximately 230,000 square feet, including 23 gates and 169 commercial spaces. TIJ's runway is 9,711 feet long, making it the largest runway in the region after Miramar. In 2008, TIJ accommodated 65,400 operations and approximately 4.0 million passengers. 13,260 tons of cargo were handled (split almost evenly between inbound and outbound flows), representing about 85 percent of all air cargo in Baja California. [56]

Figure 21: Tijuana International Airport

Source: Grupo Aeropotuario del Pacifico

- **Mexicali – General Rodolfo Sanchez Taboada International Airport (MXL)**: located approximately three miles south of the border with the United States, MXL is designated as an international airport but is only served by three Mexican airlines (with, occasionally, international charter flights and some cross-border general aviation). The entire airport property is approximately 1,400 acres but only a small portion of this area is occupied by airport facilities (the main terminal is approximately 50,000 square feet). MXL's runway is 8,530 feet. In 2008 the airport handled 12,450 operations, 533,800 passengers and approximately 2,100 tons of cargo (all domestic).[57]

- **San Felipe – San Felipe International Airport (SFH)**: significantly smaller than the previous two airports, SFH operates during limited hours (generally during daylight), and is used for general aviation and charter flights. It has an asphalt runway that is 4,850 feet long. In 2007, the airport handled approximately 6,095 operations and 14,355 passengers.

[55] In addition to these four airports, there are also 86 smaller, less-used, and/or more-informal airstrips distributed across the state. These strips are used by local residents, farmers, tourists, or the military (given limited road infrastructure and low density in Baja California's rural areas).
[56] Preliminary estimates
[57] Preliminary estimates

- **Ensenada – Base Aérea El Ciprés (ESE)**: the airport in Ensenada has been used primarily as a military base for the Mexican Air Force, as well as for general aviation (no commercial airline currently serves the airport). Like SFH, it has an "international" designation to allow for incoming flights from the U.S. to check in with Customs and Immigration officials. Its runway is 4,892 feet long. In 2007, the airport handled approximately 7,450 operations and 13,995 passengers. No cargo is known to have passed through the airport.

Planned improvements for air cargo facilities in Baja California include the following:

- **Tijuana**: a consortium of investors has purchased a 55-acre lot directly north of the airport (in U.S. territory) that could be used for a proposed Crossborder Terminal. This concept has received preliminary support from regional groups, as well as the Mexican Government. It could become reality within the next 5 to 10 years. If developed, the terminal could increase the usage of TIJ both for domestic and international flights, as well as become a hub for international cargo.
- **Ensenada**: for several years, a private group has advocated the development of a major air cargo facility close to Ensenada. This proposal would establish a new airport – Ensenada International Airport (EIA) – outside of the City of Ensenada (and away from the current site at El Ciprés), and would be intended specifically as a cargo hub for Northwest Mexico. In 2007, the Government of Mexico awarded a 30-year concession to the group to construct, administer and operate the proposed airport. In March 2009, the U.S. Trade and Development Agency authorized a $630,000 grant to develop a plan for building the airport.

2.3.5 Warehousing Infrastructure

As illustrated in Figure 22, there is a density of warehousing, maquiladora and light duty operations in Baja California, along the U.S. - Mexico border. These facilities are generating a lot of the traffic passing through California's land POEs, although an exact quantification of that traffic is not possible.

While it is believed that warehousing and logistics are important sectors of the state economy, no statewide inventory of warehousing, customs agents or third-party logistics companies is available. The following is known:

- As of 2007, approximately 5,030 companies operated cargo and/or trucking services in Baja California, over 90 percent of which were independent, sole-proprietorships. About 340 corporations offered general cargo services; another 80 offered specialized cargo services.
- In Mexico's 2004 Economic Census, at least 175 companies were identified as "Agencias Aduanales" (Customs Brokers) operating in Baja California. Many of these companies offered warehousing services. Another 178 companies were specifically listed as "foreign cargo trucking" companies.

Figure 22: Warehousing and Maquiladora Facilities on the Mexican Side of the Otay Mesa Border Crossing Area

Source: Google map

3 ESTIMATES OF EXISTING FREIGHT FLOWS

In this chapter, we present detailed estimates of existing freight flows in the San Diego – Imperial Valley region. We start with a brief description of the data sources and methodology used to derive the estimates.

3.1 Data Sources and Methodology

Our study relies on the **IHS Global Insight Transearch** database and international trade forecasts as the primary sources of information.

The Transearch database is a nationwide database of freight flows between U.S. counties,[58] with an overlay of infrastructure data. The database draws from a wide variety of data sources covering commodity volumes and modal flows, including a long term, proprietary motor carrier traffic sample, proprietary railroad data, and numerous commercial and federal government samples and surveys.

The database is structured as a set of county-level origin-to-destination flows by commodity for seven modes of transportation: for-hire truckload, less-than-truckload, private truck, conventional rail, rail/truck intermodal, air, and water.[59] Volumes are first estimated in terms of tonnage, then translated into units (such as truck counts), value, vehicle miles traveled, and ton-miles using conversion tables and route distances.

For any given county, traffic estimates include flows that are **intra-county** (with origin and destination within the county), **inbound** (with origin outside the county, and destination inside the county), **outbound** (with origin inside the county and destination outside the county), and **through** (with origin and destination outside the county, but passing through the county). Through volumes are estimated with modal routing models applied to nationwide data. All other flows are estimated on the basis of state and county level production volumes by industry or commodity.

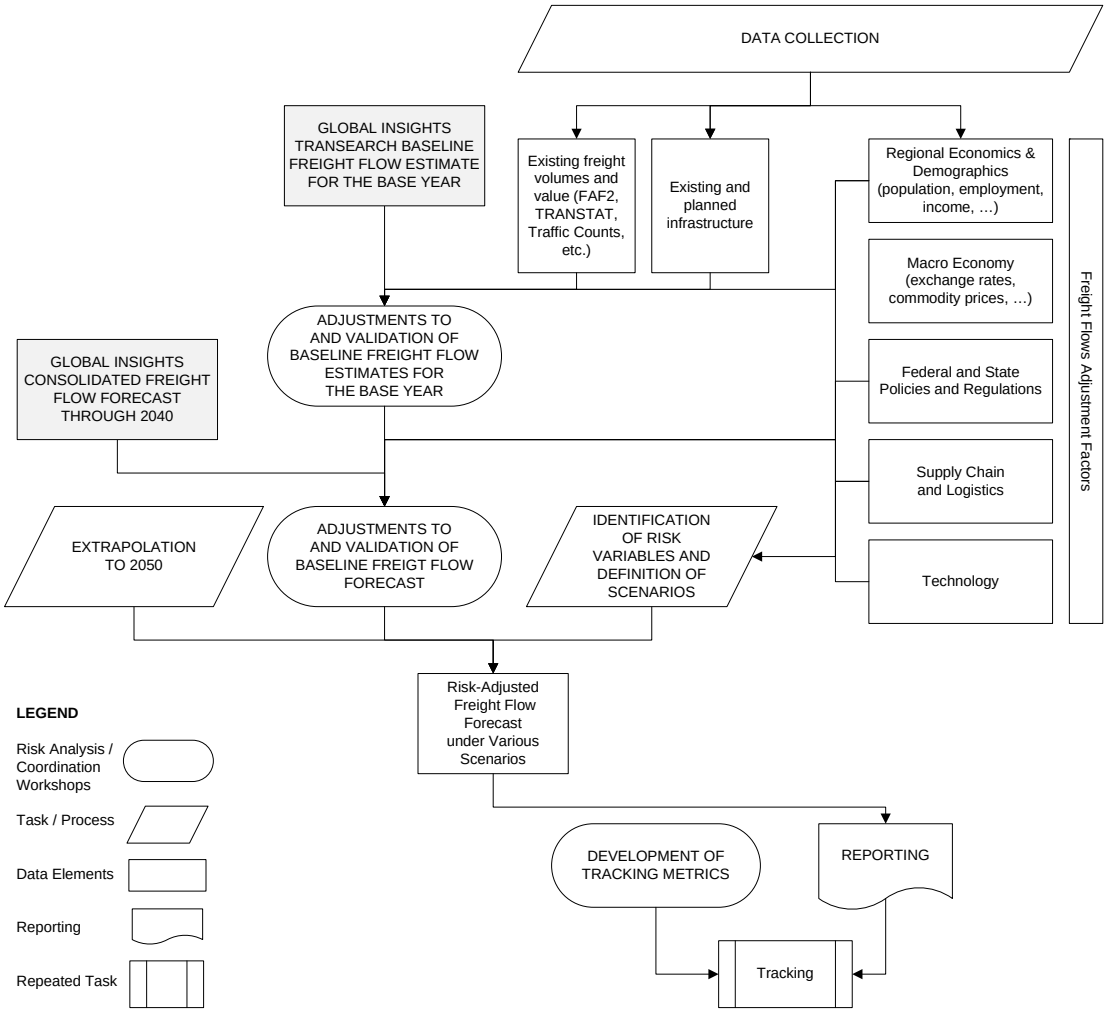
A number of additional data sources (including national and regional databases, master plans for key infrastructure facilities, and interviews with regional freight stakeholders) were used to address known limitations of Transearch and to produce the final estimates and forecasts needed for the study.

Figure 23 below provides an overview of our approach. It highlights the data elements and other resources used in the preparation of our forecast.

[58] Or ZIP codes

[59] Where the mode of transportation is unknown, the shipment is included in an "other" or "unknown" grouping.

Figure 23: Approach Overview



*Note: * Adjustments to the baseline estimates and forecast are presented in Figure 25.*

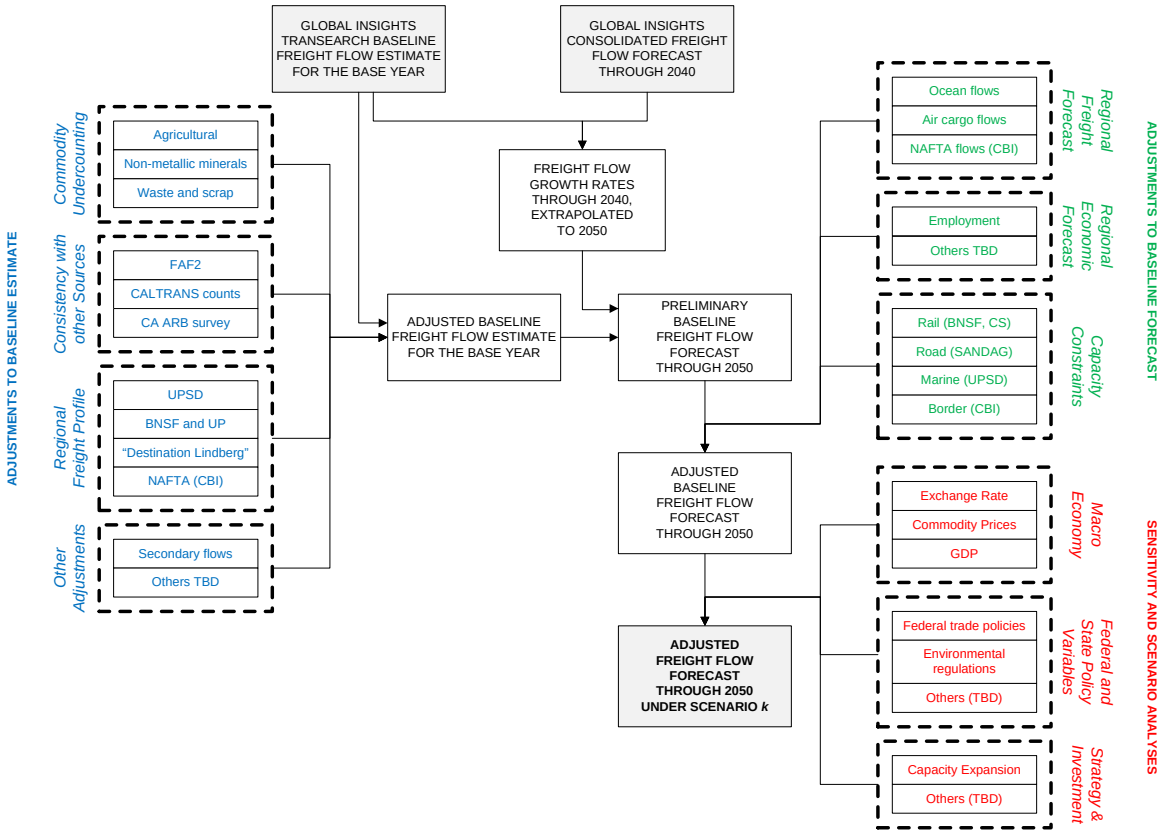
The above figure also illustrates the principal tasks undertaken in the course of the study, which consist of the following: data collection (including data review and processing); adjustments to, and validation of, the Transearch "baseline" freight flow estimates and forecast; identification of key freight determinants ("risk variables") and simulation of alternative growth scenarios; development of tracking metrics; and reporting.

Adjustments to the baseline estimates and forecasts are described in the figure below; they include:

- **Adjustments to the baseline estimates in Transearch**: Adjustments for commodity undercounting (commodities such as agricultural commodities or waste material are known to be undercounted in Transearch); adjustments to ensure consistency with other data sources (such as FHWA's Freight Analysis Framework or Caltrans' traffic counts) or with freight statistics available from regional stakeholders (Rail Carload data from BNSF, for example).

- **Adjustments to the baseline forecast in Transearch**, to reflect existing and future capacity constraints in the region or to ensure consistency with available regional economic and/or freight forecasts.[60]

Figure 24: Adjustment Process Overview



Sensitivity and scenario analyses consist of assessing the impacts (on the adjusted baseline freight forecast) of changes in assumptions related to the economy (e.g., growth in real GDP or regional employment), to infrastructure investment and planning (e.g., opening of a new land port of entry at Otay Mesa, or closure of the Tenth Avenue marine terminal), or to federal and state policies.

Besides Transearch, our approach uses a variety of data and information sources, including the following:[61]

- FHWA's Freight Analysis Framework database;
- Data on border crossings and cross-border freight flows from the U.S. Customs and Border Protection and Bureau of Transportation Statistics;

[60] Adjustments to the baseline estimates and baseline forecast from Transearch are presented in detail in a separate, technical memorandum.

[61] Transearch itself is based on a number of data sources, including proprietary samples and surveys, developed and maintained by IHS Global Insights. These data sources are presented in Appendix A.

- National income and product accounts tables from the Bureau of Economic Analysis, U.S. Department of Commerce;
- Occupational employment statistics, from the California Department of Finance, Labor Market Information;
- Regional input-output matrices from the Minnesota Implan Group (IMPLAN);
- Survey data from Caltrans, including traffic counts and Weigh in Motion (WIM) reads;
- Port commodity tonnage data from the U.S. Army Corps of Engineers;
- San Diego International Airport's master plan, prepared by the San Diego County Regional Airport Authority;
- BNSF's rail carload data;
- Commodity-specific data sources, including databases maintained by the County Agricultural Commissioners (statistics on agricultural production) or the California Integration Waste Management Board (data on waste production from recycling centers and landfills); and
- Various planning documents prepared and provided by SANDAG.

Our analysis also relies on the involvement of regional freight stakeholders and subject matter experts, convened to review our methodology and baseline forecast in the context of coordination and risk analysis workshops facilitated by Team HDR and hosted by SANDAG.

In the following sections, we summarize adjusted regional freight flow estimates for 2007, the most recent estimates available from IHS Global Insight. Freight forecasts are introduced and discussed in the next chapter.

3.2 Estimates of Freight Flows passing through the Region's Gateways

In this section we present regional freight flow estimates for all major freight gateways in the region:

- Land ports of entry: Otay Mesa, Tecate, Calexico East and Andrade;
- Rail ports of entry, at San Ysidro and Tecate;
- The Unified Port of San Diego terminals; and
- The San Diego International Airport.

We then provide a regional summary by transportation mode, commodity grouping and origin-destination. Estimates of grand total freight flows are presented last.

3.2.1 Estimates of Freight Flows by Truck passing through the Region's Land Ports of Entry along the Border with Mexico

According to Customs and Border Protection (CBP) data, a total of 816,085 trucks entered the region through San Diego POEs in 2007 (loaded and empty trucks combined).[62] There were about 520,050 incoming loaded containers and 292,550 incoming empty containers.[63] Traffic through Imperial County was lighter. There were 323,826 incoming trucks, carrying a total of about 181,510 loaded containers and 145,270 empty containers.

Table 2: Number of Trucks or Truck Containers Entering the United States through California POEs, 2007 Customs Data

California Truck POEs	Number of incoming trucks	Number of incoming loaded truck containers	Number of incoming empty truck containers
Calexico East / Mexicali II	323,348	181,114	145,272
Andrade / Algodones	478	396	0
Imperial County Total	**323,826**	**181,510**	**145,272**
Otay Mesa / Mesa de Otay	738,765	477,822	257,483
Tecate	77,320	42,232	35,067
San Diego County Total	**816,085**	**520,054**	**292,550**
Gateway Region Total	**1,139,911**	**701,564**	**437,822**

Note: The number of outgoing trucks is not recorded as part of Customs data. The number of incoming trucks is not exactly equal to the sum of incoming loaded containers and incoming empty containers, as incoming trucks may be empties or equate to more than one container.
Source: U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data and based upon Customs data.

The number of incoming trucks in Table 2 is based on Customs data and differs from the estimates in subsequent tables throughout the study, which are based on average payload factors.

As indicated in Table 2, the majority of trucks entering the region from Mexico came in through ports located in San Diego County. At least two thirds of incoming shipments came through the Otay Mesa POE, while most of the rest came through the Calexico East POE, in Imperial County. .

Imports by truck into and through San Diego County are summarized in Table 3 below. **The estimates in this table were derived from the database developed for this study (and described in Section 3.1). They differ slightly from the Customs data reported by the Bureau of Transportation Statistics.** As can be seen in Table 3, most

[62] Number of truck crossings, not unique vehicles, excluding privately owned pickup trucks.
[63] U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data

commodities coming through the border were headed outside the county: 80 percent of the total in terms of volume, and over 90 percent in terms of value. Similarly, just about 10 percent of all incoming loaded trucks had a final destination in the county.

Table 3: Shipments by Truck from Mexico to the United States through San Diego County POEs, 2007 Estimate *

Through San Diego County POEs	Volume (million tons)	Assumed number of loaded trucks **	Value ($ million)	Average ($ per ton)
From Mexico to San Diego County	0.432	39,141	$1,395	$3,232
From Mexico to the Rest of the U.S. (including CA)	3.417	317,459	$21,283	$6,229
Total	**3.849**	**356,599**	**$22,678**	**$5,893**

*Notes: * Otay Mesa and Tecate POEs combined. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*
Source: Team HDR analysis

The volume and value of exports through San Diego POEs are reported in Table 4 below. The total amount exported was about 1.6 million tons higher than the total amount imported. However, in value terms, trade exported from the US (by truck) to Mexico was -$11.4 billion less than the trade imported (by truck) from Mexico to the U.S. The average value per ton of the commodities *exported* by truck through San Diego POEs was only about 35 percent of the value per ton of *imports*.

Table 4: Shipments by Truck from the United States to Mexico through San Diego County POEs, 2007 Estimate *

Through San Diego County POEs	Volume (million tons)	Assumed number of loaded trucks **	Value ($ million)	Average ($ per ton)
From San Diego County to Mexico	0.411	39,456	$1,244	$3,024
From the Rest of the U.S. (including CA) to Mexico	5.034	498,799	$9,992	$1,985
Total	**5.446**	**538,255**	**$11,236**	**$2,063**

*Notes: * Otay Mesa and Tecate POEs combined. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*
.
Source: Team HDR analysis

The amounts traded through Imperial County's POEs by truck are reported in the following two tables. As can be seen in Table 5, most of the goods coming in through Imperial County's POEs had a final destination outside the county. Total volume was about 2 million tons less than the amount handled in San Diego County (1.8 vs. 3.8 million tons). The average value per ton was about $800 lower than at San Diego County's POEs, with an aggregate value of $9.5 billion.

Table 5: Shipments by Truck from Mexico to the United States through Imperial County POEs, 2007 Estimate *

Through Imperial County POEs	Volume (million tons)	Assumed number of loaded trucks **	Value ($ million)	Average ($ per ton)
From Mexico to Imperial County	0.014	1,298	$49	$3,476
From Mexico to the Rest of the U.S. (including CA).	1.870	168,527	$9,490	$5,075
Total	**1.884**	**169,825**	**$9,539**	**$5,063**

*Notes: * Andrade and Calexico East POEs combined. ** Estimated from average payload factors factors for 2007-2050 forecasting comparability.*

.

Source: Team HDR analysis

The table below reports the volume and value of exports through Imperial County's POEs. The total volume of exports was about 0.2 million tons higher than the corresponding volume of imports (2.1 vs. 1.9 million tons). Exports had an average value of $2,448 per ton, about half the average value per ton of imported goods.

Table 6: Shipments by Truck from the United States to Mexico through Imperial County POEs, 2007 Estimate *

Through Imperial County POEs	Volume (million tons)	Assumed number of loaded trucks **	Value ($ million)	Average ($ per ton)
From Imperial County to Mexico	0.015	1,444	$47	$3,174
From the Rest of the U.S. (including CA) to Mexico	2.056	207,723	$5,023	$2,443
Total	**2.071**	**209,167**	**$5,070**	**$2,448**

*Notes: * Andrade and Calexico East POEs combined. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

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Source: Team HDR analysis

The above statistics indicate that a significant portion of freight flows entering the region's POEs by truck are headed outside the region. For San Diego County, slightly over 10 percent of the goods that entered ended up staying within the county. Otherwise, most of the imported goods were headed to the rest of California, nearby states such as Arizona and Nevada, and some freight goes as far east as New York. The distribution of freight destinations is recorded in the following table.

Table 7: Top 10 Destinations of Trucks Entering the United States through the San Diego Region or Imperial County Land POEs, 2007 Estimate

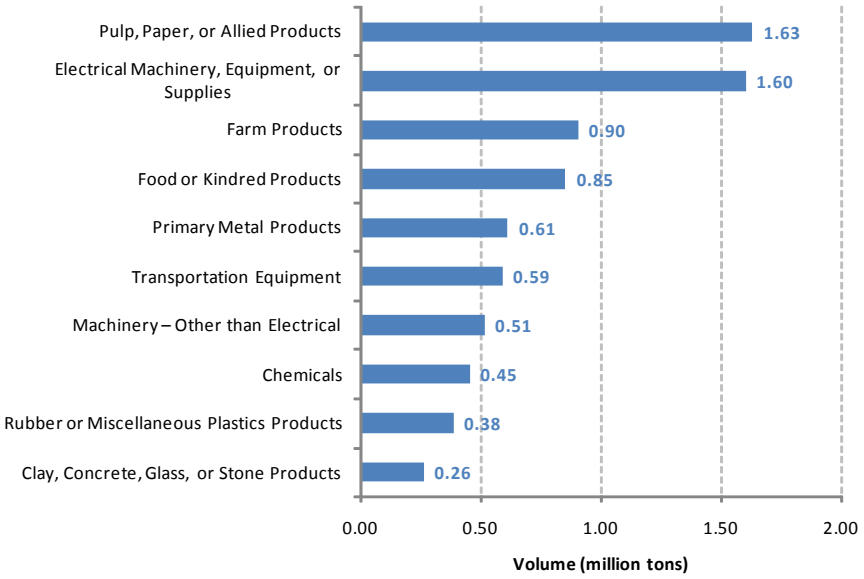
Through San Diego County POEs	% of total volume	Through Imperial County POEs	% of total volume
San Diego County	**11.2**	**Imperial County**	**0.7**
Rest of California	**77.4**	**Rest of California**	**66.7**
New York	2.6	New York	9.9
Arizona	1.2	Texas	4.0
Nevada	1.0	Massachusetts	3.2
Wisconsin	0.8	Washington	3.0
Pennsylvania	0.7	Ohio	2.2
Texas	0.7	Missouri	2.1
Oklahoma	0.7	Iowa	1.8
Kentucky	0.7	Pennsylvania	1.4

Source: Team HDR analysis

For Imperial County, most commodities were transported to other parts of California, trucked toward the Midwestern states or the East Coast. Less than 1 percent of the goods actually remained within the county.

The commodities shipped by truck through the two counties' land POEs were somewhat similar. Goods imported through POEs located in San Diego County included: pulp, paper or allied products; electrical machinery, equipment or supplies; farm products; and food or kindred products (Figure 25 below). The top two commodities accounted for about 35 percent of total volume.

