March 2009

Healthy Communities and Healthy Economies

A Toolkit for Goods Movement







goods movement

Caltrans

RCTC
Riverside County Transportation Commission

Metro

Governments
SANBAG
Working Together

Healthy Communities and Healthy Economies

A TOOLKIT FOR GOODS MOVEMENT

Prepared for

California State Department of Transportation

Los Angeles County Metropolitan Transportation Authority

Riverside County Transportation Commission

San Bernardino Associated Governments

Prepared by

MIG, Inc.

ICF International

in association with UltraSystems

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foreword

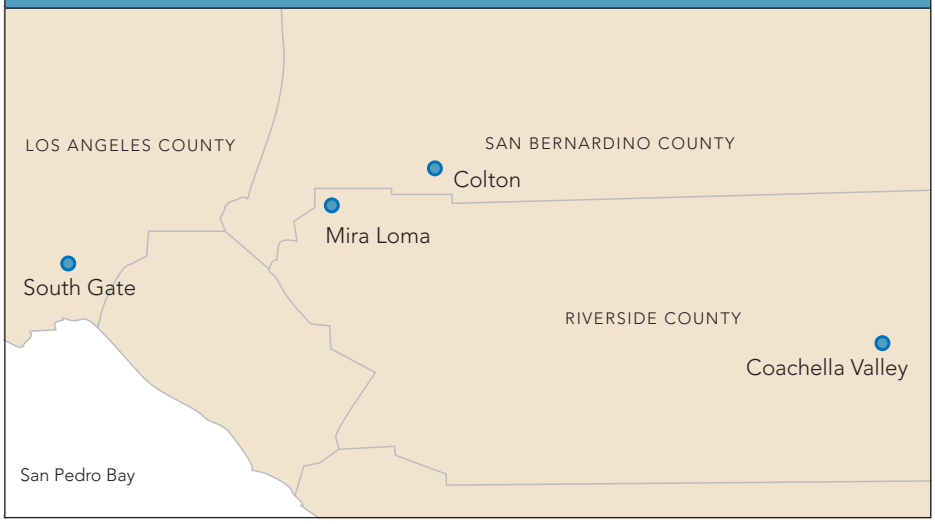
WHY A GOODS MOVEMENT TOOLKIT?

This toolkit is intended to be a starting point and source of ideas for how Southern California's goods movement system—an important economic engine and source of jobs for the region—and the communities that are affected by the system can co-exist.

The toolkit was developed in partnership by California State Department of Transportation (Caltrans), Los Angeles County Metropolitan Transportation Authority (Metro), the Riverside County Transportation Commission (RCTC) and San Bernardino Associated Governments (SANBAG). Many people advised on development of the toolkit as part of the Environmental Justice Analysis and Outreach Study from 2007–2009. A Technical Advisory Committee and multiple Community Feedback Groups from throughout Southern California who have experienced impacts from goods movement collaborated through a continuous feedback loop, reviewing the best data available about the benefits and burdens of goods movement, as well as the real-life experiences of all those involved.

The four participating Community Feedback Groups were located in Mira Loma (Riverside County), Coachella Valley (Riverside County), City of South Gate (Los Angeles County), and City of Colton (San Bernardino County), and are displayed on a map in Figure 1-1. Participants included goods movement industry representatives, planning professionals, and residents from communities who have experienced goods movement-related issues. More details about the process are provided in "Summary Report: Process and Outcomes" in the appendix of this report.

FIGURE 1-1 LOCATIONS OF COMMUNITY FEEDBACK GROUPS



WHO CAN USE THIS GOODS MOVEMENT TOOLKIT?

All of those involved in and affected by the goods movement system can benefit from using this toolkit. Goods movement provides unique challenges but also unique opportunities for communities. Specifically, the toolkit offers many potential strategies to assist in the dialogue between partners in supporting continued growth of goods movement industries and in resolving goods movement-related issues.

Depending upon the particular situation, partners could include:

- Community residents who experience impacts from goods movement
- Rail and trucking interests
- Representatives of local freight-related businesses such as warehouses and distribution centers
- City and county planning and public works departments
- County and regional agencies
- Local, state and federal regulatory bodies

HOW DOES ONE USE THIS GOODS MOVEMENT TOOLKIT?

Depending upon the user's information needs, the toolkit offers basic information on:

- How the goods movement system works
- The benefits of goods movement to communities and the region
- The impacts of goods movement on communities and the region
- The roles of organizations that regulate the goods movement system and operators
- Strategies for how to reduce the impact of goods movement for a variety of situations
- Experiences from communities that have been affected by goods movement-related issues

CONSIDER THE GOODS MOVEMENT TOOLKIT AS A STARTING POINT

Perhaps most importantly, the toolkit offers a starting point for addressing specific goods movement-related issues. It is not designed to address issues from transit or other transportation development projects. The toolkit offers potential strategies for addressing goods movement issues developed from the best

available technical information and practical experiences from communities at one point in time. The goods movement industry and system is constantly changing due to many factors. Users of the toolkit are encouraged to consult as many additional, updated sources of information as possible.

There is no one-size-fits-all approach. This toolkit does not offer a set of requirements or minimum standards to address goods movement or other transportation-related impacts. While many communities may experience similar impacts, each setting will have a unique combination of conditions and people involved. As the Community Feedback Groups and case study communities have demonstrated, this presents an opportunity to create tailored solutions to fit each situation.

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CHAPTER ONE

introduction

SOUTHERN CALIFORNIA IS OUR NATION'S LARGEST AND MOST important center for transferring and moving merchandise from container ships to people throughout the country. It is an international gateway for foreign trade. This area connects cities throughout the country to manufacturers and markets in Asia and Mexico. "Goods movement", put simply, is the transfer of freight and merchandise from one location to another location. But the moving parts are many and complex.

Millions of Southern California residents and businesses purchase merchandise and thousands of manufacturers produce goods for U.S. and international consumption. The result: a massive network of goods movement infrastructure, including ports, airports, railyards, and distribution centers, connected by a large system of truck routes and rail lines.

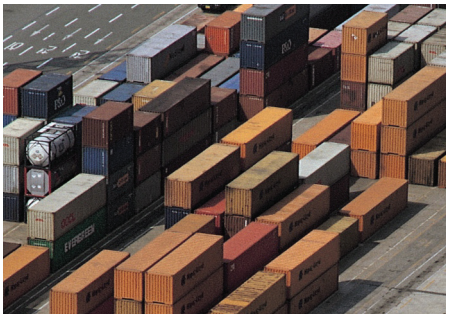
Goods movement benefits the economy of the area by supporting hundreds of thousands of jobs and providing state and local tax revenues. The direct economic impact of goods movement to the Southern California region includes:[1]

- $90.7 billion, or 6.6%, of the total $1,375 billion in economic activity
- $63.6 billion, or 7.8%, of the total $812.6 billion in economic value created
- 687,837, or 6.1%, of the total 11,321,518 people employed
- $52.6 billion, or 7.0%, of the total $750.6 billion earned income
- $11.1 billion, or 17.8%, of the total $62.0 billion in sales taxes, property taxes, fees, licenses, and excise taxes paid to the government
- Each new goods movement job supports a total of 2.19 jobs in the economy

Additionally, virtually all the products purchased by residents, schools and businesses get to their final destinations by some combination of truck, plane, train and ship. But goods movement also has negative effects, causing air pollution, noise, traffic jams, safety issues, and visual blight. These impacts are most directly felt by people who live near ports, warehouses, distribution centers, railyards, freeways, and railways.

The purpose of this toolkit is to serve as a starting point for communities and others who want to understand:

- how goods movement works
- the benefits and burdens of goods movement
- how issues that communities have with goods movement can be addressed so that communities and the goods movement industry can co-exist



The toolkit begins with an overview of the goods movement system, reviews the economic impacts of goods movement, explains how the different pieces of the system impact communities and describes what might be done about these impacts. It also includes potential strategies to assist in the dialogue between partners in resolving goods movement-related issues. Results from real-life discussions with Community Feedback Groups from a cross-section of freight-impacted Southern California communities helped to develop this toolkit. Their input is described in case study call-out boxes throughout this toolkit and in an appendix to further illustrate how local communities can work together to resolve goods movement concerns.

OVERVIEW OF THE GOODS MOVEMENT SYSTEM

Southern California's network of cargo plays a critical role in goods movement in our country. The recently-completed Multi-County Goods Movement Action Plan provides detailed information about the significance of goods movement today, as well as its expected growth in the future. As the nation's two largest ports, the Ports of Los Angeles and Long Beach, also known as the San Pedro Bay (SPB) ports, handled $221 billion in imports and $35 billion in exports in 2005. Despite the late 2008 downturn in the economy the amount of goods is expected to triple by 2030. Of these imported goods, 70% are transported from the ports by truck or railroad to markets outside Southern California.[2]

Warehouses and cargo distribution centers are scattered throughout the region, encompassing over 1.5 billion square feet of storage space. Containerized goods are transferred between trucks and rail cars, and trains are assembled for outbound trips at railyards. Most of the railyards are close

to the ports, south and east of downtown Los Angeles, or near freeways in the adjacent Inland Empire counties of San Bernardino and Riverside.

These cargo distribution centers are connected by a large network of truck routes and rail lines. Trucks move goods on freeways and streets, requiring cars to often "share the road." Major highways like I-5, I-710, I-605, and SR-60 frequently carry more than 25,000 trucks per day. Railway lines also move goods with Burlington Northern Santa Fe (BNSF) and Union Pacific (UP) being the two primary railroad operators with east-west routes handling more than 150 freight trains per day. The Alameda Corridor is a grade-separated or trenched cargo-only rail line linking the SPB ports to downtown Los Angeles, where trains then travel to the Inland Empire, to destinations within California, and to the rest of the nation.

SUMMARY OF GOODS MOVEMENT IMPACTS

The region's goods movement system has both positive and negative effects. It influences the area's local economy, environment, and quality of life. The freight industry is an economic driver for the region, creating jobs and money for the local economy. However, activities from goods movement can negatively impact local communities, creating air pollution, noise, traffic, and "visual pollution" or blight. The causes of each category must be understood in order to increase positive impacts and lessen the negative impacts. A brief description of each impact is provided here, with more details in the following sections.

Economic Impacts. The goods movement industry is the fourth largest employment sector in Southern California. Goods movement employs 692,000 people, accounting for more than one in ten of the region's jobs and injects over $170 billion annually into the local economy.[b] The goods movement sector creates well-paying jobs for both skilled and unskilled workers, which typically include benefits such as health insurance, retirement packages or pensions, and others. These jobs tend to be located near cargo distribution centers. However, since these employees live all over the area, the whole region's economy benefits from these jobs. Money spent by employees on housing, food and day-to-day living supports jobs for others and generates further revenues for local communities.

Air Quality Impacts. Southern California air quality has dramatically improved over recent decades thanks to a variety of strategies to reduce pollution from mobile and stationary sources. Despite the fact that the region now has nearly three times as many people and four times as many vehicles compared to the 1950s, maximum levels of ozone, one of the worst elements of smog, has been

AS THE NATION'S TWO LARGEST PORTS, THE PORTS OF LOS ANGELES AND LONG BEACH HANDLED $221 BILLION IN IMPORTS AND $35 BILLION IN EXPORTS IN 2005. DESPITE THE LATE 2008 DOWNTURN IN THE ECONOMY THE AMOUNT OF GOODS IS EXPECTED TO TRIPLE BY 2030.

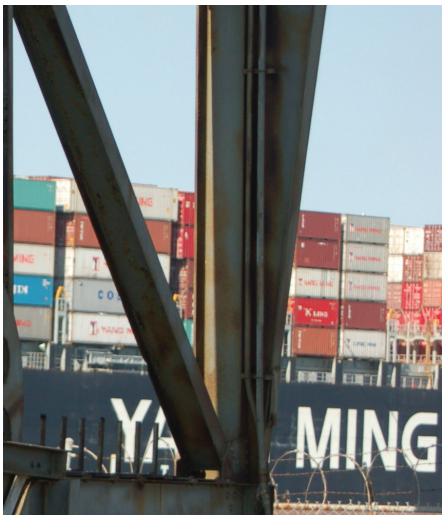
cut to less than one-third since then. Furthermore, smog alerts on days with poor air quality that occurred through the 1970s and 1980s and encouraged schools to keep children from playing outside have been virtually eliminated. Yet, while recent years have been the cleanest on record, there is still need for improvement. Some goods movement activities can negatively impact air quality and the health of residents living near freight routes and facilities. Air emissions from diesel engines have been shown to cause cancer and a variety of respiratory problems. These emissions are widespread, since diesel engines power freight trucks, locomotives, ships and cargo handling equipment – most of the vehicles involved in goods movement. The region violates the federal ozone standard (8-hour average) more frequently than any other location in the U.S. and does not meet the standards for particulate matter. However, additional improvements in the coming decades are anticipated due to current and future regional, state and federal requirements and control measures.

Noise Impacts. Goods movement projects can be very noisy for neighboring communities. Sources of noise, including trucks, locomotives, and loading / unloading, can negatively impact local residents. Since noise levels drop off quickly with distance, those nearest to the facility are most affected. The greatest noise impacts come from roads and rail lines, which often run through or adjacent to residential neighborhoods. Excess noise can be a health risk for nearby residents, possibly leading to hearing impairment. Fortunately, most ports, railyards, and cargo distribution centers are intentionally located in industrial areas, where their noise has less impact. Yet even the fringes of industrial areas can have impacts where they meet the edges of residential areas.

Traffic and Safety Impacts. The goods movement network relies on freeways and streets, and cars must often "share the road" with freight trucks. Because trucks travel on major streets to get to and from ports, warehouses and railyards, pedestrians and bicyclists are also affected. Freeways provide access to ports, railyards, and distribution centers and links to outside destinations along the interstate highways. Truck traffic can further clog already-congested roads. Railroads can cause delays and safety concerns where they cross roadways. Travel to and from railyards and cargo distribution centers can create traffic on local roads. These issues are made worse when high truck volumes coincide with commute times.

