SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

2008 RTP REGIONAL TRANSPORTATION PLAN

Making the Connections

Goods Movement Report

GOODS MOVEMENT

Goods movement activities thrive in the SCAG region because of the numerous advantages the region offers, including deep-water marine ports, highly developed networks of highways and railways, an abundance of trans-loading facilities, and a large internal market. As a result, the region serves as a major gateway for both international and domestic commerce, with goods movement being the fastest growing segment of the region's transportation sector. Additionally, goods movement plays a vital role in the local, regional, state, and national economies with one out of every seven jobs in Southern California linked to trade related industries.

While all projections indicate continued robust growth in trade volumes, the existing goods movement system is highly constrained. Over time, this trend will undermine the efficiency, reliability, and productivity of the system, and contribute to negative environmental and community impacts. Without improvements to the current system, projected growth in trade will worsen traffic congestion, pushing the region toward massive gridlock. Ultimately, this will lead to delays in goods delivery, which will increase costs to consumers and reduce quality of service, potentially undermining the region's competitive advantages. Additionally, the air quality and public health effects of diesel emissions are expected to worsen if no action is taken to mitigate these negative impacts. Current research suggests that health impacts associated with diesel emissions include lung malfunctioning, arterial thickening, birth defects, low birth weights, premature deaths, and increased rates of cancer and asthma. These and other environmental and public health impacts have increasingly led communities and policy makers to demand mitigation strategies and challenge proposals for infrastructure capacity enhancements.

Goods movement activities in the SCAG region have enormous impacts on the local, regional, state, and national economies, as well as local residents' quality of life. Infrastructure constraints, their associated impacts on operational efficiency, and associated adverse health impacts are critical issues which will continue to impact the SCAG region throughout the RTP period and beyond, requiring a coordinated regional framework to realize accelerated infrastructure improvements. As such, this RTP proposes three key goods movement strategies to address these challenges.

1. Freight Rail Investments, which consist of accelerating mainline capacity, grade separations, and locomotive engine upgrades;
2. Dedicated lanes for clean technology trucks, which focus upon adding roadway capacity along truck intensive corridors; and
3. High-Speed Regional Transport (HSRT) for freight, which includes exploration of HSRT systems that can provide greater freight throughput and reliability, with near zero emissions.

Economic Impacts of Goods Movement

INTERNATIONAL TRADE

Trade activities in the SCAG region produce a wide range of economic impacts at the local, regional, state, and national levels, and generate significant employment opportunities ranging from entry level to white-collar managerial positions. Businesses and services supported by trade activities include wholesale, supply chain management, courier services, vessel operations services, cargo handling, surface transportation (rail and truck), air cargo, trade finance, freight forwarding, customs brokers, insurance, and government agencies.

The total trade value of containerized trade through the San Pedro Bay ports (the Ports of Los Angeles and Long Beach) was $256 billion in 2005. According to the U.S. Department of Transportation, the Port of Los Angeles became the nation's most valuable trade conduit in 2003 surpassing John F. Kennedy International Airport for total value of goods imported and exported through a freight gateway. The total economic output associated with international containerized trade through the Ports in 2005 was approximately $364 billion. Containerized trade has generated, directly or indirectly, approximately $107.5 billion in income, approximately 3.3 million jobs, and $28.3 billion in state and local taxes, as shown in Table 1. However, it is important to note that the majority of these tax revenues were not reinvested to provide capacity enhancements to the regional goods movement system.

TABLE 1 SUMMARY OF TRADE IMPACTS FOR CONTAINERIZED TRADE VIA THE PORTS OF LOS ANGELES AND LONG BEACH IN 2005 ($ BILLIONS)

Item	Exports	Imports	Total
Trade Value	$35.4	$220.6	$256.0
Economic Impacts:			
• Output	$78.7	$285.2	$364.0
• Income	$18.8	$88.3	$107.5
• Total Jobs	446,000	2,840,000	3,306,000
• State & Local Taxes	$2.0	$26.3	$28.3

Source: BST Associates, PIERS, US Department of Commerce, U.S. Bureau of Economic Analysis, WISER Trade.

LOCAL MANUFACTURING AND LOGISTICS INDUSTRY

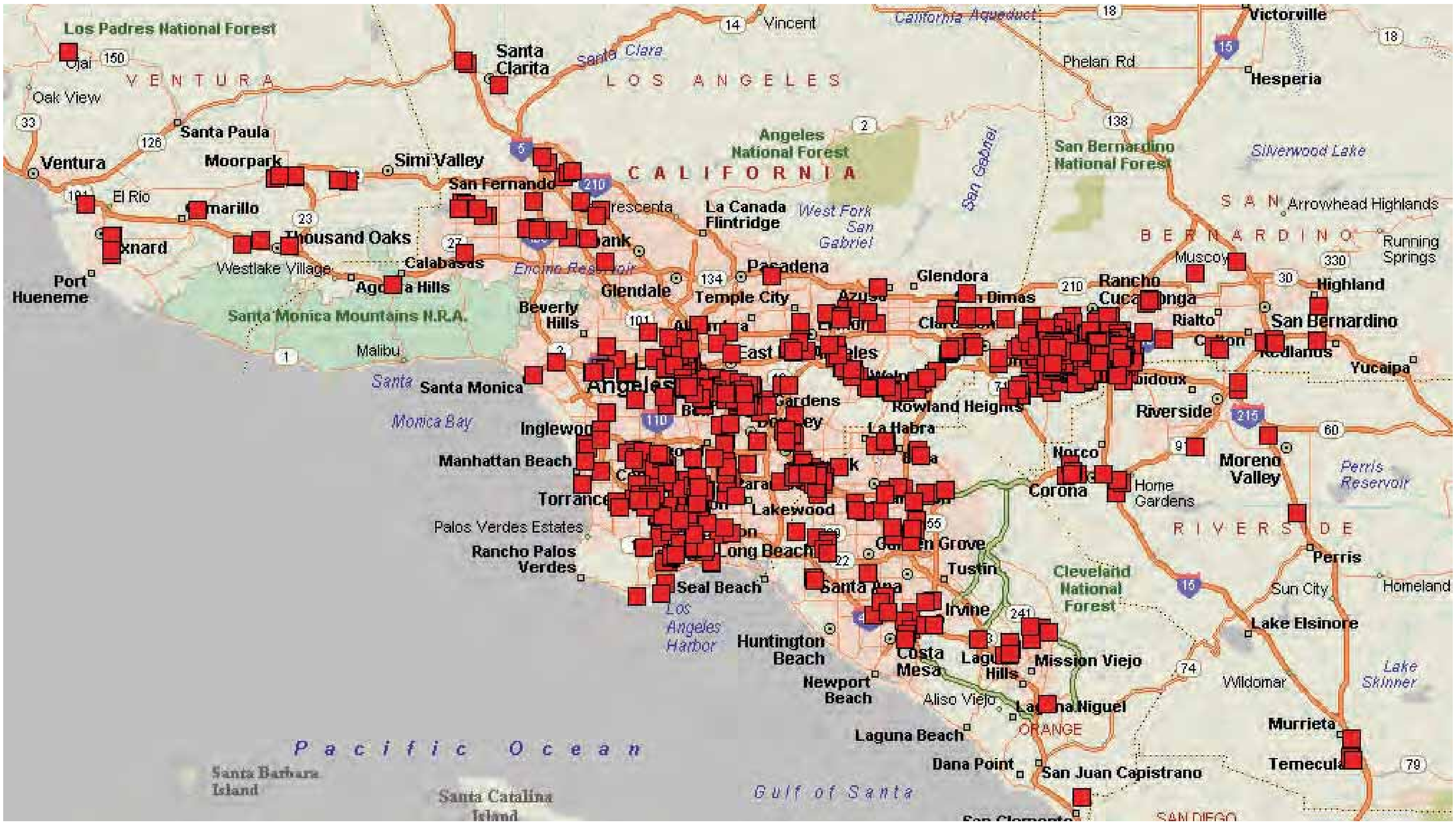
Although the region's manufacturing sector has been declining, it is still one of the largest in the nation. Los Angeles County ranks 1st, Orange County 8th, and the Riverside-San Bernardino area 16th largest in the nation. These data indicate that the region represents a significant market for all types of suppliers. Major products produced in the region include computer & electronic products, apparel, transportation equipment, fabricated metal products, plastics & rubber products, textile and food. Most of the region's manufacturing centers are clustered in the area bounded by SR-60, I-710 and Los Angeles/Orange county line, the South Bay area, the San Fernando Valley, the San Gabriel Valley (the City of Industry), and northern parts of Orange County and Inland Empire.

According to studies by Dr. John Husing, the manufacturing sector historically played a key role in the regional economy by providing upward income mobility to entry-level workers with marginal education. Manufacturing has enabled unskilled workers to gain necessary skills and experience via on-the-job training, and given them the means to enter the middle class. Recent technology advancements, however, have increased operational efficiency and have led to significant declines in employment demand for this sector. Another factor contributing to this trend is the high cost of conducting business in Southern California, including increasing workers compensation costs, rising energy costs, and an expensive housing market. These high costs and the need to compete in the global marketplace, have increasingly led manufacturers to outsource their activities to achieve lower costs. As a result, international trade continues to grow rapidly in the region, as goods and products manufactured overseas are shipped to the United States through Southern California's ports. This has created an exponential growth in the logistics sector, as these imported goods are transported from Southern California's ports to the rest of the United States. Current data suggests that Southern California's logistics sector will continue to experience both sustained and rapid growth well into the future.

The logistics industry is now filling the employment needs created by the region's declining manufacturing sector. Similar to manufacturing, the logistics industry provides good-paying jobs that are well above the minimum wage for entry-level workers with limited education. The success of the logistics industry in the SCAG region is due in part to "Just-in-Time" systems used by the nation's manufactures and retailers, which makes the logistics sector one of the most capital and information-intensive industries in the region.

The locations of logistics centers tend to overlap with manufacturing centers as these sectors are complementary to one another. Throughout the region, warehousing, distribution, and intermodal facilities occupy more than 1.5 billion square feet of space with more than 32 million square feet currently in development. Services provided by these facilities account for 15% of the total U.S. market and 60% of the West Coast market. Exhibits 1 and 2 display the distribution of warehouses and distribution centers in the SCAG region.

EXHIBIT 1 WAREHOUSES AND DISTRIBUTION CENTERS IN THE SCAG REGION



Source: Inland Port Feasibility Study, SCAG, 2006.

EXHIBIT 2 WAREHOUSES AND DISTRIBUTION CENTERS IN THE INLAND EMPIRE

Source: Inland Port Feasibility Study, SCAG, 2006.

CROSS-BORDER TRADE ACTIVITY

Cross-border trade activity between California and Baja California, Mexico increased significantly following the passage of NAFTA in 1993, resulting in economic benefits for both countries. In the SCAG region, there are three Ports of Entry (POEs) located in Imperial County (Calexico, Calexico East and Andrade). The total value of goods transported through these POEs increased from $3.4 billion in 1995 to $10.8 billion in 2005. The Calexico POE was the second busiest land crossing along the California/Baja California border with approximately 17 million people crossing northbound in 2003 and 600,000 annual truck crossings. Incoming border-crossing truck volumes through Imperial County's POEs rose from over 182,000 in 1994 to almost 322,000 in 2005, a 77% increase.

This increase in truck traffic is primarily due to the maquiladora industry, (manufacturing / assembly plant operations along the Border), which has grown over 472% since 1978. Caltrans estimates that border trade activity will continue to grow, with approximately 5.6 million border crossings expected by 2030. Railroads also contribute to border-crossing trade activity. In the SCAG region, a Union Pacific rail line connects Mexicali in Baja California to Calexico and El Centro in Imperial County. This line handles approximately 160 railcars per day, six days a week.

Existing Regional Goods Movement System

The region's major ports and airports handle an enormous amount of imported goods, mainly from Asia, as well as exports. Goods enter and exit the region via ocean carriers, railroads, trucks, and aircraft and are transported to final destinations or to local warehousing and distribution centers for sorting, consolidation, and distribution. Exhibit 3 illustrates the existing regional goods movement system. The following sections discuss each of the components in detail.

EXHIBIT 3 EXISTING REGIONAL GOODS MOVEMENT SYSTEM

Source: Southern California Association of Governments, ESRI StreetMap USA, Teleatlas

Maritime Activity

The Ports of Los Angeles and Long Beach, also known as the San Pedro Bay (SPB) ports, constitute the nation's busiest seaport and the fifth largest container port complex in the world. In 2005, the Ports accounted for approximately 24 percent of all U.S. export container traffic and approximately 40 percent of import container traffic. The Ports handled 14.2 million twenty-foot equivalent Units (TEUs) in 2005 and 15.8 million TEUs in 2006.

Table 2 shows forecasted growth for cargo containers moving through the SPB ports through 2030. The forecasts are capacity constrained forecasts based on current development strategies at the Ports. The US Department of Transportation has noted that unconstrained demand could be as high as 60 million TEUs. The ability of the Ports to handle projected growth in containerized cargo volumes is critical to the continued health of the local, regional, state, and national economies.

TABLE 2 SAN PEDRO BAY PORTS CONTAINERIZED CARGO FORECASTS

Year	TEUs (Million)	Share of California Total
2006 (actual)	15.8	86.8%
2010	19.7	86.8%
2020	36.0	85.7%
2030	42.5	86.7%

Source: Growth of California Ports – Opportunities and Challenges, A Report to the Legislature, April 2007

The breakdown of cargo types and volumes received by both Ports is illustrated in Table 3.

TABLE 3 PORTS OF LOS ANGELES AND LONG BEACH CARGO TYPES AND VOLUMES

Cargo Types	2006 Cargo Volume (Millions of Metric Revenue Tons)		
	Port of Los Angeles	Port of Long Beach	Total (Both Ports)
General Cargo	155.3	127.2	282.5
Liquid Bulk	22.8	33.2	56.0
Dry Bulk	3.6	9.4	13.0
Total	181.7	169.8	351.5

Sources: Port of Los Angeles 2006 Financial Statement; and Port of Long Beach 2006 Monthly Tonnage Summary Report.

Seventy percent of imported goods arriving at the Ports are intended for markets outside of the region. Despite efforts to develop alternative West Coast gateways, such as enhancing cargo handling capacity, the SPB ports are expected to remain the primary West Coast gateway to the rest of the nation well into the future.

The Port of Hueneme also plays an important role in the region's goods movement system. Located approximately 60 miles northwest of Los Angeles, the Port of Hueneme is the only deep-water harbor between Los Angeles and San Francisco. Roughly $7.5 billion in cargo moves through the Port of Hueneme each year, which mostly includes automobiles, fresh fruit, and produce. The Port's location near the Santa Barbara channel has also made the Port one of the primary support facilities for the offshore oil industry. Port related activity contributes over $650 million to the local economy, and supports an additional 5,000 jobs (directly and indirectly) in Ventura County.

PORT RELATED RAIL ACTIVITIES: ON-DOCK, NEAR-DOCK AND OFF-DOCK FACILITIES

More than half of the international import and export container market utilizes the region's intermodal rail system. There are two main types of international intermodal movements in Southern California, depending on cargo handling and intermodal transfer practices:

- Direct Intermodal: The direct loading/unloading of marine containers on/off intermodal trains, without intermediate cargo handling, and
- Transload Intermodal: The transfer of cargo from marine containers to domestic trailers at transload/consolidation facilities and warehouses, and includes subsequent transfer to railcars. This offers advantages by expediting the return of empty marine containers back to port terminals and enhancing the cost-effectiveness of intermodal movements since domestic trailers offer the ability to move larger shipment volumes per rail car compared to marine containers. Approximately 10% of total port container throughput is currently estimated to be transloaded and moved on the rail system.

Depending on the location of the intermodal yards relative to port terminals, intermodal logistics movements associated with port containers can be categorized into the following types:

- On-Dock Intermodal Rail: Loading/unloading of containers directly on/off intermodal trains on the docks. On-dock intermodal accounted for more than 24% of the SPB ports intermodal throughput in 2006.
- Near-Dock Intermodal Rail: Loading/unloading of containers directly on/off intermodal trains at an intermodal rail yard located near the docks. Currently, the only near-dock intermodal yard in Southern California is the Intermodal Container Transfer Facility (ICTF) owned and operated by the Union Pacific Railroad. The ICTF handled approximately 8% of the SPB ports intermodal cargo in 2006.
- Off-Dock Intermodal Rail: Loading/unloading of containers on/off intermodal trains at an intermodal yard located farther away from terminals than a near-dock intermodal yard. Off-dock intermodal facilities in Southern California are located in downtown Los Angeles, approximately 25 miles north of the Ports. They are operated by both BNSF and UP. Off-dock intermodal facilities handled approximately 20% of Port container cargo throughput in 2006, though this share has been declining due to increased movement of containers using on-dock rail.
- On-dock intermodal rail requires no truck movements on local and regional roadway systems. Remaining intermodal market movements require at least one truck trip to a near dock or off-dock intermodal facility. Compared to off-dock intermodal, on-dock and near-dock intermodal operations play a key role in minimizing port truck trips and reducing truck VMT, resulting in lower emissions and increased safety benefits to the region. The increased efficiency of intermodal yards has an impact on the overall productivity of the regional goods movement system.

As of 2005, 3.8 million TEUs, or 24 %, of intermodal cargo were handled at on-dock rail yards at the SPB ports. With planned improvements at the Ports, this number is projected to increase to 12.9 million TEUs, or approximately 30 %, by 2030. If this projected volume were handled exclusively by trucks, the increased truck traffic would cripple regional traffic flows, and adversely impact air quality. In recognition of these challenges, stakeholders are proceeding with projects to enhance intermodal facility capacity and connectivity with the SPB ports by developing several on-dock rail yard projects and working with shipping lines and terminal operators to improve efficiency. However, demand is projected to outpace capacity making near-dock rail yard expansion critical.

The SPB ports have initiated the Rail Enhancement Program (REP) for the phased development and implementation of key on-dock rail projects and key rail infrastructure projects. Projects included in the REP have been supported by industry stakeholders who believe these projects are imperative to maintain efficient operations at the SPB ports. Table 4 highlights planned on-dock and near-dock facilities in the SPB ports area, and Table 5 highlights rail infrastructure projects.