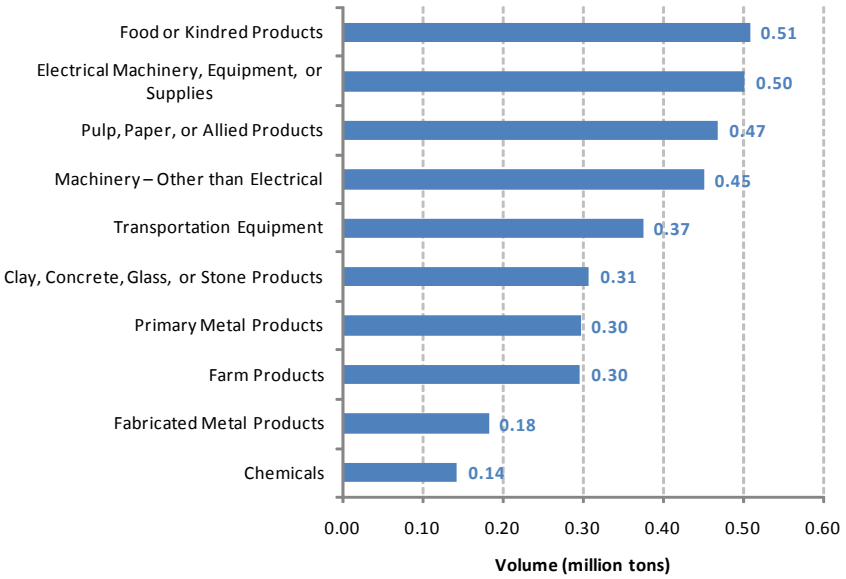
Figure 25: Top 10 Commodities Entering the United States by Truck through San Diego County Land POEs, 2007 Estimate



Source: Team HDR analysis

Figure 26 below shows the top ten commodities entering the region by truck through Imperial County POEs. As mentioned earlier, the overall commodity mix for this county was not very different from San Diego.. Food or kindred products, however, was the most represented commodity group (it was the fourth in San Diego) and non-electrical machinery was also relatively more significant.

Figure 26: Top 10 Commodities Entering the United States by Truck through Imperial County Land POEs, 2007 Estimate



Source: Team HDR analysis

3.2.2 Estimates of Freight Flows by Rail passing through the Region's Land Ports of Entry along the Border with Mexico

Customs and Border Protection reported that incoming rail flows through POEs located in the Gateway region included approximately 2,073 loaded railcars and 13,935 empty rail cars.[64] They were distributed as follows:

Table 8: Number of Rail Carloads through California POEs, 2007 Customs Data and SD Freight Rail Consulting

California Rail POEs	Number of carloads from the U.S. to Mexico	Number of carloads from Mexico to the U.S.
Calexico	7,114	2,060
San Ysidro	5,783	13
Tecate	456	0
Total	**13,953**	**2,073**

Sources: U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data and SD Freight Rail Consulting

Table 9 below shows that almost all of the 10 thousand tons of imported goods terminated in San Diego County. Together, these commodities were valued at over $189 million. The numbers of loaded railcars in the table are based on average payload factors used through the study; and differ from the estimates reported by Customs.

Table 9: Shipments by Rail from Mexico to the United States through San Diego County POEs, 2007 Estimate *

	Volume (million tons)	Assumed number of loaded railcars **	Value ($ million)	Average ($ per ton)
From Mexico to the U.S. through San Diego County POEs	0.10	1,707	$189	$1,965

*Notes: * San Ysidro and Tecate POEs are combined. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

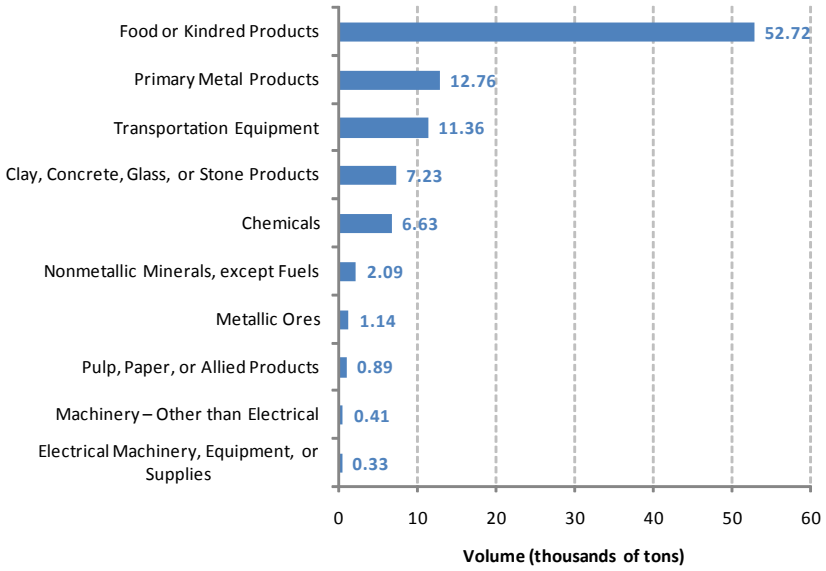
.

Source: Team HDR analysis

The figure below provides a breakdown by commodity group of imports by rail from Mexico, through San Diego County POEs. The most common commodities were food or kindred products and primary metal products. These two groups accounted for almost 70 percent of the total volume of imports. Electrical machinery, equipment or supplies and clay, concrete, glass or stone products had the highest value per ton, at over $9,100.

[64] U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data

Figure 27: Commodity Breakdown of Shipments from Mexico to the United States by Rail, through San Diego County POEs, 2007 Estimate



Source: Team HDR analysis

Looking at the total value and volume of freight transported through San Diego POEs by rail, total exports – shown in the table below – exceeded total imports. However, again, we observe that the average value per ton of exports from the United States to Mexico ($1,470 per ton) was *lower* than the value of imports from Mexico to the United States ($1,969 per ton).

Table 10: Shipments by Rail from the United States to Mexico through San Diego County POEs, 2007 Estimate *

	Volume (million tons)	Assumend number of loaded railcars **	Value ($ million)	Average ($ per ton)
From the U.S. to Mexico through San Diego County POEs	0.50	7,425	$729	$1,470

*Notes: * San Ysidro and Tecate POEs combined. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

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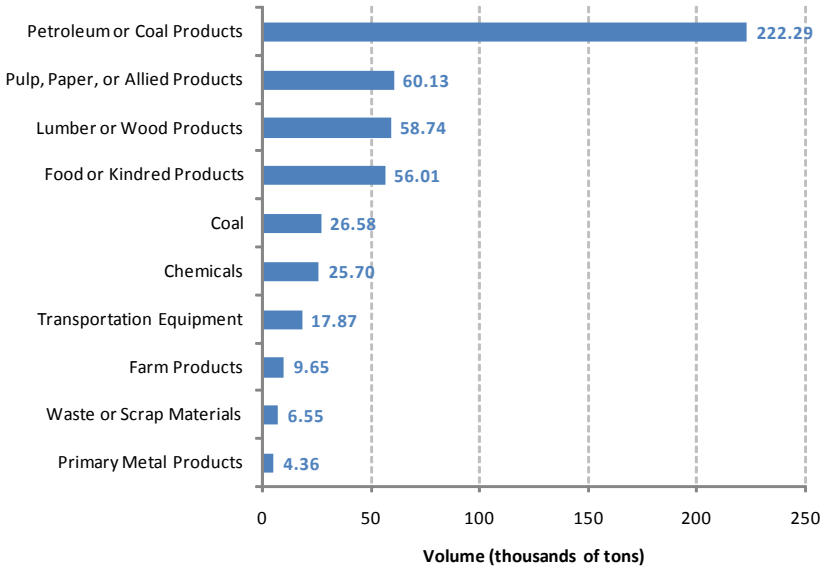
Source: Team HDR analysis

Figure 28 shows the ten most exported commodities by rail to Mexico through San Diego County. We note that petroleum and coal products were heavily exported in 2007. This may explain why exported goods, overall, had a *lower* value per ton on average.

Figure 28: Commodity Breakdown of Shipments from the United States to Mexico by Rail through San Diego County POEs, 2007 Estimate



Source: Team HDR analysis

We reported earlier that most of the freight flows passing through San Diego County terminated or originated in the county, rather than being carried outside the county. For shipments from Mexico with a destination outside the county, all goods were heading to the rest of California. For shipments from outside the county to Mexico, slightly under half originated from the rest of California and approximately one-forth came from Texas.

The following tables and figures summarize the rail movements to, from, and through Imperial County. The findings here are quite different from those observed for San Diego County. As Table 11 indicates, less than 40 thousand tons were imported into or through Imperial County from Mexico. This is at least three times more than the amount imported into San Diego County. However, the value of goods imported here, excluding inbound flows through the county, were exceptionally high ($3,581 per ton), and higher than observed for San Diego County. These goods were mainly transportation equipment.

Table 11: Shipments by Rail from Mexico to the United States, through Imperial County POE, 2007 Estimate *

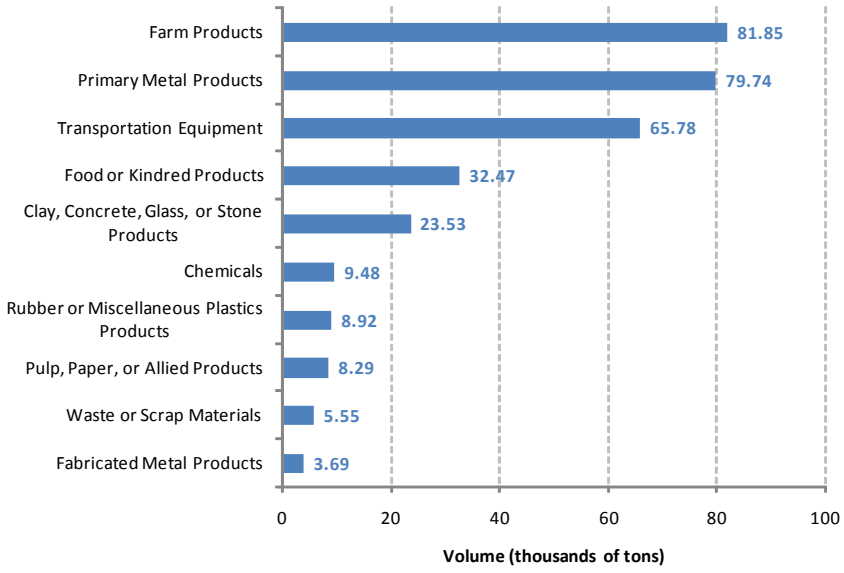
	Volume (million tons)	Assumed number of loaded railcars **	Value ($ million)	Average ($ per ton)
From Mexico to the U.S. through Imperial County POE	0.33	6,869	$490	$1,490

*Notes: * Calexico POE. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis

From the chart below, we observe that about two third (69 percent) of the total volume of imports by rail was distributed – almost evenly – between three commodity groups: farm products, primary metal products, and transportation equipment.

Figure 29: Commodity Breakdown of Shipments from Mexico to the United States by Rail, through Imperial County POE, 2007 Estimate



Source: Team HDR analysis

Table 12 presents exports to Mexico by rail, from and through Imperial County. As with inbound flows, the total value of freight transported *through* the county was lower, despite a larger volume.

Table 12: Shipments by Rail from the United States to Mexico, through Imperial County POE, 2007 Estimate *

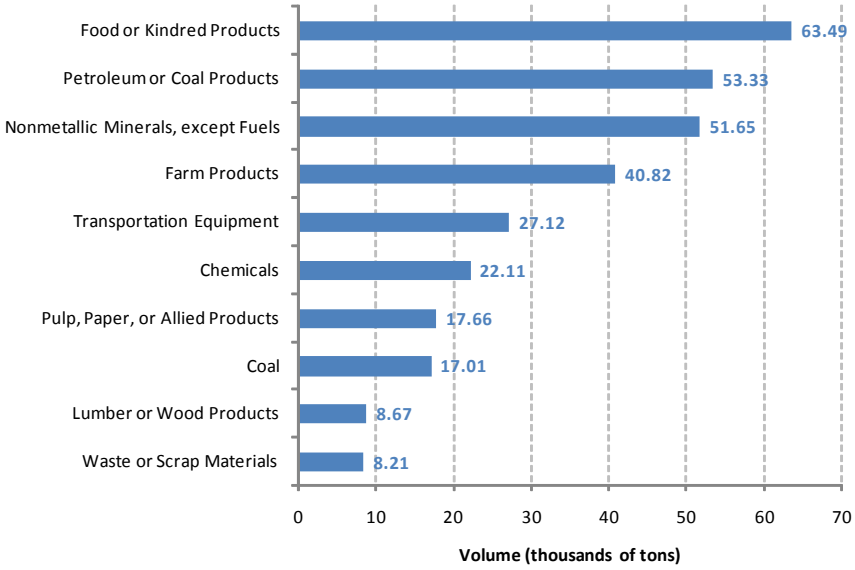
	Volume (million tons)	Assumed number of loaded railcars **	Value ($ million)	Average ($ per ton)
From the U.S.to Mexico through Imperial County POE	0.33	5,074	$498	$1,529

*Notes: * Calexico POE. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis

The top ten commodities exported from the United States to Mexico through Imperial County by rail are summarized in Figure 30. The types of goods transported out of Imperial County were mainly primary goods. These goods are less processed, and therefore have less value-added. They include food and kindred products, petroleum and coal products, nonmetallic minerals (except fuels),[65] and farm products. These goods accounted for over 50 percent of all goods exported from or through the county by rail.

Figure 30: Commodity Breakdown of Shipments from the United States to Mexico by Rail, through Imperial County POE, 2007 Estimate



Source: Team HDR analysis

In Table 13, we provide estimates of freight volumes handled at the BNSF Tenth Avenue yard, in downtown San Diego.

The yard receives manifest trains from the city of Barstow. It has an automotive facility and a lumber trans-load site. This is also where the local trains serving National City, and the BNSF National City yard, originate.[66]

[65] Including broken stone, riprap, gravel, sand, or clay ceramic
[66] Source: "Railroad Freight Facilities", SD Freight Rail Consulting

Table 13: Volume of Freight Handled, and Capacity of, the BNSF Yard Facility in Downtown San Diego, 2007 Estimate

Commodity	Volume (tons)	Capacity (tons)
Manifest Trains		
Farm Products	119,478	1,750,000
Food or Kindred Products	172,777	
Lumber or Wood Products	160,985	
Pulp, Paper, or Allied Products	94,591	
Chemicals	240,710	
Petroleum or Coal Products	213,796	
Clay, Concrete, Glass, or Stone Products	59,376	
Primary Metal Products	37,162	
Electrical Machinery, Equipment, or Supplies	9,166	
Waste or Scrap Materials	132,880	
Other	30,088	
Total Manifest Trains	**1,271,009**	**1,750,000**
Vehicle Trains		
Transportation Equipment	362,026	500,000
Total Vehicle Trains	**362,026**	**500,000**

Source: SD Freight Rail Consulting

3.2.3 Estimates of Freight Flows passing through the Port of San Diego

As can be seen in Table 14 below, there were over 2.5 million tons of goods coming in by vessel at the region's seaport in 2007, with a total value of over $7.1 billion.

Table 14: Volume and Value of Port Inbound Flows (Imports and Domestic Freight), 2007 Estimate

Arriving at the Port by vessel and leaving the Port by:	Volume (million tons)	Assumed number of loaded trucks or railcars *	Value ($ million)
Truck	1.184	90,298	$1,211
Rail	0.772	23,500	$5,041
Water	0.066	N/A	$317
Other / Unknown	0.510	N/A	$576
Total	**2.532**	**113,798**	**$7,145**

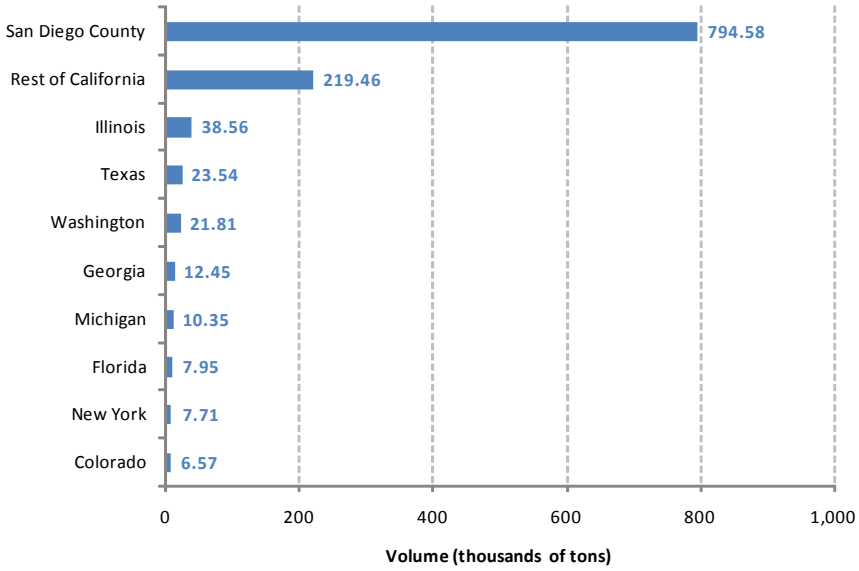
*Note: * Estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis

Almost 47 percent of the total incoming goods arriving by vessel at the port were shipped out of the port by truck. However, the total value of the goods transported by this mode represented less than 20 percent of the total value.

The top ten destinations of the goods leaving the port by truck are reported in Figure 31 below. As reported in the figure, almost 89 percent of all goods were heading to San Diego County or to the rest of California.

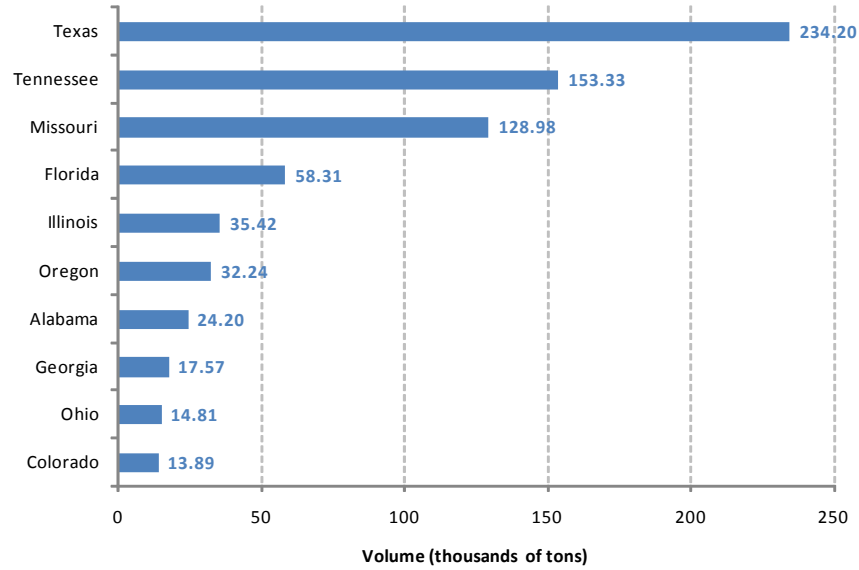
Figure 31: Top 10 Destinations from the Port by Truck, 2007 Estimate



Source: Team HDR analysis

The top ten destinations of the shipments leaving the port by rail are shown in the chart below. Almost three fourths of those shipments had a final destination in the southern part of the nation, including Texas, Tennessee, Missouri, and Florida.

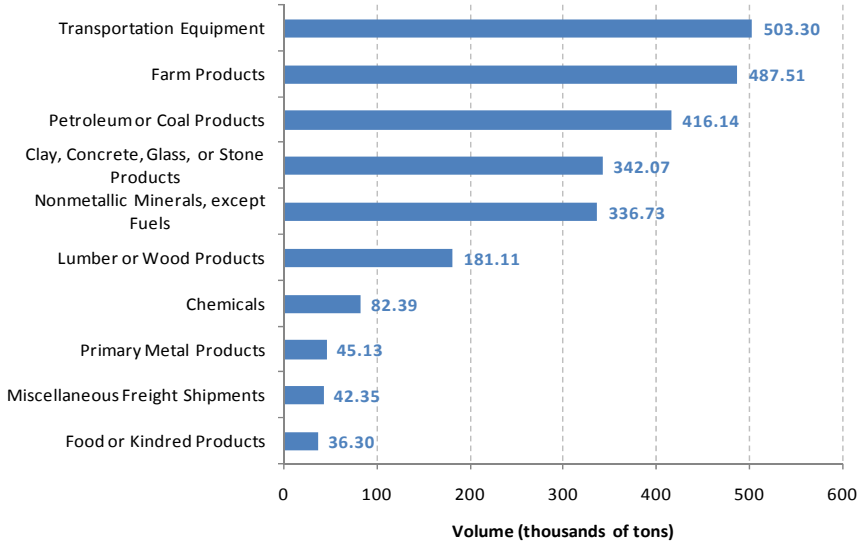
Figure 32: Top 10 Destinations from the Port by Rail, 2007 Estimate



Source: Team HDR analysis

As shown in Figure 33, among all of the commodities imported through the port, transportation equipment ranked first in terms of tonnage. The second commodity was farm products, followed by petroleum and coal products; clay, concrete, glass, and stone; and nonmetallic minerals (except fuels). These five categories represent about 82 percent of all the commodities imported through the seaport.

Figure 33: Top 10 Commodities Imported through the Port, 2007 Estimate



Source: Team HDR analysis

The volume and value of port outbound flows are summarized in Table 15 below. These are freight flows arriving at the port by truck, rail or other modes, and leaving the port by vessel.

In 2007, over 355 thousand tons of commodities were exported through the port, worth about $336 million. Less than 1 percent of that tonnage was delivered to the port by modes other than truck or rail. However, the other modes accounted for almost 15 percent of the total value of exports through the port ($48 million out of $336 million). This includes freight carried by water (short sea shipping) or pipeline, and freight for which the mode is unknown (not reported).

Table 15: Volume and Value of Port Outbound Flows (Exports and Domestic Freight), 2007 Estimate

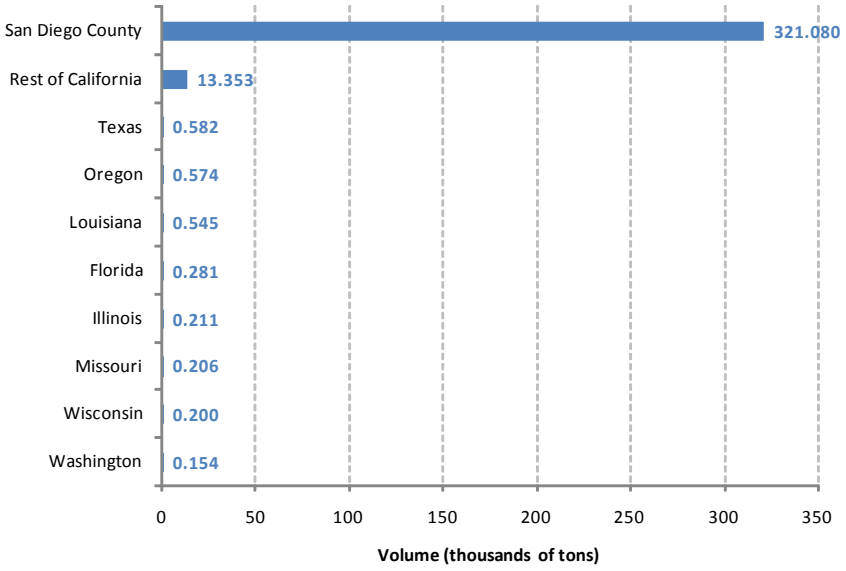
Leaving the Port by vessel and arriving at the Port by:	Volume (million tons)	Assumed number of loaded trucks or railcars *	Value ($ million)
Truck	0.338	28,429	$243
Rail	0.014	225	$45
Water	0.001	N/A	$1
Other / Unknown	0.003	N/A	$46
Total	**0.356**	**28,654**	**$336**

*Note: * Estimated from average payload factors for 2007-2050 forecasting comparability.*
Source: Team HDR analysis

The top ten origins of the goods arriving at the port by truck, and being exported through the port, are shown in Figure 34.

Among all the commodities arriving at the port by truck, over 95 percent originated from within San Diego County, and about 4 percent came from the Rest of California. Less than 600 tons (about 0.2 percent of the total) were shipped from Texas, the third most frequent origin.