Aesthetic Impacts. Depending upon the location, local conditions, and facility design, goods movement facilities can have varying aesthetic impacts on communities. Some facilities may be the result of redevelopment and provide an

improved use for the local community, replacing blight or other undesirable uses. Additionally, goods movement facilities may improve the local community with attractive architecture, building design and landscaping. However, goods movement facilities can also cause aesthetic or visual impacts both during and after construction including degrading the appearance of an area, restricting views, illuminating neighborhoods with excess light and glare, or featuring building and landscape designs that are not well-suited to a surrounding community's design.



WHO DOES WHAT? AUTHORITIES IN RELATION TO GOODS MOVEMENT IMPACTS

Understanding and reducing goods movement impacts is challenging. There are multiple layers of government involved in regulating the goods movement sector. This section summarizes the roles of the federal, state, and local governments related to goods movement impacts, particularly related to the Southern California region.

To better understand "who can do what," here is a brief description of some of the potential partners, their roles, and levels of influence. While federal policy (for example) can be influenced in the longer term, it is important to understand what can't be done at the local level as well as what can be done in looking at all of the strategies.

Unique Federal Relationships, Railroads and Air Quality. Agencies of the federal government including Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), Federal Transit Administration (FTA), U.S. Environmental Protection Agency (EPA), and others set overall regulations and standards that all must adhere to. Especially important when looking at goods movement:

- Only the Federal Government (primarily FRA and EPA) have authority over the railroads. Locally-developed strategies must be voluntary and/or negotiated.
- California must have a waiver from the EPA to apply more stringent requirements than EPA standards.

State Influence and Role. The State of California mostly gets involved with goods movement issues through the California State Department of Transportation (Caltrans), the Governor's Office of Planning and Research (OPR), and the California State Air Resources Board (ARB).

Caltrans is the owner/operator of the freeway system and some state highways that operate as local roads. Caltrans is active in cooperative efforts in freight-related congestion relief and traffic management along the interstate highway system.

Caltrans can:

- Provide a statewide transportation plan addressing goods movement
- Program funding (in cooperation with the California Transportation Commission and local transportation commissions) for improvements such as grade separations
- Provide guidance on strategies to reduce goods movement impacts

Caltrans cannot:

- Control interstate railroad operations
- Control port operations
- Directly control land use decisions by railroads, schools and local governments

ARB sets air quality regulations to reduce emissions from trucks, ports, and other goods movement facilities. ARB also recently set emission standards for existing (in-use) trucks. More information on ARB and air quality is available later in this section.

Regional and Subregional Government. In Southern California, the regional planning agency, also known as the metropolitan planning organization, is the Southern California Association of Governments (SCAG). Subregional Councils of Government (COGs) are active in goods movement issues. Examples include the Gateway Cities Council of Governments (GCCOG), the primary COG for local communities affected by the SPB ports, the San Gabriel Valley COG and San Bernardino Associated Governments.

- SCAG leads the development of a Regional Transportation Plan that guides major goods movement-related projects and also prepares plans for goods movement covering a six-county area (Imperial, Los Angeles, Orange Riverside, San Bernardino and Ventura Counties).
- GCCOG has taken a leadership role in creating policies, incentives, and action plans for dealing with goods movement impacts, including the original diesel truck replacement program. Many COGs are pursuing grade separation projects throughout the region.

Councils of Government can:

- Prepare plans and provide incentives for air quality improvement

- Prepare a regional program of projects to improve goods movement
- Fund and conduct studies aimed at improving goods movement and lessening impacts

Councils of Government cannot:

- Set air quality regulations
- Directly construct projects
- Control local land uses for cities, schools, railroads or warehouses

The County Transportation Commissions or Regional Transportation Planning Agencies develop countywide plans dealing with public transportation, highways and goods movement, and also program (designate) federal, state and local funds to carry out these plans. Along with planning and funding goods movement projects, these agencies take a leadership role in funding grade separations and coordination, as well as funding and operations of traffic management programs. These agencies work in cooperation with local communities, SCAG, the subregional COGs and the State to plan, design, and construct transportation projects, including those needed to improve goods movement and lessen impact on local communities.

Transportation Commissions can:

- Fund and/or construct transportation projects to facilitate the movement of goods on streets and highways or to lessen local impact of goods movement (for example, separating trucks from cars)
- Program state and federal funding for grade separations
- Convene cities and the county to pursue joint projects to lessen the impact of goods movement

Transportation Commissions cannot:

- Place operating requirements on railroads or ports
- Get directly involved in land use decisions

The **Ports of Los Angeles and Long Beach** are departments within each city's government, but operate relatively autonomously on a day-to-day basis. The

SPB ports have adopted a Clean Air Action Plan aimed at decreasing port-generated pollution through strategies such as low-emission technologies and truck replacement. The SPB ports fund projects to lessen the impact of port-related community issues, including low- or no-pollution equipment, truck replacement and off-hours operation.

The Ports can:

- Negotiate with terminal operators to use low- or no-emission yard equipment
- Place requirements or provide incentives for clean truck technology for those trucks accessing port property
- Require short-line, local rail to use clean technology
- Provide incentives for ships and rail to use clean technology

The Ports cannot:

- Require interstate railroads (BNSF, UP) to use clean technology
- Require ships to use low-emission fuel

City or county governments often are the first point of contact in dealing with goods movement impacts. In unincorporated areas, county government performs the role of the city. Overall, cities and counties can create plans and regulations to minimize the impact of new goods movement facilities on the local community, including warehouses. Generally, cities and counties do not receive any funding directly for goods movement projects and must rely on grants from federal, state or regional sources. The two departments that deal most directly with goods movement are the Planning Department and the Transportation (or Traffic) Department.

The Planning Department can:

- Develop a General Plan for adoption by the City Council (or County Board of Supervisors)
  - — The Land Use Element outlines overall land use for the city–what can go where
  - — The Circulation Element (developed in consultation with the Transportation Department) designates how traffic should move around the city and designates major vs. minor routes
- Review and approve applications for new land uses (such as new warehouses) for fit within the General Plan framework and define measures (such as setbacks or noise restrictions) that must be taken to deal with any adverse impacts
- Negotiate voluntary restrictions on hours of operation and noise for existing facilities

The Planning Department cannot:

- Control locations of public schools in relation to freight facilities (this is the purview of the School Districts)
- Control railroads or railyards (other than voluntary, negotiated agreements) since these are controlled at the national level by the Surface Transportation Board and the FRA
- Control existing warehouses or facilities unless they are expanding

The Transportation Department can:

- Define and enforce specific truck routes within the city
- Define and enforce overnight parking ordinances
- Improve signage and street markings
- Install traffic calming measures to divert trucks from residential streets
- Designate truck layover areas

The Transportation Department cannot:

- Control railyard internal operations
- Require retrofit of trucking company and railyard entrances

The following gives more detail on the "who does what" in addressing goods movement impacts.

NEW EMISSIONS STANDARDS WILL REQUIRE MANY OWNERS TO UPGRADE THEIR VEHICLES AND EQUIPMENT.

Emissions and Air Quality

The U.S. EPA sets air quality standards for new trucks, train locomotives, cargo handling equipment, and domestic marine vessels (such as tugboats). Under EPA standards, these engines and vehicles can only produce a certain amount of air emissions. The current standards only apply when a new engine is installed or vehicle is sold. The standards generally do not affect the emissions from vehicles already in use. While some progress can be made negotiating international agreements, currently neither the U.S. nor California state government can regulate the emissions from foreign ships calling on Southern California ports. Virtually all of these ships entering the ports are foreign-owned and registered.

The U.S. EPA also sets standards for air quality, including standards to protect human health. The standards cover smog elements, the small particles (particulates) coming from diesel engines and other pollutants. EPA regulations require that areas in violation of air quality standards (including all of Southern California) improve air quality and reach the EPA standards by specific dates.

At the state level, the California ARB sets emissions standards for trucks similar to

the U.S. EPA. However, while EPA has jurisdictional authority to regulate new trucks, ARB restricts the scope of its regulation to apply only to existing in-use trucks. These requirements will become stricter over time. The standards will require many owners to upgrade their vehicles and equipment. This will impact city and county governments, private businesses, and individuals. ARB has also set regulations that limit the amount of time trucks can sit with their engines running (truck idling). The two major railroads have voluntarily agreed to reduce emissions at railyards.

At the regional or metropolitan level, many agencies have overlapping jurisdiction over air quality issues. Primary jurisdiction belongs to the South Coast Air Quality Management District (SCAQMD), which works with ARB to implement air quality regulations and incentives. Additionally, the SCAQMD is responsible for bringing the Southern California region into compliance with federal and state clean air standards.[4]

Local city and county governments can also take action. They can set limits on truck idling and can influence the location and design of new facilities for goods movement. Local city and county governments can also make voluntary

TABLE 1-1 JURISDICTIONAL AUTHORITY RELATED TO GOODS MOVEMENT AIR QUALITY IMPACTS

Level of Government	*Agency*	*Type of Authority*	*Function of Regulation*
Federal	U.S. Environmental Protection Agency (EPA)	Emission Standards (causes of pollution)	Sets maximum levels of emissions for pollutants coming from new engines.
	U.S. EPA	Ambient Air Quality Standards (levels of pollution)	Sets health-based standards for air quality and requires a plan for achieving the standards
State of California	Air Resources Board (ARB)	Emission Standards	Sets maximum levels of emissions for pollutants coming from existing trucks and off-road equipment
	ARB	Truck Idling Regulations	Limits idling of trucks to 5 minutes
Region	South Coast Air Quality Management District (SCAQMD)	Develops Air Quality Management Plan to meet federal and state standards.	Sets rules for emissions sources
City or County	Planning Department (or equivalent)	Land use guidelines, Zoning code, Design standards	Restricts location and design of new land uses
	Planning Department (or equivalent)	City/County Code	Sets limits on truck idling

agreements with vehicle owners to reduce emissions. Local governments can also reduce emissions by replacing their vehicles with clean-fuel versions. Additionally, local governments can influence air quality through land use decisions, with the exception of the siting of new schools. School siting is controlled by school districts and the state, rather than local governments.

Table 1-1 shows "who can do what" among national, state and local governments and agencies.

Noise

The FHWA and the FTA set the maximum increase in level of noise that can be caused by road, traffic and public transportation projects when federal funds are used. Caltrans sets similar standards at the state level for freeways and other state highways. In contrast, noise regulations for the railroads are determined by

TABLE 1-2 JURISDICTIONAL AUTHORITY RELATED TO GOODS MOVEMENT NOISE IMPACTS

Level of Government	*Agency*	*Type of Authority*	*Function of Regulation*
Federal	Federal Highway Administration (FHWA)	Noise Abatement Criteria	Sets thresholds for dealing with noise caused by road projects
	Federal Transit Administration (FTA)	Noise Impact Criteria	Sets thresholds for dealing with excessive noise caused by public transit projects
State of California	Governor's Office of Planning and Research	General Plan Guidelines	Sets criteria for judging the severity of noise impacts on various land uses; used as a guideline for local community requirements
	Department of Transportation (Caltrans)	Noise Abatement Criteria	Same as for FHWA and FTA
City or County	Planning Department (or equivalent)	General Plan, Noise Element	Sets criteria for judging the severity of noise impacts on various land uses.
	Planning Department (or equivalent)	City/County Code and/or Noise Ordinances	Sets noise limits for specific activities

the FRA, which sets policies on train whistle volumes and "quiet zones."

For land and building projects, the Governor's Office of Planning and Research sets criteria to evaluate the severity of noise impacts in the State of California. Local city and county governments can set noise limits for specific activities. They can also establish criteria to judge the severity of noise impacts on various land uses, and encourage noise barriers or buffers on new local development projects. Table 1-2 summarizes national, California, city and county government authority related to noise impacts from goods movement.

Traffic and Safety

Jurisdictional authority for roadway traffic and safety is divided among federal, state, and local organizations. A different set of agencies oversees truck and railroad safety regulations.

At the federal level, the U.S. Department of Transportation (U.S. DOT) oversees the operation and safety of the nation's transportation system through agencies focused on each mode of transportation. The FWHA delivers federal funding for highway projects and promotes safety in highway planning, design, construction, and operations. Another U.S. DOT agency, the National Highway Traffic Safety Administration (NHTSA), regulates the safety of passenger cars and light trucks. The Federal Motor Carrier Safety Administration (FMCSA) focuses on the safety of large trucks, with programs and regulations to encourage safe operating practices. Railroad safety is regulated by the FRA.

State transportation policy is set by the Business, Transportation and Housing Agency and the California Transportation Commission. Caltrans implements policy and manages most of the state's highway system. Caltrans oversees construction and maintenance of highways (which can include some arterial streets that are designed as state highways). The California Highway Patrol is responsible for enforcement of traffic regulations on the highway system.