TABLE 4 PLANNED ON-DOCK RAIL YARD PROJECTS AT THE SAN PEDRO BAY PORTS

Rail Yard Project		Sponsor	Development Cost ($ millions)
Phase I Short-term (by end of 2007)			
	No Rail Yard Projects		
Phase II Near-term (by end of 2010)			
	Pier A On-Dock Rail Yard Expansion to Carrack	POLB	19.6
	Pier S On-Dock Rail Yard	POLB	34.3
	New Near-Dock-South of Sepulveda (potential)	POLA	Na
	Pier G-New North Working Yard	POLB	14.1
	Pier G-South Working Yard Rehabilitation	POLB	40.7
	West Basin East-New ICTF (Phase I)	POLA	45.4
Phase III Medium-term (by end of 2015)			
	Navy mole Road Storage Rail Yard	POLB	10.0
	Middle Harbor Terminal Rail Yard	POLB	68.9
	Pier J On-Dock Rail Yard Reconfiguration	POLB	100.0
	Pier 400 On-Dock Rail Yard Expansion (Phase I)	POLA	33.4
	Pier 300 On-Dock Rail Yard Expansion	POLA	23.4
	Terminal Island ICTF Rail Yard Expansion	POLA	18.9
	West Basin ICTF Rail Yard Expansion (Phase I)	POLA	6.2
Phase IV Long-term (beyond 2015)			
	Pier A On-Dock Rail Yard East of Carrack	POLB	31.4
	Pier 400 On-Dock Rail Yard Expansion (Phase II)	POLA	16.3
	West Basin ICTF Rail Yard Expansion (Phase II)	POLA	12.5
	West Basin East-ICTF Expansion (Phase II)	POLA	7.8
	Subtotal POLA Cost (millions)		163.9
	Subtotal POLB Cost (millions)		318.9
	Total Potential Rail Yard Cost (millions)		482.8

Source: San Pedro Bay Port Rail Study Update, December 2006

TABLE 5 LIST OF RAIL INFRASTRUCTURE PROJECTS (OUTSIDE MARINE TERMINALS)

	Rail Infrastructure Project	Sponsor	Development Cost ($ millions)
Phase I Short-term (by end of 2007)			
I.1	Closure of Edison Avenue Grade Crossing	POLB	0.3
I.2	Expanded Control Points to POLB/POLA	ACTA	4.9
I.3	Thenard Track Connecion at Alameda Street/K-Pac	ACTA	4.6
Phase II Near-term (by end of 2010)			
II.2	Terminal Island Wye Track Realignment	POLB	3.6
II.4	Pier B Street Realignment	POLB	12.6
II.6	Constrain Badger Bridge Lifts	POLB/LA	1.0
II.7	Track Realignment at Ocean Boulevard/Harbor Scenic Drive	POLB	20.0
II.8	Pier F Support Yard	POLB	3.4
II.11	Double Track Access from Pier G to Pier J	POLB	1.7
II.12	West Basin Rail Access Improvements	POLA	150.0
Phase III Medium-term (by end of 2015)			
III.1	Pier B Rail Yard Expansion (Phase I)	POLB	85.4
III.2	Pier B Rail Yard Expansion (Phase II)	POLB	159.9
III.3	Grade Separation for Reeves Crossing	POLB/LA	60.0
III.4	Closure of Reeves At-grade Crossing	POLB/LA	1.0
III.6	Pier 400 Second Lead Track	POLA	7.7
III.7	Reconfiguration at CP Mole	POLB/LA	20.0
Phase IV Long-term (beyond 2015)			
IV.1	Triple Track Badger Bridge	ACTA	91.0
IV.2	Triple Track South of Thenard Jct.	ACTA	16.5
	Subtotal ACTA Cost (millions)		$117.0
	Subtotal POLA Cost (millions)		$157.7
	Subtotal POLB Cost (millions)		$286.9
	Subtotal Shared POLB/LA Cost (millions)		$82.0
	Total Potential Infrastructure Cost (millions)		$643.6

Source: San Pedro Bay Ports Rail Study Update, December 2006.

Rail

RAIL CHARACTERISTICS

Railroads have been involved in moving freight through California for over 140 years. As of 2005, 29 freight railroads operate 7,335 track miles statewide, including trackage rights. The Union Pacific Railroad (UP) operates on 3,358 miles of track, a 46% share of the State's rail network. The Burlington Northern Santa Fe Railway (BNSF) operates on 2,130 miles, a 29% share. Regional, local, and short-line carriers serve the remaining 25% of the State's track miles.

With an extensive network throughout the SCAG region, rail serves as a vital link in the goods movement supply chain. Railroads are best known for the ability to move large volumes of goods over long distances. The current system sees 5 million lifts annually, of which 64% are intermodal containers.

MAINLINE RAIL

The region has an extensive mainline rail network. BNSF operates a single mainline network in the SPB ports region, the Transcon, which runs from downtown Los Angeles to Barstow with a terminus in Chicago. UP operates multiple lines in and out of the Los Angeles basin. Typically referred to as the Alhambra and Los Angeles lines, UP operates two mainlines between downtown Los Angeles and the Colton Crossing. Along these lines, UP performs "directional running" operations, where all eastbound through-trains are routed along the Los Angeles lines and westbound through-trains along the Alhambra line. North of West Colton, UP operates the Palmdale line which parallels BNSF's Transcon line, ascending the south slope of the Cajon Pass between San Bernardino and the San Gabriel Mountains. Compared to other UP lines, the Palmdale line carries relatively little traffic. UP also runs trains on BNSF's Transcon between West Riverside and Barstow-utilizing trackage rights agreements.

A key component of the Southern California rail network is the Colton Crossing. The Colton Crossing is an at-grade railroad crossing located south of I-10 between Rancho Avenue and Mount Vernon Avenue in the City of Colton, where BNSF's San Bernardino Line crosses UP's Alhambra/Yuma Lines.

In 2000, the Colton Crossing saw on average 90 freight trains per day on the BNSF San Bernardino Line, and 31 freight trains per day on the UP line. By 2010, these numbers are projected to increase by 50%, with an average of 137 BNSF freight trains and 45 UP trains transiting the Colton Crossing on a daily basis. This high volume of trains, which is expected to further increase by an additional 46% in 2025, clearly poses serious congestion, safety, and air quality challenges for the region.

Another key component of the regional rail network is the Alameda Corridor, a 20-mile, four-lane freight rail expressway that began operations in April 2002. The corridor links the SPB ports with the transcontinental rail network near downtown Los Angeles, and is composed of a series of underpasses, overpasses, and bridges that separate freight trains from passenger trains and automobiles. Since 2002, the Alameda Corridor has improved operating efficiency, and provided safety and environmental benefits for the entire region. In 2006, an average of 55 intermodal trains per day transited the Alameda Corridor, an approximate increase of 15% since 2005.

Freight rail traffic is projected to increase due to trade growth at the Ports, and robust population growth. These trends are projected to have a significant impact on the mainline rail network described above. Table 6 illustrates actual and projected freight and passenger train volumes along some of the most utilized rail segments in the region.

TABLE 6 PASSENGER AND FREIGHT TRAIN TRAFFIC VOLUMES PER PEAK DAY BY LINE SEGMENT

Line Segment	Train Type	2000	2010	2025
BNSF Hobart - Fullerton Jct.	Freight	50.0	74.1	111.9
	Psgr	46.0	96.0	106.0
	Total	96.0	170.0	207.9
BNSF Fullerton Jct. - Atwood	Freight	50.0	74.1	111.9
	Psgr	5.0	20.0	34.0
	Total	55.0	94.1	145.9
BNSF Atwood - West Riverside	Freight	57.0	82.2	121.3
	Psgr	16.0	38.0	62.0
	Total	73.0	120.2	183.3
West Riverside - Colton	UP Freight	35.2	49.8	72.9
	BNSF Freight	57.0	82.2	121.3
	Psgr	11.0	24.0	36.0
	Total	103.2	156.0	230.2
Colton Crossing	BNSF Line	90.2	137.1	201.8
	UP Yuma Line	31.0	44.6	64.7
	Total	121.2	181.7	266.5
Colton - San Bernardino	UP Freight	22.2	30.9	44.5
	BNSF Freight	57.0	82.2	121.3
	Psgr	11.0	24.0	36.0
	Total	68.0	106.2	157.3
Lines over Cajon Pass	Freight	93.7	130.0	186.7
(including BNSF/UP Cajon Line and UP Palmdale Line)	Psgr	2.0	6.0	8.0
	Total	95.7	136.0	194.7
UP Mira Loma - W. Riverside plus	Freight	64.2	90.4	126.2
UP West Colton - Colton	Psgr	14.0	26.0	44.0
	Total	78.2	116.4	170.2
UP Yuma Line	Freight	42.0	59.5	87.1
	Psgr	2.0	4.0	8.0
	Total	44.0	63.5	95.1

Source: Inland Empire Railroad Main Line Study, SCAG, June 2005.

RAIL SYSTEM CONSTRAINTS AND ISSUES

INTERMODAL RAIL YARD CAPACITY CONSTRAINTS

The region's intermodal rail yards are reaching capacity, resulting in time delays in moving both international and domestic containers between trains and trucks. According to the 2006 San Pedro Bay Ports Rail Study Update, off-dock rail yards in Southern California, which handle direct intermodal, transload, and domestic intermodal cargo, will exceed capacity between 2010-2015, meaning all direct international intermodal demand will need to be accommodated at on-dock and near-dock intermodal yards. Assuming full on-dock rail capacity enhancements are realized at the Ports in the future, Table 7 illustrates the resulting shortfall in intermodal lift capacity if no new near-dock or off-dock intermodal yards are developed in the region. This indicates that, even when considering all planned on-dock rail capacity enhancements, total direct intermodal demand will likely exceed capacity by over 2.2 million TEUs.

TABLE 7 FORECAST PORT DIRECT INTERMODAL DEMAND AND AVAILABLE INTERMODAL LIFT CAPACITY

Direct Intermodal excludes Transload All values in millions of TEU	2005 Actual	2010	2015	2020	2030
SPB Cargo Forecast (Demand)	14.20	20.20	27.10	36.20	42.50
SPB Direct Intermodal (Demand)	5.70	8.10	10.84	14.48	17.01
POLB On-Dock Capacity	1.09	2.27	4.15	5.49	6.10
POLA On-Dock Capacity	1.84	2.79	4.33	6.25	6.84
SPB Off-Dock Capacity	1.69	0.67	0.04	0.00	0.00
SPB Near-Dock Capacity	1.08	1.40	1.84	1.84	1.84
SPB Variance (negative = shortfall)	0.00	-0.97	-0.48	-0.90	-2.23

Source: San Pedro Bay Port Rail Study Update, December 2006

RAIL NETWORK CAPACITY CONSTRAINTS

SCAG has identified rail mainline capacity constraints east of Los Angeles as a critical issue facing the region. In 2000, train delays averaged more than 30 minutes and are projected to increase by over 40% by 2010 without capacity improvements. Overall, mainline capacity constraints reduce system velocity, which results in delays of time-sensitive shipments to customers nationwide.

TABLE 8 YEAR 2000 AND 2010 TRAIN DELAYS ON EXISTING TRACKAGE

Year	Train Type	Average Delay Per Train
2000	BNSF Freight	31.9 minutes
	UP Freight	30.4 minutes
2010	BNSF Freight	206.3 minutes
	UP Freight	196.9 minutes

Source: Inland Empire Railroad Main Line Study, SCAG, June, 2005.

The Colton Crossing has been identified in several previous studies as a major rail bottleneck that slows freight movement and has delayed the implementation of additional passenger rail service in the Inland Empire. The majority of freight rail traffic moving between Southern California and the rest of the nation must transit the Colton Crossing. Increasing international trade and regional population growth led the Southern California Regional Rail Authority (SCRRA) to conduct a network rail operation analysis to identify potential bottlenecks in the vicinity of the Colton Crossing. The study confirmed the need to make capital improvements to the crossing to reduce rail congestion and operational conflicts. The Inland Empire Railroad Main Line Study also confirmed the critical need for grade-separations.

The Cajon Pass is another critical transcontinental rail segment requiring capacity improvements to ensure efficient freight movement. Steep grades and curves along the Cajon Pass pose operational challenges that significantly slow trains. Presently, approximately 90 trains per day traverse the Cajon Pass.

The Inland Empire Railroad Main Line Study projected that, by 2010, the BNSF line segment between Colton Crossing and Barstow will require a minimum of three main tracks while the segment between San Bernardino and Barstow will require four main tracks by 2025. There is also a need for four main tracks on the UP lines between Los Angeles and Riverside/Colton.

Trucks

PORT RELATED TRUCKING

Given the number of truck trips generated by the Ports, port truck traffic associated with the logistics of container movements in the region must be analyzed. Depending on the geographic concentration of warehouses, distribution centers, transload facilities, and other inland facilities, some port cargo movements may be associated with high-density truck flows between origin-destination pairs including:

- Truck trips between marine terminals and near-dock/off-dock intermodal yards;
- Truck trips between marine terminals and transload/cross-dock facilities; and
- Truck trips between marine terminals and warehouse/distribution centers.

The high concentration of intermodal yards near downtown Los Angeles has resulted in significant container movements on freight corridors connecting the Ports and these facilities. However, due to the scattered nature of logistics and manufacturing facilities in the region, container movements on freight corridors between marine terminals and logistics and manufacturing facilities may not be as significant as movements between marine terminals and intermodal yards. But logistics and manufacturing facilities may generate secondary truck trips that create significant truck demand along many of the region's freight corridors.

Most port truck cargo movements associated with intermodal yards, transload facilities, and warehouses are primarily related to import containers from the SPB ports. However, there are significant empty container truck movements between these facilities and the Ports that generate high-density port truck movements. Examples include empty container return truck trips from trans-load facilities and warehouses to the port terminals, and truck trips associated with empty container repositioning from off-dock intermodal yards to port terminals.

The magnitude and distribution of port-related truck traffic in the region warrants careful consideration of the feasibility of dedicated lanes for clean technology trucks to address future growth in port truck traffic volumes. A major factor in determining the feasibility of such facilities is whether high-density truck traffic exists between major origin-destination pairs. Consequently, in examining the feasibility of such facilities on certain corridors between the Ports and inland facilities, key issues pertaining to truck traffic flows and patterns must be understood. These include:

- Total truck traffic demand along the corridors between the Ports and inland facilities;
- Origin-destination (O-D) patterns of truck trips along these corridors; and
- Major generators of truck traffic demand along these corridors.

Table 9 shows the shares of port truck trips along I-710 and SR-60. For other major freight corridors in the region, please refer to Appendix A.

TABLE 9 TOTAL AND PORT TRUCK TRAFFIC ALONG I-710 AND SR-60, 2003

Highways	Segments	Total Daily Vehicle Volume	Total Daily Truck Volume	Daily Port Truck Volume	Total Trucks as % of Total Vehicle Volume	Port Trucks as % of Total Truck Volume
I-710	I-105 to I-10	324,000	15,900	2,485	4.9%	15.6%
	PCH to Willow	146,000	25,400	23,900	17.4%	94.1%
	Willow to I-405	161,000	27,100	23,235	16.8%	85.7%
	I-405 to SR-91	186,000	31,400	20,045	16.9%	63.8%
	SR-91 to I-105	227,000	38,300	15,315	16.9%	40.0%
	I-105 to I-5	237,000	34,600	11,685	14.6%	33.8%
	I-5 to SR-60	199,000	24,200	1,025	12.2%	4.2%
	SR-60 to I-10	132,000	11,300	845	8.6%	7.5%
SR-60	SR-57 to I-605	265,000	23,200	1,560	8.8%	6.7%

Source: “Baseline Transportation Study”, Port of Los Angeles, 2004; Caltrans Truck Volumes 2004 (Year 2003 data).

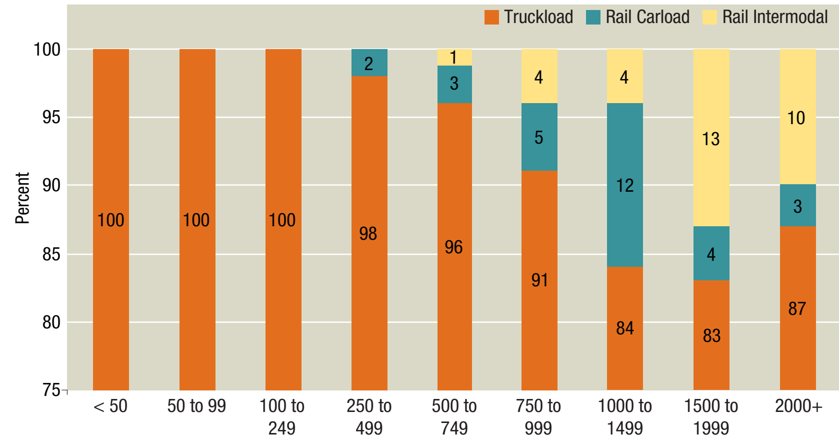
As illustrated in Table 9, I-710 has a larger share of port-related trucks than SR-60. Port-related truck traffic and its share of total truck volume along I-710 are more highly concentrated along segments closer to the Ports. This indicates that a large number of port truck access facilities exist along I-710.

The I-710 major corridor study analyzed growth in truck traffic along I-710 based on expected growth in port container volumes. The study projected total heavy-duty truck traffic to more than double on the I-710 by 2025, with truck shares reaching up to 35% of total traffic volumes along high volume segments compared to the current shares of between 14% - 19%. Considering the magnitude and distribution patterns of port truck trips along I-710, forecasts indicate that demand would be favorable to the implementation of dedicated lanes for clean technology trucks on I-710. Future near-dock intermodal yard capacity expansions associated with the expansion of the ICTF and the development of the Southern California International Gateway (SCIG), which is privately funded by BNSF, may also play a key role in addressing the growth of high-density truck traffic.

LOCAL TRUCKS

The vast majority of imports through the SPB ports are retail goods. SCAG's Port and Modal Elasticity study calculated local container volume based on local purchasing power associated with retail sales. According to the study, 23 % of traffic generated by the SPB ports is local traffic, meaning goods either originate or are ultimately consumed in the region which is defined as Southern California, Southern Nevada, Arizona, and New Mexico. In 2005, local consumption of the total import trade value of $256 billion was $58.8 billion. With over 75% of truck tonnage in the region moving less than 50 miles, the effect on local truck traffic is dramatic. The modal shares and lengths of haul by rail and truck are shown in Figure 1.

FIGURE 1 MODAL SHARES AND LENGTH OF HAUL



Source: Goods Movement Truck and Rail Study Executive Summary, SCAG, 2003.

SCAG's Travel Demand Model suggests that regional daily truck VMT will increase from 29.0 million in 2003 to 50.4 by 2035, an 82.7% increase. Daily delay will also increase as shown in Table 10.

TABLE 10 PROJECTED DAILY DELAY IN THE REGION

	Daily Delay (Hours)		
	2003 Base Year	2035 Baseline	2035 Plan
Autos	3,711,266	7,545,518	6,155,229
Trucks	192,555	592,733	466,598

Source: Travel Demand Model Output, SCAG, 2007.

This increase in regional VMT will reduce average freeway speeds from 51 mph in 2005 to approximately 37.5 mph in 2035. The average speed on the regional freeway system for 2003, the 2035 Baseline, and the 2035 Plan are illustrated in Exhibits 4, 5, and 6. Delays caused by congestion could increase the cost of transporting goods by as much as 50%-250%.

EXHIBIT 4 BASE YEAR 2003 FREEWAY SPEED | PM PEAK

Source: Southern California Association of Governments, ESRI StreetMap USA, Teleatlas

EXHIBIT 5 BASELINE 2035 FREEWAY SPEED | PM PEAK

Source: Southern California Association of Governments, ESRI StreetMap USA, Teleatlas

EXHIBIT 6 PLAN 2035 FREEWAY SPEED | PM PEAK

Source: Southern California Association of Governments, ESRI StreetMap USA, Teleatlas

Environmental Impacts

Mitigating the community and environmental impacts of goods movement is critical to the region. Perhaps the most visible and pressing environmental impacts are the increasing volumes of criteria air pollutant emissions surrounding the Ports and major freight corridors. While trade activities in the SCAG region are key contributors to the economy, air pollution from these activities poses serious health hazards to the region, especially for communities located near the Ports and trade corridors. The California Air Resource Board (CARB) has identified particulate matter (PM) as a toxic air contaminant linked to increased health risks. Table 11 lists CARB's assessment of PM2.5 health effects on residents of the Southern California Air Basin. Table 10 chronicles other goods movement related pollutants and their health effects.