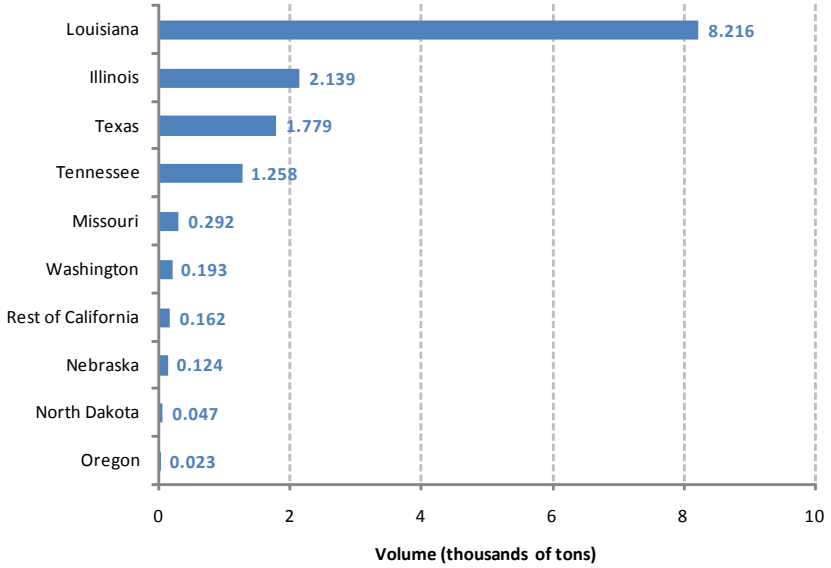
Figure 34: Top 10 Origins of Freight Flows to the Port by Truck, 2007 Estimate



Source: Team HDR analysis

The top ten origins of the goods transported to the port by rail are illustrated in Figure 35 below. In general these goods travelled from more distant locations than those transported by truck. Among all volume transported by rail, the majority came from southern states such as Texas, Tennessee, Missouri, and especially Louisiana (in 2007, over 55 percent came from this state alone).

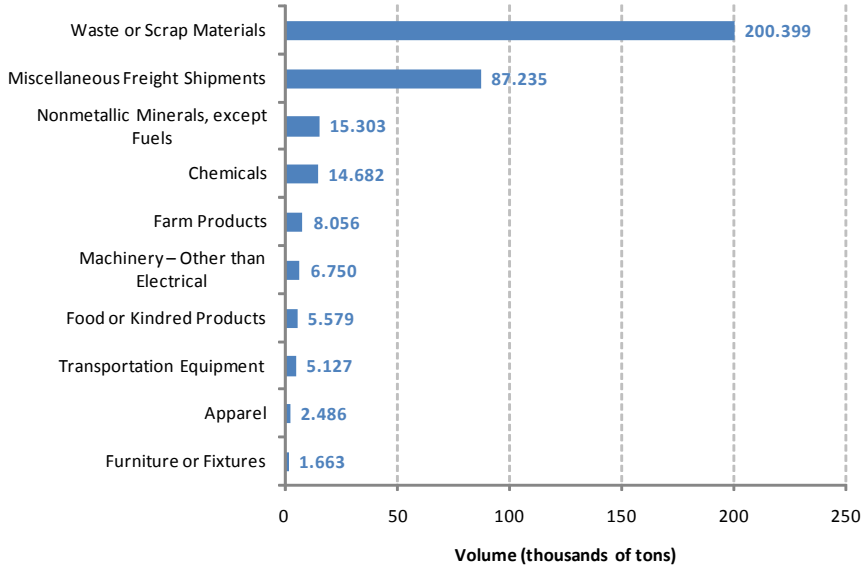
Figure 35: Top 10 Origins of Freight Flows to the Port by Rail, 2007 Estimate



Source: Team HDR analysis

Overall, the primary exports being carried through the seaport were waste and scrap materials (see below), comprising over half of the total tonnage transported. The second most transported commodity was miscellaneous freight shipments, which accounted for about one quarter of the total tonnage. Interestingly, by comparison, the port handled relatively little incoming waste and scrap material.

Figure 36: Top 10 Commodities Exported through the Port, 2007 Estimate



Source: Team HDR analysis

3.2.4 Estimates of Freight Flows passing through the Region's Airports

Imperial County currently does not have infrastructure to support air cargo other than the existing airport facilities that can only handle small private passenger planes. Therefore the majority of air freight in the region is handled through the San Diego International Airport, Lindbergh Field. Thus, in what follows we combine the freight flow estimates for both counties. In 2007, over 47 thousand tons of goods were traded at the region's airports, valued at over $112 million. The majority of the goods imported into the region came from within the U.S. However, the goods that were imported from Mexico had the highest average value per ton (more than double the Canadian and domestic averages). Goods traveling through the region had an average dollar value of $24,520 per ton. These lightweight, high-value commodities were mainly electrical machineries, equipment, and supplies.

Table 16: Airport Inbound Flows (Imports and Domestic Freight), 2007 Estimate *

	Volume (million tons)	Assumed number of loaded trucks **	Value ($ million)	Average ($ per ton)
Total Inbound Flows by Air	0.05	4,461	$110	$2,384

*Notes: * Only includes trade with Mexico and Canada, and movements within the U.S. ** Number of trucks carrying goods from the airport to final destination; estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis

As indicated in Table 17, outbound air freight traffic in 2007 was twice as large as the inbound volume estimates. Around 109 thousand tons of goods were exported through the airport, with a total value of $240 million. In terms of volume, almost half of the total exported tonnage was transported to Canada. As with inbound air freight, goods destined for Mexico had the highest average value per ton among all export destinations.

Table 17: Airport Outbound Flows (Exports and Domestic Freight), 2007 Estimate *

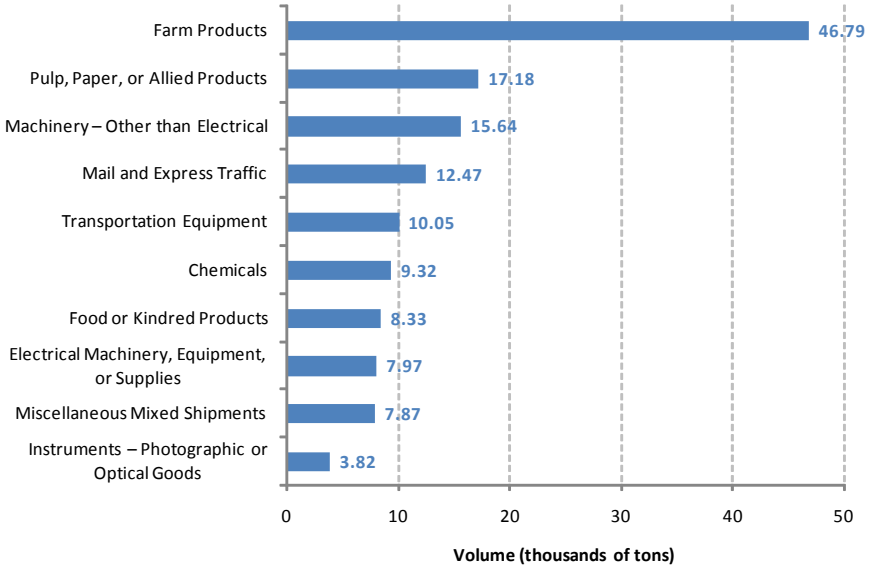
	Volume (million tons)	Assumed number of loaded trucks **	Value ($ million)	Average ($ per ton)
Total Outbound Flows by Air	0.11	9,375	$240	$2,218

*Notes: * Only includes trade with Mexico and Canada, and movements within U.S. ** Number of trucks carrying goods into the airport; estimated from average payload factors for 2007-2050 forecasting comparability.*
Source: Team HDR analysis

The top ten commodities handled at the airport are shown in the chart below. In 2007, the most represented commodities were farm products, pulp, paper and allied products, and non-electrical machinery. These three commodity groups accounted for more than 50

percent of all commodities transported. Farm products alone accounted for 30 percent of the total. They consisted primarily of fresh flowers.

Figure 37: Top 10 Commodities Handled at the Airport, 2007 Estimate



Note: Only includes trade with Mexico and Canada, and movements within U.S.
Source: Team HDR analysis

3.3 Estimates of Freight Flows within the Region

In this section, we characterize goods movement within the individual counties (with origin and destination within San Diego County, or with origin and destination within Imperial County) and between the two counties (with origin in one county and destination in the other; this is referred to as local traffic). Freight flows within the region contributed to about 25 percent of the region's overall freight volume, while their share of total value was less than 10 percent. Reported in the table below is the amount transported in 2007, in both volume and value.

Table 18: Freight Flows within or between San Diego County and Imperial County, 2007 Estimate *

	Volume (million tons)	Assumed number of loaded trucks **	Value ($ million)	Average ($ per ton)
Within San Diego County or within Imperial County	35.7	2,704,134	$19,156	$537
Local (between San Diego County and Imperial County)	2.8	196,857	$1,335	$484
Total	**38.5**	**2,900,991**	**$20,491**	**$532**

*Note: * Within San Diego County, within Imperial County, and between the two counties. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*
Source: Team HDR analysis

The above table shows that in 2007, over 93 percent of freight shipments with origins and destinations in the region were transported within the individual counties (versus 7 percent between), adding 2.9 million loaded trucks to the region's roadway system. Given the size of the two counties and their geographic proximity, it is obvious that truck is the dominant mode of transportation. According to Table 19, nearly all locally distributed goods were transported by truck in 2007. Small quantities of freight were transported by air. The average value per ton for air transported goods was more than 5 times higher than for goods transported by truck.

Table 19: Distribution of Internal Freight Flows by Mode, 2007 Estimate *

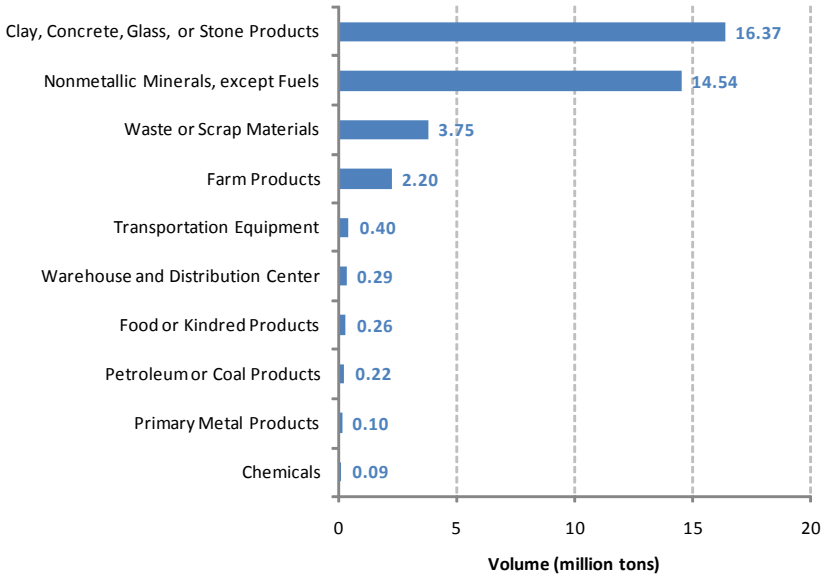
Mode	Volume (million tons)	Assumed number of loaded trucks **	Value ($ million)	Average ($ per ton)
Truck	38.5	2,900,933	$20,489	$532
Air	0.001	58	$2	$2,937
Rail	0	0	$0	N/A
Other	0	0	$0	N/A

*Note: * Within San Diego County, within Imperial County, and between the two counties. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis

Summarized in the chart below are the top ten commodity groups transported within and between the two counties. In 2007, about 30 million tons of clay, concrete, glass, or stone products, and nonmetallic materials (except fuels) were transported. This amounts to over 80 percent of the total tonnage transported within and between the two counties. The next two most transported commodities, namely waste and scrap materials and farm products, represented another 15 percent of total tonnage.

Figure 38: Distribution of Internal Freight Flows by Commodity, 2007 Estimate



Note: Within San Diego County, within Imperial County, and between the two counties.
Source: Team HDR analysis

3.4 Estimates of Total Freight Flows

In 2007 over $281 billion worth of goods, weighing about 155 million tons, were transported in the Gateway region.[67]

In particular, volume data from Table 20 shows that about 40 percent of total flows were *inbound* flows (with origin outside the region and final destination inside the region). The majority of these flows were domestic flows, from the rest of California or other states. Although only 28 percent of total flows (measured in tons) were *outbound* flows (with origin inside the region and destination outside the region), these flows were worth almost 50 percent of the total value of freight. These estimates show that commodities shipped from the region tend to be relatively lightweight and high-value.

[67] Unless specified otherwise, "in the region" should be generally interpreted to mean within, into, out of, and through the region.

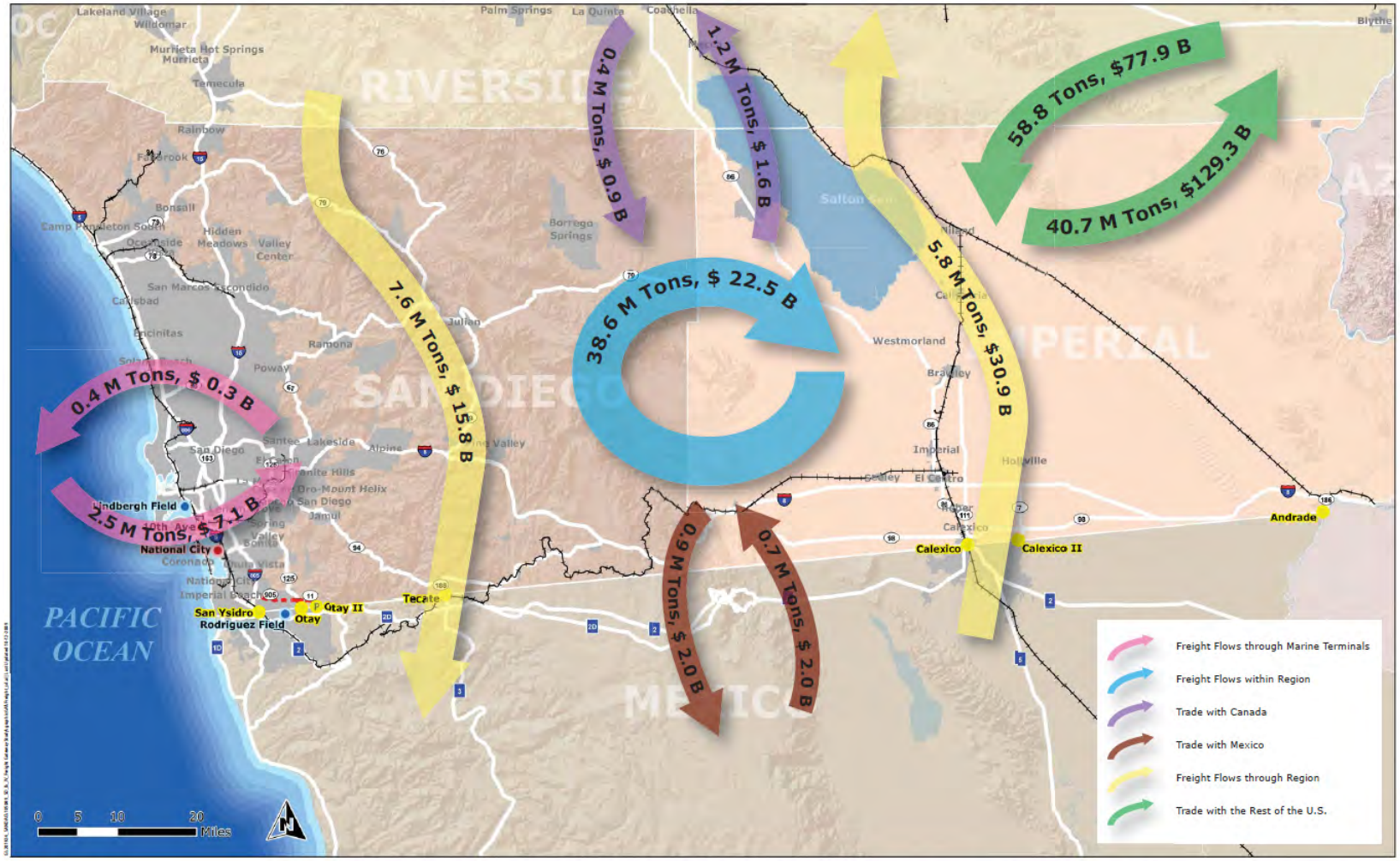
Table 20: Summary of Total Regional Freight Flows, 2007 Estimate

Direction of flow	Total for San Diego County and Imperial County Combined			
	Volume (million tons)	Percentage of Total Volume	Value ($ million)	Percentage of Total Value
Through	**13.4**	**9%**	**$46,815**	**17%**
Inbound	**59.9**	**39%**	**$80,976**	**29%**
Canada	0.4	0%	$977	0%
Domestic	58.9	38%	$77,963	28%
Mexico	0.7	0%	$2,036	1%
Outbound	**42.9**	**28%**	**$132,900**	**47%**
Canada	1.3	1%	$1,602	1%
Domestic	40.7	26%	$129,303	46%
Mexico	0.9	1%	$1,995	1%
Within or Local	**38.5**	**25%**	**$20,491**	**7%**
Grand Total	**154.7**	**100%**	**$281,182**	**100%**

Source: Team HDR analysis

About one fourth of total flows occurred within San Diego County or Imperial County, or locally, between the two counties. However these flows were worth only 7 percent of the total value. Goods that do not originate from nor terminate in the region (through flows) represented less than 10 percent of the total tonnage.

Figure 39: Summary of Total Regional Freight Flows, 2007 Estimate



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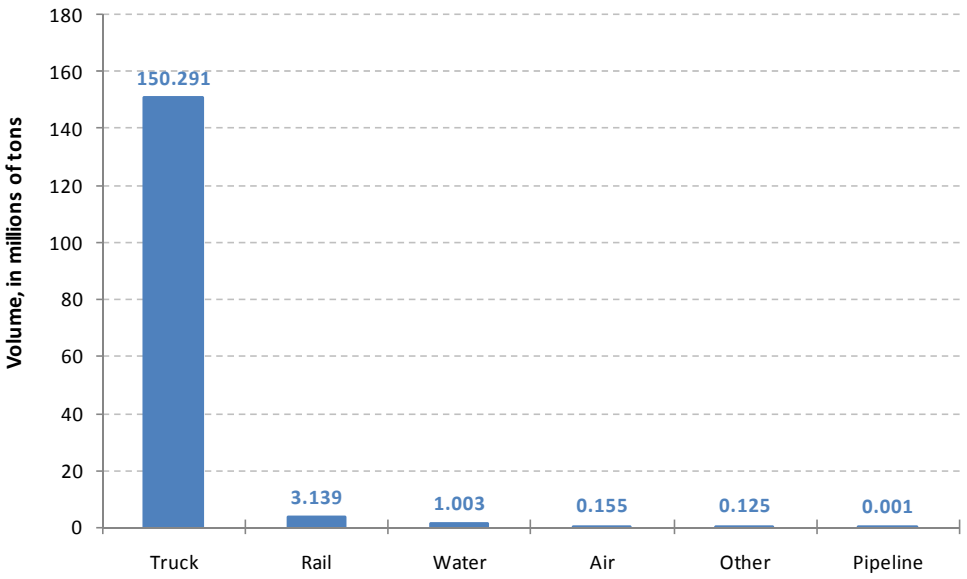
San Diego and Imperial Region Freight Flows by Origin and Destination (2007)

3.4.1 Total Freight Flow Estimates by Mode of Transportation

Freight movements in the Gateway region have been dominated by truck. Trucks handled over 97 percent of total volume transported in 2007. Freight volumes transported by truck are almost five times larger than the volume transported by either rail or water and at least 100 times larger than those transported by air..

Figure 40: Distribution of Total Freight Volume by Mode in the Gateway Region, 2007 Estimate



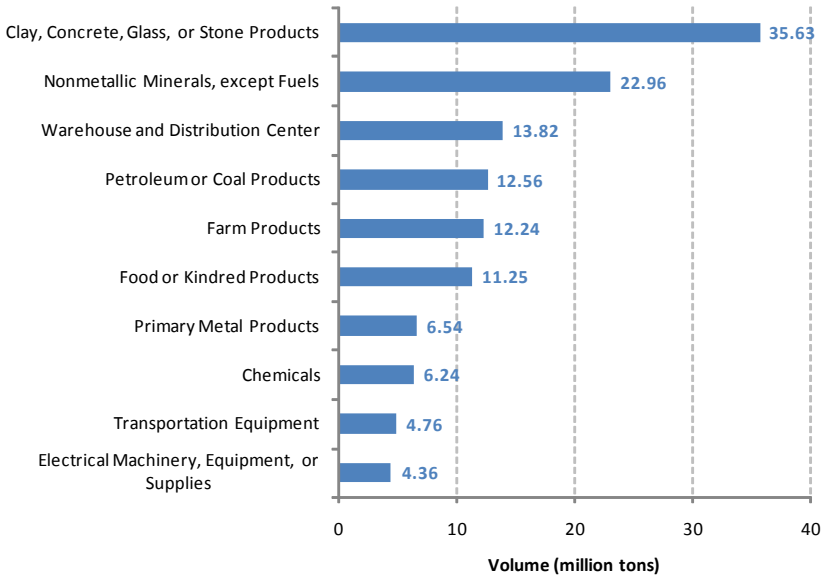
Note: To avoid double counting, freight flows in and out of the port by truck or rail are only recorded under truck or rail, not water. The water mode in the above chart represents coastal shipping. Total freight flows in and out of the port amounted to 2.9 million tons in 2007.

Source: Team HDR analysis

3.4.2 Total Freight Flow Estimates by Commodity for the Gateway Region

As displayed in Figure 41, the top five commodity groups made up about 63 percent of the total weight of all commodities. The dominant commodity groups are clay, concrete, glass, and stone products, followed by nonmetallic minerals (except fuels), and secondary traffic (flows in and out of warehouses and distribution centers).

Figure 41: Distribution of Total Freight Volume by Commodity in the Gateway Region, 2007 Estimate



Source: Team HDR analysis

These primary products have a relatively low average value (dollar per ton), in particular when compared to electrical machinery, equipment and supplies, or transportation equipment.

3.4.3 Total Freight Flow Estimates by Origin - Destination

Freight movements in volume by origin and by county, are reported in Table 21. About 70 percent of all inbound flows (commodities shipped into the region) in 2007 were from the rest of California. For San Diego County, goods from the rest of California accounted for over 73 percent of the county's total imports.[68] Also, the tonnage from within the state was almost ten times larger than the next largest origin, Arizona. Similarly, in Imperial County, the relative difference between the rest of California and Colorado (the second most frequent origin) was about the same.

[68] Imports into the county, including imports from other parts of the United States

Table 21: Top 10 Origins of Freight Flows by County, 2007 Estimate

Origin of Freight Flows Terminating in or passing through San Diego County	Volume (tons)	Origin of Freight Flows Terminating in or passing through Imperial County	Volume (tons)
Rest of California	43,437,251	Rest of California	4,562,330
Arizona	5,214,283	Colorado	439,730
Nevada	1,854,964	Nevada	423,367
Texas	1,115,491	Idaho	345,230
Washington	806,927	Arizona	298,370
Oregon	722,199	Oregon	267,961
Louisiana	466,280	New Mexico	185,313
Massachusetts	425,672	Texas	152,232
Illinois	399,997	Massachusetts	116,329
Pennsylvania	328,273	Illinois	87,105
Mexico	4,252,682	Mexico	2,169,709
Canada	259,073	Canada	115,669
Baja California	96,923	Baja California	43,585

Source: Team HDR analysis

The top destinations (within the U.S.) from San Diego County mirror the dominance of goods originating or terminating in the state of California. Over 73 percent of the total volume shipped from San Diego had a final destination somewhere else in California. For Imperial County, the rest of California accounted for about 55 percent of all domestic destinations. Furthermore, for Imperial County, states such as Colorado or Idaho no longer ranked within the top ten trading partners; instead, the second top destination was New York.

Table 22: Top 10 Destinations of Freight Flows by County, 2007 Estimate

Destination of Freight Flows Originating in or passing through San Diego County	Volume (tons)	Destination of Freight Flows Originating in or passing through Imperial County	Volume (tons)
Rest of California	30,868,594	Rest of California	5,671,278
Texas	930,139	New York	335,902
Nevada	770,813	Texas	249,901
Arizona	711,221	Illinois	190,707
Ohio	459,558	Arizona	183,040
New York	342,307	Washington	171,161
Illinois	300,324	Ohio	149,361
Hawaii	287,625	Nevada	142,383
Utah	240,595	Missouri	127,986
Oregon	208,122	Pennsylvania	125,790
Baja California	4,638,917	Baja California	2,036,576
Mexico	1,329,434	Mexico	443,490
Canada	934,377	Canada	337,754

Source: Team HDR analysis

For origins and destinations outside the U.S., the neighboring Mexican state of Baja California, was by far the most important destination of freight flows originating in either San Diego County or Imperial County.

Having presented existing freight flow estimates in this chapter, we now turn to the presentation of 2050 freight forecast, in volume and value, in the next chapter. We start with a brief description of the forecasting methodology.

4 FREIGHT FLOW FORECAST THROUGH 2050

4.1 Forecasting Methodology and Assumptions

In Transearch, long-term forecasts of commodity movements are developed using a variety of supply-side and demand-side factors, including employment, output, and commodity purchases by industry and by county.

County-to-county commodity shipments are forecasted at the four-digit Standard Transportation Commodity Classification (STCC) commodity code level by leveraging IHS Global Insight (IGI)'s proprietary databases:

- **Employment and Output Data from the Business Market Insights (BMI) database**: The BMI database is produced and maintained by IGI's Consulting Group and is built from County Business Patterns' data augmented by data from IGI's Regional Macroeconomic Group.