Long-range planning for the region's transportation system is led by SCAG. County transportation commissions work closely with SCAG and Caltrans to coordinate highway and public transit planning and identify transportation projects for funding. These agencies include Riverside County Transportation Commission, San Bernardino Associated Governments, Los Angeles County Metropolitan Transportation Authority (also known as Metro), Orange

TABLE 1-3 JURISDICTIONAL AUTHORITY RELATED TO GOODS MOVEMENT TRAFFIC AND SAFETY IMPACTS			
Level of Government	***Agency***	***Type of Authority***	***Function of Regulation***
Federal	Federal Highway Administration (FHWA)	Federal funding; safety and operations programs	Provide funding and technical assistance; oversee programs
	Federal Railroad Administration (FRA)	Regulation of railroad safety	Regulates safety of freight and commuter rail networks (not light rail and subway)
	National Highway Traffic Safety Administration (NHTSA)	Passenger car safety standards	Inspect vehicles; promulgate safety standards; collect accident data
	Federal Motor Carrier Safety Administration (FMCSA)	Freight truck safety standards	Promote safety programs in the trucking industry
State of California	Department of Transportation (Caltrans)	Plans and manages state highway network	Constructs, maintains, and operates highway network. Funds multimodal programs and planning grants
	California Highway Patrol (CHP)	Enforcement	Enforce California vehicle code; enhance traffic safety
Regional	Southern California Association of Governments (SCAG)	Long range transportation planning	Sets priorities for regional transportation projects; leads regional growth planning
	County Transportation Commissions	County funding and planning from federal, state and local funds	Sets priorities for county transportation projects; coordinates county transportation planning
Local	Planning Department (or equivalent)	Code and zoning regulations	Set local building and transportation codes
	Planning Department (or equivalent)	Development and land use planning	Determine transportation impacts of development projects
	Engineering or Traffic Department	Design and construction	Determines local traffic circulation and safety needs and designs solutions
	Local Police Department	Enforcement	Enforce vehicle safety codes on local streets

County Transportation Authority, and Ventura County Transportation Commission.

At the local level, city and county governments are responsible for construction, operation, and maintenance of the local roadway system. Local governments can influence traffic levels because they have authority over new development through their zoning regulations, comprehensive plans, and development permitting procedures. In addition, local agencies oversee construction of the majority of non-freeway road capacity.

Aesthetics

Visual and aesthetic impacts are not regulated to the same extent as air quality or traffic impacts. Federal and state governments influence decisions on aesthetic impacts primarily through environmental review documents. Both National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) environmental guidelines

TABLE 1-4 JURISDICTIONAL AUTHORITY RELATED TO GOODS MOVEMENT AESTHETIC IMPACTS

Level of Government	*Agency*	*Type of Authority*	*Function of Regulation*
Federal	All federal agencies	Environmental review through the National Environmental Policy Act (NEPA)	NEPA environmental impact statements must consider aesthetic impacts of proposed projects
State of California	All state agencies	Environmental review through the California Environmental Policy Act (CEQA)	CEQA environmental impact reports must consider aesthetic impacts of proposed projects
City or County	Planning Department (or equivalent)	Code & zoning regulations	Set zoning codes to require specific aesthetic improvements (landscaping, lighting controls, frontage regulations) for new projects

require project proponents to assess the degree of visual impact caused by the proposed project, and to identify measures to reduce these impacts. Aside from these requirements, federal and state organizations do not regulate visual impacts.

On the local level, aesthetic concerns are regulated by city and county governments through building and zoning codes. Local governments can influence the aesthetics of new developments through regulation of lighting, landscaping, building size and setbacks, parking, and many other aspects of the development process. For developments already in place, local governments' primary tools are providing code enforcement and/or incentives to encourage property owners to make aesthetic improvements.

PROACTIVE PLANNING: A TOOL TO AVOID IMPACTS BEFORE THEY OCCUR

As this chapter describes, there are many potential incompatibilities that can arise from sensitive individuals being located too close to goods movement infrastructure -- and vice versa. For instance, new schools, libraries, day care and senior centers and residential areas should not be planned near existing or planned freeways, high-traffic roads, railyards, warehouses and ports. In an area that is going to be rezoned from its current agriculture or open space zoning in order to accommodate future development, thoughtful up front planning about how to site different land uses relative to each other can reduce or avoid many future impacts and incompatibilities.


THE GOODS MOVEMENT INDUSTRY
IS ONE OF THE MOST IMPORTANT
EMPLOYERS IN SOUTHERN
CALIFORNIA.

CHAPTER TWO

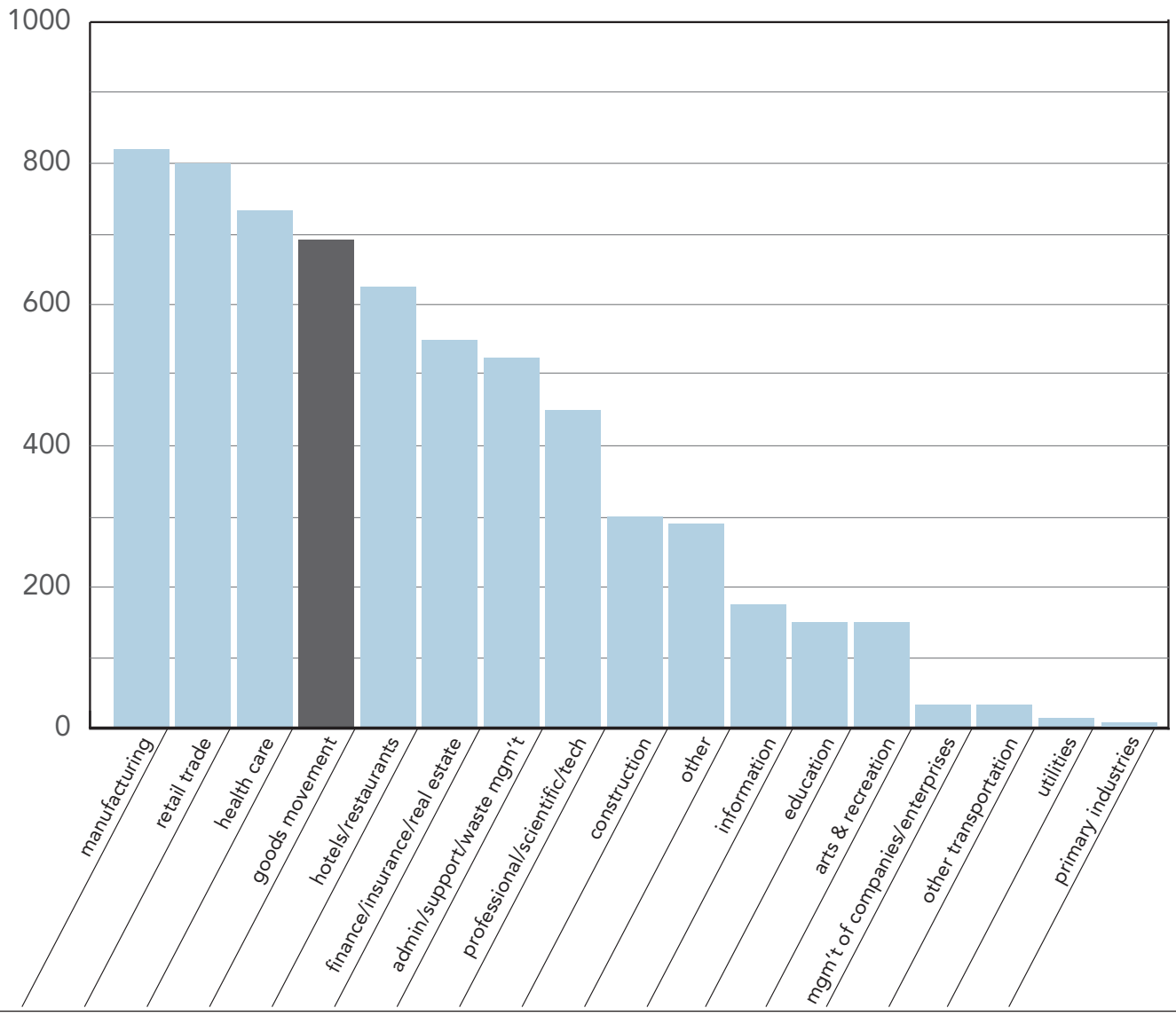
economic impacts of goods movement

GOODS MOVEMENT IS AN IMPORTANT part of the Southern California economy. The industry includes wholesale trade, warehousing, and freight transportation. The industry provides merchandise to the region's shoppers and businesses, and jobs to the region's workers. The industry also provides a number of entry-level jobs with above-average pay. The region's unique location and transportation infrastructure attract a massive amount of goods movement operations to the area. Goods movement generates an estimated $170 billion of economic benefit annually to Southern California.[5]

BENEFITS OF GOODS MOVEMENT TO THE REGIONAL ECONOMY

The goods movement industry is one of the most important employers in Southern California. Goods movement provides more than 10% of the jobs in the six-county Southern California region.[6] The goods movement sector is the fourth largest employer in the region, after the manufacturing (1st), retail (2nd), and health care (3rd) industries (see Figure 2-1 next page). Goods movement is also a strong source of job growth for the region. The number of jobs in the goods movement industry grew by 18% in the region during 1998-2006. The number of total jobs in the region grew by 14% during this period. Goods movement has grown independently of Southern California population growth patterns.[7] The current national economic downturn may hamper the growth of the

FIGURE 2-1 EMPLOYMENT BY INDUSTRY, SIX-COUNTY SOUTHERN CALIFORNIA REGION (2006)



Source: County Business Patterns 2006. Excludes government and self-employed. Excludes some data points for reasons of confidentiality.

goods movement industry. However, the industry is expected to maintain long-term growth in Southern California.

Workers in the goods movement industry who live in Southern California spend their earnings within the region. Goods movement operations buy goods and services from other regional businesses. These purchases stimulate the economy and indirectly support other employment in the region. Through this cycle of reinvestment, each job in the goods movement industry supports two new jobs in the regional economy.[8]

EACH JOB IN THE GOODS MOVEMENT INDUSTRY SUPPORTS TWO MORE JOBS IN THE REGIONAL ECONOMY.

Southern California's economy sees $1,375 billion in economic activity annually. When the indirect impact of the goods movement industry is considered, the industry is responsible for $170 billion in economic activity,[9] or more than 12% of all economic activity in the region.[10]

Development and expansion of goods movement facilities can bring economic benefits to local governments and communities, too. Building of new goods movement facilities creates construction jobs. Warehouses and other commercial developments bring property taxes to local government coffers – both secured property taxes (for the land and buildings) and unsecured property taxes (for equipment on site). Because these facilities often create little new demand for city services, they can result in a net fiscal benefit to for local governments. These revenues can then be applied to services and infrastructure that support the entire community such as public safety, libraries, parks and recreation, and many other important aspects that make communities healthy and desirable places to live.

JOBS IN GOODS MOVEMENT

Goods movement operations employ nearly 700,000 people in the six-county region. Approximately 66% of these jobs are in wholesale trade businesses, 9% are in truck transportation and another 9% are in transportation services. (See Figure 2.1 on the following page.)

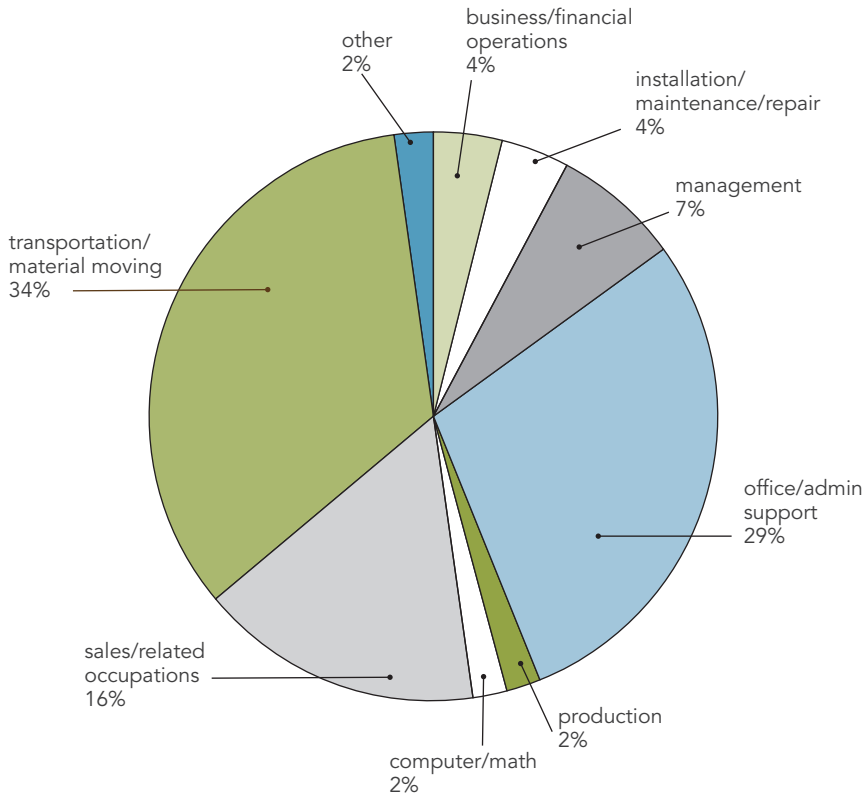
Jobs in goods movement range from entry-level to white-collar managerial positions. Goods movement operations depend heavily on two types of jobs: 1) Transportation and Material Moving occupations, and 2) Office and Administrative Support occupations. The goods movement industry also employs salespeople, business and financial experts, maintenance and repair technicians, managers, and computer technicians (See Figure 2-2 on the following page).