TABLE 11 CARB ASSESSMENT OF PM HEALTH EFFECTS ON SOUTHERN CALIFORNIA AIR BASIN RESIDENTS

Health Effect	Cases Per Year
Premature Deaths	5,400
Hospitalizations	2,400
Asthma & Lower Respiratory Symptoms	140,000
Lost Work Days	980,000
Minor Restricted Activity Days	5,000,000

Source: California Air Resources Board

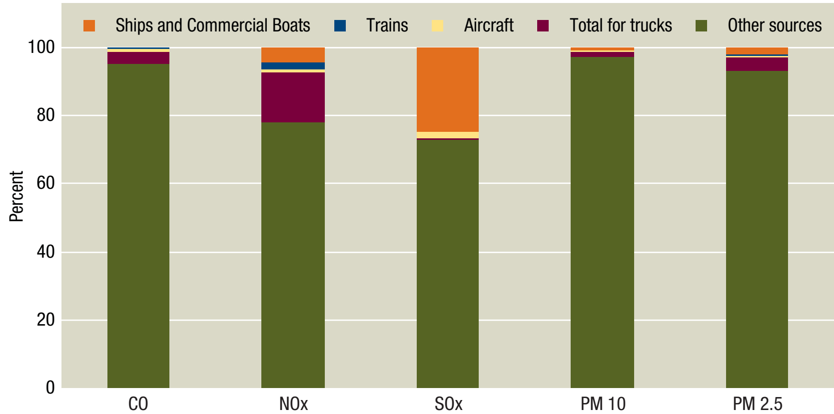
TABLE 12 OTHER GOODS MOVEMENT RELATED POLLUTANTS AND THEIR HEALTH EFFECTS

Pollutant	Health Effects
Ozone (O_3)	Breathing Difficulties, Lung Tissue Damage
Nitrogen Dioxide (NO_X)	Lung Irritation and Damage
Sulfur Dioxide (SO_X)	Increases in Lung Disease and Breathing Problems for Asthmatics
Respirable Particulate Matter (PM_{10})	Increased Respiratory Disease, Lung Damage, Cancer, Premature Death
Carbon Monoxide (CO)	Chest Pain in Heart Patients, Headaches, Reduced Mental Alertness

Source: California Air Resources Board

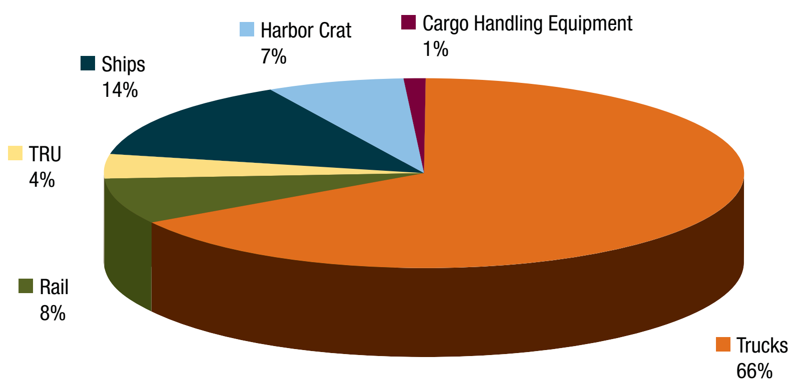
Port-related sources, which were approximately 25% of regional diesel PM emissions in 2002, are projected to increase to 50% of regional PM emissions in 2020. The CARB assessment of PM2.5 health effects indicates that the South Coast Air Basin suffers disproportionate exposure to pollutants relative to other parts of California and the rest of nation. Residents of the South Coast Air Basin are exposed to PM2.5 levels that are 82% higher than the exposure of residents statewide and 52% higher than national exposure. As shown in Figure 2, goods movement related sources contribute substantially to the region's total emissions of Nitrogen Oxides (NOX), Sulfur Oxides (SoX), PM10, PM2.5, and Carbon Monoxide (CO). Figure 3 shows statewide emissions of diesel particulate matter by goods movement sources. Air pollution is just one of many goods movement related environmental impacts identified. Other impacts include noise, vibration, aesthetic, safety, and natural resource depletion.

FIGURE 2 2008 ESTIMATED ANNUAL AVERAGE EMISSIONS IN THE SOUTH COAST AIR BASIN



Source: 2007 Air Quality Management Plan, SCAQMD

FIGURE 3 STATEWIDE EMISSIONS OF DIESEL PARTICULATE MATTER BY GOODS MOVEMENT SOURCE, 2001



Source: Emission Reduction Plan for Ports and Goods Movement in California, California EPA and California Air Resources Board (ARB), March, 2006

Safety and Security Concerns

With the growth in trade volume, accidents involving trucks and trains are expected to increase, without needed safety improvements. Accident data collected on the I-710 between 2002 and 2004 identified an average of five accidents per day between Ocean Boulevard and SR-60 on the I-710. These data also suggest that highest incident locations were primarily tied to three factors: 1) design deficiencies, 2) high traffic volumes, and 3) the mix between autos and trucks. Accidents on truck-intensive facilities are particularly problematic due to their increased severity relative to auto-exclusive accidents.

Truck-related accidents also have a significant safety impact on other modes in the transportation system. According to an FHWA report, 78 % of victims in truck-related fatalities are drivers of other vehicles and 8% are pedestrians. For a detailed discussion on truck collisions, please refer to Appendix B.

Growth in rail service also increases the potential for automobile / train interactions and rail-related fatalities at grade crossings. These emerging concerns point to the need for the region to research and implement appropriate mitigation strategies including grade separations and other grade crossing improvements.

The SCAG region is vulnerable to many types of safety and security challenges including catastrophic events, which could significantly disrupt the regional goods movement system. These challenges include earthquakes, floods, fires, hazardous material incidents, transportation accidents, and human-caused incidents such as acts of terrorism. To ensure the safety and security of residents, as well as regional economic activities, SCAG is coordinating and collaborating with various stakeholders to improve transportation security. To date, these stakeholders have developed a number of efforts and strategies to prepare for unforeseen events. Some of these efforts and strategies include:

- Identification of the operation and maintenance needs of the interstate and state highway system within the SCAG region, including the Strategic Highway Network;

- A Border Master Plan developed by California Department of Transportation (Caltrans) to ensure border security;
- A comprehensive risk analysis and security plan for the regional railroad system developed by the Railroad Security Task Force;
- Integration of security into the regional ITS architecture; and
- Collaboration of federal agencies and local law enforcement agencies to ensure safety and security at the Ports.

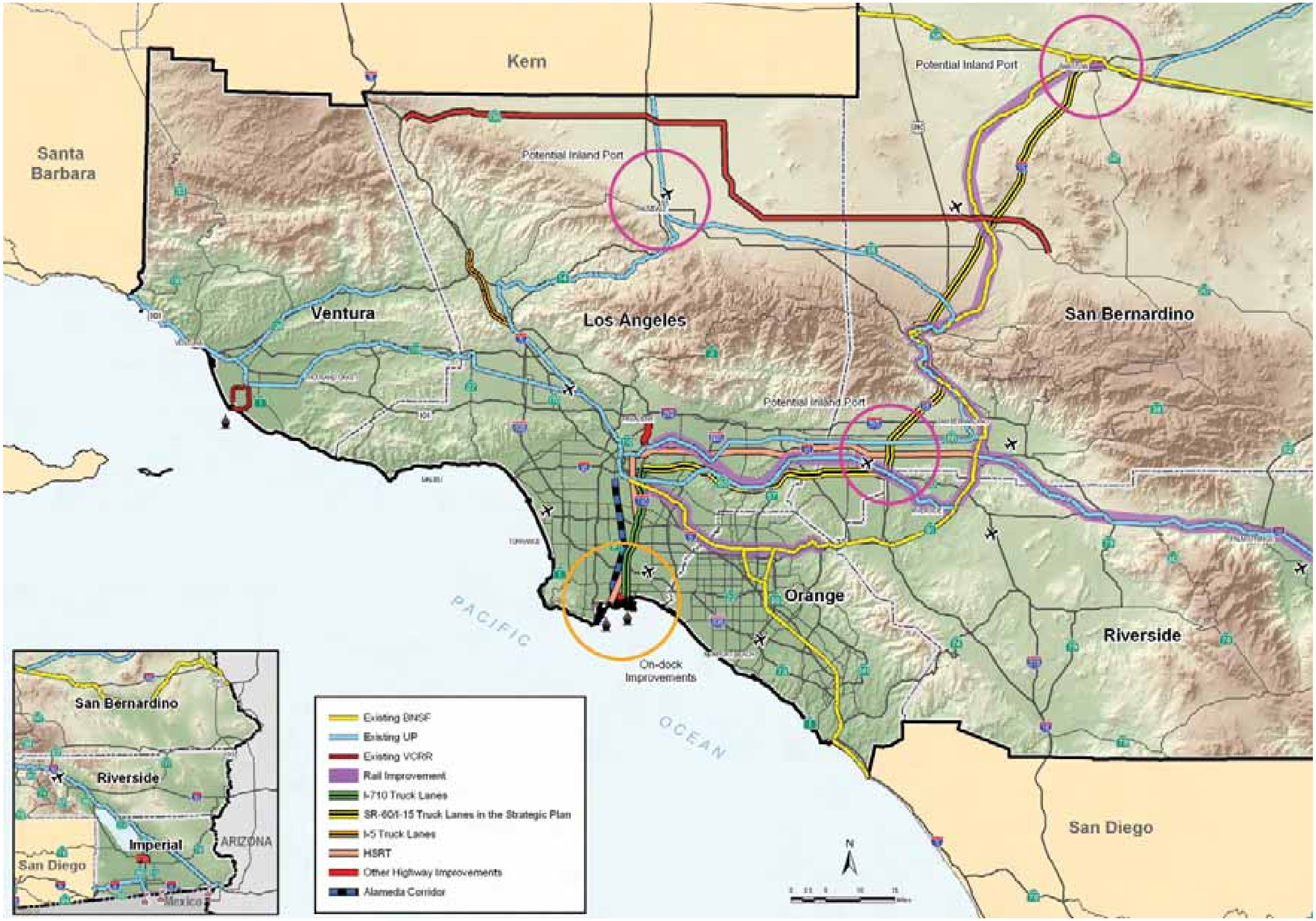
The primary agencies with responsibility for port security at the federal level include the Department of Homeland Security, United States Coast Guard, the Bureau of Customs and Border Protection (CBP), Transportation Security Administration (TSA), and the United States Maritime Administration (MARAD).

Within the port facilities themselves, security is maintained by a combination of agencies, including the U.S. Coast Guard, Customs and Border Protection, Los Angeles Port Police at the Port of Los Angeles, and the Long Beach Police Department at the Port of Long Beach who coordinate to ensure the security of the port. While all of these agencies have the authority to access all areas of the port, maintaining security inside the individual port terminals is the responsibility of the terminal operators, who are required to comply with the Maritime Transportation Security Act of 2002. This act requires terminal facilities to establish restricted areas, security patrols, access control measures, personnel identification procedures, and develop plans to address identified vulnerabilities.

In addition, the Ports of Los Angeles and Long Beach partner and coordinate their security planning with other local law enforcement agencies, such as the Los Angeles Police Department, Los Angeles County Sheriff's Department, and California Highway Patrol.

For detailed information on transportation safety and security, please see the Safety and Security reports.

EXHIBIT 7 2035 PLANNED GOODS MOVEMENT SYSTEM



Source: Southern California Association of Governments, ESRI StreetMap USA, Teleatlas

SCAG's Regional Strategies

Exhibit 7 illustrates planned goods movement system.

REGIONAL TRUCK STRATEGIES

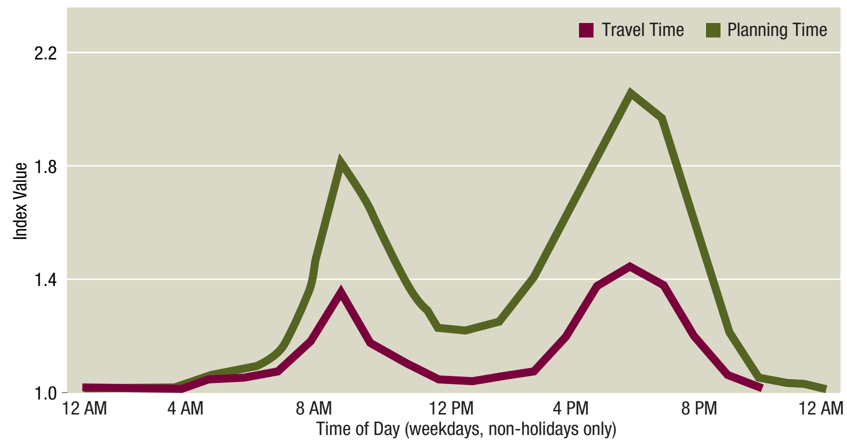
While a variety of modes of transportation are used for the movement of goods, on-road trucks perform the majority of goods movement activities in the SCAG region. Trucks utilizing the current system of local arterial streets, state highways, and interstate freeways carry approximately 80% of the total value of U.S. freight shipments. Approximately 75% of all port related freight movements are made by truck for at least one trip segment. Consequently, trucks have contributed to rising concerns about traffic congestion and public health impacts. Trucks consume upwards of 40% of total highway capacity while representing only 15% of the total number of vehicles. Forecasted growth in freight traffic has placed a greater emphasis on the need for regional efforts in addressing road congestion, air quality, and infrastructure capacity.

DEDICATED LANES FOR CLEAN TECHNOLOGY TRUCKS

Truck-related delay impacts the efficiency of goods movement in the region and ultimately increases prices paid by consumers for goods and services. Additionally, the unreliability of the highway system also increases costs of transportation as shippers build buffer times into their estimated travel times to account for the possibility of severe traffic in the region. Estimated buffer times in Southern California are twice as long as average nationwide delay for the trucking industry.

Figure 4 illustrates the variances of buffer times throughout the day in Southern California. Free-flow traffic is assigned a value of 1. For example, if the travel time index is roughly 1.3, travel time is roughly 30 % higher than free flow time. Given necessary buffer times, significant costs are incurred by trucking companies in Southern California to provide on-time service to their customers.

FIGURE 4 AVERAGE TRAVEL TIME AND BUFFER TIME VARIATIONS IN SOUTHERN CALIFORNIA



Source: SCAG

SCAG has been exploring dedicated lanes for clean technology trucks and refining the concept of user-supported, dedicated truck facilities to improve the flow of goods within the region. Operationally, these facilities would be aligned to focus on connecting freight-intensive locations such as the Ports, warehousing/distribution center locations, and manufacturing locations. Dedicated lanes would have less ingress/egress points than typical urban freeways and would be physically separated from mixed flow traffic to smooth the flow of trucks on these facilities. A network of dedicated lanes for clean technology trucks would be most advantageous for trucks that are traveling long distances and those traveling between freight-intensive locations. The corridors under consideration for such enhancements are I-710, an east-west corridor parallel to SR-60/I-10/I-210, and I-15.

Such facilities have the potential to relieve many negative truck impacts in the region, including recurrent delay, pavement deterioration, safety, emissions, and reliability. For instance, trucks are responsible for significant roadway damage including pavement deterioration. On average, one fully loaded, 80,000-pound truck causes as much pavement wear as 10,000 automobiles. By separating trucks onto designated truck lanes, pavement damage and maintenance costs could be significantly reduced on the mainline freeway system. Though dedicated truck lanes may generate intensive truck use requiring expensive design and maintenance, the net result would likely be a significant reduction in total maintenance costs for the overall freeway network.

The development of such facilities would also have the potential to significantly improve the regional roadway system by addressing current system deficiencies such as:

- On/off ramps proximity to interchanges;
- Low speed/capacity connections (loop ramps);
- Missing interchanges from major freeway connections;
- Close proximity of merging ramps to interchanges;
- Non-standard weaving distances;
- Narrow or Non-Existent Shoulders; and
- Narrow Lane Widths

Despite high capital costs and the need for further analyses on environmental impacts and equity issues, the magnitude of truck volumes on regional freight corridors requires urgent mitigation. Dedicated lanes for clean trucks along I-710 could address numerous adverse impacts associated with existing truck volumes, ensuring reliable system operation and reducing adverse environmental impacts. SCAG recommends including dedicated lanes for clean trucks on I-710, creating two lanes in each direction along existing alignments extending from the Ports to SR-60. This represents an investment of over $5 billion in nominal dollars. At the same time, SCAG recognizes the need for a comprehensive system that addresses regional truck-related issues, and considers the I-710 portion the first segment of a comprehensive regional system. Other corridors, such as an east-west corridor parallel to SR-60/I-10/I-210, and I-15, which complement the comprehensive system, are in the Strategic Plan for further analyses.

TRUCK CLIMBING LANES

Truck climbing lanes are additional lanes located outside mixed-flow lanes, which permit slower-moving trucks to operate at their own pace. This enables other vehicles to move at a faster pace, thereby reducing congestion. These lanes are typically placed where slow-moving trucks would cause an obstruction to other vehicles, such as hillsides or other areas with significant grade increases. Inclusion of these lanes would add capacity to existing roadways and help reduce truck emissions by reducing delay. However, this strategy is limited to areas with significant grade increases and may only have minimum benefits on the regional transportation system. Corridors identified suitable for truck climbing lanes are I-5, I-10, I-15, I-215, SR-57 and SR-60.

HIGH DESERT CORRIDOR

In an effort to avoid the congested metropolitan area, many trucks traverse SR-138, the east-west corridor linking the Antelope and Victor Valleys. However, SR-138 currently lacks adequate infrastructure to handle heavy truck volumes. The proposed High Desert Corridor between I-15 and I-5 will accommodated an expected three- to six-fold increase in traffic, providing a new level of accessibility and carry trucks and other through traffic safely around existing communities.

TRUCK EMISSION CONTROL STRATEGIES

Heavy-duty trucks are usually powered by diesel, which contributes to regional NOX and PM emissions. New EPA emission standards taking effect in 2007 and 2010 will require strict emission reductions in both NOX and PM. Truck emission reduction strategies are listed below. While these strategies do not address congestion or capacity issues, they do provide support for the mitigation of freight emissions.

- Truck Replacement: This strategy assumes that truck owners replace older model trucks with newer trucks, with proof of disposal to prohibit resale within the SCAG region.

- Engine Repowering: This strategy is generally feasible for pre-1994 trucks and can be obtained at lower capital costs than replacing the entire truck. This strategy replaces older diesel truck engines with cleaner diesel or alternative fuel engines. Similar to the truck replacement strategy, proof of disposal is required to ensure that the engine is not resold into the region.
- Exhaust Treatment Device Retrofit: Diesel particulate filters (DPFs), flow-through filters (FTFs), and diesel oxidation catalysts (DOCs) are easily retrofitted to existing trucks with only minor modifications to the existing system. While CARB has not certified emission reduction amounts, DPFs, FTFs and DOCs are expected to reduce PM emissions by at least 50% and 25% respectively.
- Alternative Fuels: There are a variety of alternative fuels that can reduce truck emissions such as emulsified diesel, bio-diesel, natural gas, propane, and new hybrid-electric technologies.