- **Purchase Data from the Business Transaction Matrix (BTM) Input / Output Table**: IGI's Consulting Group produces and maintains a U.S. national input/output database which contains total sales between purchasing and selling industries. This database, the Business Transaction Matrix, uses the most current input/output data available, and leverages information from IGI's U.S. Macroeconomic Group to produce forecasts.

The forecasting process is comprised of the following steps:

- National commodity shipment forecasts are developed using year-over-year projections for a set of growth factors (determinants of commodity shipments). The growth factors are taken from databases developed and maintained by IGI's U.S. Macroeconomic Group (industrial production data) and IGI's Agriculture Group (agriculture production data).

- Base year estimates are produced at the county-level. First, origin county shipments are forecast based on output data from the Business Market Insights database. Output data is matched to base year estimates using the industry code and origin county. If an origin county in the base year shows shipments, but there is no output data for that industry (i.e. the good may be shipped *through* the area but not produced there), then the growth rate is set to zero.

- Purchase or supply-side data from the Business Transaction Matrix are distributed across counties using employment data from the BMI database.[69] The amount of purchases assigned to each location is based on the proportion of employment in the purchasing industry in that location to total employment in that industry.

[69] The BTM data is at the industry level and shows total amounts purchased from one industry by another industry. It is not disaggregated by county.

- Destination county commodity shipments are forecast based on growth rates from the purchase data. Purchase data is matched to base year estimates using the industry code and destination county. If goods are shipped to a county with no employment, a growth rate of zero percent is assumed.

- Lastly, a rebalancing process brings together the national forecast, the origin shipment forecast, and the destination shipment forecast. The prime objective of the rebalancing is to constrain the county-level forecasts to the national level forecast by commodity. Thus, in total, the shipped volume of a commodity does not exceed the amount produced. This is an iterative process that holds purchases (destination shipments) constant until origin shipments equal purchases.

As explained above, regional forecasts of freight movements by industry are produced using projections for a number of growth factors or freight determinants. These determinants include population, employment, output, or commodity purchases, at the national and regional levels. They are summarized for the early years in the table below.

Table 23: Short-term Socio-Economic Projections assumed in Transearch

	2007	2008	2009	2010	2011	2012
Economic Indicators for the San Diego Metropolitan Area						
Real Gross Metro Product (2001$ million)	140,378	141,605	136,949	140,003	146,069	151,909
Real Gross Metro Product (% change)	1.0	0.9	-3.3	2.2	4.3	4.0
Total Employment (thousands)	1,308.8	1,299.4	1,254.4	1,250.2	1,280.6	1,315.4
Total Employment (% change)	0.6	-0.7	-3.5	-0.3	2.4	2.7
Manufacturing Employment (thousands)	102.4	102.3	93	88.6	90.5	94
Nonmanufacturing Employment (thousands)	1,206.4	1,197.1	1,161.4	1,161.6	1,190.1	1,221.4
Population (thousands)	2,966	3,006	3,049	3,089	3,123	3,157
Population (% change)	0.9	1.4	1.4	1.3	1.1	1.1
Unemployment Rate (%)	4.6	6	9.5	9.8	8.8	7.9
Personal Income (% change)	4.8	3.4	0.3	2	4.6	5.3
U.S. Economy						
Real GDP (% change)	2.00	1.10	-2.80	1.50	3.10	3.80
Employment (% change)	1.10	-0.40	-3.60	-0.50	1.60	2.40

Source: IHS Global Insight

The freight forecasts available from Transearch were first modified to account for the adjustments to the baseline estimates introduced in Chapter 3. After completion of this process, the modified forecast underwent further adjustments in the following two areas:

- ***Regional Forecast Adjustments*:** These adjustments were performed to make the forecast consistent with the future year freight transportation and commodity forecasts developed by SANDAG freight stakeholders, including the port, airport and rail community.

- ***Transportation System Constraints Demand Adjustments*:** These adjustments were performed to account for the potential inability of the region's transportation system in future years to handle the projected future demand in commodities as estimated by the forecast.

The adjustments ensured that the multi-year forecasts, which go out to the year 2040, fully consider existing stakeholder commodity/freight forecasts, and also take into account the ability of the region's transportation system to support the demand for the commodity flows estimated in the outer years.

Finally, to help inform SANDAG's 2050 Regional Transportation Plan (RTP), the 2040 adjusted multi-year freight forecasts were extrapolated to 2050. This extrapolation was done by first estimating the average annual growth rate of each individual freight flow (i.e., by mode, origin destination, and STCC4 commodity) in the adjusted database, between 2035 and 2040. The 2035 – 2040 average annual growth rates were assumed constant through 2050 and applied to the 2040 volumes and all intermediate years through 2050.

4.2 Forecast of Freight Flows passing through the Region's Gateways

The freight forecasts introduced in this chapter are constrained by capacity limitations at some of the region's facilities and gateways (see Section 4.1 and Chapter 2). They do not reflect potential policy constraints or possible departures from our baseline forecasting assumptions. We address these issues in the next two chapters.

In this section, we present detailed freight forecasts for all major gateways in the region. Projected growth rates are based on the 2007 estimates presented in Chapter 3.

4.2.1 Forecast of Freight Flows by Truck passing through the Region's Land Ports of Entry along the Border with Mexico

As demonstrated in the Table 24, we anticipate that there will be almost 19 million tons of goods coming in through San Diego County land POEs by 2050; with an expected total value of $250 billion.

These projections are equivalent to a 3.8 percent average annual increase in volume and a 5.7 percent average annual increase in value. Most of these flows will be headed outside of the county. In terms of volume, these "through" flows are expected to account for over 92 percent of total inflows (97 percent in value) and to grow at 3.8 percent annually (5.8 percent in value).

Table 24: Import Shipments by Truck from Mexico to the United States through San Diego County POEs, 2050 Forecast *

Through San Diego County POEs	Volume (million tons)	Assumed number of loaded trucks **	Value ($ million)	Average ($ per ton)
From Mexico to San Diego County	1.44	152,787	$7,652	$5,304
From Mexico to the Rest of the U.S. (including CA)	17.55	2,014,889	$242,298	$13,807
Total	**18.99**	**2,167,676**	**$249,950**	**$13,161**

*Notes: * Otay Mesa and Tecate POEs combined. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis.

As demonstrated in Table 25, exports through San Diego County's POEs are projected to reach 20 million tons and about $59 billion by 2050. This represents a somewhat slower growth than imports at 3.1 percent per year in volume (compared to 3.8 percent for imports) and 3.9 percent in value (5.8 percent). By 2050, the total value of exports will be less than a quarter of the total value of imports. We forecast that the value regional exports will exceed the value of regional imports by $3.4 billion ($11.1 vs. $7.7 billion).

Table 25: Export Shipments by Truck from the United States to Mexico through San Diego County POEs, 2050 Forecast *

Through San Diego County POEs	Volume (million tons)	Assumed number of loaded trucks **	Value ($ million)	Average ($ per ton)
From San Diego County to Mexico	1.92	220,875	$11,118	$5,787
From the Rest of the U.S. (including CA) to Mexico	18.27	2,053,385	$48,313	$2,644
Total	**20.19**	**2,274,261**	**$59,431**	**$2,943**

*Notes: * Otay Mesa and Tecate POEs combined. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

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Source: Team HDR analysis

Freight flows through Imperial County's POEs are reported in the following two tables. As with San Diego County, most of the shipments will have a final destination outside Imperial County. The total volume, however, is projected to be half of that handled in San Diego County. Nine million tons of imports are expected in 2050, based on an average annual growth rate of 3.7 percent, yielding a total value of $120 billion.

Table 26: Imports by Truck from Mexico to the United States through Imperial County POEs, 2050 Forecast *

Through Imperial County POEs	Volume (million tons)	Assumed number of loaded trucks **	Value ($ million)	Average ($ per ton)
From Mexico to Imperial County	0.06	7,025	$391	$6,323
From Mexico to the Rest of the U.S. (including CA)	9.05	1,019,697	$119,137	$13,167
Total	**9.11**	**1,026,722**	**$119,528**	**$13,121**

*Notes: * Andrade and Calexico East POEs combined. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis

Table 27 reports projected export volume and value through Imperial County's POEs. Total export volume is expected to be 1.25 million tons less than corresponding import volumes. This is due to a slower growth rate of 3.2 percent per year (compared to 3.7 percent for imports). Exported commodities will have an average value per ton of $2,988 (a 0.5 percent average annual increase relative to 2007).

Table 27: Exports by Truck from the United States to Mexico through Imperial County POEs, 2050 Forecast *

Through Imperial County POEs	Volume (million tons)	Assumed number of loaded trucks **	Value ($ million)	Average ($ per ton)
From Imperial County to Mexico	0.06	7,484	$419	$6,538
From the Rest of the U.S. (including CA) to Mexico	7.80	881,550	$23,074	$2,959
Total	**7.86**	**889,035**	**$23,493**	**$2,988**

*Notes: * Andrade and Calexico East POEs combined. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis

Tables 24 through 27 above summarize our forecast for truck movements across the California / Mexico border. This is an unassigned and unconstrained forecast, meaning that: i) future truck movements were not assigned to a particular border crossing; and ii) existing and future capacity constraints at the POEs were ignored. In Table 28 we use the 2007 percentage distribution of incoming trucks across POEs within a county to estimate the 2007 estimate and the 2050 forecast of total freight flows for that county to a specific port.[70]

[70] By so doing, we are ignoring any diversion of traffic from one POE to another over time.

Table 28: Summary of Truck Freight Forecast Assigned to Land POEs, 2050 Forecast

Port of Entry	2007 Estimate	2050 Forecast	Average Annual Growth
Otay Mesa / Mesa de Otay			
Volume, million tons	8.4	35.5	3.4%
Value, $billion	$30.7	$280.1	5.3%
Assumed number of loaded trucks	810,071	4,021,085	3.8%
Tecate			
Volume, million tons	0.9	3.7	3.4%
Value, $billion	$3.2	$29.3	5.3%
Assumed umber of loaded trucks	84,783	420,851	3.8%
Calexico East / Mexicali II			
Volume, million tons	3.9	16.9	3.4%
Value, $billion	$14.6	$142.8	5.4%
Assumed number of loaded trucks	378,433	1,912,928	3.8%
Andrade / Algodones			
Volume, million tons	0.01	0.03	3.4%
Value, $billion	$0.02	$0.21	5.4%
Assumed number of loaded trucks	559	2,828	3.8%

Notes: Estimates in volume and value include both imports and exports. Number of loaded trucks estimated from average payload factors for 2007-2050 forecasting comparability.
; includes both incoming and outgoing loaded trucks.
Source: Team HDR analysis

In terms of origins and destinations of commodity flows through the Gateway region's POEs, less than 8 percent of goods moving through San Diego County will remain within the county. This represents a decrease of about two percent from 2007. Over three quarters of the imported goods will be transported to the rest of California. Destinations such as Massachusetts and Minnesota will be among the top ten destinations in 2050, reflecting an annual increase in demand from these states of 7.2 percent and 5.4 percent respectively.

Table 29: Top 10 Destinations of Trucks Entering the United States through the San Diego Region or Imperial County POEs, 2050 Forecast

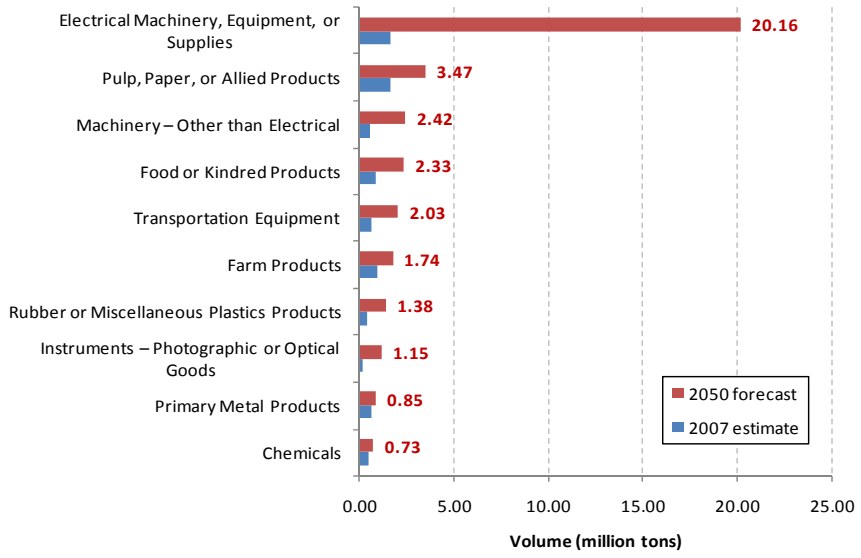
Through San Diego County POEs	% of total volume	Through Imperial County POEs	% of total volume
San Diego County	**7.6**	**Imperial County**	**0.7**
Rest of California	**75.5**	**Rest of California**	**54.3**
New York	3.7	New York	15.1
Pennsylvania	1.6	Massachusetts	11.3
Massachusetts	1.4	Texas	3.5
Nevada	1.2	Iowa	2.5
Wisconsin	1.2	Pennsylvania	2.4
Minnesota	1.1	Ohio	1.9
Arizona	1.1	Missouri	1.8
Oklahoma	1.0	Illinois	1.6

Source: Team HDR analysis

Regarding Imperial County, all of the destinations reported for 2007 will remain constant with the top ten destinations in 2050. Imperial County itself will continue to retain a very small share of imported goods, while the rest of California will continue to demand over half of the total volume. As indicated in the above table, most goods will be carried towards the Midwestern states and the East Coast.

In terms of inflows, we forecast the composition of commodities imported into the region to remain stable throughout the study period. In particular, imported goods through San Diego County will include pulp, paper, or allied products; electrical machinery, equipment, and supplies; and food and farm products (see the figure below). The top two commodities are forecasted to account for about 35 percent of the total traded volume.

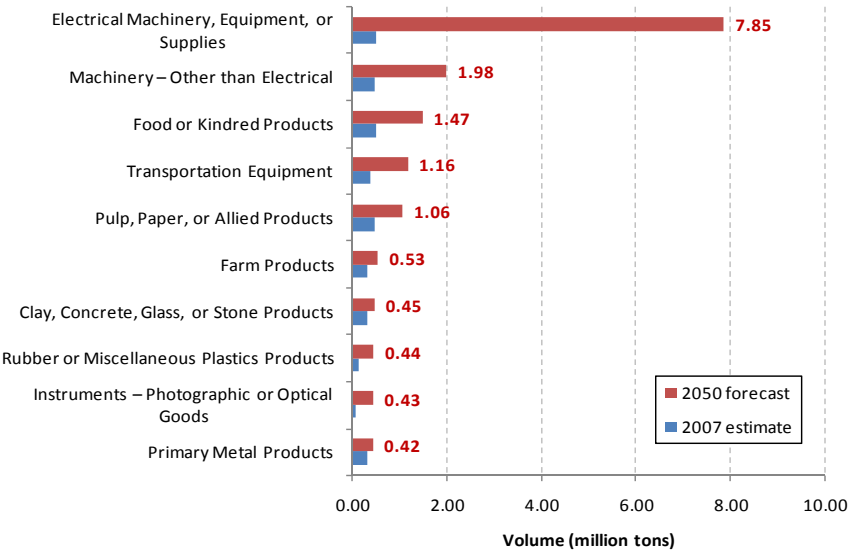
Figure 42: Top 10 Commodities Entering the United States by Truck through San Diego County Land POEs, 2050 Forecast



Source: Team HDR analysis

Figure 43 displays the top ten commodities that will be carried through Imperial County's POEs. As mentioned above, the composition of these commodities is similar to those traded through San Diego's POEs. Among these goods, there will be a more even distribution of volume compared to those forecasted for San Diego County.

Figure 43: Top 10 Commodities Entering the United States by Truck through Imperial County Land POEs, 2050 Forecast



Source: Team HDR analysis

4.2.2 Forecast of Freight Flows by Rail passing through the Region's Land Ports of Entry along the Border with Mexico

As can be seen in Table 30, there will be almost 215 thousand tons of goods from Mexico imported by rail into or through San Diego County by 2050. This amounts to a projected value of $417 million. No significant increase in the average value per ton is expected and both the volume and value of imports will grow at an average annual rate of 1.9 percent.

Table 30: Imports by Rail from Mexico to the United States through San Diego County POEs, 2050 Forecast *

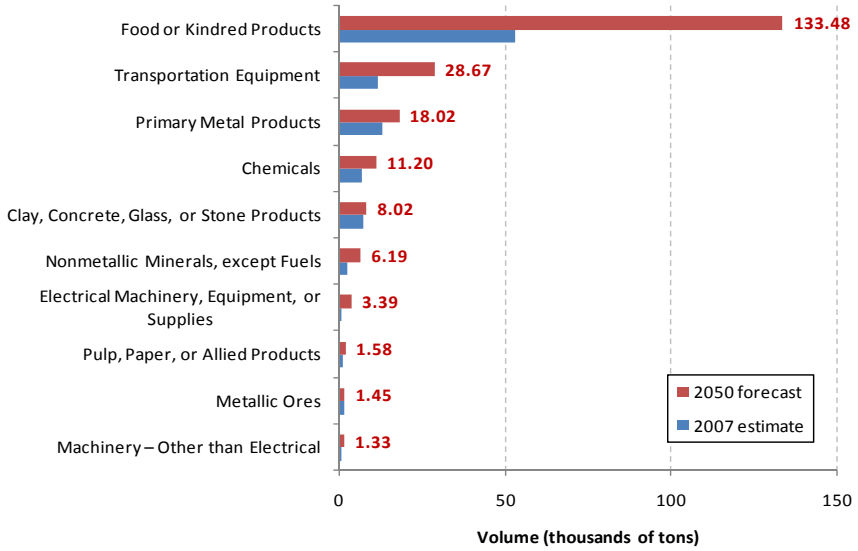
	Volume (million tons)	Assumed number of loaded rail cars **	Value ($ million)	Average ($ per ton)
From Mexico to the U.S. through San Diego County POEs	0.215	4,159	$417	$1,940

*Notes: * San Ysidro and Tecate POEs combined. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis

Figure 44 provides a breakdown by commodity group of total imports by rail. Food and kindred products are expected to triple in volume by 2050, growing at about 2.2 percent annually. The fastest growing commodity group will be electrical machinery, equipment or supplies. The volume of imports for that group is expected to increase by 5.6 percent annually over the next 40 years.

Figure 44: Commodity Breakdown of Imports from Mexico to the United States by Rail, through San Diego County POEs, 2050 Forecast



Source: Team HDR analysis

San Diego County is expected to handle significantly more exports by rail in 2050 than it did in 2007. We estimate that about one billion tons of goods will be transported through the county to Mexico, for a total value of $1.5 billion (a 1.7 percent annual increase in both volume and value). Additionally, we expect an increase of 1.8 percent a year in the number of rail cars carrying these commodities.

Table 31: Exports by Rail from the United States to Mexico through San Diego County POEs, 2050 Forecast *

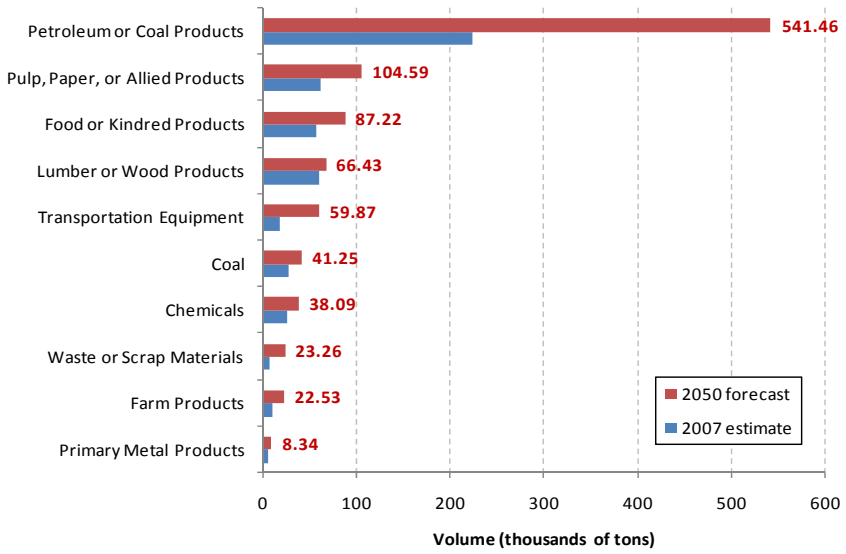
	Volume (million tons)	Assumed number of loaded rail cars **	Value ($ million)	Average ($ per ton)
From the U.S.to Mexico through San Diego County POEs	1.006	15,911	$1,491	$1,482

*Notes: * San Ysidro and Tecate POEs combined. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis

Figure 45 shows the ten exported commodities by rail to Mexico through San Diego County, in 2050. The top four commodities are still expected to include petroleum and coal products; pulp, paper and allied products; food and kindred products; and lumber and wood products. Together they will account for almost 80 percent of total tonnage. However the fastest growing commodity groups are expected to be electrical machinery, equipment and supplies and non-electrical machinery. The shipments associated with these goods will increase at 5.3 percent and 4.0 percent respectively. This is consistent with the general projection that there will be an increase in the volume of advanced-technology products being shipped.

Figure 45: Commodity Breakdown of Shipments from the United States to Mexico by Rail through San Diego County POEs, 2050 Forecast



Source: Team HDR analysis

The above estimates show that a significant portion of freight flows passing through San Diego County's border crossings by rail are transported through (instead of originating or terminating in) the region. For through imports, all goods are expected to remain in California. For through exports, close to 60 percent will originate from the rest of California and over one-fourth will come from Texas.

The following tables and figures summarize rail movements in Imperial County.

Table 32 shows that the volume of imports by rail through the county's border with Mexico is expected to reach 842,000 tons in 2050. Imported volumes are expected to grow by 2.2 percent a year, while the value of imports is expected to grow by 3.2 percent; resulting in a 0.9 percent increase in the average value per ton.

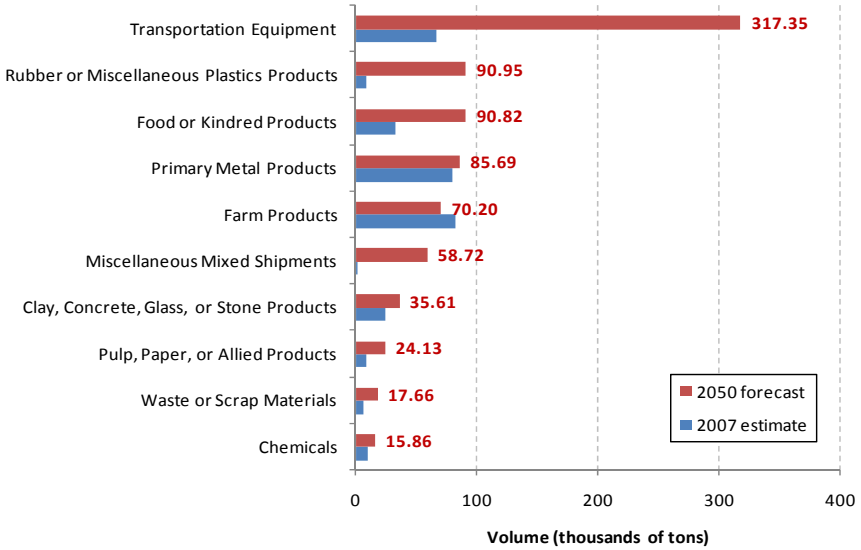
Table 32: Imports by Rail from Mexico to the United States, through Imperial County POEs, 2050 Forecast *

	Volume (million tons)	Assumed number of loaded rail cars **	Value ($ million)	Average ($ per ton)
From Mexico to the U.S. through Imperial County POE	0.842	29,650	$1,885	$2,239

*Notes: * Calexico POE. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*
Source: Team HDR analysis

Figure 46 illustrates the distribution by commodity of imports by rail through Imperial County border crossings. By 2050, transportation equipment will account for almost 38 percent of total volume. However, this commodity is not projected to have the highest rate of growth. Among the top ten commodities transported in 2050, miscellaneous mixed shipments are projected to grow at 8.6 percent annually, while shipments of rubber and other plastic products will grow at 5.6 percent. By comparison, the volume of transportation equipment being shipped will grow at 3.7 percent annually.

Figure 46: Commodity Breakdown of Exports from Mexico to the United States by Rail, through Imperial County POEs, 2050 Forecast



Source: Team HDR analysis

Goods exported through Imperial County are expected to amount to over 649,000 tons, for a total value of $875 million. Compared to 2007, the average value per ton will fall at a rate of 0.3 percent per year (over the study period).