TABLE 2-1 EMPLOYMENT IN GOODS MOVEMENT IN THE SIX-COUNTY REGION (2006)

Business Type	*Employees*
Wholesale trade	464,000
Truck transportation	62,000
Support services for transportation	62,000
General warehousing and storage	42,000
Non-local couriers	36,000
Air transportation	23,000
Water transportation	3,000
Rail transportation	<3,000*
Total	**692,000**

Source: County Business Patterns 2006
*** There is conflicting data on the size of the rail transportation industry in the six-county region. Employment in the rail industry is estimated to be equal to or less than employment in water transportation.**

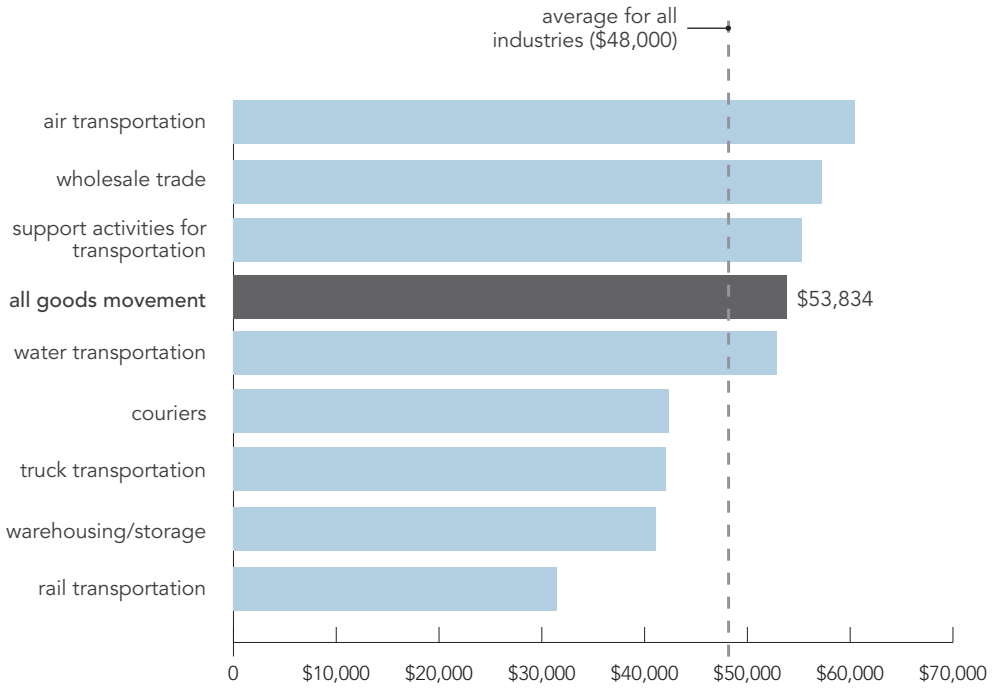
FIGURE 2-2 CALIFORNIA GOODS MOVEMENT INDUSTRIES: OCCUPATIONS EMPLOYED (2006)



Source: California Industry-Occupational Matrix 2006-2016, CA EDD

Many goods movement jobs pay better than the average job. In Southern California, employees in goods movement make an average of $54,000 annually, $6,000 higher than the average annual pay. Note that this average salary includes airline pilots, who are high-skilled employees who earn a higher wage than most other goods movement jobs. But some other types of goods movement jobs also pay more than the average. Wholesalers, the primary employer in the industry, pay their employees an average of $10,000 more per year than the regional average (see Figure 2-3).

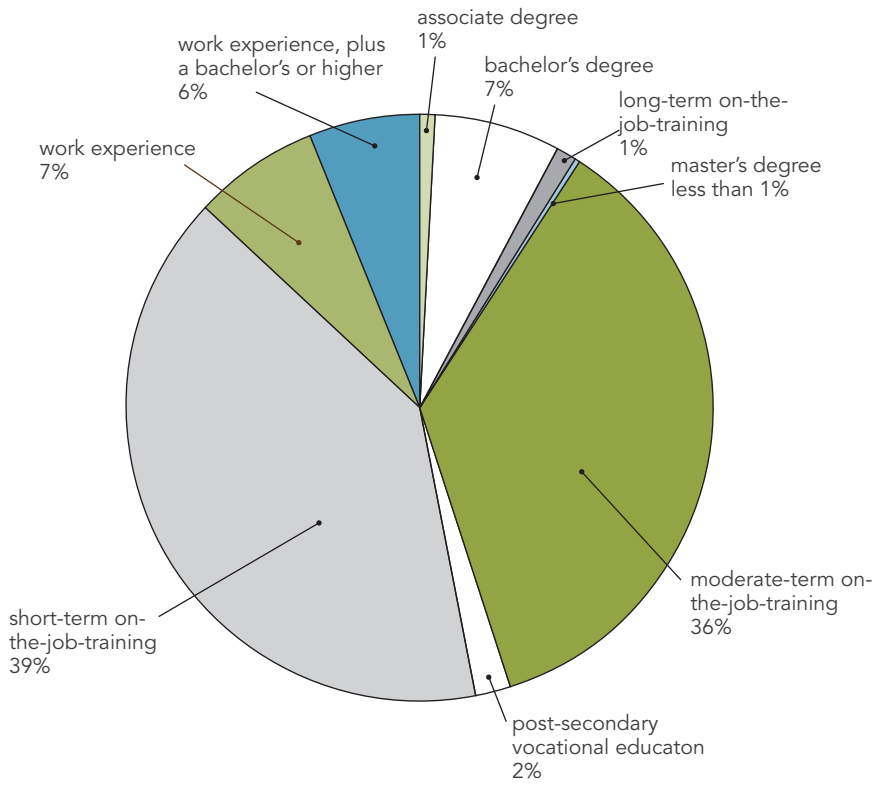
FIGURE 2-3 AVERAGE ANNUAL PAY FOR EMPLOYEE, SIX-COUNTY REGION (2007)



Source: Quarterly Census of Employment and Wages, CA EDD (2007)
Note: These figures do not account for the number of hours worked by employees, but reflect the average amount paid to each person employed. Therefore, an industry with a high proportion of part-time employees will show lower annual average pay.

Many of the jobs available within the industry are entry-level jobs, suitable for workers with little to no higher education or training. In California, 75% of jobs in the goods movement industry require workers to have only short-term or moderate-term on-the-job training (see Figure 2-4 below). Unskilled workers can gain entry into the labor force with starting pay above minimum wage and benefits packages. Goods movement jobs allow workers to develop new skills and increase their income as they gain experience.[11]

FIGURE 2-4 MINIMUM TRAINING LEVEL FOR GOODS MOVEMENT JOBS IN CALIFORNIA (2006)



Source: California Industry-Occupational Matrix 2006-2016, CA EDD

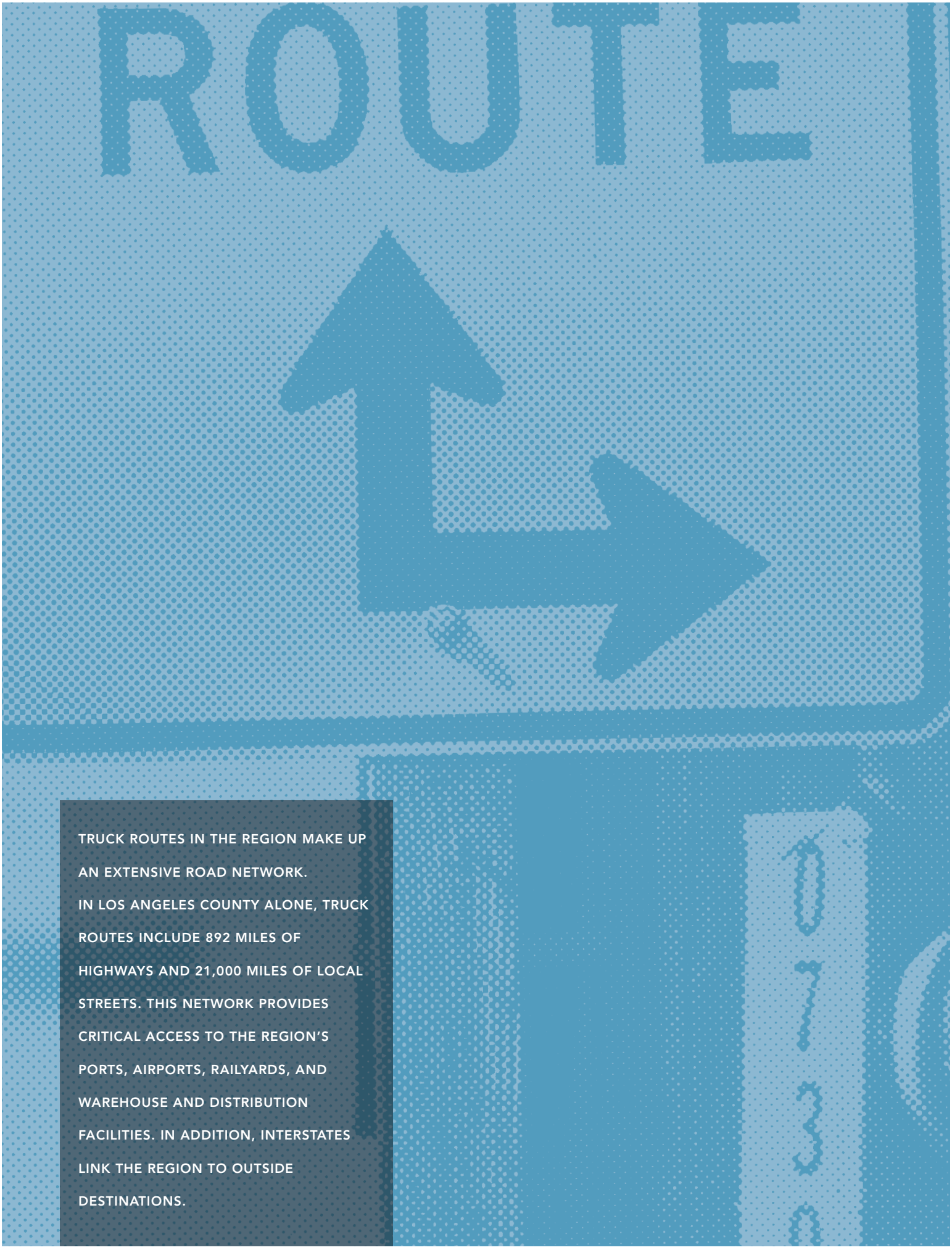
DISTRIBUTION OF ECONOMIC IMPACTS

The economic benefits of goods movement are not necessarily distributed equally across the cities and residents of Southern California. Goods movement jobs tend to be clustered near the SPB ports, and near key highway and rail interchange points, including San Bernardino and Riverside counties. Like many other industries, those holding jobs at goods movement facilities often do not live in the communities where they work. Thus, some communities may bear the brunt of goods movement environmental impacts without experiencing the economic benefits of well-paying jobs. By working in partnership with companies providing goods movement services, communities can help to ensure that local residents are made aware of and considered for new jobs in these businesses.

CASE STUDY

MIRA LOMA

The Mira Loma community in Riverside County hosts a major railyard and warehouse facilities, which are significant parts of the region's goods movement system. Yet, Community Feedback Group members describe challenges by local residents in securing permanent, stable positions at these facilities, finding that temporary, lower-paying positions are more commonly available for unskilled workers.



TRUCK ROUTES IN THE REGION MAKE UP AN EXTENSIVE ROAD NETWORK. IN LOS ANGELES COUNTY ALONE, TRUCK ROUTES INCLUDE 892 MILES OF HIGHWAYS AND 21,000 MILES OF LOCAL STREETS. THIS NETWORK PROVIDES CRITICAL ACCESS TO THE REGION'S PORTS, AIRPORTS, RAILYARDS, AND WAREHOUSE AND DISTRIBUTION FACILITIES. IN ADDITION, INTERSTATES LINK THE REGION TO OUTSIDE DESTINATIONS.

CHAPTER THREE

trucks

TRUCKS CARRY MORE GOODS THAN ANY other mode in the region. On-road trucks include tractor-trailer combination trucks and single-unit trucks. These trucks are used for tasks such as urban pick-up and delivery, waste hauling, and construction. ARB defines "heavy-duty trucks" as trucks with a gross vehicle weight rating (GVWR) of more than 8,500 pounds.

Heavy-duty trucks transport freight in one of three ways.

1. Local transport carries freight on highways and streets from its origin—ports, railyards, and distribution centers—to a destination within the six-county region.
2. Long haul trucking primarily uses the interstate highway system to take goods to destinations outside the region.
3. Intermodal drayage service moves freight in short trips between ports, railyards, and distribution centers.

Truck routes in the region make up an extensive road network. In Los Angeles County alone, truck routes include 892 miles of highways and 21,000 miles of local streets. This network provides critical access to the region's ports, airports, and railyards. In addition, interstates link the region to outside destinations.[10a]

Local highways within the region carry some of the highest truck volumes in the country. Trucks logged 22.4 million miles within the region in the

Throughout Chapters 3 – 7 of this toolkit, potential strategies listed in **bold** are described in more detail in Chapter 8.

year 2000. Truck traffic is concentrated on major routes connecting population centers, ports, border crossings, and other major hubs of activity.[13]

Tables 3-1 through 3-3 show highway locations with the highest truck volume in Los Angeles, Riverside and San Bernardino counties. I-710 is the primary corridor for SPB port-specific traffic, with nearly 40,000 truck trips on an average weekday. Many of these trips are are related to traffic from the SPB ports. Trucks directly or indirectly related to activity at the SPB ports have destinations throughout Southern California, but generally tend to flow northeast from the ports towards eastern Los Angeles County and the Inland Empire.

TABLE 3-1 LOS ANGELES COUNTY HIGHWAY LOCATIONS WITH HIGHEST TRUCK VOLUME, 2006

Highway	*Segment Location*	*Total Daily Traffic Volume*	*Daily Truck Volume*	*% Trucks*	*PM2.5 Emissions per Mile (kg / day)*
710	Long Beach, Jct. Rte. 91, Artesia Freeway	222,000	38,584	17%	19.3
605	Santa Fe Springs, Jct. Rte. 5, Santa Ana Freeway	268,000	37,842	14%	16.5
710	Lynwood, Jct. Rte. 105, Glenn Anderson Freeway	234,000	37,417	16%	17.4
605	Whittier, Jct. Rte. 72, Whittier Boulevard	258,000	36,430	14%	15.9
710	South Gate, Firestone Boulevard Interchange	213,000	36,210	17%	16.8
91	Long Beach, Jct. Rte. 710, Long Beach Freeway	251,000	35,190	14%	16.2
91	Bellflower, Jct. Rte. 19, Lakewood Boulevard	236,000	33,087	14%	15.2
605	Norwalk, Jct. Rte. 105, Glenn Anderson Freeway	300,000	30,810	10%	13.2
710	Long Beach, Del Amo Boulevard Interchange	183,000	28,896	16%	14.9
605	Santa Fe Springs, Telegraph Road Interchange	253,000	28,842	11%	11.2

Source: Caltrans 2006 Truck Traffic (available online at http://traffic-counts.dot.ca.gov/); Emissions estimated by ICF using EMFAC 2007.