Due to the costs associated with truck emission control strategies, monetary incentives may be necessary for implementation purposes. Various agencies are finalizing their incentive programs to support similar truck emission reduction programs. These incentive programs include:

- The Clean Air Action Plan – Technology Advancement Program by the SPB ports;
- The Port of Los Angeles' Port Air Quality Mitigation Incentive (PAQMIP); and
- The Carl Moyer Program by South Coast air Quality management District (SCAQMD) .

REGIONAL RAIL STRATEGIES

Given its superior connections to inland locations, freight rail is key to the region's economy. Over the next 25 years, at least half of the containers coming through the Ports will be transported via rail. Table 13 illustrates this growth. Over the same period, commuter rail needs will also double. To address these issues, SCAG is proposing rail system capacity enhancements, rail grade separations, and alternative strategies to reduce rail emissions.

TABLE 13 SAN PEDRO BAY PORTS CARGO GROWTH FORECASTS* (TEUS IN MILLIONS)

	2005 (Actual)	2010	2015	2020	2030
Total Port Container Throughput	14.2	20.3	27.1	36.2	42.5
Regional Truck Demand	6.8	9.7	13.0	17.4	20.4
Long Haul Truck Demand	0.1	0.2	0.3	0.4	0.4
Total Rail Demand**	7.2	10.3	13.8	18.5	21.7
Rail Share of Total Throughput	50.7%	50.7%	50.9%	51.1%	51.1%

* Total San Pedro Bay projections are based on Mercer Management forecast as adjusted by Port of Los Angeles and Port of Long Beach

** Includes transload to rail

Source: The San Pedro Bay Ports

RAIL MAINLINE CAPACITY IMPROVEMENTS

As a system, rail transports goods more efficiently, and emits three times less pollutants than trucks. While the current system manages both passenger rail and freight rail, current projections indicate severe system shortfalls in near the future. To ensure sound operations, existing system infrastructure must be expanded and grade separations at critical crossings must be completed. Exhibit 8 identifies planned projects for regional rail capacity enhancements. Critical mainline track capacity improvements in the region are associated with UP and BNSF lines. BNSF's Transcon track capacity improvements include:

- Additional 3rd and 4th mainline tracks between Hobart/Commerce and Fullerton;
- Additional 3rd mainline tracks for Fullerton - Placentia, Placentia - Yorba Linda, Prado Dam – Riverside, and Highgrove - M.P. 2.9 segments; and
- Additional 4th mainline track between Riverside and Colton.

UP's mainline capacity improvements include:

- Additional 2nd main track for West Riverside - Riverside, Riverside - Pedley, and Bon view - Ontario segments; and
- Additional 2nd main track for Pomona - Montclair, and Alhambra - Walnut.

Colton Crossing is also a highly important capacity enhancement project which involves both BNSF and UP lines. Improvements would provide significant public and private sector benefits to the region including:

- Improved operational efficiency resulting from increased speed through the crossing;
- Increased rail network capacity resulting in increased train throughput;
- Economic benefits resulting from increased employment associated with increased throughput through the crossing;
- Environmental benefits due to emissions reductions resulting from elimination of train idling, and enhanced train speeds through the crossing; and
- Environmental benefits associated with commuter VMT reduction resulting from increased commuter rail service.

RAIL GRADE SEPARATIONS

Vehicle delay at grade crossings is expected to triple between 2000 and 2025. Allowing two intersecting axes of traffic to move concurrently, grade crossings eliminate vehicle delay and decrease associated emissions by reducing vehicle idling times. This also means that longer trains may be formed, thus increasing operating efficiencies by permitting the transport of larger volumes of goods per trip.

The projected growth in freight and passenger train volumes make it critical to separate grade crossings in order to ensure an efficient goods movement system, to reduce traffic congestion and delays, and to meet regional air quality conformity requirements. Grade separations also address other rail crossing related concerns such as noise and safety.

Throughout the SCAG region, 131 grade crossings requiring grade separations were identified by the Alameda Corridor-East Trade Corridor Plan. These grade separation projects would cost an estimated $5.99 billion to implement.

Exhibits 9, 10, 11, and 12 show proposed grade separation projects planned in the region by county.

LOCOMOTIVE ENGINE UPGRADES

Upgrading locomotives to cleaner engines is another strategy to reduce diesel emissions. In March 2007, the EPA proposed new Tier 3 and Tier 4 engine standards to reduce emissions from diesel locomotives. Tier 3 standards are near-term engine-out emission reduction standards for PM and NOX. Tier 4 standards are longer-term standards for newly-built engines. These standards will be phased in over time, and would be based on the application of high-efficiency catalytic aftertreatment technologies which would be enabled by the availability of ultra low sulfur diesel fuel. Tier 3 engines are expected to be available in 2009, and Tier 4 engines are expected to be available in 2015. While these technologies may reduce emissions significantly, Tier 3 engines will not reduce emissions by the amount required to meet the EPA's attainment deadline for PM2.5, and Tier 4 engines will not be available to meet the 2014 deadline. However, these strategies can be implemented at substantially lower capital costs than other alternatives such as system electrification. SCAG is exploring methods to accelerate implementation of this strategy through measures such as financial incentives to engine manufacturers and railroads.

EXHIBIT 8 PLANNED PROJECTS FOR REGIONAL RAIL CAPACITY ENHANCEMENT

Rail Capacity Improvements

No	Railroad	County	Improvements
1A	BNSF	Orange/Los Angeles	3rd main track, Fullerton(Basta) - City of Commerce (Bandini)
1B	BNSF	Orange/Los Angeles	4th main track, Hobart-Fullerton
2A	BNSF	Orange	3rd main track, Placentia(Atwood) - Yorba Linda(Esperanza), Prado Dam-Riverside, and Highgrove to MP 2.9
2B	BNSF	Orange	3rd main track, Fullerton-Placentia(Atwood)
3	BNSF	Riverside/San Bernardino	4th main track, Riverside-Colton
4	BNSF	Riverside	Flying Junction at Riverside
5	BNSF	San Bernardino	Colton Crossing to Barstow
6	UP	Riverside/San Bernardino	2nd main track, W. Riverside-Riverside (Streeter), Riverside (Arlington)-Pedley, Bon View-Ontario(Tower)
7	UP	Los Angeles	2nd main track, Pomona(Oak)-Montclair (Roselawn)
8	UP	Los Angeles	2nd main track, Alhambra - Walnut
9	UP	San Bernardino	Flying junction of Palmdale Line at West Colton (Rancho)
10	UP	Riverside/San Bernardino	Colton Crossing to Indio
11		San Bernardino	Grade Sep. @ Colton Crossing (Rail to Rail)
12	UP	Los Angeles	Flying junction at Pomona

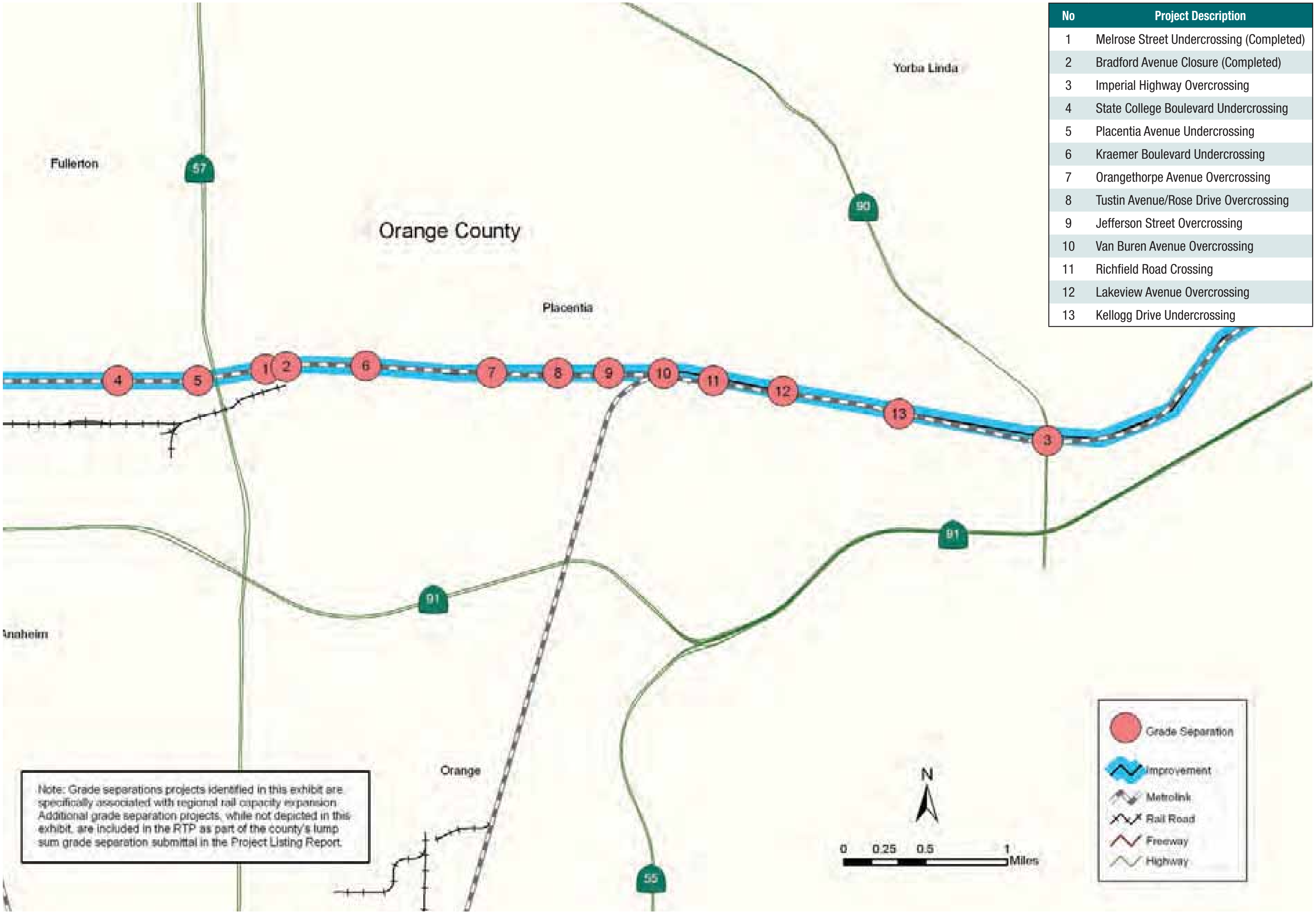
Source: Southern California Association of Governments, ESRI StreetMap USA, Teleatlas

EXHIBIT 9 GRADE SEPARATION PROJECTS IN LOS ANGELES COUNTY

No	Project Description
1	Nogales Street/SP - Industry (Completed)
2	Ramona Boulevard/SP - El Monte
3	East End Avenue/SP&UP - Pomona
4	Reservoir Street/SP&UP - Pomona
5	Temple Avenue/SP - Pomona
6	Brea Canyon Road/UP - Industry
7	Sunset Avenue/SP - Industry
8	Baldwin Avenue/SP - El Monte
9	Nogales Street/UP - Industry
10	Valley Boulevard/SP - Los Angeles
11	Passons Boulevard/BNSF - Pico Rivera
12	Valley View Avenue/BNSF - Santa Fe Springs
13	Rosecrans Avenue/BNSF - Santa Fe Springs
14	Norwalk/BNSF - Santa Fe Springs/Gateway
15	Durfee Avenue/UP - Pico Rivera
16	San Gabriel Trench - San Gabriel
17	Turnbull Canyon Road/UP - Industry
18	Rose Hills/UP - Industry
19	Puente Avenue/SP - Industry
20	Fairway Drive/SP - Industry
21	Fairway Drive/UP - Industry
22	Montebello Boulevard/UP - Montebello
23	Fullerton Road/SP - Industry
24	Temple Avenue/SP - Industry
25	Lemon Avenue/SP - Industry
26	Brea Canyon Road/SP - Industry
27	San Antonio Avenue/SP&UP - Pomona
28	Lower Azusa Road/SP - Temple City
29	Fullerton Road/UP - Industry
30	Hamilton Boulevard/SP&UP - Pomona
31	Park Avenue/SP&UP - Pomona
32	Temple City Boulevard/SP - El Monte
33	California Avenue/SP - Industry
34	Walnut Grove Avenue/SP - Rosemead
35	Lemon Avenue/UP - Industry
36	Vineland Avenue/SP - Industry
37	Arden Drive/SP - El Monte
38	Stimson Avenue/UP - Industry
39	Palomares Street/SP&UP - Pomona
40	Cogswell Road/SP - El Monte

Source: Southern California Association of Governments, ESRI StreetMap USA, Teleatlas

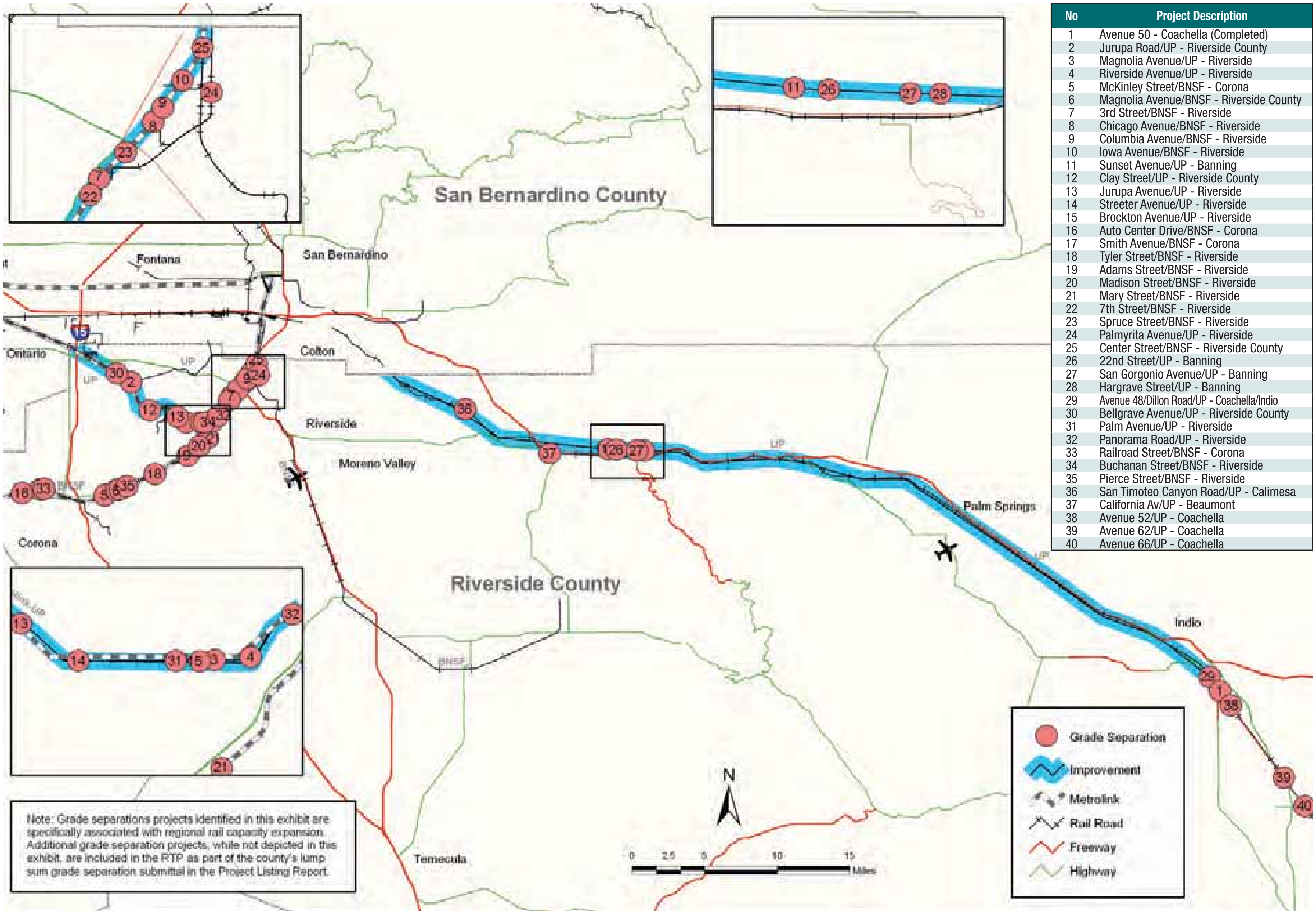
EXHIBIT 10 GRADE SEPARATION PROJECTS IN ORANGE COUNTY



No	Project Description
1	Melrose Street Undercrossing (Completed)
2	Bradford Avenue Closure (Completed)
3	Imperial Highway Overcrossing
4	State College Boulevard Undercrossing
5	Placentia Avenue Undercrossing
6	Kraemer Boulevard Undercrossing
7	Orangethorpe Avenue Overcrossing
8	Tustin Avenue/Rose Drive Overcrossing
9	Jefferson Street Overcrossing
10	Van Buren Avenue Overcrossing
11	Richfield Road Crossing
12	Lakeview Avenue Overcrossing
13	Kellogg Drive Undercrossing

Source: Southern California Association of Governments, ESRI StreetMap USA, Teleatlas