Table 33: Exports by Rail from the United States to Mexico, through Imperial County POE, 2050 Forecast *

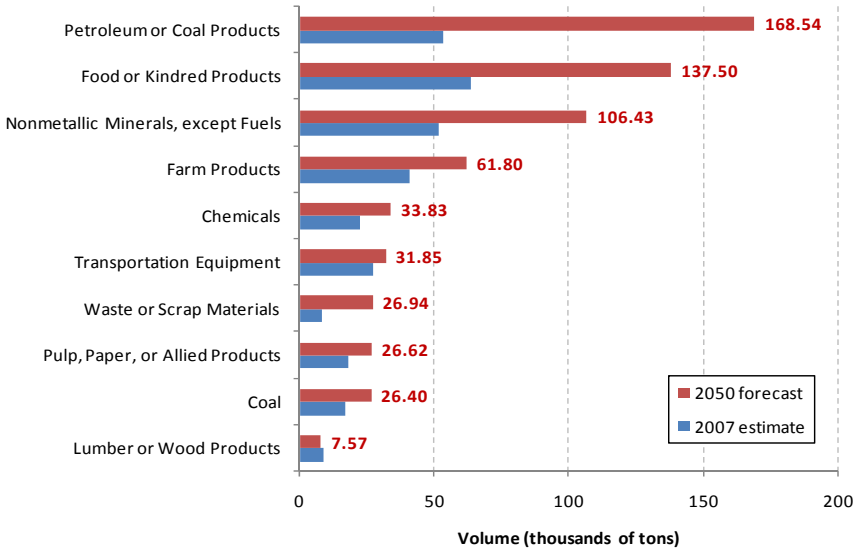
	Volume (million tons)	Assumed number of loaded rail cars **	Value ($ million)	Average ($ per ton)
From the U.S.to Mexico through Imperial County POE	0.649	9,647	$875	$1,348

*Notes: * Calexico POE. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis

Figure 47 summarizes the top ten commodities exported to Mexico by rail and passing through a POE in Imperial County. The top four commodity groups will account for about three-fourth of total tonnage. Of note, the volume of petroleum and coal product shipments will surpass that of food and kindred products due to a faster projected rise in demand (2.7 percent compared to 1.8 percent, annually).

Figure 47: Commodity Breakdown of Shipments from the United States to Mexico by Rail, through Imperial County POE, 2050 Forecast



Source: Team HDR analysis

4.2.3 Forecast of Freight Flows passing through the Port of San Diego

Table 34 indicates that by 2050, 4 million tons of freight will be imported through the region's seaport, with a total value of nearly $13 billion. Over 200 thousand loaded trucks or railcars will be required to carry these goods out of the port, to their final destinations. These forecasts correspond to an average annual growth of 1.1 percent in volume, and about 1.4 percent in value between 2007 and 2050. Trucks will transport 56 percent of the 4 million tons of cargo coming in through the port; an increase of 1 percent compared to 2007.

Table 34: Volume and Value of Freight Flows arriving at the Port by Vessel (Port Inbound Flows), 2050 Forecast

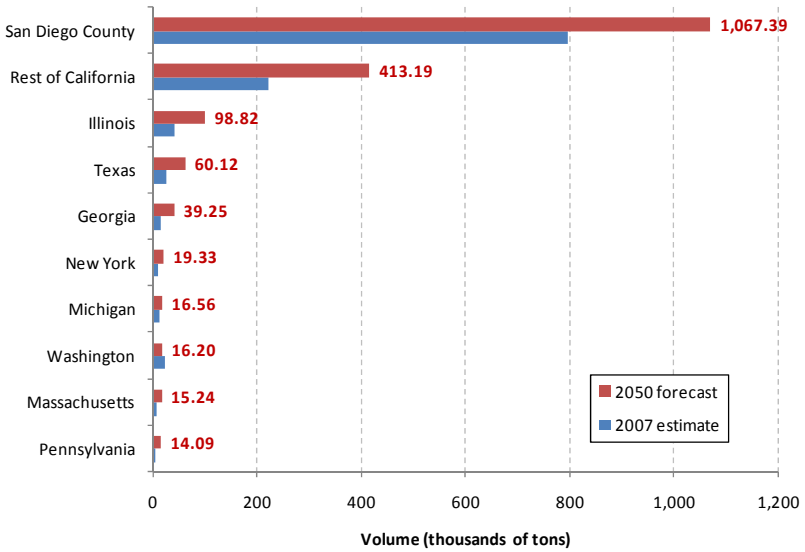
Arriving at the Port by vessel and leaving the Port by:	Volume (million tons)	Assumed number of loaded trucks or railcars *	Value ($ million)
Truck	1.843	147,580	$2,456
Rail	1.257	39,817	$8,243
Water	0.194	N/A	$1,537
Other / Unknown	0.702	N/A	$745
Total	**3.997**	**187,397**	**$12,980**

*Note: * Estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis

The top ten destinations for goods transported out of the port by truck are illustrated in the figure below. By 2050, the top three destinations (San Diego County, rest of California, and Illinois) will account for about 40 percent of total volume (all modes combined). Among the other top destinations, Pennsylvania will experience the most significant increase, with growth averaging 3.3 percent annually.

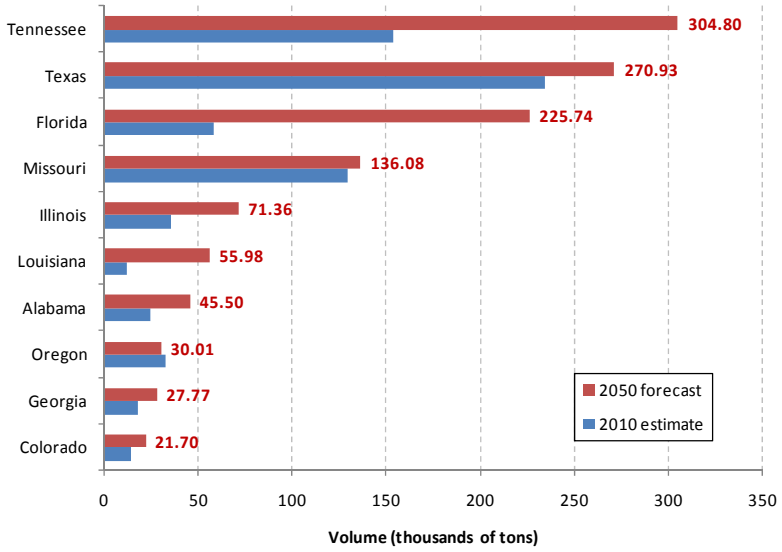
Figure 48: Top 10 Destinations of Freight Flows from the Port by Truck, 2050 Forecast



Source: Team HDR analysis

Figure 49 displays the top ten destinations of goods transported by rail from the Port of San Diego. Of the total tonnage moved by rail, over 80 percent will head towards southern states, including Tennessee, Texas, Florida, Missouri, Louisiana, Alabama and Georgia. Among these destinations, Louisianan will experience the strongest increase in demand, with annual growth averaging 3.7 percent.

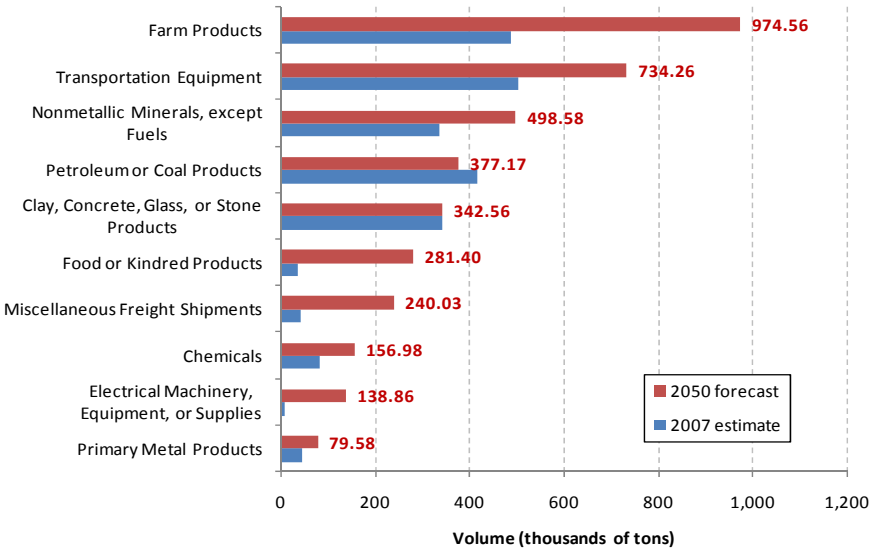
Figure 49: Top 10 Destinations of Freight Flows from the Port by Rail, 2050 Forecast



Source: Team HDR analysis

As shown in Figure 50, farm products will represent the largest share of commodity volumes. The second most common commodity will be transportation equipment, followed by nonmetallic minerals (except fuels). Demand for electrical machinery and equipment will grow the fastest, at about 6.4 percent annually.

Figure 50: Top 10 Commodities Imported through the Port, 2050 Forecast



Source: Team HDR analysis

Table 35 below shows the amount of freight, in volume and value, that will be exported through the San Diego seaport in 2050. We expect that over 2 million tons of goods will be exported through the port, with a total value of nearly $1.3 billion.

These forecasts translate into a 4 percent annual growth in terms of tonnage, and about 3 percent annual growth in value. Over 98 percent of total tonnage will be transported to the port by truck.

Table 35: Volume and Value of Export Flows Leaving the Port by Vessel (Port Outbound Flows), 2050 Forecast

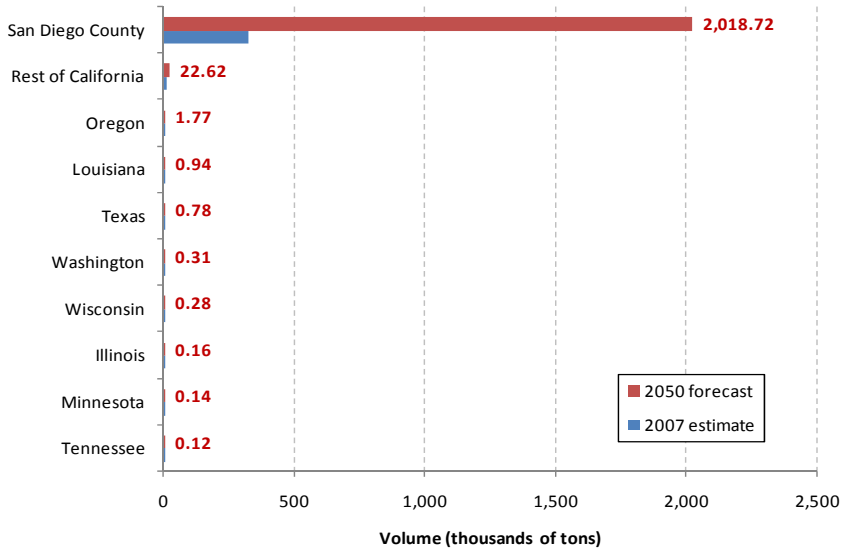
Leaving the Port by vessel and arriving at the Port by:	Volume (million tons)	Assumed number of loaded trucks or railcars *	Value ($ million)
Truck	2.047	172,804	$1,112
Rail	0.025	453	$96
Water	0.0003	N/A	$2
Other / Unknown	0.005	N/A	$80
Total	**2.077**	**173,257**	**$1,290**

*Note: * Estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis

The main regions or states of origin of the goods transported to the port by truck (to be shipped out of the port by vessel) are shown in the figure below. The majority of the shipments will originate in San Diego County or the rest of California. Negligible amounts will come from other western and southern states.

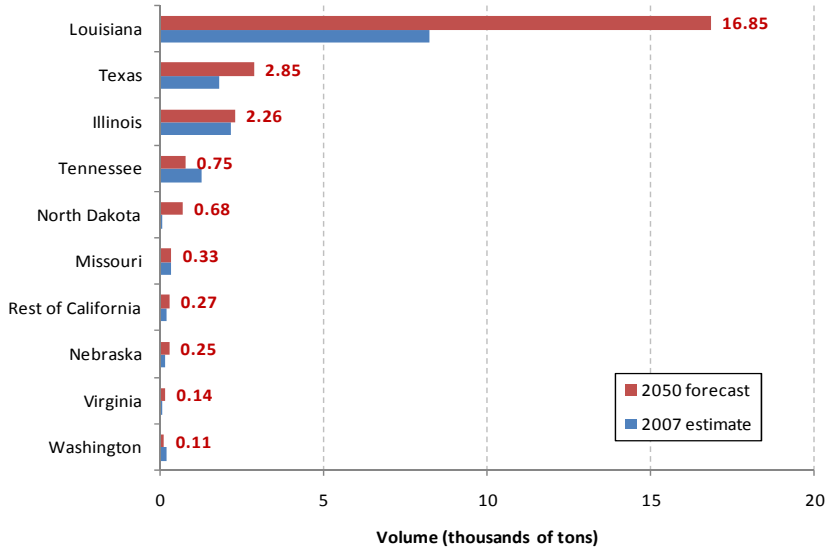
Figure 51: Top 10 Origins of Freight Flows to the Port by Truck, 2050 Forecast



Source: Team HDR analysis

The top ten origins of goods exported through San Diego's seaport and transported to the port by rail are illustrated in Figure 52. The majority of the goods will come from the southern U.S. including Louisina (over 68 percent) and Texas. Among all origins, North Dakota will experience the strongest relative growth (6.8 percent annually, in volume).

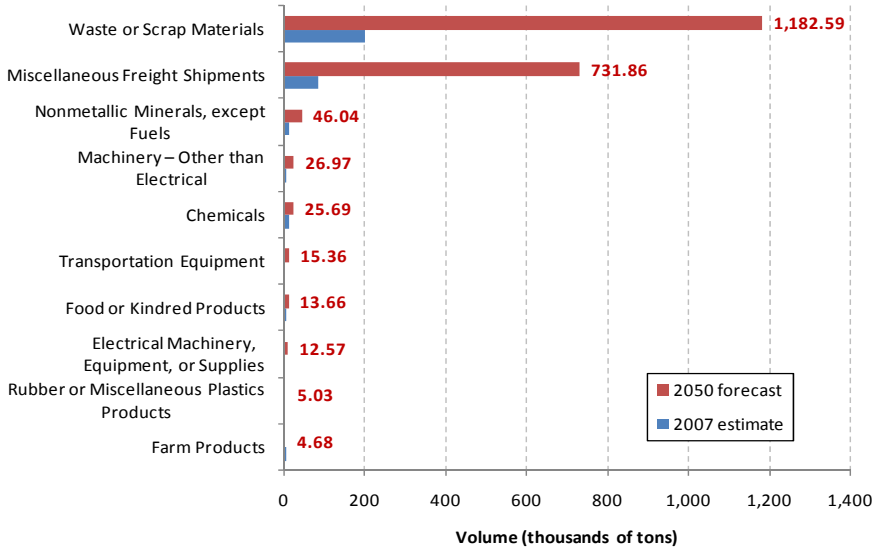
Figure 52: Top 10 Origins of Freight Flows to the Port by Rail, 2050 Forecast



Source: Team HDR analysis

Commodities exported through San Diego's seaport will consist primarily of waste and scrap materials, in addition to miscellaneous freight shipments (Figure 53)These two groups will make up 90 percent of the total tonnage exported through the port. The volume of "miscellaneous freight" shipments [71] is expected to increase in volume by over 5 percent per year during the study period.

Figure 53: Top 10 Commodities Exported through the Port, 2050 Forecast



Source: Team HDR analysis

[71] Miscellaneous freight shipments in the Standard Transportation Commodity Classification (STCC) code typically refer to shipments for which details on the types of items being shipped are not available.

4.2.4 Forecast of Freight Flows passing through the Region's Airports

As with the 2007 estimates, the 2050 forecasts for air cargo account for the limited capacity of airport infrastructure in Imperial County. The majority of goods to be transported by air are expected to go through Lindbergh Field in San Diego County. As in Chapter 3, freight projections are presented below for both counties combined.

The following table reports total inbound flows by region of origin.[72] By 2050, we expect that there will be a total of 44 thousand tons of goods coming in by air, with an aggregate value of $124 million.

Table 36: Airport Inbound Flows (Imports and Domestic Freight), 2050 Forecast *

	Volume (million tons)	Assumed number of loaded trucks **	Value ($ million)	Average ($ per ton)
Total Inbound Flows by Air	0.044	4,345	$117	$2,8811

*Notes: * Only includes trade with Mexico and Canada, and movements within U.S. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis

Over the forecast period, we project that the amount of imports from Canada, Mexico, and the rest of U.S. will experience only limited change. Overall import volume will shrink at about 0.2 percent annually. The majority of freight flows will originate in the rest of the U.S. The domestic share of total inflows by air is expected to reach 85 percent in 2050 (a reduction of 3 percent from the 2007 estimate). Finally, the average value per ton of commodities coming from Mexico will continue to be the highest.

We also anticipate that there will be an increase in the amount of goods transported by air through the region. Compared to the 2007 estimate, it is projected that through inbound tonnage will grow at 6.7 percent annually over the study period. Since the aggregate value of these commodities is projected to increase at around 6 percent annually, average dollar per ton will fall by about 0.6 percent a year.

The difference between outbound and inbound freight volumes by air is expected to continue to grow. By 2050, total tonnage of outbound air freight is expected to reach 195 thousand tons, for a total value of $640 million as illustrated in Table 37. Outbound flows by air are expected to grow by 1.4 percent a year, and by 2050, total outbound volume will be more than four times as large as total inbound volume.

The total value of these outbound flows is projected to grow at 2.3 percent annually (a 0.9 percent annual increase in the average value per ton of "exports", between 2007 and 2050).

[72] Note that only trade with the rest of the U.S., Mexico and Canada is reported in the air flow database used for the study.

Table 37: Airport Outbound Flows (Exports and Domestic Freight), 2050 Forecast *

	Volume (million tons)	Assumed number of loaded trucks **	Value ($ million)	Average ($ per ton)
Total Outbound Flows by Air	0.195	19,385	$635	$3,285

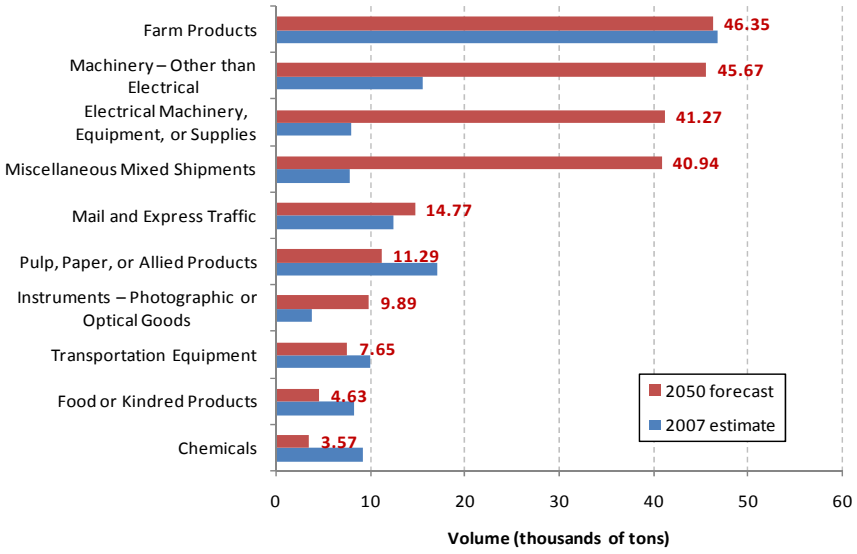
*Note: * Only includes trade with Mexico and Canada, and movements within U.S. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis

In terms of destinations, almost three fourths of the total tonnage exported by air is expected to serve the U.S. domestic market (136 thousand tons out of 195). However, shipments to Mexico are projected to increase the fastest, at around 5 percent annually in volume and value terms. Exports to Mexico will continue to have the highest average value per ton.

The top ten commodities expected to be handled at the region's airports by 2050 are identified in Figure 54.

Figure 54: Top 10 Commodities Handled at the Airport, 2050 Forecast



Note: Only includes trade with Mexico and Canada, and movements within U.S.
Source: Team HDR analysis

The most common commodity groups will be: farm products; non-electrical machinery; and electrical machinery, equipment and supplies. These three groups are expected to account for more than 50 percent of all traded tonnage. In particular, electrical machinery will experience growth of almost 4.0 percent a year. On the other hand, with a near zero annual growth, the farm product share of total tonnage is expected to fall over time.

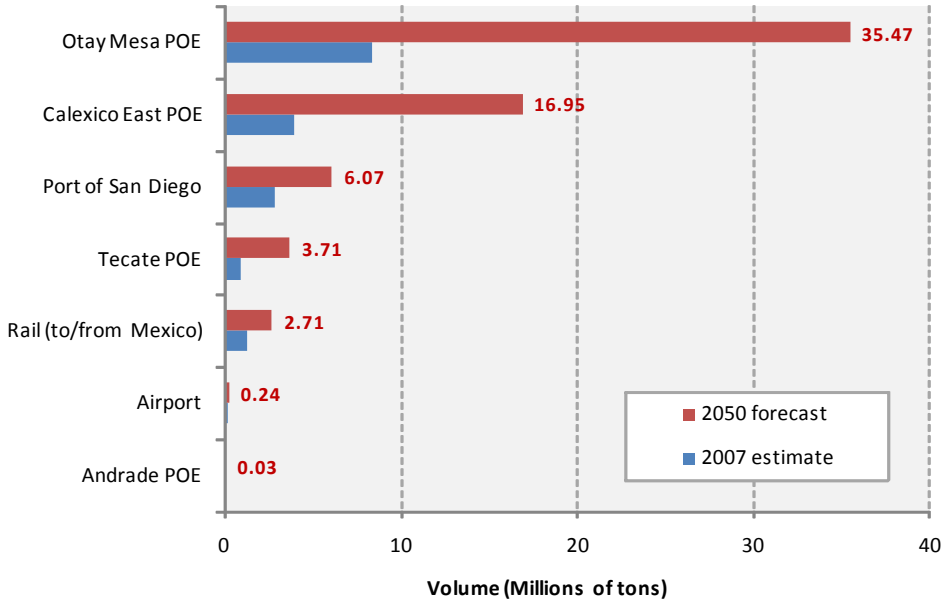
4.2.5 Summary of Freight Forecast by Gateway

Our 2007 estimate and 2050 forecast for freight flows (including inbound, outbound and through flows) through the region's international gateways are summarized in the charts below.

The strongest growth, in volume and value, is expected for movements by truck across the border with Mexico.

The Otay Mesa / Mesa de Otay POE, the Calexico East / Mexicali II POE and the Port of San Diego are expected to remain the top three gateways in terms of freight tonnage. They will account for nearly 90 percent of all flows[73] by 2050.

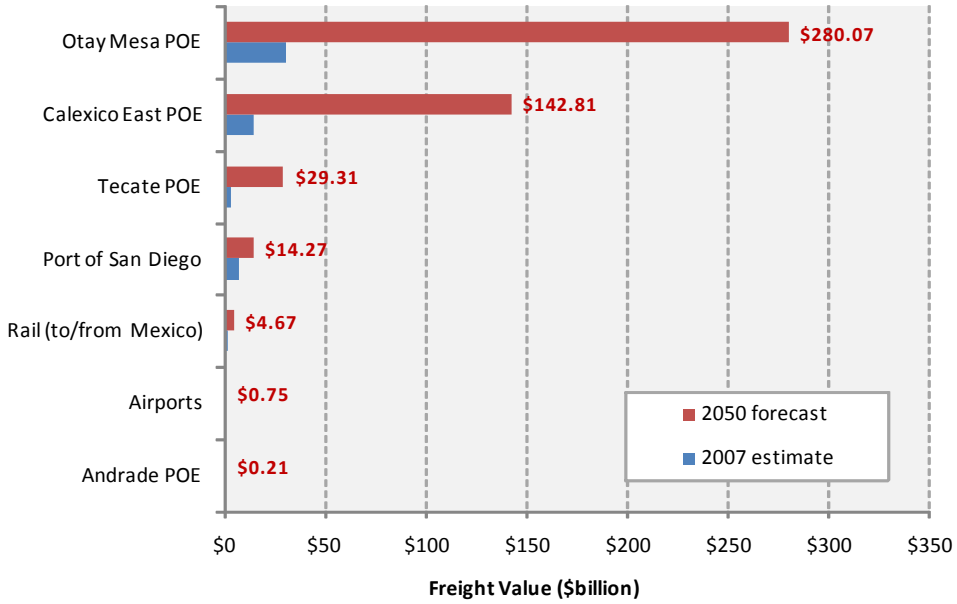
Figure 55: Summary of Freight Flows through the Region's Gateways in Volume, 2050 Forecast



Note: Sum of inbound, outbound and through truck flows
Source: Team HDR analysis

[73] Of all flows passing through the seven international gateways.

Figure 56: Summary of Freight Flows through the Region's Gateways in Value, 2050 Forecast



Note: Sum of inbound, outbound and through flows
Source: Team HDR analysis

4.3 Forecast of Freight Flows within the Region

By 2050, the total amount of goods transported within the region is expected to reach over 83 million tons with a total value of $52 billion. These forecasts in volume and value terms are associated with average annual growth rates of 1.8 and 2.2 percent respectively.