TABLE 3-2 RIVERSIDE COUNTY HIGHWAY LOCATIONS WITH HIGHEST TRUCK VOLUME, 2006					
Highway	*Segment Location*	*Total Daily Traffic Volume*	*Daily Truck Volume*	*% Trucks*	*PM2.5 Emissions per Mile (kg / day)*
60	Jct. Rte. 15	158,000	24,806	16%	9.1
10	Jefferson Street/Indio Boulevard	68,000	22,984	34%	13.1
10	Jct. Rte. 62 North	87,000	22,794	26%	11.3
10	East Ramsey Street	121,000	22,143	18%	12.0
10	Indian Avenue	88,000	20,768	24%	11.8
10	Jct. Rte. 111	89,000	19,491	22%	9.1
10	Banning, Sunset Avenue	135,000	19,305	14%	8.3
10	Beaumont, Jct. Rte. 79 South	133,000	19,285	15%	7.9
215	Jct. Rte. 60 East	170,000	18,530	11%	7.2
15	Jct. Rte. 60	223,000	18,286	8%	6.8

Source: Caltrans 2006 Truck Traffic (available online at http://traffic-counts.dot.ca.gov/); Emissions estimated by ICF using EMFAC 2007.

TABLE 3-3 SAN BERNARDINO COUNTY HIGHWAY LOCATIONS WITH HIGHEST TRUCK VOLUME, 2006					
Highway	*Segment Location*	*Total Daily Traffic Volume*	*Daily Truck Volume*	*% Trucks*	*PM2.5 Emissions per Mile (kg / day)*
60	Ontario, Jct. Rte. 83	227,000	27,785	12%	13.1
60	Central Avenue	226,000	27,662	12%	13.0
60	Los Angeles/San Bernardino County Line	225,000	27,540	12%	13.0
60	Grove Avenue	222,000	27,173	12%	12.8
10	Colton, Jct. Rte. 215	239,000	26,290	11%	9.3
10	Mountain View Avenue	202,000	24,846	12%	9.1
10	Ontario, Jct. Rte. 15	240,000	24,552	10%	11.5
10	Etiwanda Avenue	226,000	23,128	10%	10.8
10	Fontana, Cherry Avenue	226,000	23,128	10%	10.8
15	Jct. Rte. 215	160,000	22,064	14%	10.4

Source: Caltrans 2006 Truck Traffic (available online at http://traffic-counts.dot.ca.gov/); Emissions estimated by ICF using EMFAC 2007.

AIR QUALITY

Air Quality Impacts

Heavy-duty trucks are responsible for approximately 40% of the small particles (particulate matter or PM) coming from diesel engines and other goods movement-related sources in Southern California.[14]

The amount of truck emissions depends heavily on the age and size of a truck. For example, the heaviest trucks produce particulate matter emissions at a rate more than three times the rate of smaller diesel trucks. Table 3-4 shows average emission by truck size for heavy-duty diesel trucks in 2010. However, the differences are less when compared on the basis of weight carried.

ARB maintains tools for calculating emissions from freight trucks in California. The EMFAC model provides emissions factors that describe emissions from trucks per vehicle-mile of travel. Total truck emissions can be calculated by multiplying the appropriate emission factor (see Table 3-4) and the total truck-miles traveled. More information about EMFAC can be found at ARB's website.[15]

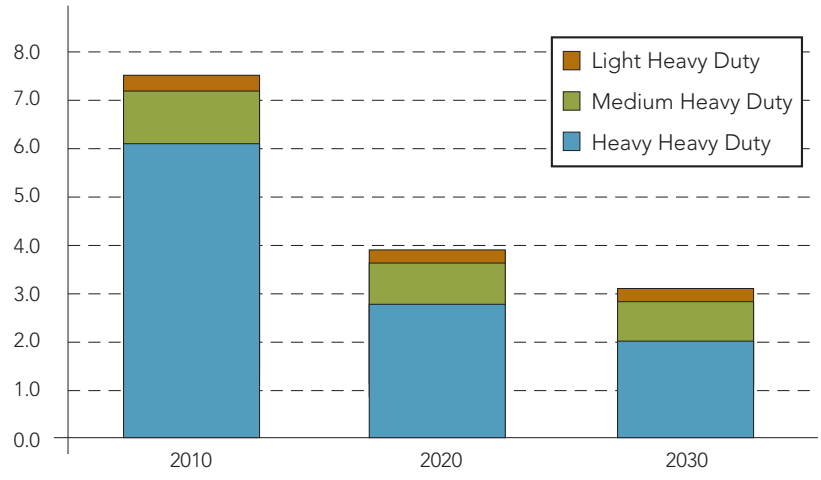
TABLE 3-4 EMISSION FACTORS IN GRAMS PER MILE, 2010*

Pollutant	*Light Heavy-Duty Diesel 1 (8500-10000 lbs GVWR)*	*Light Heavy-Duty Diesel 2 (10001-14000 lbs GVWR)*	*Medium Heavy-Duty Diesel (14001-33000 lbs GVWR)*	*Heavy Heavy-Duty Diesel (33,000+ lbs GVWR)*
ROG	0.13	0.18	0.19	1.37
NOx	5.14	6.40	9.04	16.36
PM2.5	0.03	0.04	0.21	0.70

**Calculated from ARB's EMFAC model*

Truck emissions are expected to decrease in future years with the implementation of stringent new emission standards. EPA emission standards will encourage the reduction of emissions from new trucks, while ARB in-use standards will reduce emissions from trucks currently on the road. Due to the more stringent EPA standards, total truck emissions are expected to decline by approximately 60% between 2010 and 2020, and 25% from 2020 to 2030.[16] The benefits of the new emission standards will compensate for added emissions from the growth in truck miles traveled from 2010 to 2030. Figure 3-1 shows projected PM2.5 emissions from heavy-duty trucks in the South Coast Air Basin. PM2.5 is a category of tiny particles (particles less than 2.5 micrometers in aerodynamic diameter).

FIGURE 3-1 BASELINE HEAVY-DUTY TRUCK PM2.5 EMISSIONS IN THE SOUTH COAST AIR BASIN



Source: 2007 Air Quality Management Plan, SCAQMD.
Note: Baseline does not reflect proposed ARB standards for in-use trucks or the SPB ports' proposed Clean Truck Program

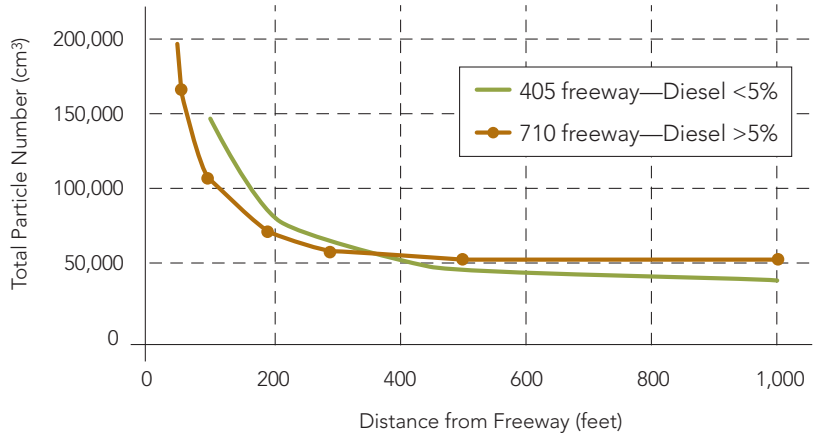
Air quality studies show that vehicle traffic, including truck traffic, directly affects air pollution. More traffic generates higher concentrations of traffic-related pollution. Research reveals that living close to freeways (500–1,000 feet) and high traffic roads can have serious impact on health, including cancer and asthma. Studies report connections between living close to high traffic roadways and a variety of health effects. Non-cancer health effects include respiratory symptoms, asthma exacerbations, and decreased lung function in children.

Key study findings include:

- Asthma and bronchitis symptoms in Southern California schoolchildren were associated with nearness to high traffic roads[17]
- Increased occurrence of asthma in Southern California children was associated with nearness to freeways[18]
- Increased asthma hospitalizations were associated with living within 650 feet of heavy traffic and heavy truck volume[19]
- Increased medical visits among San Diego children living within 550 feet of heavy traffic[20]
- Reduced lung function in children is linked with traffic density, especially trucks, within 1,000 feet, and is strongly linked with traffic density within 300 feet[21]

Another study found that the intensity of vehicle-related pollution decreased more than 300 feet from freeways in Southern California (see Figure 3-2).[22]

FIGURE 3-2 DECREASE IN CONCENTRATION OF FREEWAY DIESEL PARTICULATE MATTER (DPM) EMISSIONS WITH DISTANCE



Source: Zhu Y, Hinds WC, Kim S, Sioutas C. 2002. Concentration and size distribution of ultrafine particles near a major highway. Journal of Air and Waste Management Association. September. 52: 1032-1042.

Vehicle-related pollution includes: black carbon, carbon monoxide, and ultrafine particles. Particle number concentration was 25 times higher near freeways than it was at locations not near freeways (background locations). The concentration of ultrafine particles decreased within 300 meters downwind of freeways.

Image by Biofriendly

Air Quality Improvement

A number of strategies can help to reduce the impact of truck emissions on local communities. These strategies include:

- New technologies for cleaner engines and exhaust **(equipment replacement** and **equipment repowering)**
- Advanced fuels, such as **biodiesel blends**
- Strategies that change truck usage patterns **(designating truck routes)**
- **Virtual container yards**
- Land use strategies that reduce local exposure to pollution **(land use siting)**

Most new technologies target either engine improvements that reduce emissions or exhaust retrofits that remove pollutants. New trucks (equipment replacement) and truck engines (equipment repowering) meet stringent emissions standards and are cleaner than older trucks and engines. Trucks can use advanced fuels, such as biodiesel blends, to reduce emissions. Truck emissions can also be reduced with a retrofit filter in the engine, which removes pollutants from the exhaust stream. These filters vary in effectiveness; some can capture more than 85% of pollutants.

Operational practices that reduce freight trips can also reduce truck emissions. Empty containers account for a significant number of truck trips—500,000 trips at the Port of Los Angeles alone. Containers can be filled with export

cargo at facilities so that they do not return empty to the ports, which would reduce truck trips and emissions.[23] Improved management of empty containers coupled with a virtual container yard strategy to facilitate such exchanges could be an effective tool to reduce emissions.

Local communities can reduce exposure to truck emissions through land-use policies and development regulations. Such policies move residents away from sources of truck pollution, protect residents from nearby emissions, and discourage new development near truck routes. Land-use siting policies typically focus on the location of community services, such as schools and day care centers. The State of California recommends that schools be set back 500 feet from major roadways, to reduce exposure to exhaust. Local governments may be able to re-route truck traffic from sensitive areas by designating truck routes.

NOISE

Noise Impacts

Goods movement projects impact noise levels in neighboring communities. Mobile-source noise is noise from traffic traveling along roadways. Mobile-source noise can impact sensitive land uses such as homes and schools located near truck routes. Other noise impacts can occur if a project builds truck lanes and/or moves truck traffic closer to existing sensitive land uses. The significance of noise impacts depends on the distance between the truck routes and the land uses, and the amount of increased traffic along truck routes.

While excess noise is often considered a quality-of-life impact, it can become a health risk at high levels. Hearing damage to residents may occur when exposed to noise levels of 80 dB, approximately the noise level of heavy truck traffic.

Doubling traffic on any given roadway causes a noise increase of approximately 3 dBA, which is considered barely audible to most people. When evaluating noise impacts of a road construction project, it is necessary to consider the noise emitting characteristics and the traveling speeds of different vehicles. Truck traffic noise can be measured in terms of automobile traffic noise. For example, a heavy duty truck can produce noise similar to 11.5 automobiles. Information regarding noise impact analysis procedures can be found in the Caltrans *Technical Noise Supplement* (TeNS).

CASE STUDY
CITY OF SOUTH GATE

With a high volume of truck traffic on local city streets due to its proximity to the SPB ports, City traffic engineers have installed rubberized asphalt material on some city streets, which has led to noticeable decreases in noise impacts.

Noise Impact Improvement

Several strategies help to reduce noise impacts from trucks including:

- **Routing traffic** to reduce noise exposure
- **Soundproofing** affected dwellings
- Installing **noise barriers** along land uses

Typical measures to shield residents from freight noise include the installation of noise barriers, and soundproofing of structures.

Local communities can reduce noise exposure from trucks through traffic planning and/or land use policies. Such strategies and policies move truck traffic away from residents, reduce noise exposure, or discourage new development near truck routes. Traffic planning and land use policies typically focus on the location of community services, such as schools and day care centers. Alternative strategies re-route truck traffic through designated truck routes, away from residential neighborhoods. Enforcing strict speed limits on truck routes may reduce noise impacts on adjacent land uses.