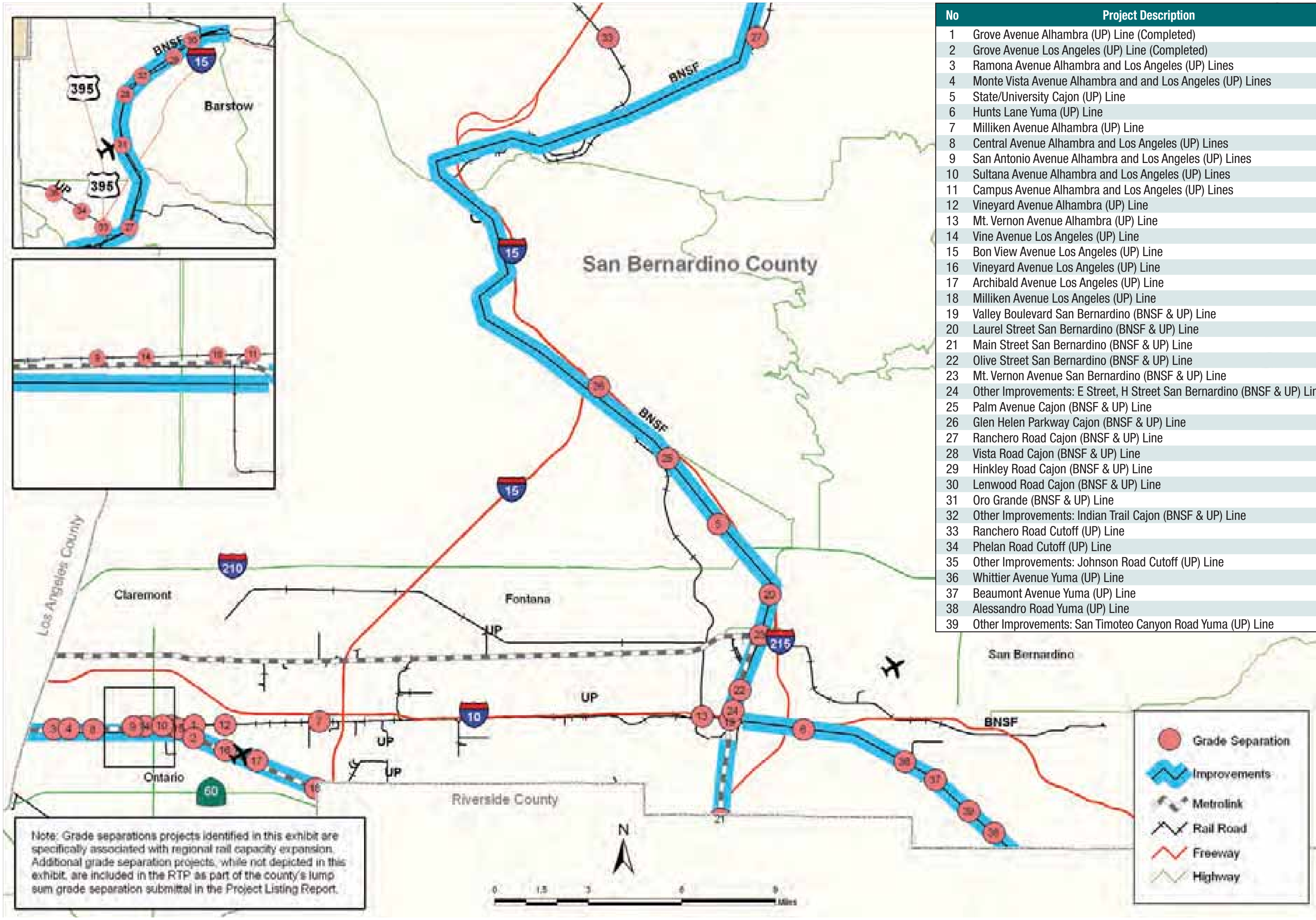
EXHIBIT 11 GRADE SEPARATION PROJECTS IN RIVERSIDE COUNTY



No	Project Description
1	Avenue 50 - Coachella (Completed)
2	Jurupa Road/UP - Riverside County
3	Magnolia Avenue/UP - Riverside
4	Riverside Avenue/UP - Riverside
5	McKinley Street/BNSF - Corona
6	Magnolia Avenue/BNSF - Riverside County
7	3rd Street/BNSF - Riverside
8	Chicago Avenue/BNSF - Riverside
9	Columbia Avenue/BNSF - Riverside
10	Iowa Avenue/BNSF - Riverside
11	Sunset Avenue/UP - Banning
12	Clay Street/UP - Riverside County
13	Jurupa Avenue/UP - Riverside
14	Streeter Avenue/UP - Riverside
15	Brockton Avenue/UP - Riverside
16	Auto Center Drive/BNSF - Corona
17	Smith Avenue/BNSF - Corona
18	Tyler Street/BNSF - Riverside
19	Adams Street/BNSF - Riverside
20	Madison Street/BNSF - Riverside
21	Mary Street/BNSF - Riverside
22	7th Street/BNSF - Riverside
23	Spruce Street/BNSF - Riverside
24	Palmyrita Avenue/UP - Riverside
25	Center Street/BNSF - Riverside County
26	22nd Street/UP - Banning
27	San Gorgonio Avenue/UP - Banning
28	Hargrave Street/UP - Banning
29	Avenue 48/Dillon Road/UP - Coachella/Indio
30	Bellgrave Avenue/UP - Riverside County
31	Palm Avenue/UP - Riverside
32	Panorama Road/UP - Riverside
33	Railroad Street/BNSF - Corona
34	Buchanan Street/BNSF - Riverside
35	Pierce Street/BNSF - Riverside
36	San Timoteo Canyon Road/UP - Calimesa
37	California Av/UP - Beaumont
38	Avenue 52/UP - Coachella
39	Avenue 62/UP - Coachella
40	Avenue 66/UP - Coachella

Source: Southern California Association of Governments, ESRI StreetMap USA, Teleatlas

EXHIBIT 12 GRADE SEPARATION PROJECTS IN SAN BERNARDINO COUNTY



No	Project Description
1	Grove Avenue Alhambra (UP) Line (Completed)
2	Grove Avenue Los Angeles (UP) Line (Completed)
3	Ramona Avenue Alhambra and Los Angeles (UP) Lines
4	Monte Vista Avenue Alhambra and and Los Angeles (UP) Lines
5	State/University Cajon (UP) Line
6	Hunts Lane Yuma (UP) Line
7	Milliken Avenue Alhambra (UP) Line
8	Central Avenue Alhambra and Los Angeles (UP) Lines
9	San Antonio Avenue Alhambra and Los Angeles (UP) Lines
10	Sultana Avenue Alhambra and Los Angeles (UP) Lines
11	Campus Avenue Alhambra and Los Angeles (UP) Lines
12	Vineyard Avenue Alhambra (UP) Line
13	Mt. Vernon Avenue Alhambra (UP) Line
14	Vine Avenue Los Angeles (UP) Line
15	Bon View Avenue Los Angeles (UP) Line
16	Vineyard Avenue Los Angeles (UP) Line
17	Archibald Avenue Los Angeles (UP) Line
18	Milliken Avenue Los Angeles (UP) Line
19	Valley Boulevard San Bernardino (BNSF & UP) Line
20	Laurel Street San Bernardino (BNSF & UP) Line
21	Main Street San Bernardino (BNSF & UP) Line
22	Olive Street San Bernardino (BNSF & UP) Line
23	Mt. Vernon Avenue San Bernardino (BNSF & UP) Line
24	Other Improvements: E Street, H Street San Bernardino (BNSF & UP) Line
25	Palm Avenue Cajon (BNSF & UP) Line
26	Glen Helen Parkway Cajon (BNSF & UP) Line
27	Ranchero Road Cajon (BNSF & UP) Line
28	Vista Road Cajon (BNSF & UP) Line
29	Hinkley Road Cajon (BNSF & UP) Line
30	Lenwood Road Cajon (BNSF & UP) Line
31	Oro Grande (BNSF & UP) Line
32	Other Improvements: Indian Trail Cajon (BNSF & UP) Line
33	Ranchero Road Cutoff (UP) Line
34	Phelan Road Cutoff (UP) Line
35	Other Improvements: Johnson Road Cutoff (UP) Line
36	Whittier Avenue Yuma (UP) Line
37	Beaumont Avenue Yuma (UP) Line
38	Alessandro Road Yuma (UP) Line
39	Other Improvements: San Timoteo Canyon Road Yuma (UP) Line

Source: Southern California Association of Governments, ESRI StreetMap USA, Teleatlas

TABLE 14 SBD CAPACITY SHARED GUIDEWAY WITH PASSENGER SERVICE - 9.2M TEU

	Operating Period			Trains/Day/Direction		Potential Capacity				
	Hr/Day	Trains/Hr/Direction		Passenger	Freight	Per Day and Direction				Per Year and Direction
		Passenger	Freight			Passenger	Freight			(24/7 Operation)
							20 ft	40 ft	TEU	TEU
Peak	8	6	6	48	48	42,528	96	1,824	3,744	1,366,560
Off-Peak	10	3	9	30	90	26,580	180	3,420	7,020	2,562,300
Night	2	0	12	0	24	-	48	912	1,872	683,280
Maintenance	4	0	0	0	0	-	-	-	-	-
Total	24	9	27	78	162	69,108	324	6,156	12,636	4,612,140
Total Passengers/Freight in Both Directions						**138,216**	**648**	**12,312**	**25,272**	**9,224,280**

Source: IBI Group

GOODS MOVEMENT HIGH SPEED RAIL TRANSPORT (HSRT) FOR FREIGHT

The region is also exploring new HSRT systems that may provide greater throughput and reliability with near zero emissions. A recent analysis carried out by the IBI Group considered the application of a HSRT system for the movement of containers (logistics and systems technology) to and from the SPB ports. The HSRT container movement system would provide a high capacity, fast, efficient, and environmentally sensitive method of moving containerized cargo from the Ports to inland port facilities in San Bernardino. The HSRT system capitalizes on the inherent savings of multiple uses on a single infrastructure by operating on shared alignments with a HSRT passenger system. The technology permits operation of HSRT freight vehicles on a shared guideway with passenger vehicles even during peak hour service. Freight vehicle trips can be interspersed with passenger trips while still meeting required passenger vehicle headways. Additionally, full utilization of the freight line can be achieved during the passenger system's off-peak hours.

The freight component of the HSRT system would begin at the Ports and connect to the Initial Operating Segment (IOS) at a point just east of Los Angeles Union Passenger Terminal. The assumed alignment would run north-south and follow a route parallel to the I-710/Alameda Corridor. After connecting to the IOS and other segments, the freight-only service would be interspersed with passenger service.

Table 14 shows current estimates, which indicate that a HSRT container movement system is capable of moving over 25,272 containers per day or over 9.2 million TEUs annually. The total freight component is estimated to cost nearly $18 billion in nominal dollars.

INLAND PORT STRATEGY

The region is confronting serious long-term freight mobility issues. Straightforward capacity increases that worked in the past – more highways, larger ports – are not enough for the future and may endanger the environment, tax the budget, and impact communities. Inland ports and related initiatives have been proposed as solutions to freight mobility issues. An inland port would be located further away from the Ports with transportation systems other than existing freight corridors moving goods between the Ports and the inland port. The broad potential benefits of an inland port include facilitating goods movement, encouraging economic development, reducing traffic congestion, and promoting regional objectives. The development of inland ports is also critical to the HSRT system. Based on studies conducted by SCAG, development of inland ports served by rail shuttle trains would reduce net truck VMT, lower net emissions, and encourage efficient patterns of industrial development and land use. Establishment of inland port facilities would require ongoing operating subsidies along with significant capital investment. Implementation of an inland port/rail shuttle facility would require identification of a target market, securing of sites, improvements in the existing port rail network, and cooperation with railroads. The Inland Empire area has been recognized as the most promising location for an inland port facility to address existing goods movement needs due to current demand and infrastructure. However, land availability in the area for an inland port facility is rapidly decreasing. This suggests that more suitable candidates for a future inland port facility may be found in areas where land scarcity is not a pressing concern- areas such as Barstow, Victorville, and North Los Angeles County. However, inland port facilities and associated costs need to be further evaluated.

Next Steps

SCAG strives to ensure quality of life beyond the 2008 RTP as reflected by its ongoing efforts to identify innovative solutions for the region's goods movement system. Several projects have been included in the RTP's Strategic Plan for feasibility analyses and to promote a long-term policy dialogue regarding potential solutions to the region's goods movement challenges.

These strategic projects include an extensive network of dedicated lanes for clean technology trucks, an extension of planned HSRT, establishment of inland port facilities at strategic locations, and freight rail electrification. In addition to these efforts, SCAG is currently preparing two regionally significant studies. One study would be a careful evaluation of regional goods movement system and potential implementation strategies. The other focuses on pricing mechanisms and identification of reliable financing sources for the entire system, including goods movement projects of regional significance.

Finding solutions to many of the problems faced by the region will require the involvement of stakeholders from both the public and private sectors. Private entities have recognized the challenges related to goods movement in the region and are increasingly embarking upon efforts to improve system efficiency. One example has been UP's plan to modernize ICTF, which would double this facility's capacity while at the same time improving operational efficiency and environmental standards. The BNSF has also proposed developing a privately funded near-dock facility called SCIG, which is projected to accommodate increasing trade volumes while also reducing truck traffic on the I-710.

Goods movement is a vital component of the region's transportation system as well as the economy. Based upon trends identified in this RTP, it is evident that growth in this sector will continue to have lasting impacts upon the region, its transportation systems, and the environment. By pursuing best suited solutions and collaborating with stakeholders, SCAG will continue working to develop a better future for goods movement systems in the region.

Appendix A: Comparison of Port Truck Volumes to Total Daily Truck Volumes on Regional Roadways, Year 2003

Highways	Segments	Total Daily Vehicle Volume	Total Daily Truck Volume	Daily Port Truck Volume	Total Trucks as % of Total Vehicle Volume	Port Trucks as % of Total Truck Volume
I-110	PCH to Sepulveda	148,000	9,900	7,810	6.7%	78.9%
	Sepulveda to I-405	226,000	11,900	7,335	5.3%	61.6%
	I-405 to SR-91	266,000	23,900	6,015	9.0%	25.2%
	SR-91 to I-105	247,000	17,800	4,680	7.2%	26.3%
I-710	I-105 to I-10	324,000	15,900	2,485	4.9%	15.6%
	PCH to Willow	146,000	25,400	23,900	17.4%	94.1%
	Willow to I-405	161,000	27,100	23,235	16.8%	85.7%
	I-405 to SR-91	186,000	31,400	20,045	16.9%	63.8%
	SR-91 to I-105	227,000	38,300	15,315	16.9%	40.0%
	I-105 to I-5	237,000	34,600	11,685	14.6%	33.8%
	I-5 to SR-60	199,000	24,200	1,025	12.2%	4.2%
	SR-60 to I-10	132,000	11,300	845	8.6%	7.5%
I-405	I-605 to I-710	289,000	15,700	1,875	5.4%	11.9%
	I-710 to I-110	283,000	15,400	2,965	5.4%	19.3%
	I-110 to SR-91	270,000	14,600	1,960	5.4%	13.4%
	SR-91 to I-105	294,000	12,100	1,810	4.1%	15.0%
	I-105 to I-10	310,000	12,800	1,590	4.1%	12.4%
SR-91	SR-57 to I-5	250,000	21,800	1,135	8.7%	5.2%
	I-5 to I-605	283,000	39,900	1,470	14.1%	3.7%
	I-605 to I-710	263,000	37,100	2,870	14.1%	7.7%
	I-710 to I-110	212,000	13,700	1,385	6.5%	10.1%
	I-110 to I-405	67,000	1,500	195	2.2%	13.0%
I-105	I-605 to I-710	212,000	18,800	2,800	8.9%	14.9%
	I-710 to I-110	231,000	14,700	1,605	6.4%	10.9%
	I-110 to I-405	243,000	13,800	390	5.7%	2.8%

Highways	Segments	Total Daily Vehicle Volume	Total Daily Truck Volume	Daily Port Truck Volume	Total Trucks as % of Total Vehicle Volume	Port Trucks as % of Total Truck Volume
I-5	SR-57 to SR-91	223,000	21,400	225	9.6%	1.1%
	SR-91 to I-605	199,000	18,600	160	9.3%	0.9%
	I-605 to I-710	249,000	23,200	195	9.3%	0.8%
	I-710 to SR-60	267,000	20,600	1,800	7.7%	8.7%
	SR-60 to I-10	247,000	20,400	710	8.3%	3.5%
SR-60	SR-57 to I-605	265,000	23,200	1,560	8.8%	6.7%
I-105	SR-57 to I-605	259,000	18,100	1,775	7.0%	9.8%
	I-605 to I-710	234,000	14,200	585	6.1%	4.1%
	I-710 to I-5	254,000	9,000	190	3.5%	2.1%
	SR-60 to I-110	284,000	21,600	300	7.6%	1.4%
I-605	I-405 to SR-91	245,000	11,300	20	4.6%	0.2%
	I-105 to I-5	297,000	41,900	4,100	14.1%	9.8%
	I-5 to SR-60	265,000	37,400	3,825	14.1%	10.2%
	SR-60 to I-10	224,000	26,800	1,815	12.0%	6.8%
SR-57	I-5 to SR-91	276,000	18,800	10	6.8%	0.1%
	SR-91 to SR-60	296,000	23,400	135	7.9%	0.6%
	SR-60 to I-10	139,000	9,100	40	5.8%	0.5%

Source: "Baseline Transportation Study", Port of Los Angeles, 2004; Caltrans Truck Volumes 2004 (Year 2003 data).

Appendix B: Truck-involved Traffic Collisions in Southern California

This section summarizes key findings of truck-involved traffic collisions in Southern California by using the Statewide Integrated Traffic Records System (SWITRS) data. The results include historical trends analysis (1996 – 2005) and characteristics of collisions involving trucks in 2005.

TABLE B1 TRUCK-INVOLVED FATAL COLLISIONS (1996 – 2005)

County/Region/State	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Imperial	4	5	8	5	8	9	3	6	8	3
Los Angeles	65	70	54	48	63	72	55	56	60	50
Orange	10	16	10	15	9	14	12	14	15	15
Riverside	21	25	28	27	25	20	21	28	30	22
San Benardino	29	36	32	36	34	27	28	29	36	34
Ventura	6	7	6	3	4	5	7	9	6	2
SCAG Region	135	159	138	134	143	147	126	142	155	126
Percent of CA	36%	44%	40%	40%	39%	41%	37%	42%	45%	37%
California, excluding SCAG region	238	205	205	200	223	215	219	197	187	217
California	373	364	343	334	366	362	345	339	342	343

TABLE B2 TRUCK-INVOLVED INJURY COLLISIONS (1996 - 2005)

County/Region/State	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Imperial	61	63	71	57	43	55	42	54	50	46
Los Angeles	2,520	2,375	2,307	2,428	2,446	2,511	2,344	2,338	2,087	2,210
Orange	524	544	563	537	560	487	449	461	497	524
Riverside	337	370	404	412	429	441	455	544	562	558
San Benardino	614	614	626	693	633	692	679	755	781	703
Ventura	134	166	141	136	143	155	166	151	124	133
SCAG Region	4,190	4,132	4,112	4,263	4,254	4,341	4,135	4,303	4,101	4,174
Percent of CA	50%	49%	49%	49%	49%	50%	50%	52%	52%	53%
California, excluding SCAG region	4,158	4,289	4,335	4,360	4,441	4,388	4,095	3,938	3,848	3,636
California	8,348	8,421	8,447	8,623	8,695	8,729	8,230	8,241	7,949	7,810

TABLE B3 PERCENTAGE OF TRUCK-INVOLVED COLLISIONS, 2005

County/Region/State	Fatal	Injury	Property-Damage-Only	Total
Imperial	7.7%	7.0%	11.7%	9.8%
Los Angeles	7.2%	3.8%	7.6%	6.2%
Orange	7.9%	3.3%	6.1%	5.1%
Riverside	7.3%	5.4%	8.4%	7.3%
San Benardino	9.4%	6.5%	9.3%	8.4%
Ventura	3.2%	3.1%	5.0%	4.3%
SCAG Region	7.6%	4.2%	7.6%	6.3%
California, excluding SCAG region	10.0%	3.7%	6.5%	5.5%
California	9.0%	3.9%	7.0%	5.9%

TABLE B4 TYPES OF TRUCK-INVOLVED COLLISIONS, 2005

	Fatal		Injury		Property-Damage-Only		Total	
County/Region/State	Collisions	Percent	Collisions	Percent	Collisions	Percent	Collissions	Percent
Imperial	3	1.8%	47	28.7%	114	69.5%	164	100%
Los Angeles	50	0.5%	2,229	23.8%	7,077	75.6%	9,356	100%
Orange	15	0.7%	531	24.6%	1,608	74.7%	2,155	100%
Riverside	22	1.1%	571	27.3%	1,495	71.6%	2,088	100%
San Benardino	34	1.2%	721	25.6%	2,065	73.2%	2,820	100%
Ventura	2	0.4%	134	26.7%	366	72.9%	502	100%
SCAG Region	126	0.7%	4,233	24.8%	12,726	74.5%	17,085	100%
California, excluding SCAG region	217	1.5%	3,577	25.0%	10,537	73.5%	14,331	100%
California	343	1.1%	7,810	24.9%	23,263	74.0%	31,416	100%