Table 38: Freight Flows within or between San Diego County and Imperial County, 2050 Forecast

All modes combined	Units	In 2007	In 2050	Average Annual Growth
In volume	Million tons	38.5	83.2	1.8%
In value	$ Million	$20,491	$51,996	2.2%
Average Value	$ per ton	$532	$625	0.4%

Note: Within San Diego County, within Imperial County, and between the two counties.
Source: Team HDR analysis

Table 39 reports future volume by mode. The proportion of goods carried by truck and air in 2050 will be similar to that in 2007. The increase in overall volume is expected to be 2.4 percent for the region (see Table 40). Volume by truck (see Table 39), will only grow by about 1.8 percent.

On the other hand, air cargo, with origins and destinations within the region, is expected to grow 2.3 percent a year. This is more than 1 percentage point higher than the growth in overall air cargo for the region (including inbound, outbound, and through flows).

Table 39: Distribution of Internal Freight Flows by Mode within or between the two counties, 2050 forecast *

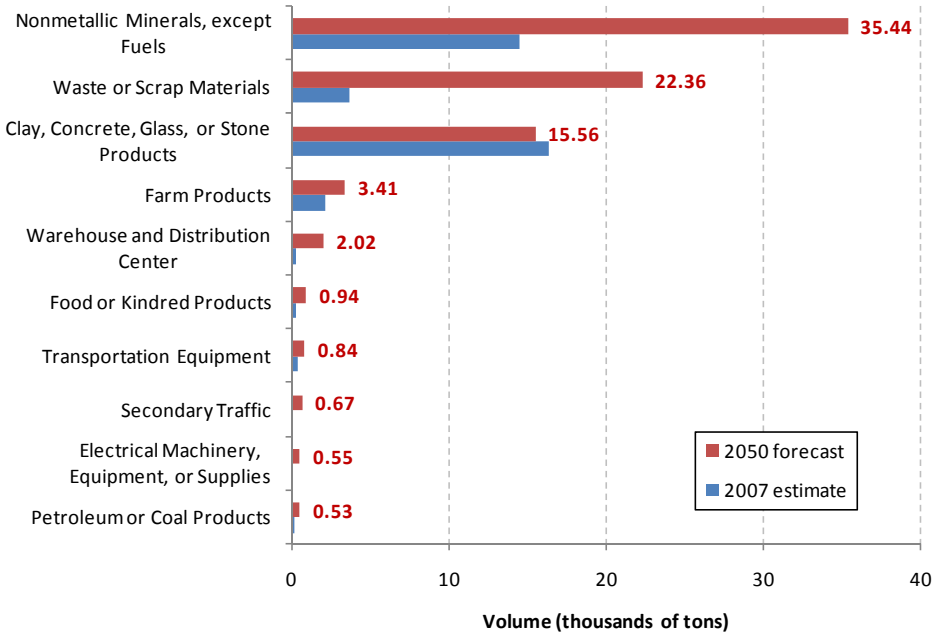
Mode	Volume (million tons)		Average Annual Growth Rate	Assumed number of Loaded Trucks**		Average Annual Growth Rate
	2007	2050		2007	2050	
Truck	38.5	83.2	1.8%	2,900,933	6,326,764	1.8%
Air	0.001	0.002	2.2%	58	157	2.3%

*Notes: * Within San Diego County, within Imperial County, and between the two counties. ** Estimated from average payload factors for 2007-2050 forecasting comparability.*

Source: Team HDR analysis

As shown in Figure 57, about 73 million tons of nonmetallic materials (except fuels), waste and scrap materials, and clay, concrete, glass, and stone products will be transported within the region in 2050. These commodities were also the most represented in the 2007 distribution, and their share of total volume within the region is projected to grow by 88 percent in 2050.

Figure 57: Distribution of Internal Freight Flows by Commodity, 2050 Forecast



Note: Within San Diego County, within Imperial County, and between the two counties.
Source: Team HDR analysis

4.4 Forecast of Total Freight Flows

We estimate that in 2050 that 432 million tons valued at over $1,500 billion will be transported to, from, in, and through the Gateway region. These projections reflect an average growth rate of 2.4 percent in value and 4% in volume t over the next 40 years. Our forecast therefore indicates that the increase in the value of the goods transported will outpace the growth in volume.

Table 40 reflects the direction of these commodity flows. Of particular note is the 7 percent annual average increase in the value of goods transported within and between individual counties. In terms of tonnage, however, the corresponding growth averages about 1.8 percent from 2008 to 2050. Exports also play a major role in freight growth, with outbound freight increasing at an annual average of 4.2 percent during the same period. Import volumes, on the other hand, will increase at an annual average rate of 1.9 percent, lower than the region's overall rate.

Overall, the projections show that the region will continue to export goods that are lightweight and of high value.

Table 40: Summary of Total Regional Freight Flows, 2050 Forecast

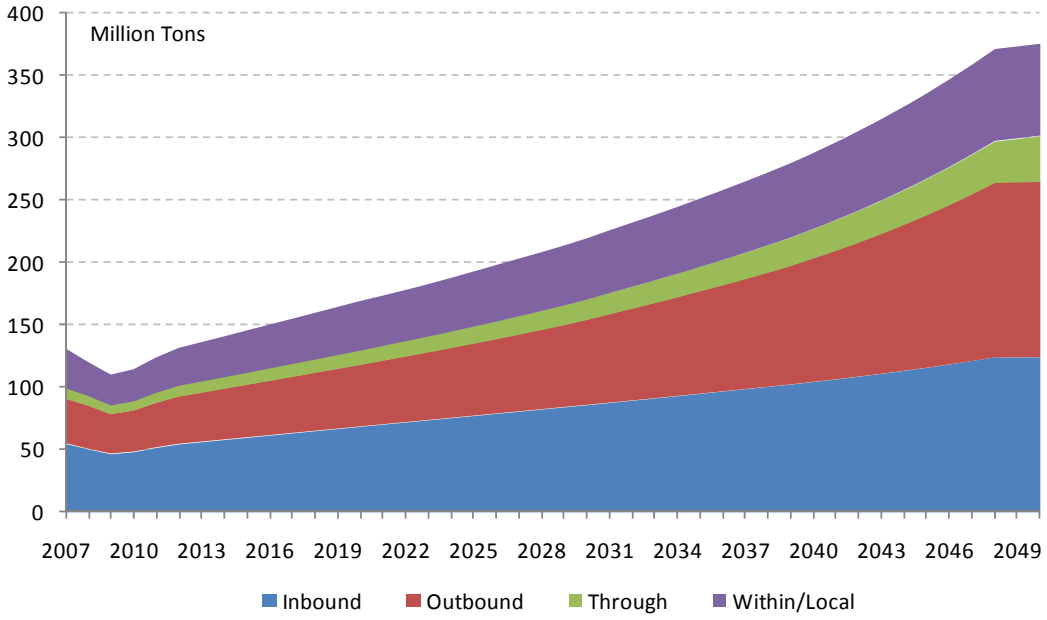
Direction of flow	Total for San Diego County and Imperial County Combined		Average Annual Growth Rate	
	Volume (million tons)	Volume (million tons)	Volume	Value
Through	**54.9**	**$118,879**	**3.3%**	**2.2%**
Inbound	**136**	**$260,028**	**1.9%**	**2.8%**
Canada	1	$3,076	2.0%	2.7%
Domestic	133	$246,997	1.9%	2.7%
Mexico	2	$9,9545	2.7%	3.8%
Outbound	**158**	**$777,495**	**3.1%**	**4.2%**
Canada	6	$9,446	3.5%	4.2%
Domestic	149	$755,002	3.1%	4.2%
Mexico	3	$13,047	2.8%	4.5%
Within or Local	**83**	**$368,461**	**1.8%**	**7.0%**
Grand Total	**432**	**$1,524,861**	**2.4%**	**4.0%**

Source: Team HDR analysis

The following two charts illustrate the expected short-term and long-term variations in the overall volume of freight handled in the region. They illustrate the impact of the current economic recession on the region's goods movement, as well as the expected recovery.

Freight forecast for San Diego County is illustrated in Figure 58. The chart shows that the county is expected to have rebounded from the current downturn by 2012, with growth in annual tonnage exceeding 5 percent per year. Growth in overall freight volume will then slow down to about 2 percent per year.

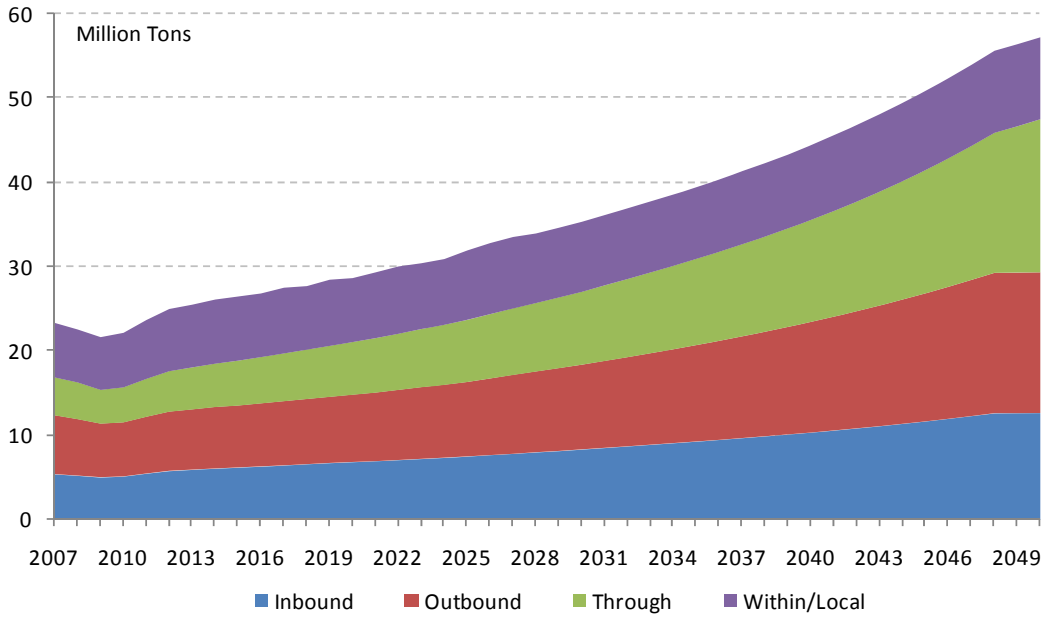
Figure 58: Total Freight Volume in San Diego County (2007-2050)



Source: Team HDR analysis

The expected trajectory of freight volumes for Imperial County is illustrated in the figure below. The chart shows that the economic downturn is expected to have a lesser impact on Imperial County's freight volume than on San Diego's.

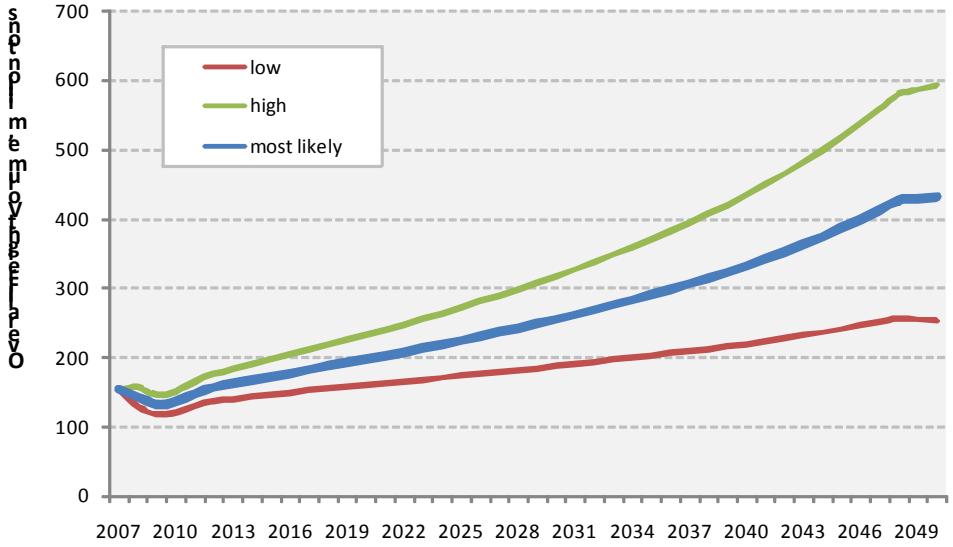
Figure 59: Total Freight Volume in Imperial County (2007-2050)



Source: Team HDR analysis

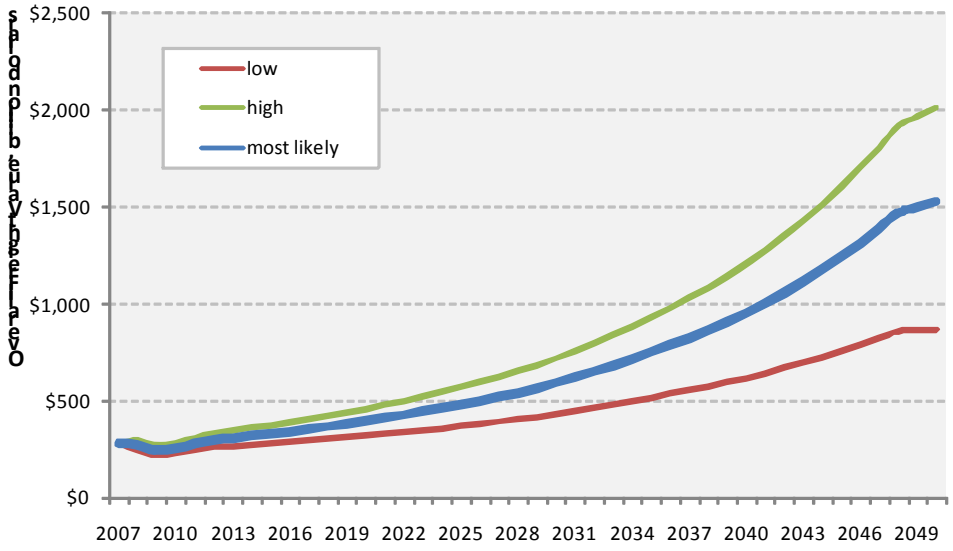
Figure 60 and Figure 61 below illustrate possible deviations from our central, most likely freight forecast, with an uncertainty bandwidth defined by a "low" and "high" forecast. While total volume is expected to increase by 2.4 percent on average annually over the study period under the "most likely" scenario (the most probable set of assumptions), it would grow by about 1.5 percent annually under the "low" scenario, and by about 3 percent under the "high".

Figure 60: Low and High Forecast of Total Goods Movement, in Volume (2007-2050)



Source: Team HDR analysis

Figure 61: Low and High Forecast of Total Goods Movement, in Value (2007-2050)



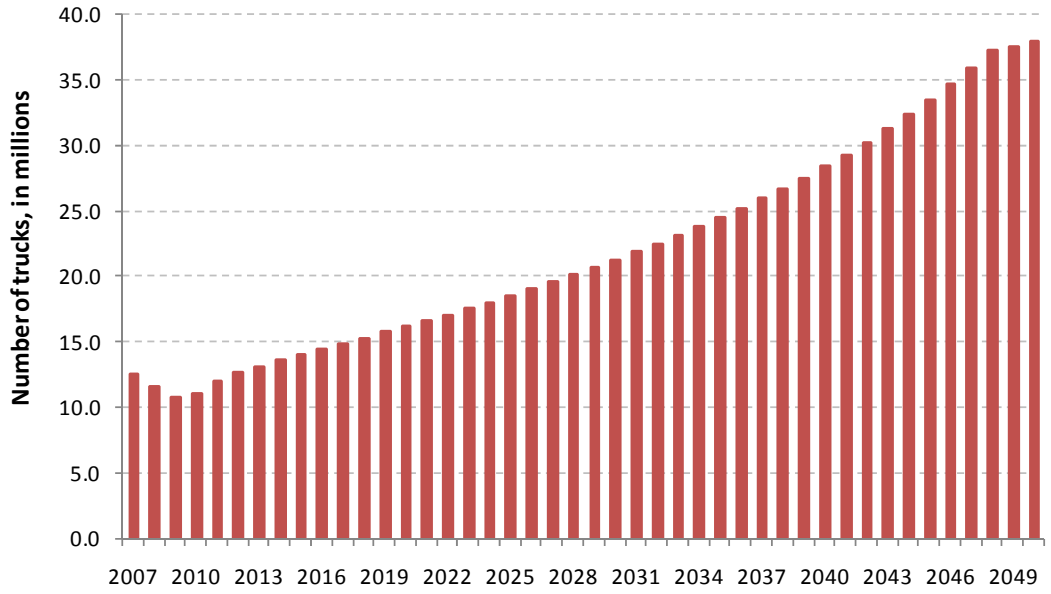
Source: Team HDR analysis

4.4.1 Forecast of Total Freight Flows by Mode of Transportation

All in all, we expect trucks to remain the dominant mode of transportation in the Gateway region. It is assumed that manufacturers, merchant wholesalers, and retailers will continue to limit inventory exposure, and demand smaller and more frequent shipments.[74] Trucks will benefit the most from this trend due to their rapid turnaround time and flexibility, especially relative to rail or marine freight.

The figure below projects that truck traffic will grow rapidly with the expected recovery in economic activity in 2010 - 2012 (at an average annual growth of 7 percent). This will be followed by a projected steady increase of about 3 percent per year over the rest of the study period.

Figure 62: Total Annual Loaded Truck Movement in the Region (2007-2050)



Source: Team HDR analysis

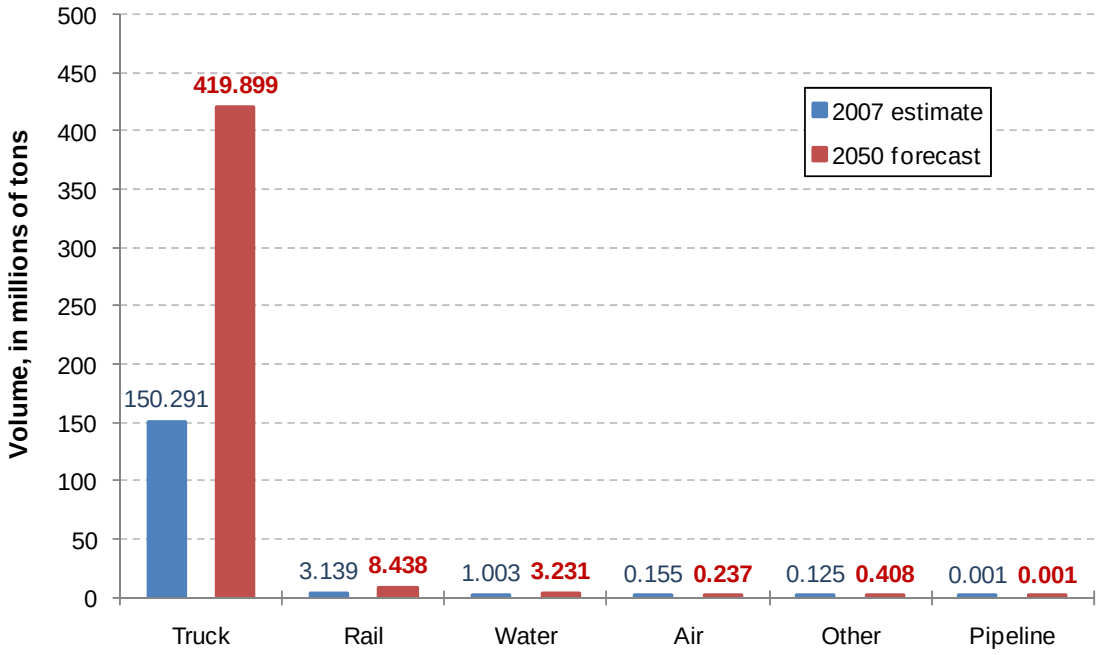
Overall, truck traffic on the region's road network is projected to increase nearly fourfold over the study period. This forecast is unconstrained[75] and reflects both the increase in overall freight volume as well as the expected shift in commodities transported by truck.

As illustrated in Figure 63, total freight volume transported by truck is expected to reach 420 million tons by 2050. Truck's modal share will remain at 97 percent of total volume during the same period. In other words, the average annual rate of growth in freight volume handled by truck, estimated at 2.4 percent, will be identical to the rate of growth of overall volume.

[74] "U.S. Freight Transportation Forecast To… 2015". Economic Forecast and Analysis prepared by Global Insight Inc., American Trucking Association, 2003.

[75] In our forecasting model, there is no feedback mechanism that would limit the growth in truck traffic when the level of service on the regional road network deteriorates.

Figure 63: Estimated Distribution of Total Freight Volume by Mode, 2050 Forecast

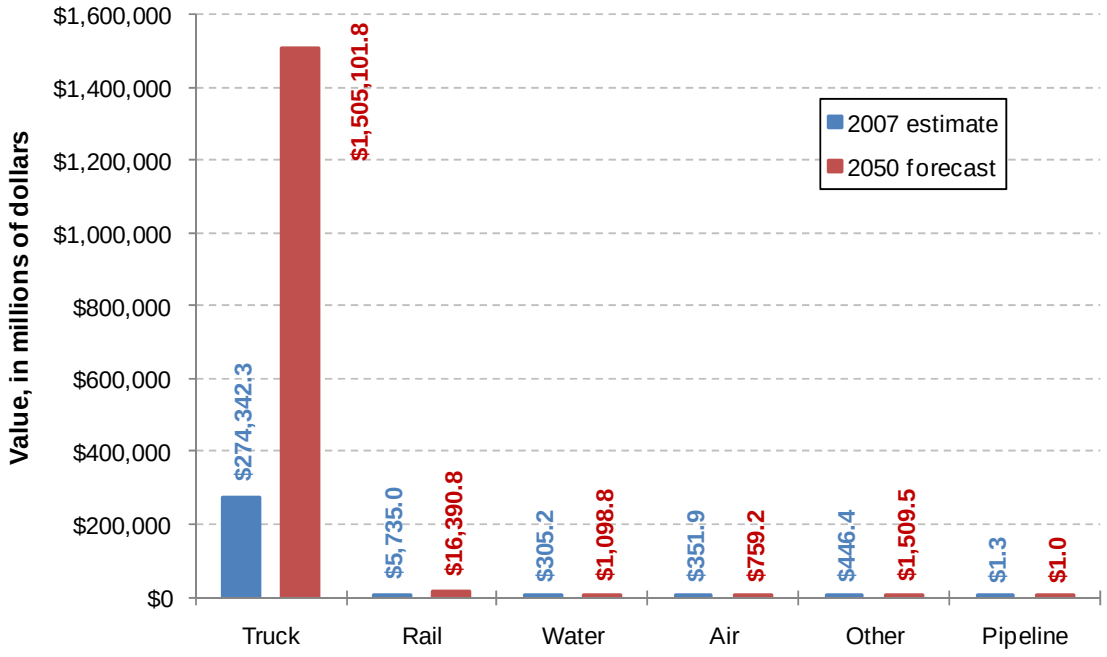


Note: To avoid double counting, freight flows in and out of the port by truck or rail are only recorded under truck or rail, not water. The water mode in the above chart represents coastal shipping. Total freight flows in and out of the port are projected to reach 6.1 million tons in 2050.

Source: Team HDR analysis

Similarly, trucks represent the dominant mode of transportation in value terms. Figure 64 shows that the value of goods transported by truck is expected to reach $1,505 billion by 2050, representing 99 percent of total freight value for the Gateway Region. This reflects a 1 percentage point increase in truck's modal share over the study period, and an average annual growth of 4.0 percent.

Figure 64: Estimated Distribution of Total Freight Value by Mode, 2050 Forecast



Note: To avoid double counting, freight flows in and out of the port by truck or rail are only recorded under truck or rail, not water. The water mode in the above chart represents coastal shipping. Total freight flows in and out of the port are projected to reach $14,270 millions in 2050.

Source: Team HDR analysis

4.4.2 Forecast of Total Freight Flows by Commodity

The distribution of freight flows by commodity group is expected to shift. The top ten commodities (in terms of volume) are presented in Figure 65. The top three commodities are projected to make up almost half of the total volume of freight by 2050.

The top three commodity groups are expected to be "secondary traffic" (goods transported from warehouses or distribution centers), followed by nonmetallic minerals (except fuels), and electrical machinery, equipment, and supplies. One of the reasons for this shift[76] is the strong expected growth in the high-technology manufacturing sector.[77] The amount of freight in the electrical machinery category is expected to increase by 6.2 percent annually over the study period; leading to an overall increase of 44 million tons (from 14 million tons in 2007 to 58 million tons in 2050).