TRAFFIC AND SAFETY

Traffic and Safety Impacts

Trucks contribute to traffic delays on regional highways, arterial streets, and local roads. The Los Angeles metropolitan area's highway network is among the most congested in the nation.[24] In 2005, traffic congestion resulted in more than 490 million hours of delay, which cost drivers $9 billion in lost time and consumed nearly 400 million gallons of excess fuel. Truck traffic worsens traffic congestion. It is estimated that 15-20% of truck volume occurs on congested

CASE STUDY
MIRA LOMA

With a major railyard and warehousing located near residential and school zones, the Mira Loma community experiences heavy truck traffic on local streets. The Community Feedback Group prioritized establishing clearly designated and signed truck routes away from sensitive land uses as a strategy to improve public safety.

roads, which ultimately increases shipment costs by 50-250%.[25]

Truck traffic also impacts highway users' safety. In the six-county region, truck accidents account for 6% of all vehicle collisions and 7% of vehicle fatalities, though auto drivers are most often responsible for causing these accidents. Truck accidents tend to damage the other vehicle and cause injury to its occupants. Eighty-four percent of fatalities in large truck accidents are passengers in other vehicles.[26]

Traffic and Safety Improvement

Federal, state, county, and city governments can reduce congestion and improve safety by reducing contact between trucks and passenger cars. Strategies to improve traffic and safety include:

- Dedicated truck lanes
- Designated truck routes

Separating the flow of trucks from the flow of passenger cars is an effective way to reduce accidents. Truck traffic can be limited to slower lanes or to dedicated truck lanes or can be separated with designated truck routes. Separating truck traffic into specified corridors can also reduce traffic congestion and improve safety.

3.5 AESTHETICS

Aesthetic Impacts

A truck route could have negative aesthetic, or visual, impacts if it degrades scenic qualities or visual character. For example, a truck route can affect a scenic vista or block views of trees, rock outcroppings, and historic buildings within a state scenic highway. These types of impacts are generally limited to rural areas or where a new highway is under construction. The amount of visual impact depends on the change between the characteristics of the scenic landscape before construction and the characteristics after construction. A freeway project may have little visual impact if it is built level with the terrain and landscaped, or it could have significant visual impact if it is an elevated roadway or overpass. However, even a landscaped freeway project could be

perceived as having a visual impact if not designed to fit the surrounding area's design.

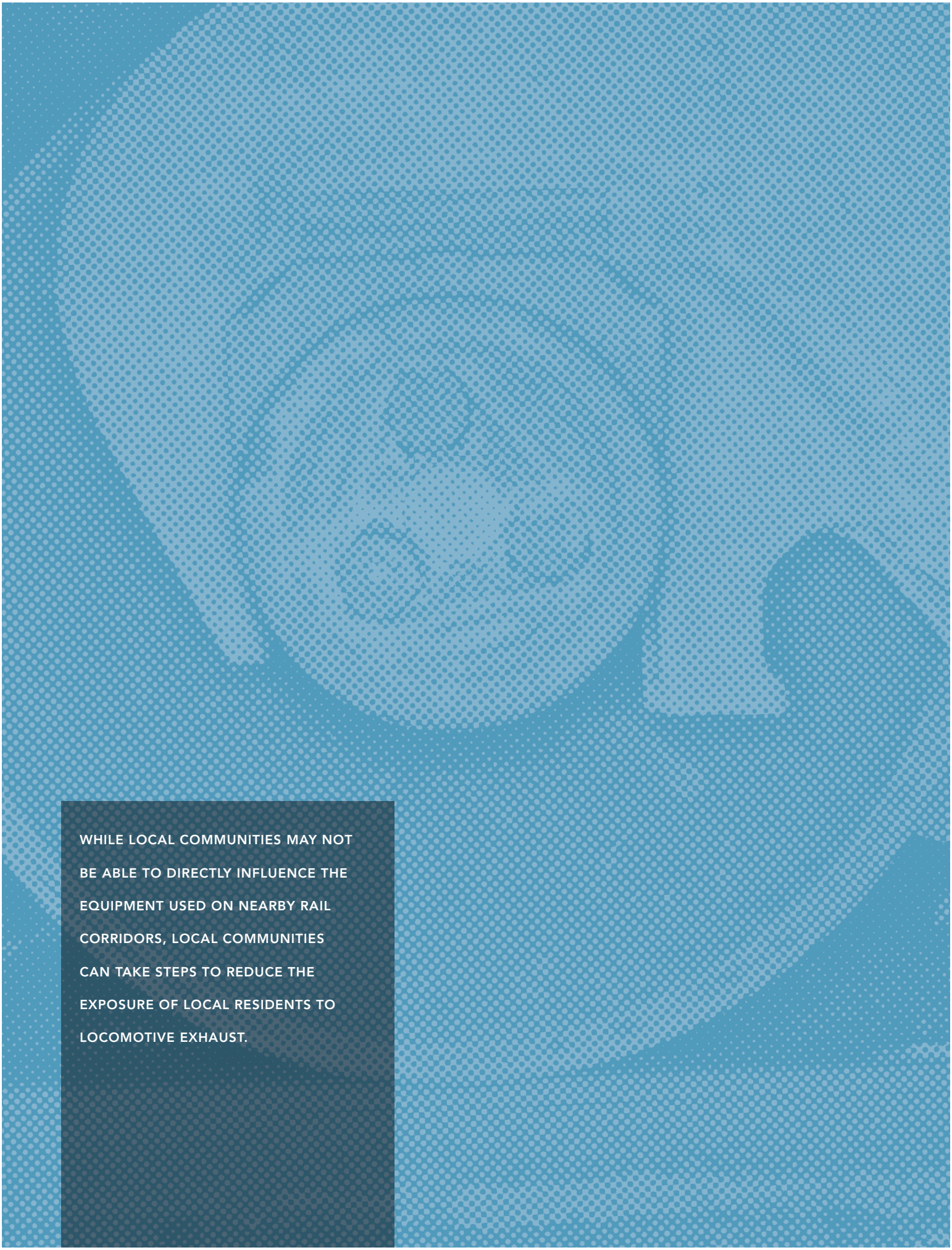
Truck routes could also have aesthetic impacts when they create substantial light or glare, which could affect day- or nighttime views in the area.

Aesthetic Impact Improvement

The aesthetic impacts of truck routes—both highways and local roads—can be reduced either during construction or afterwards. Strategies include:

- **Landscaping** to obscure the road from residents
- **Barrier walls**

Barrier walls can attract graffiti, but can possibly be reduced or prevented when combined with landscaping or other features. Freeways add spillover light or glare to a surrounding community. These impacts can be reduced by covering light sources **(hooding of light sources)** or mounting streetlights at a lower level.[27]



WHILE LOCAL COMMUNITIES MAY NOT BE ABLE TO DIRECTLY INFLUENCE THE EQUIPMENT USED ON NEARBY RAIL CORRIDORS, LOCAL COMMUNITIES CAN TAKE STEPS TO REDUCE THE EXPOSURE OF LOCAL RESIDENTS TO LOCOMOTIVE EXHAUST.

CHAPTER FOUR

rail lines

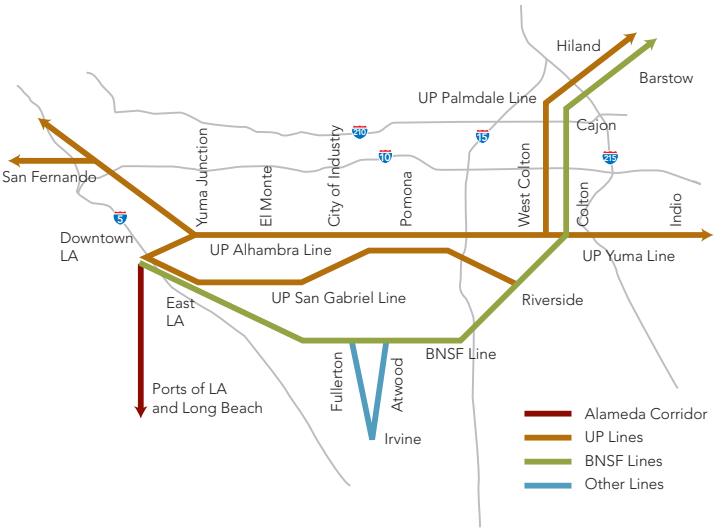
THE BURLINGTON NORTHERN SANTA FE Railway (BNSF) and the Union Pacific Railroad (UP) own and operate most rail lines in the six-county region. Pacific Harbor Lines is a short-line railroad, moving cars and equipment in and between the SPB ports and intermodal railyards. There are three main locomotive types operating in this region: 1) line-haul freight locomotives, 2) yard or switching locomotives, and 3) passenger locomotives. Line-haul and switching locomotives are involved in goods movement and account for the majority of the region's rail line environmental impacts.

photo by Bruce Montgomery

UP and BNSF own five main rail alignments in the area and the majority of rail freight moves along these main lines. BNSF's main line is the San Bernardino Subdivision between Barstow and downtown Los Angeles. The line is comprised of over 64 miles of tracks. UP's main lines are the Los Angeles Subdivision and the Alhambra Subdivision. These two alignments include 119 miles of track. UP currently handles over 50 freight trains per day and BNSF handles over 100 along their most heavily used rail line segments.[28]

Of special note is the Alameda Corridor (Corridor), a 20-mile freight rail expressway running between the SPB ports and the transcontinental railyards near downtown Los Angeles. The Corridor primarily transports imports and exports that move to and from the SPB ports to outside

FIGURE 4-1 UP AND BNSF REGIONAL RAIL SYSTEM (NOT TO SCALE)



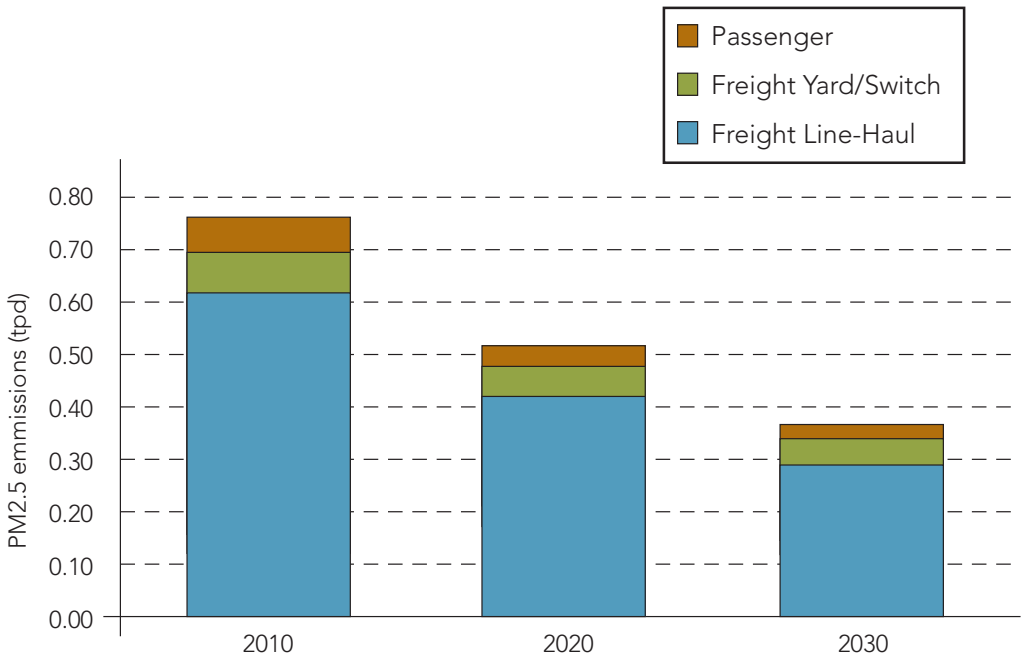
regions. Half of the Corridor is the Mid-Corridor-Trench, a ten-mile, below-ground railway that eliminated many at-grade railroad crossings. The Corridor currently handles an average of 55 train movements per day but is built to handle up to 150.[29]

AIR QUALITY

Air Quality Impacts

Railroad locomotives currently contribute 5-7% of total goods movement emissions in the region.[30] As a result of the new EPA standards, locomotive PM emissions will decline by 2020. More than 80% of railroad PM emissions come from line-haul freight locomotives. Railroad locomotives will produce 0.76 tons of PM emissions (PM2.5) per day in 2010, as shown in Figure 4-2.

FIGURE 4-2 BASELINE RAILROAD PM2.5 EMISSIONS IN SOUTH COAST AIR BASIN



Source: ARB, adjusted to reflect new EPA locomotive emission standards adopted March 14, 2008.

Like truck emissions, locomotive emissions are concentrated in corridors and at intermodal stations or railyards. The levels of emissions vary depending on the number of trains per day, the number of locomotives per train, and the types of locomotives. The busiest segments produce a significant amount of PM emissions per day. The magnitude of rail line emissions is generally much smaller than highway truck emissions. For example, the busiest truck corridor (I-710) produces ten times more emissions per mile than the busiest rail corridor. Table 4-1 on the following page shows the primary freight rail segments in the region with their corresponding daily train volume and PM2.5 emissions per mile.

Railroad emissions are greater where there is a large amount of train travel, such as in the Inland Empire (Riverside and San Bernardino Counties). In comparison, truck traffic and truck emissions are greatest in Los Angeles County. The health impacts of highway or rail segment emissions are greater in areas where population is dense.

THE BUSIEST TRUCK CORRIDOR (I-710) PRODUCES TEN TIMES MORE EMISSIONS THAN THE BUSIEST RAIL CORRIDOR.

TABLE 4-1 TRAIN VOLUME AND EMISSIONS, 2006

Rail Segment	*Average Train Volume (trains/day)*		
	Freight	*Passenger*	*PM2.5 Emissions per Mile (grams / day)*
BNSF Railway			
Barstow—San Bernardino	108	4	1,828
San Bernardino—Colton Crossing	100	19	1,782
Colton Crossing—West Riverside	116	19	1,980
West Riverside—Atwood	72	30	1,310
Atwood—Fullerton	64	14	1,110
Fullerton Jct.—Hobart	64	64	1,376
Hobart—Redondo	38	64	985

continued

Air Quality Improvement

Strategies to improve air quality include:

- Gen-set locomotives or hybrid locomotives
- Building filtration systems
- Restrictions on siting

Rail line emissions can be reduced by replacing older locomotives with newer, cleaner engines, or retrofitting the locomotive. The two major railroads in Southern California (UP and BNSF) currently operate locomotives that meet EPA emission standards. More stringent standards will begin to take effect in the next several years. In the future, railroads can further reduce their emissions by replacing their locomotives or by rebuilding existing engines.