TABLE B5 TOP TWENTY HIGHWAYS WITH MOST TRUCK-INVOLVED COLLISIONS, 2005

Rank	Primary Road	Collisions	Percent
1	RT 10	1,571	9.2%
2	RT 5	1,548	9.1%
3	RT 15	946	5.5%
4	RT 60	938	5.5%
5	RT 405	725	4.2%
6	RT 91	725	4.2%
7	RT 101	549	3.2%
8	RT 710	545	3.2%
9	RT 215	432	2.5%
10	RT 210	420	2.5%
11	RT 605	418	2.4%
12	RT 57	305	1.8%
13	RT 110	262	1.5%
14	RT 118	145	0.8%
15	RT 14	142	0.8%
16	RT 105	127	0.7%
17	RT 40	106	0.6%
18	RT 55	95	0.6%
19	RT 22	91	0.5%
20	RT 134	85	0.5%
Top 20 Routes Total		10,175	60%
Grand Total		17,085	100%

TABLE B6 TYPE OF TRUCK-INVOLVED COLLISIONS, 2005

Type of Collision	Collisions	Percent
Sidewipe	7,314	43%
Rear End	5,175	30%
Hit Object	1,747	10%
Broadside	1,706	10%
Overturned	365	2%
Head-On	265	2%
Vehicle/Pedestrian	60	0.4%
Other	453	3%
Total	17,085	100%

TABLE B7 CONTRIBUTING FACTORS OF TRUCK-INVOLVED COLLISIONS

Violation Category	Collisions	Percent
Unsafe Speed	4,417	25.9%
Unsafe Lane Change	4,186	24.5%
Improper Turning	3,305	19.3%
Other Than Driver (or Pedestrian)	821	4.8%
Automobile Right of Way	740	4.3%
Improper Passing	477	2.8%
Driving Under the Influence of Alcohol or Drug	459	2.7%
Other Hazardous Violation	443	2.6%
Other Equipment	348	2.0%
Traffic Signals and Signs	335	2.0%
Following too Closely	235	1.5%
Wrong Side of Road	228	1.3%
Other Improper Driving	122	0.7%
Brakes	94	60.0%
Pedestrian Violation	32	20.0%
Hazardous Parking	27	20.0%
Impeding Traffic	20	10.0%
Lights	15	10.0%
Pedestrain Right of Way	8	0.05%
Fell Asleep	5	0.03%
Not Stated	228	1.3%
Unknown	522	3.1%
Total	17,085	100.0%

FIGURE B1 PERCENT OF TRUCK-INVOLVED AND PASSENGER-CAR-ONLY COLLISIONS BY HOUR

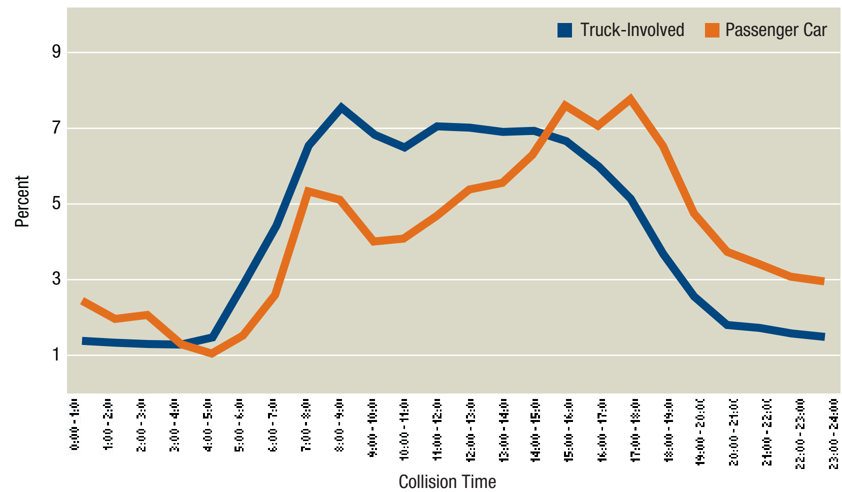
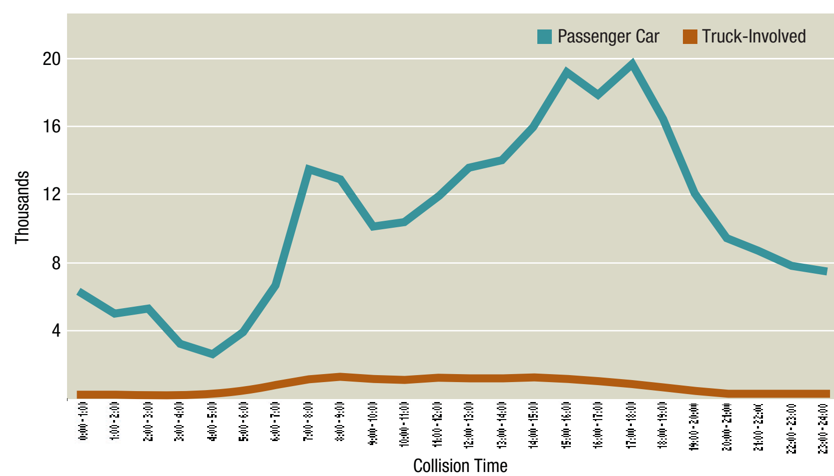


FIGURE B2 TRUCK-INVOLVED AND PASSENGER-CAR-ONLY COLLISIONS BY HOUR



Appendix C: Freight Rail Electrification Report of Findings

Memorandum
From: Cambridge Systematics
Date: August 24, 2007

As part of an effort to target clean technology investments and reduce emissions from freight rail movements in the Los Angeles Basin, the Southern California Association of Governments (SCAG) performed a preliminary evaluation of alternative scenarios for freight rail electrification and locomotive upgrades. The findings were included in the Freight Rail Emission Reduction Discussion Paper, an internal draft document dated July 17, 2007. Three of the scenarios involve rail electrification alone; the remaining two scenarios involve upgrades to lower emission diesel locomotives to reduce emissions.

Following the issuance of the discussion paper, SCAG commissioned System Metrics Group, Inc. and its subcontractor Cambridge Systematics, Inc. to conduct a study to:

- Obtain updated electrification infrastructure and electric locomotive costs vis-à-vis the Southern California Accelerated Rail Electrification Study (1992) prepared for the Southern California Regional Rail Authority (SCRRA), from which costs were derived for the 2007 discussion paper;
- Estimate electrification implementation time, including what can be accomplished by 2014; and
- Estimate electric power consumption, in order to determine emissions from incremental power generation (a separate study).

These objectives are intended to support SCAG's overall goal of assessing the feasibility of implementing freight rail electrification to contribute to significant regional emission reductions by 2014.

Three electrification scenarios for the Los Angeles Basin described in the SCRRA 1992 study are the focus of the current feasibility assessment. The scenarios are as follows:

1. Scenario 1 – Primary East/West Freight Line Electrification from the Ports of Los Angeles and Long Beach to Colton and San Bernardino;
2. Scenario 2 – Electrification Extension to Barstow and Indio; and
3. Scenario 3 – Electrification Extension to Chatsworth and San Fernando.

The current study was conducted over a three-week period and represents a high level planning assessment. The findings do not reflect engineering analysis or detailed field reviews.

The purpose of this memorandum is to present the results of the study. The results include estimated electrification costs (per mile, per electric locomotive, and for each scenario), appropriate electrification milestones and their durations, and electric power consumption associated with electrified rail.

ELECTRIFICATION COSTS

The initial object of investigation was the cost of electrifying existing rail line per mile. The unit electrification infrastructure cost and the cost of an electric locomotive (described later) allow us to estimate the scenario costs. At the outset, our attention was directed to two electrification projects: Northeast Corridor and Caltrain. Electrification of the Northeast Corridor is complete, while Caltrain electrification has not yet begun.

NORTHEAST CORRIDOR

The Northeast Corridor Improvement Project (NECIP) is the most recently completed major rail electrification project in the U.S. It included the electrification of the Amtrak mainline between New Haven, Connecticut and Boston, a distance of 157 miles. The project extended the electrified railroad that already existed between Washington, DC and New Haven, where previously electric locomotives were switched for diesel-powered locomotives for the trip to Boston. Electrification began in July 1996 and was completed in July 2000 (the date commonly given for completion, but see the next paragraph), about three years later than scheduled. The NEC provides primarily passenger services, with freight service provided through trackage rights.

The cost of electrifying the New Haven – Boston line is variously reported, ranging from $680 million in 2000 to $727 million in 2003, exclusive of electric locomotives acquired for the electrified operations. In 2000 most of the electrification work had been completed, but several work elements remained. Hence, between 2000 and 2003 costs to electrify the line were still accruing. Overall, the estimated cost of electrification increased from $300 million in 1992 to $727 million in 2003.

Electrification costs for the New Haven – Boston line included only the installation of an electrical system between the two points, covering construction work, such as the overhead catenary system and electrical substations and facilities, related to electrifying the line. The catenary system delivers 25kV AC electrical power to the locomotive for traction (movement).

Generally, what constitutes electrification costs will vary depending on how costs are tracked and reported. Variables include trackage, signal systems, grade separations, and construction of terminals, yards, bridges, and tunnels, in addition to the electrical system itself. As stated, for the NECIP, only the electrical system was included in the costs of electrification.

The New Haven – Boston electrification project was fraught with difficulties that caused both delays and cost overruns, including changed electrification contractors in 1995 when the original contractor went out of business, unanticipated and difficult working conditions in the Boston area due to the Central Artery Project ("Big Dig"), and various contractor problems. Amtrak reportedly documented numerous instances in which the contractor did not have the necessary equipment, personnel, and/or supplies in place to conduct work in a timely fashion, causing relocation of electrification work and unanticipated need for safety protection measures.

CALTRAIN

Caltrain plans to electrify its commuter rail line between San Francisco and San Jose (Tamien station), a distance of 52 miles, at a cost of $471 million. Electric rolling stock will be acquired at an additional cost. Two options are being considered: electric locomotives combined with new or overhauled, non-powered passenger cars, or electric multiple units (commonly called EMUs), self-propelled passenger power cars. Electrification is scheduled for completion in 2012.

Electrification components of the San Francisco – San Jose line include an electrical system that will provide 25kV AC electrical power through an overhead catenary system and infrastructure modifications for compatibility with the electrical system. (Recall that for the Northeast Corridor such infrastructure modifications were not counted in the costs of electrification.)

- **Electrical system**. This includes electrical facilities (electric power supply substations and switching stations), overhead catenary system to distribute power to the trains, and supervisory control of the electrical facilities and wayside switches.
- **Infrastructure modifications**. Some infrastructure modifications are necessary to facilitate the construction of and compatibility with the electrification system. These include modifications to signals, communications, track, and grade crossings. For example, tracks may need to be shifted or lowered to allow foundations for poles supporting the overhead catenary system to be installed or for the overhead wires to be run under bridges; grade crossing warning devices may need to be upgraded; and signal changes may be required to the wayside signals and track circuit.

The line between San Francisco and San Jose is primarily two tracks, similar to the Northeast Corridor, and like the latter, will deliver 25kV AC electrical power through overhead wires. In the U.S., 12.5kV and 25kV are commonly used, with 25kV considered to be the preferred system for high speed and long distance operations. The 25kV AC configuration is considered to be the "modern" way of electrifying a railroad line, and is used in the United Kingdom, France, Taiwan, and other countries.

Caltrain is implementing a number of capital improvement projects deemed necessary to facilitate the transition to electrified rail operations and to enable increased service levels. The projects and estimated costs (in 2006 dollars) are shown in the table below.

Capital Improvement	Electric Locomotives Option
State of Good Repair Projects (a)	$425 M
Rolling Stock Replacement	$296 M
Platform Modifications - Level Boarding	$190 M
Enhancement Projects (b)	$854 M
Electrification	$471 M
Positive Train Control (c)	$30 M
Fleet Expansion and Infrastructure	$598 M
Total of Capital Improvement Costs	**$2,864 M**

M - Millions

Source: Peninsula Corridor Joint Powers Board, Project 2025, November 30, 2006, page 30.
(a) Replacement and rehabilitation of equipment and infrastructure that have reached the end of their "useful" life or require rehabilitation.
(b) Construction of new terminals, yards and maintenance or storage facilities, and grade separations.
(c) Signal system that among other functions determines and displays the location of all trains within a specific area. The new level of performance will maximize the capacity potential of electrification.

As stated earlier, Caltrain electrification costs per se include the installation of the electrical system and implementation of necessary associated infrastructure modifications. Other improvements (as shown in the table), however related to electrification, are included under different cost categories.

INFRASTRUCTURE

Of primary interest was the calculation of the unit cost of the electrification infrastructure (as opposed to rolling stock), in the form of cost per route mile. The table below lists the derived costs (in millions of dollars) for the electrified New Haven – Boston (Northeast Corridor) line and the San Francisco – San Jose (Caltrain) line that is yet to be electrified.

Rail Line	Cost/Route Mile (Year)	Cost/Route Mile in 2007 Base on Consumer Price Index	Cost/Route Mile in 2007 Based on 6% Increase per Year
New Haven - Boston, NEC	$4.63 M (2003)	$5.24 M	$5.85 M
San Francisco - San Jose, Caltrain	$9.06 M (2007)	$9.06 M	$9.06 M

M - Millions

Unit costs in 2007 dollars are considerably different between the Northeast Corridor and Caltrain. Possible reasons for the difference include the following:

- Caltrain costs include infrastructure modifications directly related to electrification as well as the electrical system. NEC costs pertain to the electrical system only, and it was not possible within the scope of this study to ascertain the additional amount that could be attributed to comparable infrastructure modifications.
- Caltrain electrification will require considerable night and weekend work because of the large number of trains that run daily (almost 100), whereas fewer trains (26 trains at the outset) were running when Amtrak electrified the New Haven - Boston line.
- Raw materials (copper, steel, and concrete in particular) costs have experienced "steep" increases in recent years.
- Given the much longer NEC line, economies of scale could have lowered total NEC costs.
- Caltrain costs are estimated expenditures; NEC costs are already expended.

A review of the literature revealed no other concrete electrification projects in the U.S. from which to derive comparative projected costs.

It is recommended that the Caltrain cost of $9.06 million per mile be used to produce estimated costs for the Los Angeles Basin railroad electrification scenarios (identified on pages 1-2). Many similar infrastructure modifications would be required for Southern California as for Caltrain

In fact, electrification costs in the SCRRA 1992 study included at least some, if not all, of the infrastructure modifications included in Caltrain electrification costs. The lower NEC unit cost would certainly be higher (although to what degree is unknown) if some infrastructure modifications were included as in the Caltrain cost. Moreover, using the Caltrain cost ncorporates regional cost assumptions (e.g., labor costs) that are applicable to the Southern California scenarios, in comparison to the NEC experience that began a decade ago.

The larger Caltrain unit cost is offered as the better high level planning tool.

ELECTRIC LOCOMOTIVE

Capital costs of electrification also include electric locomotives which propel trains of nonpowered trailer cars. The electric locomotive is powered by electricity from an external source such as an overhead line. If Caltrain selects the electric locomotive option (as opposed to EMUs, as described earlier), the Bombardier ALP 46 electric locomotive will be deployed. The ALP 46 is the newer of the two major electric locomotives in use in the U.S. It is used by New Jersey Transit on the Northeast Corridor.

Cost of the ALP 46 electric locomotive is approximately $5.5 million. In comparison, a diesel freight locomotive is reported by the Electro-Motive Division (EMD) of General Motors to cost $2.2 million (SD-70M-2 DC locomotive).

LOS ANGELES BASIN SCENARIOS

Electrification and electric locomotive costs were produced for the three scenarios using the unit infrastructure cost of $9.06 million per mile and locomotive cost of $5.5 million. The results are shown in the table below.

Scenario	Mileage	Cost of Electrification	Number of Electric Locomotives	Cost of Electric Locomotives	Total cost
1 - Primary East/West Freight Line - Ports to Colton & San Bernardino	250 Miles	$2.27 B	360	$1.98 B	4.25 B
2 - Extension to Barstow & Indio	170 Miles	$1.54 B	360	$1.98 Billion	$3.52 B
3 - Extension to Chatsworth and San Fernando	40 Miles	$0.36 B	55	$0.36 B	$0.66 B
Total, All Scenarios	**460 Miles**	**$4.17 B**	**775**	**$4.26 B**	**$8.43 B**

B - Billions

The total cost of the three scenarios based on the new unit and locomotive costs is 31 percent greater than the total cost proposed in SCAG's 2007 discussion paper ($6.43 billion), due in large part to the much higher number used for the electric locomotive ($5.5 million compared to $2.0 million).

In contrast, the figure used by SCAG for the cost of electrification was a derived cost of $10.6 million per mile (based on the unit cost estimated in the SCRRA 1992 study adjusted for six percent increase per year to 2007), which being higher than the $9.06 million per mile used to produce the requirements shown in the table above, served to temper the increased locomotive costs.

ELECTRIFICATION MILESTONES AND DURATIONS

Implementation time for the scenarios also was a study objective, centered on what can be accomplished by 2014. The three scenarios are incremental. Therefore, implementation of Scenario 1 was the focus.

Caltrain sources provided the best information on applicable milestones and approximate durations that was accessible during this study. Information from the SCRRA 1992 study was used to validate milestones and their durations that were identified from information provided by the Caltrain electrification project.

Electrification of the New Haven – Boston line (157 miles) required four years assuming 2000 is used as the completion date, yielding .31 month per mile, an arguably quick pace. Characteristics of the NEC electrification do not make it a realistic benchmark for extrapolating construction time. First, during construction relatively few trains were running and this minimized construction delays brought about by train operations. Second, the electrification timeline did not include infrastructure modifications, which were performed separately from the electrification per se. Caltrain electrification, on the other hand, will take place amidst almost 100 trains a day, and infrastructure modifications are a part of the electrification timeline. These characteristics contribute to a more realistic model for estimating construction time in the Los Angeles Basin.

As a result, a construction rate derived from the Caltrain projections will be used to estimate the construction time for Scenario 1. The rate equates to .69 month per mile based on the projected electrification of the 52-mile San Francisco – San Jose line in a three-year timeframe.

Scenario 1 comprises two railroads with three parallel lines. In order to accelerate the project schedule, work could be conducted concurrently on all three lines, instead of being conducted

on each line sequentially, and time requirements would be drastically reduced. This is the premise behind the construction timeframe depicted in the table below. The table shows milestones, rough estimates of durations of these milestones, and applicable years for the implementation of Scenario 1.