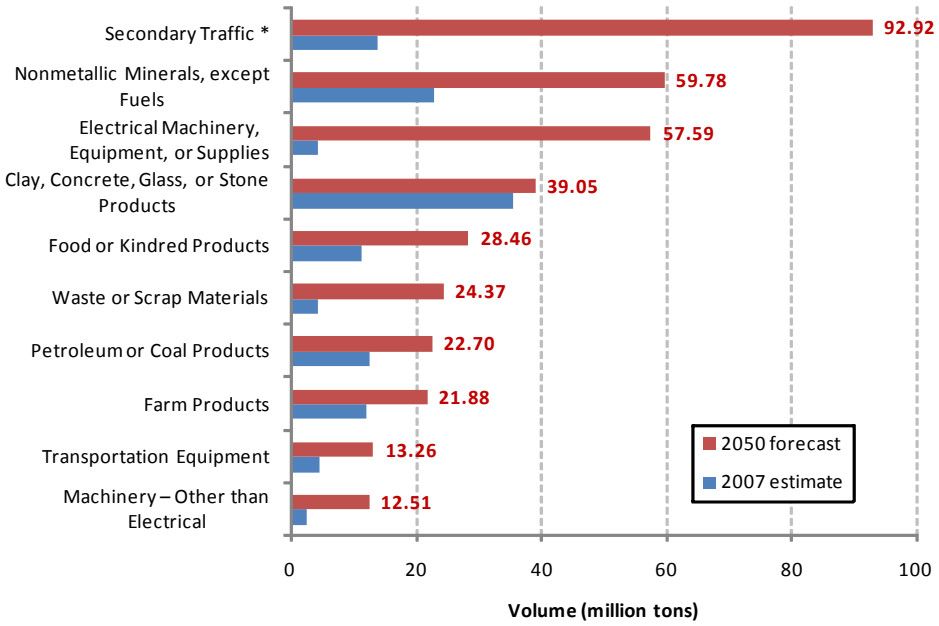
The commodity group that will experience the least growth is clay, concrete, glass, and stone products. It is forecasted to grow by a mere 0.2 percent on average annually over

[76] Recall that clay, concrete, glass, stone products, and nonmetallic minerals (except fuels) were ranked first and second in 2007.

[77] "U.S. Freight Transportation Forecast To… 2015". Economic Forecast and Analysis prepared by Global Insight Inc., American Trucking Association, 2003.

the study period. Its share of total volume will fall from 23 percent in 2007 to 9 percent by 2050.

Figure 65: Distribution of Total Freight Volume by Commodity, 2050 Forecast[78]



*Note: * Traffic movements originating in warehouses or distribution centers, or drayage movements of intermodal rail or air freight. This typically does not include "goods deliveries": shipments to or from retail (excluding mail-order and warehousing), offices, service establishments, and residences. Details on the types of items being moved are not available.*

Source: Team HDR analysis

4.4.3 Forecast of Total Freight Flows by Origin - Destination

As can be seen in the Table 41 California (excluding the Gateway region) will rank first among the top ten origins of freight in 2050. Both Arizona and Nevada will continue to ship in significant volumes of goods, as reported earlier for 2007.

For San Diego County, 69 percent of all inbound tonnage is forecasted to originate from the rest of California. This is slightly below the 2007 estimate (of 73 percent). Thus, trade with the rest of California will grow at an average 2.0 percent a year, compared to an estimated 2.8 percent annual growth for all imports. The increase in import volumes from Mexico is the most significant change relative to the base year. With an average annual growth rate of 3.6 percent, Mexico's share of total inbound flows is forecasted to increase from 7 to 13 percent over the study period.

We observe a similar trend for Imperial County. By 2050, over half of the county's total inbound tonnage (imports from foreign trading partners and from other parts of the

[78] Nonmetallic Minerals, except Fuels includes: Broken Stone, Gravel or Sand, Clay Ceramic, Chemical or Fertilzer Mineral, and Miscellaneous Nonmetallic Minerals.

Nation) is forecasted to originate from the rest of California and about one-third from Mexico. Almost all states or regions will continue to increase shipments to Imperial County at an average annual rate of about 2 percent, except for Mexico and Colorado. Goods movement from Mexico is expected to grow at an average 3.6 percent per year, while flows from Colorado are forecasted to shrink by about 0.7 percent annually during the study period.

Table 41: Top 10 Origins of Freight Flows by County, 2050 Forecast

Origin of Freight Flows Terminating in or passing through San Diego County	Volume (tons)	Origin of Freight Flows Terminating in or passing through Imperial County	Volume (tons)
Rest of California	105,249,277	Rest of California	15,233,136
Arizona	15,818,923	Nevada	738,826
Nevada	4,416,718	Oregon	668,393
Texas	1,716,690	Arizona	558,272
Massachusetts	1,533,756	Idaho	531,201
Washington	1,315,738	Massachusetts	427,514
Oregon	1,287,324	Colorado	322,251
Louisiana	852,499	Texas	310,249
New Mexico	526,778	New Mexico	274,812
Illinois	418,297	Wyoming	171,814
Mexico	19,783,880	Mexico	9,831,844
Canada	507,272	Canada	377,978
Baja California	218,316	Baja California	120,176

Source: Team HDR analysis
Note: Not all freight flows in this table will pass through the region's international POE (i.e., the border with Mexico, the Port of San Diego and San Diego's International Airport).

In terms of volume, the top freight destinations (within the U.S.) are forecasted to remain similar to those estimated for 2007. This is also true for the expected share of total exports. As stated earlier in the report, exports from the region are projected to grow significantly.

Of the top ten destinations of freight flows from San Diego County, Arizona, Hawaii, Tennessee, and Pennsylvania, are forecasted to experience an average annual growth of 4.5 percent in volume. Regarding flows from Imperial County, demand in Massachusetts is projected to grow the most, at 5.3 percent annually over the study period.

Table 42: Top 10 Destinations of Freight Flows by County, 2050 Forecast

Destination of Freight Flows Originating in or passing through San Diego County	Volume (tons)	Destination of Freight Flows Originating in or passing through Imperial County	Volume (tons)
Rest of California	115,455,025	Rest of California	15,986,559
Arizona	4,785,052	New York	1,821,026
Nevada	4,714,931	Massachusetts	1,131,813
Texas	4,591,177	Nevada	694,540
New York	2,019,852	Texas	619,963
Hawaii	1,913,846	Arizona	609,447
Ohio	1,851,611	Ohio	462,591
Illinois	1,839,482	Illinois	417,580
Tennessee	1,000,229	Pennsylvania	404,651
Pennsylvania	934,785	Missouri	340,292
Baja California	16,676,539	Baja California	7,609,171
Mexico	4,597,721	Mexico	1,181,202
Canada	5,163,827	Canada	460,792

Source: Team HDR analysis
Note: Not all freight flows in this table will pass through the region's international POE (i.e., the border with Mexico, the Port of San Diego and San Diego's International Airport).

The forecasts of domestic and international freight flows presented in this chapter are based primarily on macro-economic considerations (e.g., projected growth in output and employment) and do not take into account policy drivers which can impact freight flows, such as supply chain shifts, environmental regulations, new infrastructure which can change trade flows. A qualitative assessment of these policy issues is provided in the next chapter.

5 POLICY CONSTRAINTS, MARKET CONDITIONS AND REGULATORY ISSUES

The primary focus of this study is to provide an economic forecast of anticipated freight flows moving into, out of, within and through the region by 2050. But in addition to economic drivers underlying the forecast, there are diverse policy, market, and regulatory issues which can have a significant impact on how freight moves in the region. Such issues cannot be fully captured in a forecast, so entities that are planning freight projects have to constantly monitor them.

This chapter highlights policy, market, and regulatory issues that should be monitored. Each issue is presented as a stand alone issue; but in reality each has complex dependencies with others, and must be understood as a dynamic driver of freight supply chain efficiencies. This section captures known issues at the time the Report was written, it is known that this list will change over time, and real time monitoring of freight trends must accompany interpretation of this Gateway Forecast.

5.1 Freight Policy Issues

5.1.1 Funding Availability and Funding Priorities

At present, freight planning in the public sector is an evolving area of expertise. Nonetheless, as the complexities of freight movement escalate public freight planners are additionally challenged by the fact that there is not a coherent and consistent national, regional, or local freight framework to help organize the freight planning and funding activities within public agencies. Sometimes freight projects clearly only have local dimensions. At other times, public freight planners have to deal with freight efficiencies related to international seaports and airports, international border crossings and rail operations that have both local and national benefits and impacts. Additionally, funding solutions for freight projects often involve private interests and complex funding partnerships must be invented or crafted on a case by case basis.

San Diego and Imperial Counties have access to some federal border improvement funds, but not enough to complete the border crossing work that the region's economy demands. Similarly, there are no federal funds targeted at port landside access improvements. In 2007, the State of California did address the need for freight funding by establishing the Trade Corridor Improvement Funding program, which the region applied to border and port access projects.

Nonetheless, public agencies that tackle large scale freight projects must overcome inherent challenges of funding sources, funding priorities and the need to develop unique funding partnerships.

Although freight transportation stakeholders have advanced projects and proposals to enhance freight mobility by building new infrastructure and increasing system efficiency, public planners face several challenges when advancing freight improvement projects.

These challenges include competition from non-freight projects for public funds, limited community support in the freight planning process, building consensus among various government entities and private sector stakeholders, land use challenges and limited or restricted availability of funds available for freight transportation. Compounding these challenges; in late 2009 the federal government is still crafting a clear federal strategy and role for freight transportation as part of a general overhaul of federal transportation funding for the next transportation authorization bill. When combined, these factors seriously challenge the ability of local public sector agencies to effectively address freight mobility.

5.2 Market Issues Impacting Freight

5.2.1 Changing Market Conditions and Supply Chain Drivers

Public agencies that step forward to plan and finance complex freight projects must bear in mind that freight demand is solely market driven and subject to the vicissitudes of the global economy. Public agencies planning freight projects need to monitor and understand varied market issues such as supply chain risk mitigation in an economic downturn. For instance, as a result of the global economic downturn shippers and carriers have sought to mitigate supply chain risks by shortening supply chains. U.S. manufacturers will continue to reconfigure their supply chains by moving plant operations and sourcing vendors closer to home and away from Asia, because of limited free trade agreements, high energy costs, and rising labor and production costs in Asia all contribute to companies re-evaluating extended supply chains. Mexico in particular may become an increasingly popular source for manufactured goods, a U.S. Commerce Department report that indicates a 7.2% increase from year-to-date imports through Mexico compared to the year before.

Some are doubtful of any massive shift but do think that Mexico will do well, based on the U.S. market recovery and its own developing economy. But a school of thought is emerging that suggests profound, long-term changes in supply chain strategy are coming. This thinking holds that the massive outsourcing to China over the past 15 years represented a single-minded goal of achieving only the lowest-cost manufacturing. But now, some believe, the pendulum is swinging toward a new priority, one that could prompt major changes in where goods are manufactured: total delivered cost.

Optimizing around this objective brings in various additional factors, including transportation cost, carbon footprint, security cost, currency fluctuations, and cost of credit and risk of supply chain interruption. It places a premium on diversification of supply sources to mitigate risk from various sources. It also increases the emphasis on flexibility and responsiveness of the supply chain because demand forecasting has been rendered virtually useless by massive changes in consumer spending behavior. When all those issues are considered, manufacturers may conclude that Mexico or some other near-source location is preferable to China. A broader view of supply chain strategy has people thinking in terms of best-cost sourcing. This means looking at labor rates but also

other supply chain realities, such as extra inventory costs and improved speed and savings in Mexico.

5.3 Regulatory Issues Impacting Freight

5.3.1 National: U.S. DOT Mexican Trucking Regulations

The debate over Mexican trucks gaining access to the U.S. market has continued unabated since 1994. One of the most contentious transportation issues in Washington is access to U.S. markets for Mexican trucking interests, which was required by the North American Free Trade Agreement (NAFTA). The U.S. Department of Transportation (DOT) is considering regulations that would allow that to occur. Opponents to Mexican trucks having full access to US markets cite negative safety concerns. Advocates cite positive safety issues and the fact that it would increase competition and perhaps lower trucking prices.

This could impact cross border traffic in the regions because the present regulations limit the majority of Mexican trucks to only entering a 30 mile zone across the border. If the regulation were modified, the intense truck traffic (called Mule services due to the constant back and forth haulage in and out of the 30 mile zone) could shift over time. Additionally, the Mexican government has become so frustrated by the U.S. resistance to open all markets to Mexican truckers that they recently retaliated with trade tariffs, which impacted cross border traffic due to price spikes.

The right of Mexican trucks to operate in the United States was negotiated by the first President Bush and enacted into the NAFTA treaty under President Clinton. NAFTA includes provisions governing cross border trucking between the U.S., Canada, and Mexico that would have allowed Mexican carriers to fully provide cross-boundary trucking services to the U.S. by January 1, 2001. Certain restrictions on the right of Mexican nationals to invest in U.S. domestic trucking companies providing international cargo services between points in the U.S. were also scheduled to be phased out by the end of 1995. However, responding to union pressures, the Clinton and Obama Administrations have both cited safety concerns to delay implementing these market-opening provisions. As of late 2009 the issue remains at an impasse and requires monitoring.

5.3.2 State: California Air Resources Board (CARB) Regulations

The State of California, with the help of affected industries and other interested parties, is developing policies and programs to reduce congestion and to address the environmental impacts resulting from the growth in the movement of goods in California. The program is extensive and includes regulations and incentives including the following:

- Prop. 1B - Goods Movement Emission Reduction Program - a new partnership between the Air Resource Board (ARB) and local agencies (like air districts, ports, and transportation agencies) to quickly reduce air pollution emissions and health risk from freight movement along California's trade corridors. Local agencies provide

financial incentives to owners of equipment used in freight movement to upgrade to cleaner technologies.

- Goods Movement Plans – The Business, Transportation, and Housing Agency and the California Environmental Protection Agency (EPA) have partnered to bring all stakeholders together to discuss and address the movement of goods and reduction of their environmental impacts in California.

- Port Activities - In an effort to reduce emissions for port-related sources, ARB has regulatory activity on cargo handling, commercial harbor craft, port trucks, ship auxiliary and main engines, on-board incineration, shore power, and vessel speed reduction. ARB has also developed Health Risk Assessments for the Ports of Los Angeles and Long Beach, with the Port of Oakland assessment underway now.

- Rail Yard Activities - these efforts include an agreement with Union Pacific and BNSF Railways to reduce locomotive emissions near rail yards and the development of new regulations to address on- and off-road vehicles at rail yards. CARB approves major fleet rules.

- Truck Retrofitting and Replacement - In December 2008, CARB adopted extensive rules that require retrofit or replacement of virtually all trucks now operating in California and mandate tire and aerodynamic-related specifications in an effort to reduce greenhouse gases. These statewide bus and truck rules requires fleet owners to begin replacing older trucks operating in California or retrofitting them with diesel exhaust filters, beginning in 2011. Under CARB's Truck and Bus rules, almost all vehicles covered would be replaced or upgraded by 2014. Owners also must replace engines older than the 2010 model year under an implementation schedule running from 2012 to 2022.

California freight warehouses and transportation companies are facing aggressive environmental regulations which can influence supply chain decisions. Clearly, these programs need to be understood and monitored by those planning freight projects as they may impact market competitiveness and prices to move freight in around California. Since the California freight regulations are more stringent than in any other state, we will need to monitor regulatory impacts and possible impacts to freight volumes moving in the State Looking forward, the focus will be on reducing carbon from the freight supply chain. California in the 1990s was the center of efforts to reduce pollutants such as nitrogen oxide, sulfur oxide and particulate matter. NOx, SOx and PMs present health risks such as respiratory illnesses and cancer.

California has now turned its attention to its carbon footprint, which involves greenhouse gases that are believed to contribute to global warming. An estimated 75 percent of a company's carbon footprint is due to transportation, so the supply chain is the primary target in California's effort.

The Global Warming Solutions Act, or Assembly Bill 32 as it is known locally, was signed in 2006 and sets progressively stricter deadlines for reducing carbon emissions

from every aspect of a company's operation. In 2010, California must reduce its carbon emissions back to 2000 levels. By 2020, emissions must be rolled back to 1990 levels, and by 2050 the current level of carbon emissions must be reduced by 80 percent.

California regulators intend to reach these goals primarily by reducing vehicle miles traveled, improving fuel efficiency in all modes of transportation, and burning cleaner fuel. For example, CARB has a timeline for replacing old drayage trucks with 2007 model and younger trucks. Trailers will also be affected by new regulations that closely follow the EPA's Smart Way guidelines. EPA's guidelines include low-resistance tires and aerodynamic trailers. They are voluntary under the Smart Way program, but these measures will be mandatory in California. Out-of-state trucks, as well as trucks that enter the state from Mexico and Canada, will be subject to California's regulations for trucks and domestic 53-foot trailers.

Warehouses will also be affected. The new regulations mandate more efficient lighting, a move to electric forklifts and other energy reduction measures. Southern California, with 1.5 billion square feet of industrial real estate, is by far the largest distribution complex in the United States. Local: Land Use Constraints and Land Prices

5.4 Land Use Conflicts and Land Use Availability for Freight Facilities

With the San Diego region's population expected to grow from 3.1 million to 4.4 million by 2050, it is also expected that there will be a decreasing supply of industrial land and that the continued gentrification of commercial and industrial lands will exacerbate land use conflicts between freight and non-freight uses. Industrial land uses may be pushed out of the urban core areas accompanied by negative transport system and environmental impacts. This is likely to be most acute for the Port of San Diego operations which are located along the region's working waterfront area as well as the downtown rail yard for BNSF.

In addition to land use conflicts, land use availability and land use cost for freight projects, and land use prices will likely present major challenges for freight facilities, most especially in coastal San Diego County. The region continues to grapple with "not in my back yard" (NIMBY) issues related to existing and new freight projects. To compound the land use conflict and land price issues, currently there are no land use protections for freight and freight related facilities. As these facilities get pushed away from the urban core, which is also the commodity consuming core of a region, the phenomena of freight sprawl can occur. If and when freight facilities are either put out of business or moved away from consumers, then additional truck miles can be expected so that goods can be delivered to consumers.

5.5 International Developments Impacting Freight

5.5.1 Expansion of Panama Canal

The Panama Canal project is about to enter the largest part of its extension plan, adding a third set of locks by 2014, This will allow the canal to handle ships with nominal

capacities of up to 13,000 TEUs, more than double the approximately 5,000 TEUs that's now considered Panamax. With the expansion of the Panama Canal, we must monitor for: diversion from CA ports, particularly the Ports of Los Angeles and Long Beach; possible building or expansion of alternative ports in Mexico which could impact cross-border truck traffic; or even complete adjustment of global shipping routes that diminishes cargos moving through California ports and redirection of that waterborne freight to Gulf and E. Coast Ports (thereby completely altering supply chain patterns as we know them in 2009).

In early 2009 when the Panama Canal Authority took steps to begin major parts of a $5.25 billion construction plan, their ambitions were nothing short of changing the direction of those trade winds. By announcing bids to build locks on Panama's Atlantic and Pacific coasts on March 3, the authority set in motion an effort to meet the changing economics of ocean shipping and to the shift supply chains that have built Southern California's ports into behemoths of trade. Although their reputation has suffered from congestion and labor problems in recent years, Los Angeles and Long Beach still handle more than two-thirds of Asian import containers.

Intermodal rail connections are part of a sprawling infrastructure, dotted with distribution centers, drayage connections and highway hauls that flow from the ports. Projects along the Pacific coast of Canada and Mexico aim to get piece of the action, and carriers are building up inland connections to match those operations. The Southern California ports already have lost market share to Gulf and East Coast ports, and major shippers including Wal-Mart and Target have added distribution centers far from the traditional West Coast gateway.

It is likely there will be growth opportunities for intermodal services via the West Coast as well as all-water services to the East and Gulf Coast, especially once the economy permits resumption of a decade-long trend toward increased container volume. That view is shared by many other analysts and industry officials. The intermodal vs. all-water debate is more than academic. Shippers, ocean carriers, railroads, truckers, ports, distribution center operators and others in the supply chain are watching closely to see what happens after 2014. Despite talk of "near shoring," Asia will remain the primary source of U.S. manufactured imports.

5.5.2 Port Development in Baja, California

Mexico views port development on its Pacific Coast with a sense of urgency, despite the slump in global trade. In a little more than four years, the Panama Canal widening project will be completed, and Mexico's ports will face new competition in their quest to capture cargo for the U.S. market. If a new Port is built in Baja California or an existing port expanded in Mexico, the San Diego region would monitor that closely to see what cargo is being attracted, and what would be the related rail and highway implications for any traffic destined for the U.S.

In the quest for hosting major port/distribution centers, Mexico does not want to lose out to Panama and is pressing to get its port projects started now. Mexico's Pacific seaports

of Lazaro Cardenas, Manzanillo, Ensenada and Guaymas have always looked longingly at the U.S. market. Capturing just a slice of the lucrative U.S. import trade from Asia would be a boon to the much smaller ports. Mexico is also proceeding slowly, but deliberately, with plans to develop a container port at Punta Colonet, about 150 miles south of the U.S. border in Baja California. Punta Colonet would be designed to serve the U.S. market almost exclusively. Earlier in the decade, when trans-Pacific trade volume was growing at least 10 percent each year, Mexico's plan for attacking the U.S. market was based on the widely held assumption that the Los Angeles-Long Beach gateway would reach capacity as early as 2012. Ports such as Lazaro Cardenas, with a direct rail connection to the U.S. border, and Ensenada, less than 100 miles south of the California border, would make ideal overflow ports for Los Angeles-Long Beach.

But events appear to have overtaken Mexico's dramatic plans for Punta Colonet and more modest plans for its' smaller ports. Developers in Canada opened a port at Prince Rupert, about 500 miles north of Vancouver, with direct intermodal service to the U.S. Midwest on Canadian National Railroad. China Ocean Shipping Co. and its alliance partners have two weekly services to the Port of Prince Rupert. Trans-Pacific volume this year is down about 20 percent. Shipping lines have taken at least 15 percent of their capacity out of the trade, and marine terminals in Seattle-Tacoma, Portland, Oakland and Los Angeles-Long Beach suddenly find themselves with plenty of unused capacity. Port executives in Southern California say it could take three or four years for container volume in Los Angeles-Long Beach to return to 2006's peak. These ports are not expected to reach capacity until well after 2020.

Carriers over the past year have steadily introduced large 8,000 to 10,000-TEU ships into their U.S. West Coast services. They are replacing strings of smaller vessels with fewer strings of mega-ships to reduce operating costs and offer lower per-unit carrying cost advantages to customers. Any Mexican port that hopes to compete with Los Angeles-Long Beach must attract these 8,000-TEU vessels and generate enough cargo to fill them.

Mexican port planners are still proceeding with development projects, but marketing executives have changed their strategy, promoting Mexico's lower costs for land, labor and inland transport in the hope of grabbing U.S. import cargo. Lazaro Cardenas promotes its Kansas City Southern Railroad (KCS) connection to the U.S. heartland, but the rail route favors Houston and points east, such as Atlanta and New York. That puts Lazaro Cardenas in direct competition with all-water services from Asia. And Dallas, rather than Houston, is the distribution center hub for Texas. Trans-Pacific transit times to Los Angeles-Long Beach are one to two days shorter than to Lazaro Cardenas, and Dallas is served efficiently by intermodal rail service from Southern California. These logistical disadvantages Lazaro Cardenas faces also must be addressed if Mexico is to build a $5 billion container port and 200-mile rail line to the U.S. border at Punta Colonet.

6 SUMMARY OF FINDINGS AND CONCLUSIONS

6.1 Summary of Findings

The principal findings associated with the estimates and forecast presented in this report include the following:

- Total freight flows "in" the Gateway region (including inbound, outbound, internal and through flows) will grow by 2.4 percent annually in volume and 4.0 percent in value.
- Otay Mesa will remain the main international gateway for the region, followed by Calexico East; both are expected to see growth of over 3 percent per year in volume.
- Trucks will continue to be the dominant mode of transportation, carrying over 96 percent of total freight volume.
- Inbound and outbound domestic flows will continue to account for most "regional" freight flows, with 31 and 39 percent of total freight volume, respectively (70 percent combined).
- San Diego County and the rest of California will remain the primary origins and/or destinations of shipments passing through the region's land POEs. About three fourth of the combined volume of imports and exports will originate or terminate in the region or state.
- Trade with NAFTA partners, Canada and Mexico, will continue to grow, with the value of shipments to Mexico projected to increase by 4.5 percent annually and the value of shipments to Canada by 4.2 percent.
- Approximately 65 percent of the tonnage handled "in" the region will originate from or terminate in the rest of California.
- San Diego's large consumer base will continue to serve as a magnet for a significant amount of internal freight flows, (whether as an origin, a destination or a trans-shipment location).
- Trans-shipping activities (and flows from/to warehouses and distribution centers) are expected to grow by over 4.0 percent annually.
- Electrical machinery, equipment, and supplies, are expected to be the fastest growing commodity groups in the region.
- Over half of the shipments arriving at or departing from the Port of San Diego are - and will continue to be - carried by trucks. Most of these shipments have an origin or destination in the Gateway Region or the State of California. Shipments with an origin or destination in other states are mainly carried by rail.
- The main commodities handled at the Port will consist of transportation equipment, farm products, and waste or scrap material (export).
- Due to constraints on San Diego International Airport capacity expansion, commodity flows by air are not expected to grow significantly at that airport.