Gen-set locomotives or hybrid locomotives save fuel and produce fewer emissions on short-haul railroad trips. Many of these locomotives are already in use

TABLE 4-1 TRAIN VOLUME AND EMISSIONS, 2006 *(continued)*			
	Average Train Volume (trains/day)		
Rail Segment	*Freight*	*Passenger*	*PM2.5 Emissions per Mile (grams / day)*
Union Pacific Railway			
Indio—Garnet	51	2	793
Garnet—Colton Crossing	51	2	793
Colton Crossing—West Colton	35	2	596
West Colton—City of Industry (Alhambra Line)	29	2	488
City of Industry—Yuma Jct.	27	2	450
Yuma Jct.—Pasadena Jct.	19	0	305
Pasadena Jct.—Ninth Street	24	12	448
West Riverside—Mira Loma	43	12	775
Mira Loma—East Los Angeles (San Gabriel Line)	39	12	748
East Los Angeles—Ninth Street	26	12	525
Yuma Jct—Santa Clarita	4	25	190
Alameda Corridor			
San Pedro Bay Ports—Downtown LA	55	0	902

Note: Emissions estimates reflect rail lines only and do not include railyard emissions (discussed in Section 5).
Source: Train volumes based on Leachman, R., Hicks, G., Fetty, G., Rieger, M. (2005): Inland Empire Railroad Mainline Study—Final Report; emissions calculated by ICF.

in the region.

While local communities may not be able to directly influence the equipment used on nearby rail corridors, local communities can take steps to reduce the exposure of local residents to locomotive exhaust. These strategies include building filtration systems and restrictions on siting new community services (e.g., schools, daycare centers) near the corridor.

NOISE

Noise Impacts

Locomotive and freight car pass-bys, train horns and whistles, and wheel friction on tight curves are the main rail line noise sources. Noise impacts vary depending on the number and types of locomotives, the weight of freight cars, and how the track is constructed. The level of train noise depends upon the distance from the track, the elevations of noise sources, and the duration of a train pass-by. The FTA and FRA have developed models and methods to estimate passenger train noise impacts.[31, 32] The same tools can be applied to freight train noise impacts.

Noise exposures from trains are often calculated as one-hour or twenty-four-hour averages. Train noise exposure is influenced by several factors, including the lengths of the locomotive(s) and freight cars, the train speed, the condition of the track, and time-of-day. Figure 4-3 shows the average exposures for a typical train configuration for various numbers of trains per day.

Many cities and counties have noise exposure standards. The FTA's noise impact criteria are an example of how the significance of noise impacts may be defined.

The FTA defines three categories for land uses that are sensitive to noise impacts, or "sensitive receptors."[33] Categories 1 and 2 include land uses for which quiet is an essential element (e.g., recording studios, outdoor amphitheaters, and residences). Noise impact criteria are most restrictive for Category 1 and 2 land uses. The FTA criteria are stated in two alternative forms.

The first applies when surrounding noise levels are below 43 dBA L_{eq} The second form is a set of total, or absolute, noise levels. The absolute noise criteria are shown in Table 4-3.

FIGURE 4-3 TYPICAL FREIGHT TRAIN NOISE EXPOSURES

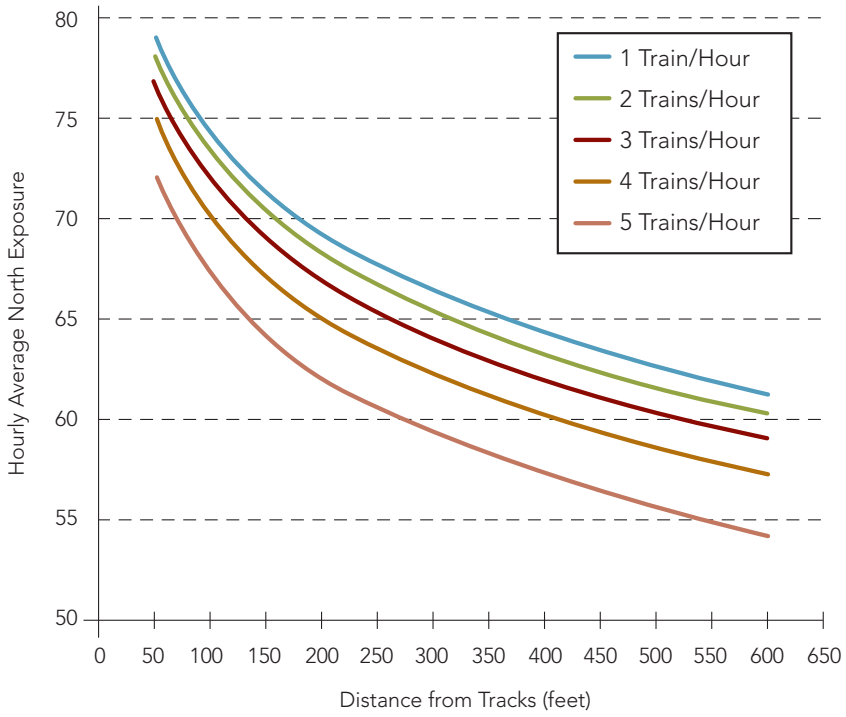


TABLE 4-3 FTA NOISE IMPACT CRITERIA

Existing Noise Exposure (dBA)	*Allowable Project Exposure (dBA)*
45	51
50	53
55	55
60	57
65	60
70	64
75	65

Source: FTA. 2006. Transit Noise and Vibration Impact Assessment. Office of Planning and Environment. FTA-VA-90-1003-06. May.

Noise Impact Improvement

Several strategies reduce noise impacts from freight trains and include:

- Land use planning to avoid incompatible uses
- **Soundproofing** of affected dwellings
- Installation of **noise barriers**
- **Quiet zone** infrastructure improvements
- Operational changes to reduce train horn noise

Noise shielding at specific locations is a common strategy. Installation of noise barriers along affected properties and/or soundproofing of affected structures can reduce noise impacts. Providing noise shielding along the railroad right-of-way may be effective in some cases if the barrier is located close to the rail line. In general, a noise barrier is typically not effective unless located close to the source or to the affected party.

Infrastructure improvements along rail lines can reduce the need to sound train horns, thus reducing noise impacts to communities near a railroad crossing. Infrastructure improvements include a quiet zone (with certain safety measures installed), grade-separation, or dead-end streets. However, these infrastructure improvements may be costly and are the responsibility of local governments not the railroads. Local communities can reduce noise exposure from trains through land use planning and policies. Such strategies and policies move residents away from train traffic, reduce noise exposure, or discourage new development near rail lines.

CASE STUDY
CITY OF COLTON

Located at the crossing of two main lines and near two major railyards, the City of Colton community experiences frequent noise from locomotive horns. The Community Feedback Group identified soundproofing of homes and quiet zone infrastructure as possible improvements for consideration.

TRAFFIC AND SAFETY

Traffic and Safety Impacts

Rail lines can affect local and regional traffic in several ways. Rail lines can have significant local traffic impacts at railroad crossings. The interrupted flow of traffic at railroad crossings can cause heavy local congestion, with local residents experiencing lost productivity and increased fuel costs.

Congestion levels at intersections are expressed in terms of Level of Service (LOS), a letter grading system ranging from A (best) to F (worst).[34] Grades are assigned based on the average delay per vehicle (in seconds per vehicle).

Intersections with LOS A operate with little delay, while intersections with LOS F experience heavy congestion. This grading system is presented in Table 4-4.

TABLE 4-4 LEVEL OF SERVICE DEFINITIONS AT GRADE CROSSINGS

Level of Service	*Average Delay per Vehicle (seconds/vehicle)*
A	< 5
B	5—10
C	10—20
D	20—30
E	30—45
F	> 45

Source: Transportation Research Board. 2000. Highway Capacity Manual, 4th ed. National Research Council. Washington, DC.

Vehicle delay is greater at busy rail crossings, and depends on both the amount of vehicle traffic and rail traffic (see Table 4-5).[35] Other factors that influence delay include the train length and the number of roadway lanes. At-grade railroad crossings with relatively low vehicle traffic volumes and few train trips operate at LOS C or better. In locations with moderate or frequent train movements, rail crossings operate at or below LOS E.

Traffic and Safety Improvement

Rail crossing traffic and safety issues can be reduced by:

- Redirecting traffic from at-grade crossings
- Separating the rail crossing from cars (grade-separated)
- Providing pedestrian over- or under-crossings

Local communities can calm traffic with methods that **redirect traffic** to grade-separated crossings, which are not delayed by trains. Communities can improve safety at rail crossings by installing or **upgrading traffic control systems**. These systems alert cars of approaching trains and restrict car and pedestrian movement across rail lines. These systems also redirect traffic by timing nearby stoplights.

CASE STUDY

CITY OF COLTON

The South Colton community has a rail spur that runs in the middle of a city street with multiple crossings across a short distance. To address safety and traffic congestion impacts, the Community Feedback Group identified the need to study redesigning local traffic circulation and improved crossing infrastructure.

Vehicle-train conflicts can be eliminated with **grade-separation** infrastructure. Grade-separation involves construction of a roadway bridge over railroad tracks or an underpass. More than 40 grade separation projects have been proposed for the UP and BNSF lines in the region. These infrastructure projects are costly. The Trade Corridor Improvement Fund estimates most planned grade separations to cost between $30 and $90 million, with one project costing as much as $189 million.[36] Similarly, safety at crossings with heavy pedestrian traffic may be improved with over- or under-crossings for pedestrians either as part of roadway bridges or under-passes or as stand-alone facilities.

AESTHETICS

Aesthetic Impacts

Aside from rail yards, most of the aesthetic impacts of rail lines are caused by the intensity of use, type of equipment and maintenance and upkeep of tracks and wayside properties. The height of train cars can also contribute to visual impacts—freight trains with double-stacked container cars can reach a height of up to 20 feet, which can reduce views of scenic vistas.

TABLE 4-5 DELAY AND LEVEL OF SERVICE AT RAIL CROSSINGS

Vehicle Traffic	*Rail Traffic*					
	Low 25 trains / day		*Moderate 50 trains / day*		*High 100 trains / day*	
	Delay hrs/day	*LOS*	*Delay hrs/day*	*LOS*	*Delay hrs/day*	*LOS*
Low: 10,000 vehicles / day	0.11	C	0.46	D	1.46	F
Moderate: 25,000 vehicles / day	0.32	C	1.30	E	4.15	F
High: 40,000 vehicles / day	0.60	D	2.41	F	7.70	F

Source: ICF International 2008. Analysis of Goods Movement Emission Reduction Strategies, Task 1 Final Report. Prepared for Southern California Association of Governments. January.

Aesthetic Impact Improvement

Many of the strategies to reduce visual impacts are similar to those for truck routes, including:

- Setbacks
- Barrier walls
- Selective **landscaping**

Localities can also work with railroads to either negotiate improved maintenance (such as trash removal) or a local jurisdiction can choose to take on maintenance and upkeep. Unlike truck routes, rail lines are typically unlit, except at railroad crossings and railyards (discussed in Chapter 5). Barrier walls can attract graffiti, but this can possibly be reduced or prevented when combined with landscaping or other features. There is typically no need to address spillover light or glare at rail lines.

RAILYARDS SUPPORT A VARIETY OF OPERATIONS INCLUDING: LOCOMOTIVES, ON-ROAD AND OFF-ROAD TRUCKS, CARGO-HANDLING EQUIPMENT, TRANSPORTATION REFRIGERATION UNITS AND MAINTENANCE SHOPS.

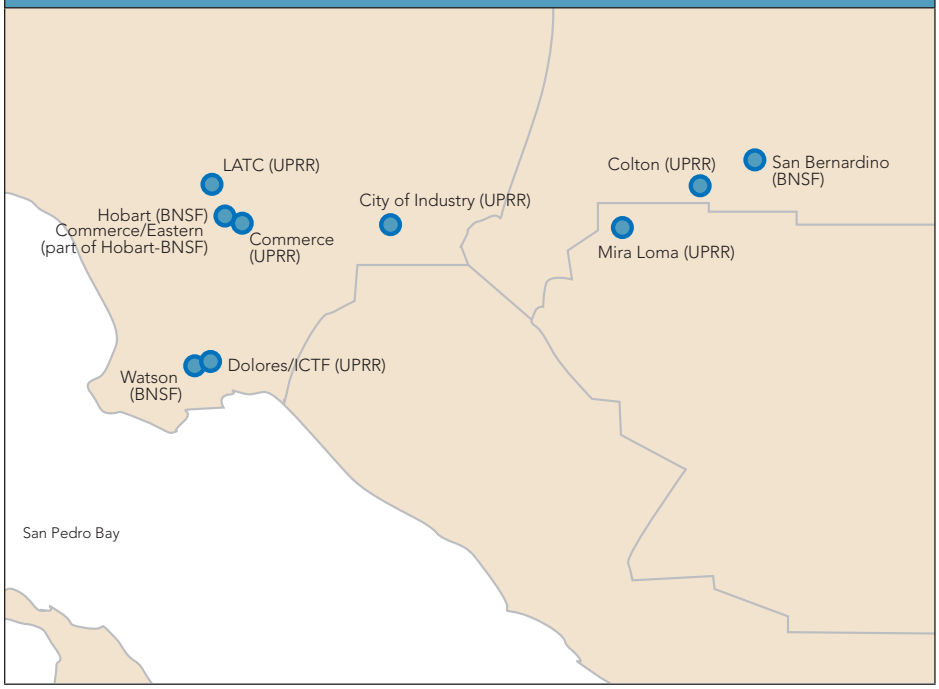
CHAPTER FIVE

railyards

RAILYARDS ARE ANOTHER MAJOR component of the goods movement system in Southern California. Railyards are used for switching rail cars to make up or break down trains. Many railyards contain facilities that transfer containers and trailers between trucks and rail cars. Some railyards include locomotive maintenance facilities. They are often sited in mixed industrial and residential areas.