Milestone	Scenario 1 Duration	Years
Preliminary Engineering and Institutional Processes (a)	3.0	2007-2009
Environmental Approvals (b)	1.5	2010-2011
Final Design	1.0	2011-2012
Procurement and Contract	0.5	2012
Construction (c)	5.2	2013-2017
Electrification Interface Testing; Locomotives Commissioning and Test	1.0	2018
Total	**12.2**	2007-2018

(a) Includes project definition, conceptual design, railroad and utility agreements, access rights, regulatory approvals, and full funding plan. Duration may potentially be reduced if consensus building can be accelerated.
(b) Includes a Request for Proposals (RFP) for environmental studies and environmental documentation. Duration may potentially be reduced if consensus building can be accelerated.
(c) Based on a construction rate of .69 month per mile as derived from Caltrain, San Francisco - San Jose projections (36 months to electrify 52 miles), applied to the 90-mile Burlinton Northern Santa Fe (BNSF) line in Scenario 1. Electrification of the two shorter Union Pacific (UP) lines will occur at the same time as the BNSF line. Construction includes overhead catenary system poles and wires, traction power substations, switching stations and paralleling stations; pantograph inspection platforms; associated infrastructure modifications; etc.
(d) Procurement and manufacture of locomotives occurs during construction.

Construction time of slightly over five years as shown in the table is an optimistic estimate. It requires the deployment of three full construction crews, one devoted to each of the parallel lines. The five-year estimate is based on the time needed to complete the longest line (90 miles).

It is more reasonable to assume that additional time will be needed. The railroads run freight trains 24 hours a day, seven days a week. Work has to be halted when the trains pass. In the Caltrain case, however, night work is productive because the passenger trains do not run 24 hours (making this an assumption of the Caltrain construction rate). Clearly, density and frequency of train operations will help determine how much work can be accomplished during a 24-hour period.

How much time is associated with productivity, and any other, issues cannot be determined with any certainty. Seven years construction time may be a good, realistic estimate. This would push the completion of construction to about the end of 2019, and completion of testing to about the end of 2020. However, as noted previously, work must proceed on all three lines at the same time, requiring three crews and very possibly additional costs. Diversion of trains also may be necessary to allow work to proceed at an acceptable pace given that trains run 24x7.

ELECTRIC POWER CONSUMPTION

One of the benefits of an electrified system is the reduction of diesel emissions. The final study objective was to estimate electric power consumption per mile to support estimates of total annual power consumption and the associated emissions from the incremental power generation. The objective was limited to identifying unit consumption. Subsequent analysis will be conducted by SCAG or a third party.

According to the American Public Transportation Association (2007), “heavy rail” power consumption equates to 5.83 kilowatt hours per vehicle mile. Heavy rail, as opposed to light rail, is an electric railway that can support a heavy volume of traffic, is capable of high speed and/or rapid acceleration, and is primarily grade-separated.

KEY REFERENCES BY TOPICS

BACKGROUND

DeLeuw Cather & Company, et al. for Southern California Regional Rail Authority, Southern California Accelerated Rail Electrification Program, February 1992.

21st Century Science & Technology, “Why Electrified Rail Is Superior,” Summer 2005.

NORTHEAST CORRIDOR

Federal Railroad Administration, 2001 Assessment of Amtrak’s Financial Performance and Requirements, January 2002.

Journal of Homeland Security, “Electrifying Transportation for Homeland Security,” February 2004.

Mineta Transportation Institute, High-Speed Rail Projects in the United States: Identifying the Elements of Success Part 2, November 2006.

Office of the Inspector General, Audit Report, Amtrak’s High Speed Rail Electrification Project, December 1999.

Personal Communication, Rick Schmedes (works with SamTrans/Caltrain, formerly on the NECIP), August 10, 2007.

U.S. General Accounting Office, Intercity Passenger Rail, Amtrak’s Management of Northeast Corridor Improvements Demonstrates Need for Applying Best Practices, February 2004.

CALTRAIN

Peninsula Corridor Joint Powers Board, Environmental Assessment/Draft Environmental Impact Report, April 2004.

Peninsula Corridor Joint Powers Board, Project 2025 (Report), November 2006.

Personal Communication, Rick Schmedes (works with SamTrans/Caltrain, formerly on the NECIP), August 10, 2007.

COSTS – GENERAL

Federal Railroad Administration, High-Speed Ground Transportation for America, September 1997.

21st Century Science & Technology, "A Plan to Revolutionize America's Transport," Summer 2005.

U.S. Department of Labor, Bureau of Labor Statistics, May 2006.

ELECTRIC LOCOMOTIVES

Adtranz-Daimler Chrysler Rail Systems, "New Jersey Transit Purchase of ALP 46 Electric Study Locomotives" (multiple news articles), November 2001.

Morrison Knudsen Corporation, et al. for California Department of Transportation, Feasibility Study for Electrifying the Caltrain/PCS Railroad, October 1992.

Peninsula Corridor Joint Powers Board, Project 2025 (Report), November 2006.

Personal Communication, General Motors Electro-Motive Division Manager of Sales, August 22, 2007.

Personal Communication, Rick Schmedes (works with SamTrans/Caltrain, formerly on the NECIP), August 10, 2007.

RAILSIM Rolling Stock Libraries, "North American Locomotives," n.d.

MILESTONES AND IMPLEMENTATION TIME

DeLeuw Cather & Company, et al. for Southern California Regional Rail Authority, Southern California Accelerated Rail Electrification Program, February 1992.

Peninsula Corridor Joint Powers Board, Environmental Assessment/Draft Environmental Impact Report, April 2004.

Peninsula Corridor Joint Powers Board, Project 2025 (PowerPoint Presentation), January 2007.

Personal Communication, Rick Schmedes (works with SamTrans/Caltrain, formerly on the NECIP), August 10, 2007.

U.S. General Accounting Office, Intercity Passenger Rail, Amtrak's Management of Northeast Corridor Improvements Demonstrates Need for Applying Best Practices, February 2004.

ELECTRIC POWER CONSUMPTION

American Public Transportation Association, 2007 Public Transportation Fact Book, n.d.

Appendix D: San Pedro Bay Port Goods Movement Strategies

The SPB ports are planning and developing specific strategies to increase capacity and enhance operational efficiency. At the same time, these strategies attempt to minimize the impacts of goods movement activities on the environment and public health.

ON-DOCK RAIL CAPACITY ENHANCEMENTS

Table D1 documents the growth in on-dock rail intermodal throughput compared to near-dock and off-dock intermodal throughput.

TABLE D1 EXISTING TRENDS IN SAN PEDRO BAY PORT ON-DOCK RAIL THROUGHPUT, AND COMPARISONS WITH NEAR-DOCK AND OFF-DOCK INTERMODAL THROUGHPUT TRENDS, 2003 TO 2006

TEU	2003	2004	2005	2006
On-Dock	1,885,642	2,369,853	2,934,850	3,801,892
Percent of Port Through-put	15.9%	18.1%	20.7%	24.1%
Near Dock	962,197	936,428	1,081,350	1,271,327
Percent of Port Through-put	8.1%	7.1%	7.6%	8.1%
Off-Dock	1,805,791	1,846,199	1,689,890	1,671,489
Percent of Port Through-put	15.3%	14.1%	11.9%	10.6%
Total Direct Intermodal	4,653,630	5,152,469	5,706,090	6,744,708
Percent of Port Through-put	39.3%	39.3%	40.2%	42.8%
Total Port Throughput	11,837,064	13,101,292	14,194,442	15,759,219

Source: San Pedro Bay Port Rail Study Update, December 2006

Table D2 lists projected on-dock intermodal throughput through 2030 based on planned on-dock rail investments at the Ports.

TABLE D2 PROJECTED SAN PEDRO BAY PORT ON-DOCK RAIL THROUGHPUT

(millions of TEU)	2010	2015	2020	2030
POLB	2.27	4.15	5.49	6.10
Percent of Port Throughput	23%	32%	32%	30%
POLA	2.79	4.33	6.25	6.84
Percent of Port Throughput	27%	31%	33%	31%
Total SPB	5.06	8.47	11.74	12.94
Percent of Port Throughput	25%	31%	32%	30%

Source: San Pedro Bay Port Rail Study Update, December 2006

An on-dock rail capacity enhancement strategy at the Ports will be crucial in addressing critical landside capacity constraints and environmental issues in the region. Key constraints and issues include the following: 1) lack of capacity at off-dock intermodal yards; 2) congestion and safety issues on port access routes; and 3) air quality impacts from port truck traffic.

A report by the California Marine and Intermodal Transportation System Advisory Council (CALMITSAC) observes that recent trends in increased on-dock rail activity at the Ports can be partly attributed to the imposition of quotas by BNSF at the Hobart off-dock intermodal yard. The Hobart yard has eliminated free time, with the imposition of a $150 per day demurrage fee for containers. It has been estimated that transload and domestic cargo will exceed off-dock rail yard capacity by the 2010-2015 timeframe.

REDUCTION IN TRUCK TRIPS AND TRUCK VMT

The Port Truck Trip Reduction Strategies study analyzed the impact of increased on-dock rail on truck trips on four major access roadways around the Ports (I-710, I-110, SR-103, and Alameda Street). In one approach, baseline scenarios for 2010 and 2030, which already include on-dock rail investment, were compared against revised baseline scenarios for these years, which assumed on-dock rail capacity to be capped at 2005 levels. The study demonstrated reductions in truck traffic on these roadways and total truck VMT attributable to on-dock rail investments. Tables D3 and D4 highlight reductions in truck traffic for 2010 and 2030 in baseline scenarios compared to alternative baselines (assuming 2005 on-dock capacity). Significant truck traffic and peak hour congestion reductions are shown in Table D4.

TABLE D3 IMPACTS OF ON-DOCK RAIL ON TRUCK TRAFFIC AND VMT (2010)

Weekday Port Container Truck Volumes by Period of Day and By Roadway and Percentage Change from 2010 Baseline					
Time Period	I-710	SR 47/ SR 103	HF/ Alameda	I-110	
AM Peak (6:00 am - 9:00 am)	3,958	980	692	1,470	
	-4.8%	-5.6%	-5.2%	-6.1%	
Midday (9:00 am - 3:00 pm)	15,134	2,860	4,077	6,248	
	-4.5%	-4.5%	-5.1%	-5.1%	
PM Peak (3:00 pm - 7:00 pm)	5,339	1,113	1,436	2,254	
	-4.7%	-4.6%	-5.2%	-7.0%	
Subtotal (Daytime: 6:00 am - 7:00 pm)	24,611	4,953	6,205	9,972	
	-4.6%	-4.8%	-5.1%	-5.7%	
Night (7:00 pm - 6:00 am)	2,398	600	741	1,511	
	-5.3%	-4.8%	-6.4%	-5.7%	
Total	27,009	5,553	6,946	11,483	
	-4.7%	-4.8%	-5.2%	-5.7%	
Total Weekday Container Truck Trips by Port and by Truck Type					
	Bobtails	Chassis	Loads	Empties	Total
POLB	1,161	3,294	9,598	7,400	31,453
	-3.6%	-8.3%	-4.6%	0.0%	-3.7%
POLA	18,576	3,617	14,218	11	47,184
	-6.9%	-19.1%	-8.4%	0.0%	-7.0%
Total	29,737	6,911	23,816	18,174	78,637
	-5.7%	-14.3%	-6.9%	0.0%	-5.7%
Total VMT	1,205,617				
	-5.7%				

Source: Port Truck Trip Reduction Strategies, Final Report, December 2005

TABLE D4 IMPACTS OF ON-DOCK RAIL ON TRUCK TRAFFIC AND VMT (2030)

Weekday Port Container Truck Volumes by Period of Day and By Roadway and Percentage Change from 2030 Baseline Capped at 2005 On-Dock Capacity Levels					
Time Period	I-710	SR47/ SR103	HF/ Alameda	I-110	
AM Peak (6:00 am - 9:00 am)	9,391	2,061	1,468	2,177	
	-19.0%	-18.0%	-18.0%	-22.0%	
Midday (9:00 am - 3:00 pm)	37,367	6,201	8,703	9,557	
	-19.0%	-18.0%	-19.0%	-20.0%	
PM Peak (3:00 pm - 7:00 pm)	13,258	2,441	3,066	3,375	
	-19.0%	-19.0%	-20.0%	-23.0%	
Subtotal (Daytime: 6:00 am - 7:00 pm)	60,015	10,703	13,237	15,109	
	-19.0%	-18.0%	-19.0%	-22.0%	
Night (7:00 pm - 6:00 am)	5,223	1,147	1,393	2,270	
	-17.0%	-16.0%	-18.0%	-22.0%	
Total	65,238	11,849	14,630	17,379	
	-19.0%	-18.0%	-19.0%	-22.0%	
Total Weekday Container Truck Trips by Port and by Truck Type					
	Bobtails	Chassis	Loads	Empties	Total
POLB	32,147	8,570	27,333	22,546	90,596
	-20.0%	-41.0%	-23.0%	0.0%	-20.0%
POLA	29,819	6,047	22,445	18,845	77,156
	-19.0%	-43.0%	-23.0%	0.0%	-19.0%
Total	61,966	14,617	49,778	41,391	167,752
	-19.0%	-42.0%	-23.0%	0.0%	-19.0%
Total VMT	2,571,855				
	-19.0%				

Source: Port Truck Trip Reduction Strategies, Final Report, December 2005

TABLE D5 EMISSION REDUCTION FROM INCREASED ON-DOCK RAIL

Scenarios	Truck VMT Per Day	Change in Truck VMT Per Day	Net Emissions (Tons Per Day)				Percent Reductions from Base			
			ROG	CO	NO_x	PM_{10}	ROG	CO	NO_x	PM_{10}
2005 Scenarios										
Increased On-Dock Rail (1 eastbound train per week per terminal)	999,691	-17,807	-0.010	-0.048	-0.2178	-0.0035	-1.33%	-1.61%	-1.13%	-1.03%
2010 Scenarios										
On-Dock Rail Base 2010 Comparison with Revised 2010 Baseline		-72,302	-0.037	-0.120	-0.916	-0.010	-4.75%	-4.59%	-4.95%	-3.81%

Source: Port Truck Trip Reduction Strategies, Final Report, December 2005

One on-dock intermodal trains can eliminate approximately 750 truck trips from the local highway networks around the Ports. Given forecasted growth in cargo volumes, and full on-dock capacity available by 2030, on-dock rail is estimated to remove nearly 29,000 daily truck trips.

EMISSION REDUCTION

The Port Truck Trip Reduction Strategies study performed a detailed analysis of emission reduction benefits from increased on-dock rail for the region. Two on-dock rail scenarios were tested in the study to analyze their performance in emission reduction by type of pollutant, which included:

- A 2005 increased on-dock rail scenario involving 1 eastbound train per week per terminal, and
- The 2010 baseline scenario compared to the 2010 alternative baseline that assumed on-dock rail capped at the 2005 level in 2010.

Table D5 presents emission reductions from the above two scenarios in percent reduction of emissions compared to baseline by type of pollutant.

Statistics in Table 5 show that increased on-dock rail has notable emission reduction benefits for each of the four pollutant types.

PRODUCTIVITY BENEFITS

The movement of containerized cargo by on-dock rail has higher efficiency and productivity than near-dock or off-dock intermodal yards. This is because:

- Movement of cargo by on-dock rail involves one-time loading or unloading, whereas near-dock or off-dock rail require trucks to transport cargo between docks and railcars;
- There can be delays in truck loading/unloading at marine terminals due to delays at gates, which can affect productivity;
- Congestion on the highway system can impact reliability and productivity for near-dock and off-dock yards; and
- On-dock yards only involve direct intermodal cargo, whereas transloaded cargo moving through off-dock yards requires transload-

ing/distribution facilities, which increases container lead times and reduces productivity.

PIERPASS OFF-PEAK PROGRAM

The PierPass program was launched in July 2005, to alleviate truck congestion and improve air quality in the region. The OffPeak program provides an incentive for cargo owners and their carriers to move cargo during nighttime periods and weekends to reduce truck traffic during peak day time periods on major highways, and to decrease negative air quality impacts from high peak period truck traffic volumes. The program is based on a market incentive approach where all containers entering or exiting marine terminals at the Ports during the peak day time hours (Monday through Friday, 3:00 am to 6:00 pm) are charged a Traffic Mitigation Fee (TMF). Trucks entering or exiting during the off-peak shift (Monday through Thursday, 3:00 pm to 6:00 am) or anytime between 6:00 pm Friday to 3:00 am Monday, avoid the TMF. This provides an incentive for truck drayage companies to operate during these off-peak time periods. Landside and terminal capacity constraints affecting the implementation of the OffPeak program include peak-period congestion on port access routes, and port terminal gate capacity constraints.

The PierPass program has been successful in shifting truck trips from peak to off-peak periods, reducing peak period congestion, and improving utilization of port terminal gate capacity. On a typical day, more than 10,000 trucks use off-peak shifts, alleviating congestion during peak-day time periods. This translates to approximately 30% - 35% of container throughput from the Ports shifting to the off-peak periods, exceeding the targets of the program. According to the Alameda Corridor Transportation Authority (ACTA), peak hour truck traffic on I-710 was reduced by an estimated 24% due to the Off-Peak program.

The Port Truck Trip Reduction Strategies study looked at the reduction in peak period truck trips due to extended gate hours. The following scenarios were analyzed in the study:

- 68% day and 32% night container moves, with no shift to weekends, in 2010
- 68% day and 32% night container moves, with 20% of weekly gate moves allotted to weekends, in 2010

Tables D6 and D7 present the reduction in truck trips from extended gate hour strategies at the Ports. Statistics show that significant truck trip reductions can be achieved on all the major access routes to the Ports in the A.M. and mid-day time periods in 2010 through extended gate hour strategies, shifting truck trips to the nighttime period and weekends.