- Rail movements constitute about 2 percent of overall freight flows. Most of the commodities carried by rail consist of transportation equipment, food or kindred products, and petroleum coal products.

6.2 Capacity Constraints and Challenges to Regional Goods Movement

While our forecast for freight movement at the port, airport and rail yards accounts for capacity constraints, freight flows by truck potentially face fewer constraints. Truck movements tend to be more flexible in terms of routing (e.g., use of alternative roadways or POEs) and time of travel (e.g., earlier or later departure times), and they are cost efficient for short-haul moves.

This study acknowledges that there are important challenges to goods movement in the region. In general, land costs and land use conflicts present costly challenges to increasing the existing freight footprint. Examples of freight issues include:

- Lack of direct freeways to Otay Mesa POE, Port of San Diego, rail yards, and intermodal facilities;
- Lack of dedicated truck lanes or truck bypass routes;
- I-5, I-805, and I-15 are nearing capacity levels;
- If a regional goal is to not increase truck traffic, it will be important to preserve the existing freight capacity at the Port of San Diego and on the regional freight corridors;
- Need for a reconfigured rail yard at TAMT and improved intermodal facilities including train storage tracks, warehouses, etc;
- Shared rail capacity on the MTS-owned facilities from downtown to the Mexican border to the south and from downtown to the City of Santee to the east, limits the hours of service for freight movements;
- Single track sections of the freight rail system on the Los Angeles to San Diego (LOSSAN) corridor which is an impediment to expanded and safer freight and passenger ops on the line;
- Limited facilities to stage SD&IV trains near the Mexican border at San Ysidro (being planned);
- Limited ability to develop cargo handling or cargo storage facilities near Port terminals, border crossings, warehouse districts, etc.;
- Wharf expansion required at NCMT to maximize automotive import throughput as well as military cargos;
- Limited air cargo service in Imperial County;
- Air cargo capacity at San Diego International Airport is limited due to it being a single runway airport with passenger service that will soon breach the limits of the single runway; and

- Limited warehouse space exists at Lindbergh Field. UPS, USPS and FedEx all currently sort cargo off site.

6.3 Conclusions: Towards a Sustainable Freight System

The reliable movement of goods and services is the lifeblood of the regional and national economy. The regional transportation planning and the regional prosperity strategies acknowledge that freight facilitation is an integral part of the economic growth and sustainability of the Region.

Freight movement has been, however, is often addressed as a double-edge sword. On one hand, it is recognized as a catalyst to regional and national growth, but on the other hand, freight movement has been viewed as a burden to the region's facilities and network, contributing to delays, accidents, and environmental impacts. The two views are, indeed, real and present a constant tension in regions that host freight operations..

The freight forecast planning tool, however, may assist planners to plan effectively while minimizing negative impacts. It may also help decision makers understand key issues that need to be addressed in order to balance competing transportation needs and reach consensus on strategies for more efficient and sustainable freight movement. More specifically, in order to ensure that the growth underlying the prosperity goals established for the region materializes, challenges to the freight system must be addressed.

Therefore, to prevent the erosion of the region's prosperity and welfare, the following mitigation approaches, among other strategies, could be considered:

- Incorporating freight needs into the current modeling tools and planning processes used by the region to better anticipate future needs;
- Regular interaction and collaborative planning with freight stakeholders to develop and/or implement mutually beneficial solutions to expand capacity at strategic freight facilities;
- Addressing the challenges associated with the projected number of trucks on the Region's roadways with a view to improve the reliability of the network for both truck and personal vehicles alike;
- Addressing delivery and servicing issues through traffic management;
- Sustaining and or growing current use of rail and encouraging coastal shipping for freight;
- Encouraging the development of new rail freight terminals and improving access to existing terminals;
- Encouraging land use patterns and development projects that generate significant amounts of freight in locations that have good access to the rail network;
- Encouraging local authorities and other agencies to co-operate in the development of a Goods Movement Action Plan as part of the regional Transportation Plan, and

- Considering all modes of freight transportation (i.e. truck, rail, water and air) equally in the development of the Good Movement Action Plan.

APPENDIX A: SUPPLEMENTARY DATA TABLES

Table A-1: Truck Routes in San Diego County

Highway	Origin	Destination	Miles	POE	Lanes		
					Total	HOV	HOT
Major North South Routes							
I-5	San Diego	Orange	74	San Ysidro	8	2	
I-805	San Diego	San Diego	28		8	Y	
I-15	San Diego	Riverside	56		8	Y	Y
Major East-West Routes							
SR-905	San Diego	San Diego	8		4		
SR-125	San Diego	San Diego	11	Otay			4
SR-125	San Diego	San Diego	11		8		
I-8	San Diego/Imperial	Arizona	171		4		
SR-94	San Diego	San Diego	63		2		
Planned Outer Loop to Increase Truck Capacity							
SR-52	San Diego	San Diego	15		6	Y	
SR-54	San Diego	San Diego	7		4	2	
SR-67	San Diego	San Diego	5		4		
Other Routes							
SR-188	San Diego	San Diego	2	Tecate	2		
SR-11	San Diego	San Diego	3	Otay II			4
SR-79	San Diego	Riverside	63		2		
SR-78	San Diego	Imperial	109		2		
SR-163	San Diego	San Diego	11		8		
SR-76	San Diego	San Diego	17		2		
SR-56	San Diego	San Diego	10		4		

Source: CALTRANS & Windows Live Maps

Table A-2: Rail Lines in San Diego County

Name	From	To	County	Freeway	Tracks	Miles	Owner	Operator
San Diego Subdivision (SDNR)	County Line	San Diego	San Diego	I-5	1	60.1	NCTD & MTS	BNSF / PSRR
Escondido Branch	Oceanside	Escondido	San Diego	SR-78	1	21.3	NCTD	PSRR
San Diego Subdivision (BNSF)	San Diego	National City	San Diego	I-5	1	5.4	BNSF	BNSF
Coronado Branch	Chula Vista	Coronado	San Diego	I-5	1	7.3	MTS	-
SDTI - East Line	San Diego	El Cajon	San Diego	I-8	1	19.4	MTS	SDIV
SDTI - South Line	San Diego	San Ysidro	San Diego	I-5	1	15.1	MTS	SDIV
Desert Line	Division	Plaster City	San Diego / Imperial	I-8	1	70	MTS	CZRY

Note: A limited service between the Mexican border at San Ysidro/Tijuana through Mexico to Division is operated by CZRY. The line is owned by the Mexican government.
Source: SD Freight Rail Consulting

Table A-3: Marine Terminals in San Diego County

Name	Size (acres)	# of Berths	Area (sqft)	Warehouse (sqft)	Cargo Handling	Rail	# of Cars	Operator
Tenth Avenue	96	8	4,620	1,056,000	Improvements could enhance efficiency	Underutilized	196	BNSF
National City	230	8	5,965	829,900	No shore side unloading equipment	Adequate	85	BNSF

Source: SDUPD Maritime Business Plan Update, April 2007

Table A-4: Cargo Facilities at San Diego International Airport

Facility	Tenants	Operational Purpose	Area (acres)	Airside / Landside	Location
Air Freight Terminal	Delta, Alaska, Continental, American, California Air, Air Transport Int., Paxton, Shreve and Hays	Airline Belly Cargo	0.9	Landside	South Side
Capital International Cargo	Capital International Cargo	Cargo Loading Area	1.9	Airside	North Side
Federal Express (FedEx) Cargo	FedEx	Cargo Loading Area	11	Airside	South Side
Southwest Airlines Cargo Facility	Southwest Airlines	Office Space / Warehouse	0.3	Landside	South Side
United / Southwest Air Cargo Operations	United, Southwest, Executive Air Maintenance Inc.	Airline Belly Cargo / Aircraft Maintenance	0.4	Landside	South Side
United Parcel Service (UPS) Cargo	UPS	Cargo Loading Area	1.1	Airside	South Side
USPS Sorting Facility	Vacant	To be Demolished	1	Landside	South Side

Source: C&S Companies

Table A-5: Major Distribution Centers in San Diego County

Name	County	Connectors
Miramar	San Diego	I-805, I-15, Rail
Otay Mesa	San Diego	SR-125, SR-905
Port District	San Diego	I-5, I-15, Rail
SR-78 Corridor	San Diego	SR-78
SR-67 Corridor	San Diego	SR-67
I-5 Corridor	San Diego	I-5

Source: SANGIS

Table A-6: Truck Routes in Imperial County

Highway	Origin	Destination	Miles	POE	Lanes		
					Total	HOV	HOT
Major North South Routes							
SR-111	Imperial	Imperial	22	Calexico	4		
SR-111	Imperial	Riverside	44		2		
SR-86	Imperial	Riverside	63		4		
SR-7	Imperial	Imperial	6	Calexico East	4		
Major East-West Routes							
I-8	San Diego/Imperial	Arizona	171		4		
SR-94	San Diego	San Diego	63		2		
SR-98	Imperial	Imperial	57		2		
Other Routes							
SR-186	Imperial	Imperial	2	Andrade	2		
SR-78	Imperial	Imperial	68				

Source: CALTRANS & Windows Live Maps

Table A-7: Rail Lines in Imperial County

Name	From	To	County	Freeway	Tracks	Miles	Owner	Operator
Desert Line	Division	Plaster City	San Diego / Imperial	I-8	1	70	MTS	CZRY
El Centro Branch	Plaster City	El Centro	Imperial	I-8	1	17.8	UPRR	UPRR
Calexico Branch	Calexico	Niland	Imperial	SR-111	1	40.6	UPRR	UPRR
Yuma (Sunset Line)	County Line	Yuma	Imperial	SR-111 / I-8	1	89.8	UPRR	UPRR

Source: SD Freight Rail Consulting

Table A-8: Major Distribution Centers in Imperial County

Name	County	Connectors
Calexico	Imperial	SR-98, SR-7, SR-111, Rail
El Centro	Imperial	I-8, SR-111
Calexico East	Imperial	SR-98, SR-7, SR-111

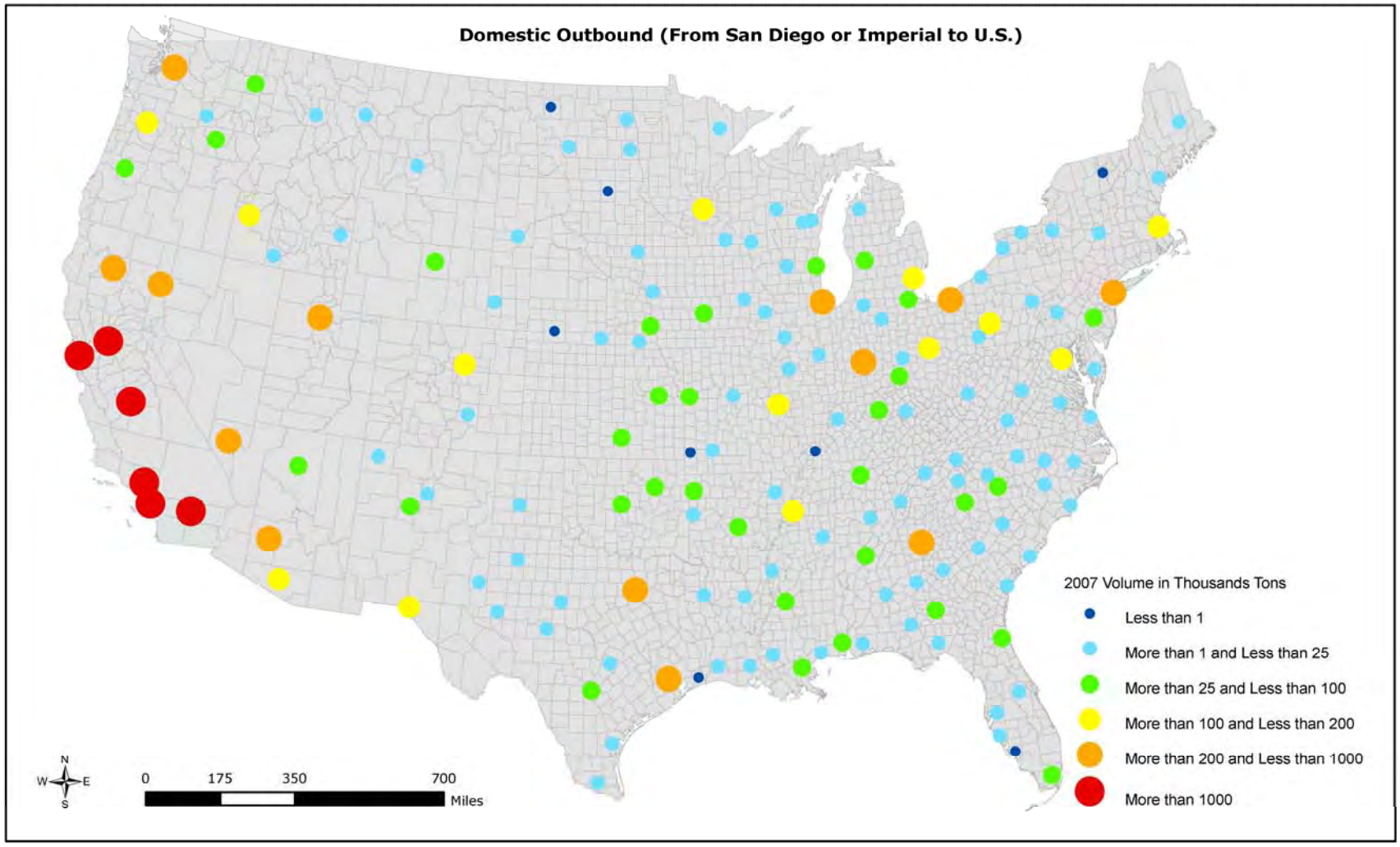
Source: SANGIS

APPENDIX B: MAPS SHOWING THE ORIGIN AND DESTINATION OF FREIGHT FLOWS

The figures on the next page map the origins and destinations of *domestic* freight flows, originating or terminating in the region, for all modes of transportation combined.

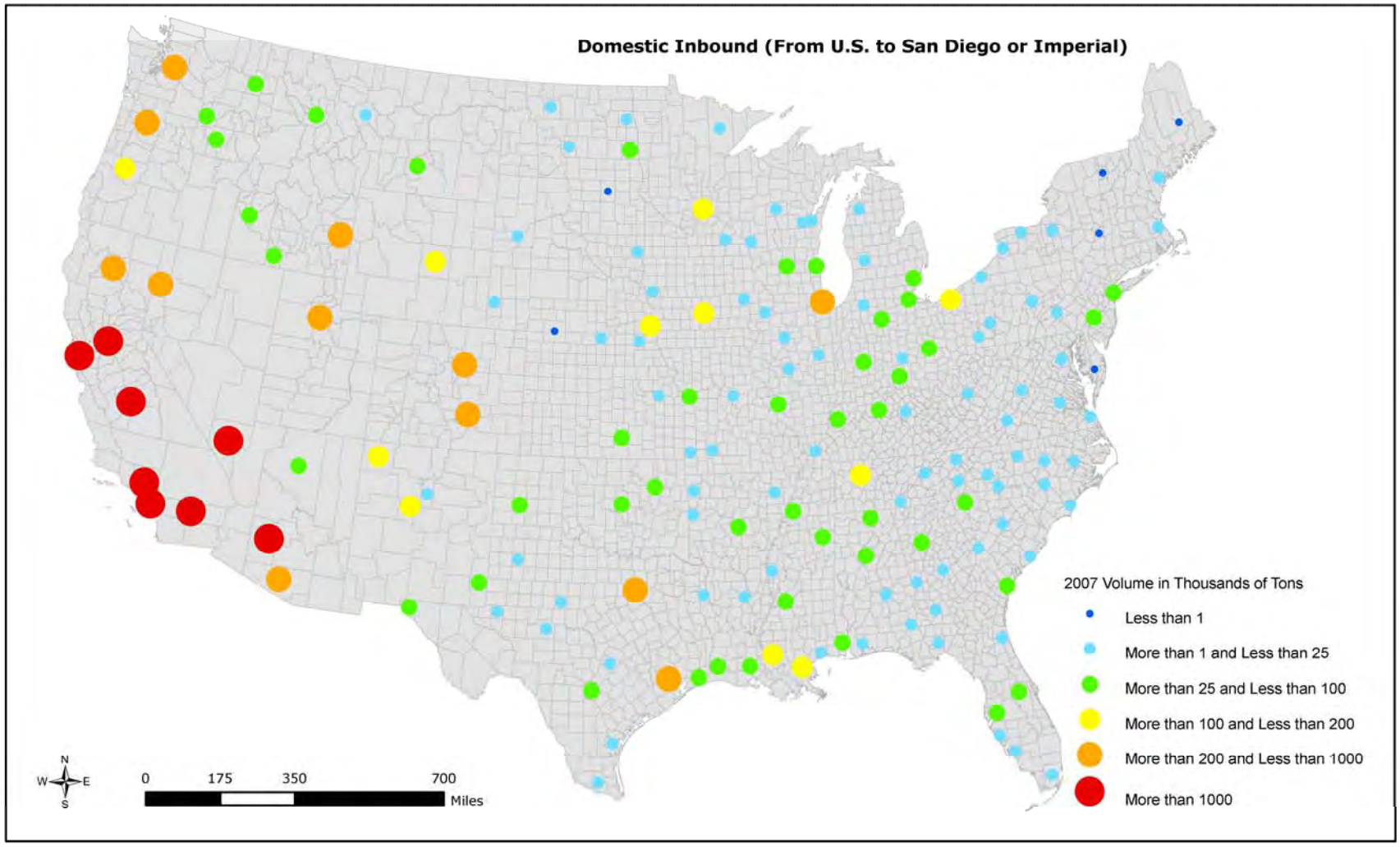
Both maps illustrate the diversity of the Gateway region's domestic trading partners. Not surprisingly however, important origins and destinations are found on the West Coast, and more specifically in the rest of California.

Figure B-1: Destination of Domestic Freight Flows Originating in the Region



Source: Team HDR analysis

Figure B-2: Origin of Domestic Freight Flows with Destination in the Region



Source: Team HDR analysis

APPENDIX C: SUMMARY OF FREIGHT FLOWS BY POE

Table C-1: Freight Estimate and Forecast for Andrade / Algodones POE (Truck only)

Imports	Units	In 2007	In 2050	Average Annual Growth
In volume	Million tons	0.003	0.013	3.7%
	Loaded trucks	251	1,516	4.3%
In value	Millions of 2007 dollars	$14.08	$176.44	6.1%
Average value	$ per ton	$5,062.8	$13,120.7	2.2%
Exports	**Units**	**In 2007**	**In 2050**	**Average Annual Growth**
In volume	Million tons	0.003	0.012	3.2%
	Loaded trucks	309	1,312	3.4%
In value	Millions of 2007 dollars	$7.48	$34.68	3.6%
Average value	$ per ton	$2,447.8	$2,987.9	0.5%

Source: Team HDR Analysis

Table C-2: Freight Estimate and Forecast for Calexico East / Mexicali II POE (Truck only)

Imports	Units	In 2007	In 2050	Average Annual Growth
In volume	Million tons	1.88	9.10	3.7%
	Loaded trucks	169,575	1,025,206	4.3%
In value	Millions of 2007 dollars	$9,525.1	$119,351.5	6.1%
Average value	$ per ton	$5,062.8	$13,120.7	2.2%
Exports	**Units**	**In 2007**	**In 2050**	**Average Annual Growth**
In volume	Million tons	2.07	7.85	3.2%
	Loaded trucks	208,858	887,722	3.4%
In value	Millions of 2007 dollars	$5,062.2	$23,458.0	3.6%
Average value	$ per ton	$2,447.8	$2,987.9	0.5%

Source: Team HDR Analysis

Table C-3: Freight Estimate and Forecast for Otay Mesa / Mesa De Otay POE (Truck only)

Imports	Units	In 2007	In 2050	Average Annual Growth
In volume	Million tons	3.48	17.19	3.8%
	Loaded trucks	322,813	1,962,299	4.3%
In value	Millions of 2007 dollars	$20,529.6	$226,268.8	5.7%
Average value	$ per ton	$5,892.7	$13,161.4	1.9%
Exports	**Units**	**In 2007**	**In 2050**	**Average Annual Growth**
In volume	Million tons	4.93	18.28	3.1%
	Loaded trucks	487,258	2,058,786	3.4%
In value	Millions of 2007 dollars	$10,171.6	$53,800.5	3.9%
Average value	$ per ton	$2,063.3	$2,942.9	0.8%

Source: Team HDR Analysis

Table C-4: Freight Estimate and Forecast for Tecate POE (Truck only)

Imports	Units	In 2007	In 2050	Average Annual Growth
In volume	Million tons	0.36	1.80	3.8%
	Loaded trucks	33,786	205,377	4.3%
In value	Millions of 2007 dollars	$2,148.7	$23,681.6	5.7%
Average value	$ per ton	$5,892.7	$13,161.4	1.9%
Exports	**Units**	**In 2007**	**In 2050**	**Average Annual Growth**
In volume	Million tons	0.52	1.91	3.1%
	Loaded trucks	50,997	215,475	3.4%
In value	Millions of 2007 dollars	$1,064.6	$5,630.8	3.9%
Average value	$ per ton	$2,063.3	$2,942.9	0.8%

Source: Team HDR Analysis

Table C-5: Freight Estimate and Forecast for San Ysidro and Tecate POE Combined (Rail only)

Imports	Units	In 2007	In 2050	Average Annual Growth
In volume	Million tons	0.10	0.22	1.9%
	Loaded rail cars	1,707	4,159	2.1%
In value	Millions of 2007 dollars	$189.4	$416.8	1.9%
Average value	$ per ton	$1,965.5	$1,931.6	-0.04%
Exports	**Units**	**In 2007**	**In 2050**	**Average Annual Growth**
In volume	Million tons	0.50	1.01	1.7%
	Loaded rail cars	7,425	15,912	1.8%
In value	Millions of 2007 dollars	$728.8	$1,491.2	1.7%
Average value	$ per ton	$1,470.5	$1,483.6	0.02%

Source: Team HDR Analysis

Table C-6: Freight Estimate and Forecast for Calexico POE (Rail only)

Imports	Units	In 2007	In 2050	Average Annual Growth
In volume	Million tons	0.33	0.84	2.2%
	Loaded rail cars	6,869	29,650	3.5%
In value	Millions of 2007 dollars	$489.9	$1,885.3	3.2%
Average value	$ per ton	$1,490.0	$2,239.3	0.95%
Exports	**Units**	**In 2007**	**In 2050**	**Average Annual Growth**
In volume	Million tons	0.33	0.65	1.6%
	Loaded rail cars	5,074	9,648	1.5%
In value	Millions of 2007 dollars	$497.6	$875.7	1.3%
Average value	$ per ton	$1,528.7	$1,349.5	-0.29%

Source: Team HDR Analysis

Table C-7: Freight Estimate and Forecast for the Port of San Diego

Imports	Units	In 2007	In 2050	Average Annual Growth
In volume	Million tons	2.53	4.00	1.1%
	Loaded trucks*	90,298	147,580	1.1%
	Loaded rail cars*	23,500	39,817	1.2%
In value	Millions of 2007 dollars	$7,144.9	$12,980.2	1.4%
Average value	$ per ton	$2,821.6	$3,247.5	0.3%
Exports	**Units**	**In 2007**	**In 2050**	**Average Annual Growth**
In volume	Million tons	0.36	2.08	4.2%
	Loaded trucks**	28,429	172,804	4.3%
	Loaded rail cars**	225	453	1.6%
In value	Millions of 2007 dollars	$335.9	$1,290.1	3.2%
Average value	$ per ton	$944.0	$621.1	-1.0%

*Notes: * Trucks and rail cars leaving the Port. ** Trucks and rail cars carrying goods into the Port.*
Source: Team HDR Analysis

Table C-8: Freight Estimate and Forecast for San Diego International Airport

Imports	Units	In 2007	In 2050	Average Annual Growth
In volume	Million tons	0.05	0.04	-0.2%
	Loaded trucks	4,461	4,345	-0.1%
In value	Millions of 2007 dollars	$110.4	$117.8	0.2%
Average value	$ per ton	$2,383.9	$2,810.9	0.4%
Exports	**Units**	**In 2007**	**In 2050**	**Average Annual Growth**
In volume	Million tons	0.11	0.19	1.4%
	Loaded trucks	9,375	19,385	1.7%
In value	Millions of 2007 dollars	$239.5	$635.0	2.3%
Average value	$ per ton	$2,217.9	$3,285.8	0.9%

Note: Imports and exports include both domestic and international trade; but exclude freight flows by air within the region (within San Diego County, within Imperial County and between San Diego County and Imperial County).
Source: Team HDR Analysis

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