TABLE D6 EXTENDED GATE HOURS (68% DAY, 32% NIGHT) WITH NO SHIFT TO WEEKEND (2010)

Weekday Port Container Truck Volumes by Period of Day and By Roadway and Percentage Change from 2010 Baseline					
Time Period	I-710	SR 47/ SR 103	HF/ Alameda	I-110	
AM Peak (6:00 am - 9:00 am)	2,211	516	382	776	
	-44.1%	-47.4%	-44.9%	-47.2%	
Midday (9:00 am - 3:00 pm)	12,209	2,385	3,330	5,380	
	-20.3%	-16.6%	-18.3%	-13.9%	
PM Peak (3:00 pm - 7:00 pm)	5,674	1,208	1,560	2,426	
	6.3%	8.5%	8.6%	7.6%	
Subtotal (Daytime:6:00 am - 7:00 pm)	20,093	4,109	5,272	8,582	
	-18.4%	-17.1%	-15.0%	-13.9%	
Night (7:00 pm - 6:00 am)	6,688	1,302	1,827	2,935	
	178.9%	116.9%	146.4%	94.2%	
Total	26,781	5,410	7,099	11,517	
	-0.8%	-2.6%	2.2%	0.3%	
Total Weekday Container Truck Trips by Port and by Truck Type					
	Bobtails	Chassis	Loads	Empties	Total
POLB	11,161	3,294	9,598	7,400	31,453
	0.0%	0.0%	0.0%	0.0%	0.0%
POLA	18,576	3,617	14,218	10,774	47,184
	0.0%	0.0%	0.0%	0.0%	0.0%
Total	29,736	6,911	23,816	18,174	78,638
	0.0%	0.0%	0.0%	0.0%	0.0%
Total VMT	1,205,617				
Percent Change	0.0%				

Source: Port Truck Trip Reduction Strategies, Final Report, December 2005

TABLE D7 EXTENDED GATE HOURS (68% DAY, 32% NIGHT) WITH 20% WEEKDAY SHIFT TO WEEKEND (2010)

Weekday Port Container Truck Volumes by Period of Day and By Roadway and Percentage Change from 2010 Baseline					
Time Period	I-710	SR 47/SR 103	HF/Alameda	I-110	
AM Peak (6:00 am - 9:00 am)	1,956	457	331	714	
	-50.6%	-53.4%	-52.2%	-51.4%	
Midday (9:00 am - 3:00 pm)	10,810	2,114	2,914	4,948	
	-29.4%	-26.1%	-28.5%	-20.8%	
PM Peak (3:00 pm - 7:00 pm)	5,007	1,069	1,366	2,276	
	-6.2%	-4.0%	-4.9%	1.0%	
Subtotal (Daytime: 6:00 am - 7:00 pm)	17,774	3,640	4,612	7,938	
	-27.8%	-26.5%	-25.7%	-20.4%	
Night (7:00 pm - 6:00 am)	5,914	1,153	1,597	2,710	
	146.6%	92.1%	115.4%	79.3%	
Total	23,688	4,793	6,208	10,648	
	-12.3%	-13.7%	-10.6%	-7.3%	
Total Weekday Container Truck Trips by Port and by Truck Type					
	Bobtails	Chassis	Loads	Empties	Total
POLB	9,734	2,886	8,372	6,440	27,431
	-12.8%	-12.4%	-12.8%	-13.0%	-12.8%
POLA	16,642	3,256	12,728	9,603	42,229
	-10.4%	-10.0%	-10.5%	-10.9%	-10.5%
Total	26,375	6,141	21,100	16,043	69,660
	-11.3%	-11.1%	-11.4%	-11.7%	-11.4%
Total VMT	1,067,979				
Percent Change	-11.4%				

Source: Port Truck Trip Reduction Strategies, Final Report, December 2005

OTHER BENEFITS

Other potential benefits of the OffPeak program include:

- Improved monitoring of trucks entering and exiting marine terminals as part of the program, may allow for improved regulation of trucks, especially in assessing equipment standards and ensuring that trucks meet air quality requirements;
- Increased truck turn times in harbor trucking due to improved efficiency; and
- Improved ability for harbor trucking companies to assess premiums from shippers for off-peak operations (due to the savings in Traffic Mitigation Fee), which are also ultimately passed on to the drivers providing incentives to work during off-peak periods.

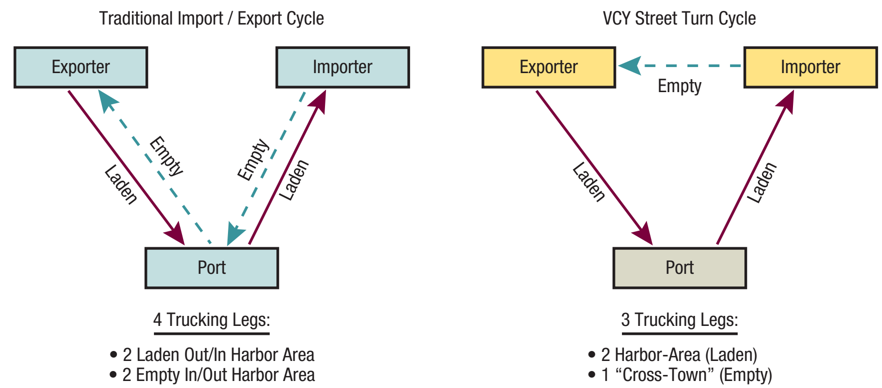
VIRTUAL CONTAINER YARDS

A Virtual Container Yard (VCY) is an innovative empty container management strategy to reduce truck movements of empty containers in and out of port terminal gates. In many cases, after an import container is unloaded by the importer (or a transloader), it is returned to the Ports or an off-site depot for storage until an exporter calls for a container. In the SCAG region, virtually all loaded import containers are trucked back to the Ports empty (after unloading at the importer's location or a transload facility) with only about 2% matched with shippers needing an export container en route to the Ports. In 2000, more than one million empty containers were trucked back to the Ports after unloading, while approximately 500,000 empty containers were trucked to access facilities from the Ports for export loading.

The VCY concept is based on a computerized matching system that tracks the location of empty import containers and matches them with export container requirements prior to returning to the Ports to facilitate "street turn" container interchanges between the importer/transloader and exporter locations. The VCY concept could increase empty container re-use from the current 2% to almost 10%, which would result in reductions of empty container truck trips around the Ports.

Figure D1 depicts the VCY concept in comparison with the traditional empty container logistics practice.

FIGURE D1 VCY CONCEPT AND TRADITIONAL PORT EMPTY CONTAINER LOGISTICS



Source: Alameda Corridor Transportation Authority

The Empty Ocean Container Logistics Study conducted by The Tioga Group estimated 2000 baseline and forecasted empty container flows for the San Pedro Bay port marine terminals through 2020. These estimates are provided in Table D8. The largest share of empty trips to and from the Ports are associated with local shippers and consignees. The number of empty truck trips from importer/transload facilities to the Ports (westbound flow) is projected to increase from more than 3.5 million TEUs in 2000 to over 14.4 million TEUs in 2020, which is an average annual growth rate of slightly over 7%.

TABLE D8 BASE YEAR AND FORECASTED EMPTY CONTAINER FLOWS

		2000		2010		2015		2020	
		TEU	Units	TEU	Units	TEU	Units	TEU	Units
Eastbound to Exporters		1,324,476	715,933	2,738,344	1,480,186	3,631,065	1,968,738	5,027,971	2,717,822
	Via Rail	22,169	11,983	80,413	43,467	116,400	62,919	170,494	92,159
	• On-Dock Intermodal	22,169	11,983	80,413	43,467	116,400	62,919	170,494	92,159
	Via Truck	1,302,306	703,949	2,657,931	1,436,719	3,514,665	1,899,819	4,857,476	2,625,663
	• Off-Dock Intermodal	51,728	27,961	187,631	101,422	271,600	146,811	397,820	215,038
	• Local for Export Loading	1,017,137	549,804	2,053,720	1,110,119	2,618,965	1,415,657	3,514,937	1,899,966
	• SSL Off-Hires to Depots	233,441	126,184	416,579	225,178	624,100	337,351	944,719	510,659
Westbound to the Ports		3,568,312	1,928,817	6,367,713	3,442,007	9,539,815	5,156,657	14,440,698	7,805,783
	Via Rail	278,128	150,339	501,602	271,136	731,291	395,293	1,084,536	586,236
	• On-Dock Intermodal	278,128	150,339	501,602	271,136	731,291	395,293	1,084,536	586,236
	Via Truck	3,290,183	1,778,478	5,866,112	3,170,871	8,808,524	4,761,364	13,356,161	7,219,547
	• Off-Dock Intermodal	564,600	305,189	920,401	497,514	1,491,797	806,377	2,366,438	1,279,156
	• Local form Import Loads	2,084,712	1,126,871	3,842,221	2,076,876	5,661,030	3,060,016	8,483,038	4,585,426
	• Local from WB Domestic Loads	64,897	35,079	105,793	57,186	171,471	92,687	272,004	147,029
	• Repo Off-Hires from Depots	333,487	180,263	595,113	321,683	891,572	481,931	1,349,598	729,512
	• Local Empties from Trans-loads	242,488	131,075	402,583	217,613	592,655	320,354	885,083	478,423
	• Bobtail Trip Change		0		0		0		0
Port Subtotal		4,892,787	2,644,750	9,106,058	4,922,193	13,170,880	7,119,395	19,468,669	10,523,605
	On-Dock Rail	300,297	162,323	582,015	314,603	847,691	458,211	1,255,031	678,395
	• Truck through Terminal Gates	4,592,490	2,482,427	8,524,043	4,607,591	12,323,189	6,661,183	18,213,638	9,845,210
Cross-Town Truck	Factor	149,184	90,640	268,159	144,951	399,506	215,949	602,663	325,764
Local Off-hires to Depots	3%	80,577	43,555	146,796	79,349	216,030	116,773	323,278	174,745
IM Off-Hires to Depots	3%	19,469	10,524	31,738	17,156	51,441	27,806	81,601	44,109
Reused empties for exports	2%	49,138	26,561	89,624	48,446	132,035	71,370	197,784	106,910
Grand Total		5,041,972	2,725,390	9,374,216	5,067,144	13,570,387	7,335,344	20,071,332	10,849,368

Source: EmptyOceanContainerLogisticsStudy,TheTiogaGroup

Key constraints and issues related to the movement of empty containers in Southern California include:

- Marine terminal yard capacity constraints due to higher terminal space usage by empty containers resulting from permitted longer dwell times;
- Delays at marine terminal gate due to empty container volumes moving through the Ports;
- Truck traffic volume and congestion due to empty container logistics.

The first virtual container yard program has operated at the SPB ports since July 2006. Tables D9 and D10 show potential savings in annual truck trips and VMT that could result from VCY strategies assuming 5% and 10% container reuse through 2020.

TABLE D9 TRUCK TRIP SAVINGS FROM VIRTUAL CONTAINER YARD STRATEGIES

Scenarios	2010	2015	2020
Base Case	3,186,995	4,475,673	6,485,392
VCY (5% Reuse) - Total Trips	3,029,304	4,243,363	6,137,400
VCY (5% Reuse) - Trips Saved	157,691	232,310	347,992
VCY (5% Reuse) - % Reduction	-4.9%	-5.2%	-5.4%
VCY (10% Reuse) - Total Trips	2,766,487	3,856,179	5,557,412
VCY (10% Reuse) - Trips Saved	420,508	619,494	927,980
VCY (10% Reuse) - % Reduction	-13.2%	-13.8%	-14.3%

Source: Empty Ocean Container Logistics Study, The Tioga Group

TABLE D10 EMPTY CONTAINER ANNUAL TRUCK VMT SAVINGS FROM VIRTUAL CONTAINER YARD STRATEGIES

Scenarios	2010	2015	2020
Base Case	64,040,254	92,374,112	136,322,325
VCY (5% Reuse) - Total VMT	61,852,813	89,151,532	131,494,795
VCY (5% Reuse) - VMT Reduction	2,187,441	3,222,580	4,827,530
VCY (5% Reuse) - % Reduction	-3.4%	-3.5%	-3.5%
VCY (10% Reuse) - Total VMT	58,207,077	83,780,567	123,448,912
VCY (10% Reuse) - VMT Reduction	5,833,177	8,593,545	12,873,413
VCY (10% Reuse) - % Reduction	-9.1%	-9.3%	-9.4%

Source: Empty Ocean Container Logistics Study, The Tioga Group

VCY strategies may have significant VMT reduction benefits as some of the trips associated with "street turns" will potentially have lower trip lengths.

Table D11 shows the emission reduction benefits by type of pollutant resulting from VCY strategies through 2020.

TABLE D11 EMISSION REDUCTIONS FROM VCY STRATEGIES

Scenario & Emissions Type	2010		2015		2020	
	Annual Tons	Peak Day Tons	Annual Tons	Peak Day Tons	Annual Tons	Peak Day Tons
Base Case						
Carbon Monoxide	925	3.98	1,335	5.75	1,970	8.48
Total Organic Gases	211	0.91	304	1.31	449	1.93
Reactive Organic Gases	206	0.89	297	1.28	438	1.89
Oxides of Nitrogen	783	3.37	1,129	4.85	1,666	7.17
Exhaust Particulates	73	0.31	105	0.45	155	0.67
Tier I - 5% Reuse						
Carbon Monoxide	894	3.95	1,288	5.55	1,900	8.18
Reduction	32	0.14	47	0.20	70	0.30
Total Organic Gases	204	0.88	294	1.26	433	1.86
Reduction	7	0.03	11	0.05	16	0.07
Reactive Organic Gases	199	0.86	287	1.23	423	1.82
Reduction	7	0.03	10	0.04	16	0.07
Oxides of Nitrogen	756	3.26	1,090	4.69	1,607	6.92
Reduction	27	0.12	39	0.17	59	0.25
Exhaust Particulates	70	0.30	101	0.44	149	0.64
Reduction	2	0.01	4	0.02	5	0.02
Tier II - 10% Reuse						
Carbon Monoxide	841	3.62	1,211	5.21	1,784	7.68
Reduction	84	0.36	124	0.53	186	0.80
Total Organic Gases	192	0.83	276	1.19	407	1.75
Reduction	19	0.08	28	0.12	42	0.18
Reactive Organic Gases	187	0.81	269	1.16	397	1.71
Reduction	19	0.08	28	0.12	41	0.18
Oxides of Nitrogen	712	3.06	1,024	4.41	1,617	6.96
Reduction	71	0.31	105	0.45	50	0.21
Exhaust Particulates	66	0.28	95	0.41	140	0.60
Reduction	7	0.03	10	0.04	15	0.06

Source: Empty Ocean Container Logistics Study, The Tioga Group

PORT CLEAN AIR ACTION PLAN PROJECTS

The San Pedro Bay Port Clean Air Action Plan (CAAP) is a five-year action plan developed by the Ports to establish goals and standards for air quality in the region and identify specific projects, programs, control measures, and technologies to meet those air quality goals/standards through multi-party collaboration for successful project funding and implementation. The five-year plan is a blueprint for the Ports to significantly reduce the health risks posed by air pollution from port-related ships, trains, trucks, terminal equipment, and harbor craft. The Plan will be reviewed and updated on an annual basis to assess and evaluate the effectiveness of current strategies to meet air quality goals, test new strategies and control measures, and jointly develop a revised and improved CAAP annually. The Ports have committed a total of $417.9 million, of which $166.0 million is allocated as truck engine replacement/retrofit incentives. The broad categories for the performance standards based on the type of sources are:

Engine standards for Heavy Duty Trucks to meet EPA 2007 on-road PM emission standards (0.01 g/bhp-hr)

Heavy duty truck engine replacement/retrofit

Vessel Speed Reduction (VSR) for OGVs

Low Sulfur Marine Gas Oil (MGO) fuel in auxiliary and main engines of OGVs

Shore power (cold ironing) at marine terminals

Diesel Particulate Matter (DPM) and NOx emission control devices for auxiliary and main engines of OGVs

Engine standards to meet EPA 2007 on-road PM emission standards (0.01 g/bhp-hr) for cargo handling equipments (CHE), or alternative use of Verified Diesel Emissions Controls (VDECs) on engines not meeting EPA's PM emission standards

EPA 2007 on-road or Tier 4 engine standards for yard tractors, top picks, forklifts, reach stackers, rubber tired gantries, and straddle carriers.

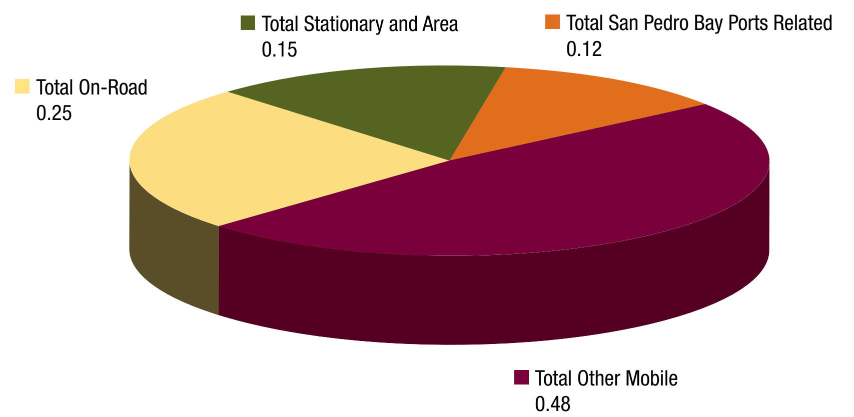
EPA engine standards and NOx/PM emission reduction technologies for harbor craft

EPA engine standards, idling-limiting devices, and alternative diesel fuels for switcher, helper and long-haul locomotives

ENVIRONMENTAL AND PUBLIC HEALTH ISSUES

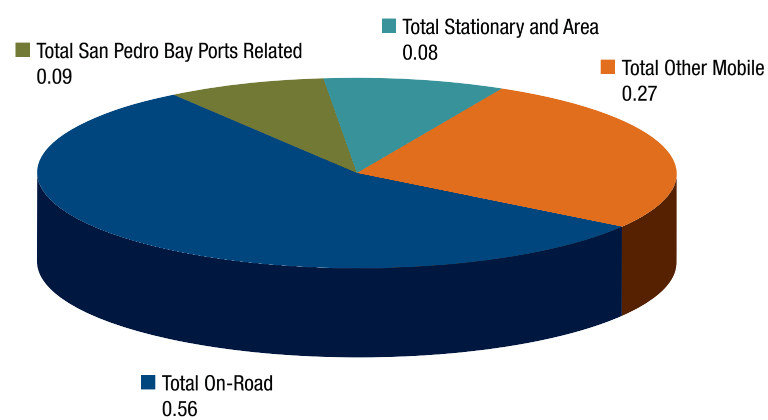
The Multiple Air Toxics Exposure Study (MATES) by the South Coast Air Quality Management District (SCAQMD) identified emissions from port-related sources as a major concern for public health in the region. A large share of pollutant emissions in the South Coast Air Basin come from the SPB ports as Figures D2, D3, and D4 illustrate.

FIGURE D2 DIESEL PARTICULATE MATTER (DPM) EMISSIONS BY SOURCE IN SCAB



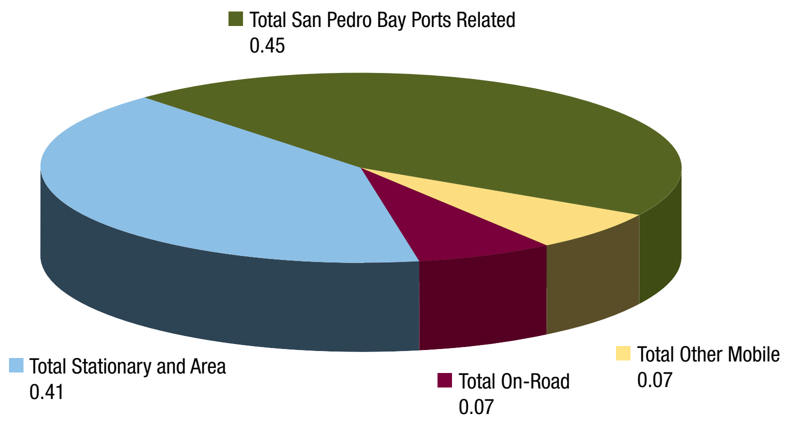
Source: San Pedro Bay Ports Clean Air Action Plan

FIGURE D3 NOX EMISSIONS BY SOURCE IN SCAB



Source: San Pedro Bay Ports Clean Air Action Plan

FIGURE D4 SOX EMISSIONS BY SOURCE IN SCAB



Source: San Pedro Bay Ports Clean Air Action Plan

EMISSION REDUCTIONS FROM CAAP MEASURES

The initial development and implementation of CAAP control measures and strategies for emissions reduction from port-related sources focuses on emissions from heavy-duty trucks, cargo handling equipment, and ocean going vessels. A quantitative assessment of the benefits of the CAAP control measures estimates emission reductions of 47% for Diesel Particulate Matter (DPM), 45% for NOX, and 52% for SOX by 2011.