There are nine major railyards in the Southern California region, shown in Figure 5-1. All are owned and operated by either the UP or BNSF railroads. These railyards support a variety of operations including: locomotives, on-road and off-road trucks, cargo-handling equipment, transportation refrigeration units (TRUs), maintenance shops, and others. Activity at railyards can be measured in a variety of ways including: the number of locomotives and their time of operation, truck counts at facility gates, the number of pieces of cargo-handling equipment and their time of operation, or the number of container "lifts."

FIGURE 5-1 LOS ANGELES AREA—MAJOR CLASS I RAILYARDS



AIR QUALITY

Air Quality Impacts

Railyards contain locomotives, cargo-handling equipment, on-road trucks, as well as off-road vehicles and stationary equipment. Railyards equipped to handle truck to train transfer of goods (intermodal facilities) attract heavy truck traffic. All of these sources burn diesel fuel and emit toxic air contaminants such as diesel particulate matter. The number of locomotives and intensity of their use, the volume of on-road trucks serving the facility, and the activity of other diesel equipment used in the railyard contribute to railyard emissions.

In 2005, UP, BNSF and ARB agreed to reduce railroad pollution.[37] This agreement requires that Health Risk Assessments (HRAs) be conducted for 17 designated railyards in the State of California. A number of railyard HRAs were conducted among Southern California's nine railyards in 2007 and 2008. These assessments focused on the health risks associated with diesel pollution. Each assessment included analysis to estimate potential cancer risk associated with railyard emissions.

The sources of diesel particulate matter (DPM) and the total emissions per year were identified. Locomotives were the dominant source of DPM emis-

TABLE 5-1 RAILYARD DPM EMISSIONS BY SOURCE TYPE (TONS/YEAR) AND PERCENT CONTRIBUTION, 2005

Railyard	*Locomotives*		*Cargo-Handling Equipment*		*On-Road Trucks*		*Off-Road Trucks and Stationary Sources*		*Total*
BNSF San Bernardino[38]	10.6	48%	3.7	17%	4.4	20%	0.75	3%	22.0
UP Colton[39]	16.3	99%	NA	NA	0.2	1%	0.05	0.3%	16.5
UP City of Industry[40]	5.9	54%	2.8	26%	2.0	18%	0.3	3%	10.9
UP ICTF/ Dolores[41]	9.8	41%	4.4	19%	7.5	32%	2.0	8%	23.7
UP Commerce[42]	4.9	40%	4.8	40%	2.0	17%	0.4	3%	12.1
UP LATC[43]	3.2	44%	2.7	37%	1.0	14%	0.50	7%	7.3
UP Mira Loma[44]	4.4	90%	NA	NA	0.2	4%	0.2	4%	4.9
BNSF Hobart[45]	5.9	25%	4.2	18%	10.1	42%	3.7	15.5%	23.9
BNSF Watson[46]	1.9	100%	NA	NA	<0.01	<1%	0.04	<1%	1.9

sions for all of the railyards evaluated in the region. ARB collected data on the types of locomotives and what locomotives were doing (i.e., moving, idling, or undergoing maintenance testing). ARB estimated locomotive emissions and modeled the air quality impacts on the surrounding community.

Emissions vary by source type and railyard. Total emissions from the Southern California region's nine major railyards range from 4.9 tons per year to 23.9 tons per year, with the highest level of emissions recorded at the BNSF Hobart yard, one of the largest railyards in the nation, which is located just south and east of downtown Los Angeles. Locomotives tend to be the highest emitting source, followed by cargo handling equipment and on-road trucks. Off-road trucks and stationary sources have the lowest emissions among source types. Table 5-1 shows the types of emission sources in the region's nine major railyards.

HRAs focused on potential cancer risk. Cancer risk is evaluated as the number of chances of getting cancer in a certain population (one million people). The risk of cancer at multiple distances from the railyard was estimated. The risk

TABLE 5-2 CANCER RISK ESTIMATES REPORTED BY HRAS OF SOUTHERN CALIFORNIA RAILYARDS, 2005

Railyard	*Risk At PMI (per One Million)*	*Risk At Boundary (per One Million)*	*Risk per One Million (by Distance from Boundary of Railyard)*						
			200 yards	*400 yards*	*0.5 miles*	*1 mile*	*1.5 miles*	*2 miles*	*4+ miles*
BNSF San Bernardino[47]	3300	> 500	NA	NA	100	50	NA	25	NA
UP Colton[48]	575	> 250	250	100	50	25	NA	≤10	NA
UP City of Industry[49]	480	100-250	NA	NA	50	25	NA	10	NA
UP ICTF/ Dolores[50]	1200	700	NA	NA	NA	100	NA	25	≤10
UP Commerce[51]	650	> 500	NA	>250	100	50	NA	25	≤10
UP LATC[52]	430	100-250	NA	NA	50	25	NA	10	NA
UP Mira Loma[53]	160	50	NA	NA	25	NA	10	NA	NA
BNSF Hobart[54]	3000	> 500	NA	>250a	>250b	100	NA	50	10
BNSF Watson[55]	220	> 100	NA	NA	> 50	10	NA	NA	NA

of cancer was also estimated at the point of maximum impact (PMI). The PMI is the location with the highest cancer risk level outside of the railyard boundary. Table 5-2 summarizes the cancer risk estimates in railyards in Southern California.

The BNSF San Bernardino and BNSF Hobart railyards were reported as the top two sites associated with the highest potential risk of cancer. The largest cancer risk area ranged from 3,000 to 3,300 chances per one million individuals. Risk decreased at the boundary of the railyard, and continued to decrease outside the boundary of the railyard. The UP ICTF/Dolores Railyard had the highest potential cancer risk at its boundary. Potential cancer risk was estimated to be 700 chances per one million people. In practically every assessment, potential cancer risk decreased outside the boundary of the railyard. Cancer risk remained the same (greater than 250 chances per one million

individuals) at 0.5 mile from the boundary of the the cluster of railyards near the City of Commerce (UP LATC, BNSF Hobart, BNSF Commerce/Eastern, and UP Commerce). Risks consistently decreased, however, at 2 miles and 4+ miles from the boundary. Similarly, the HRA for the UP Mira Loma railyard indicated that the greatest cancer risk is located on the northeast fence line of the property and is estimated to be 160 chances per million people. The cancer risk at the boundary of the facility is estimated to be 50 chances per million. Cancer risk decreases with increased distance from the facility: 25 chances per million at 0.5 miles from the facility, and 10 chances per million at 1.5 miles from the facility.

The HRAs concluded that diesel emissions from all railyard sources can exceed 20 tons per year. As shown in Table 5-2, PMI potential cancer risks associated with railyards may range from 160 to 3,300 chances per one million individuals. Studies predicted that potential cancer risk decreased with greater distance from railyards. The potential cancer risk at 2 or more miles from the railyard is significantly lower than the risk at railyard boundaries.

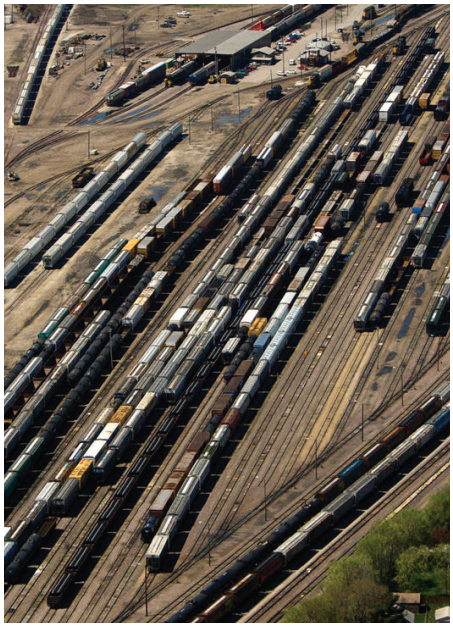
Air Quality Improvement

Strategies to improve air quality include:

- **Hybrid and generator-set, or "gen-set" locomotives**
- **Appointment** and **scheduling systems**
- **Infrastructure improvements**
- **Exhaust retrofits**
- Alternative fuels (such as **biodiesel**)
- **Building filtration systems**
- Restrictions on **siting new community services**

The emissions at railyards can be reduced by operating cleaner locomotives. Potential strategies tend to target switcher locomotives, which move rail cars in the yard and may be old equipment retired from line-haul use. New technologies for switcher locomotives, such as hybrid and gen-set locomotives, can substantially cut emissions and save fuel costs for the railroads.

Railyard emissions can also be reduced by limiting the idling of locomotives. A number of strategies reduce idling times when there is no operational need for engine idling. Strategies include operator training and technology use, such as an auxiliary power unit (APU) or an automatic engine start-stop (AESS) device.



Railyards with significant truck traffic can reduce emissions with policies and programs to streamline truck use. These policies include: appointment and scheduling systems, as well as infrastructure improvements at loading platforms and parking facilities. These policies allow trucks to move goods with less downtime and congestion, and reduce fuel consumption.

Many railyards use yard trucks, cranes, and other types of cargo handling equipment. Emissions from this equipment can be reduced with exhaust retrofits, alternative fuels (such as biodiesel), engine repowering, or electrification.

Local communities can take steps to reduce the exposure of local residents to railyard air pollution. These strategies include building filtration systems and restrictions on siting new community services—including schools and daycare centers—near railyards.

NOISE

Noise Impacts

Noise from railyards can significantly impact neighboring communities. Noise sources associated with railyard operations include: locomotive engines, horns and whistles, and switching and moving operations. In addition, noise from associated truck and railroad traffic can impact nearby communities. The significance of the impacts depends on the distances between railyards and sensitive land uses, and background noise levels.

Noise Impact Improvement

Several strategies reduce noise impact from railyards, including:

- Land use planning
- **Soundproofing** of affected dwellings
- Installation of **noise barriers** along sensitive land uses
- Operational practices to reduce noise generation (**operating restrictions**)

Typical measures provide noise shielding and can include the installation of noise barriers along affected properties and soundproofing of affected structures. The noise source can also be shielded.

Railyard operators can reduce noise generation with operating restrictions and programs, which include limiting idling time and reducing train speed. Operation practices reduce noise emissions at lower costs than noise shielding.

Local communities can reduce noise exposure from railyard operation through land use planning and policies. These strategies discourage new development near railyards.

TRAFFIC AND SAFETY

Traffic and Safety Impacts

Railyards and facilities contribute to traffic congestion and safety issues on roadways when they generate large numbers of truck trips. The flow of trucks entering or exiting a railyard can cause congestion, which affects cars and other trucks, and can affect residential and commercial areas.

Truck traffic to and from railyards can be high. The main source of traffic is from drayage trucks, which transfer cargo containers between railyards and local freight facilities including ports and distribution centers. Typically, railyards are connected to nearby freeways by only a few routes that are built to handle truck traffic. Because of this, residents along these truck routes can experience impacts from these truck trips including air quality, traffic safety, and traffic congestion.

In Southern California, some of the greatest railyard truck impacts occur near the UP Dolores / ICTF intermodal yard in Long Beach and the cluster of railyards near the City of Commerce (UP LATC, BNSF Hobart, BNSF Commerce/ Eastern, and UP Commerce). The UP Dolores / ICTF railyard, which is four miles from the SPB ports, generated more than 2,500 truck trips per day in 2005.[56] While the railyard has sufficient freeway access (it is positioned near the intersections of I-710 and I-405 freeways), it has only two established heavy truck routes. Of these two routes, traffic and air quality impacts from the southerly route is of most concern, since it passes through residential neighborhoods in West Long Beach.

CASE STUDY
MIRA LOMA

Community activists in Mira Loma successfully engaged the local railyard operator in re-aligning truck access points to reduce truck traffic in nearby residential areas. To further reduce these impacts, the Community Feedback Group prioritized establishing clearly designated and signed truck routes away from sensitive land uses as a strategy to improve public safety.

Truck traffic at many railyards is expected to grow significantly over the next decade as the volume of intermodal freight movement grows. For example, UP is planning a modernization project within ICTF, which will greatly expand cargo capacity of rail traffic. As a result, truck traffic to and from the railyard is projected to double, to nearly two million truck trips per year.[57] BNSF is planning a new near-dock railyard project south of the ICTF yard, which will further increase railyard truck traffic in the area.

Traffic and Safety Improvement

Strategies to reduce railyard traffic and safety impacts are similar to those for other large truck trip generators. **Designated truck routes** limit traffic congestion in some locations, and direct trucks away from residential areas, reducing the noise and air quality impacts.

AESTHETICS

Aesthetic Impacts

Railyards have negative visual impacts when equipment or facilities block vistas or create excessive light or glare. The sheer size of railyards can potentially make these impacts more severe. Colton Railyard, for example, is 5.5 miles long and almost 1/3 of a mile wide. Because of the space required, railyards are predominantly located in industrial areas, where their visual impacts tend to be less significant.

Aesthetic Impact Improvement

Railyards share many attributes with other industrial land uses. Many industrial area strategies for aesthetic impacts apply to railyards. Many cities have guidelines that apply to all industrial land uses including:

- Bordering walls
- Lighting controls
- Landscaping

Bordering walls block visual impacts and reduce noise impacts. Many zoning regulations, such as setback requirement and height restrictions, reduce railyard visual impacts. Local city and county governments can use landscaping, such as trees, shrubbery, vines, and groundcovers as a visual barrier between railyards and the surrounding community.

IMPORTED GOODS ARE MERGED AND SORTED AT MANY SOUTHERN CALIFORNIA DISTRIBUTION CENTERS FOR DELIVERY TO DESTINATIONS ACROSS THE NATION.

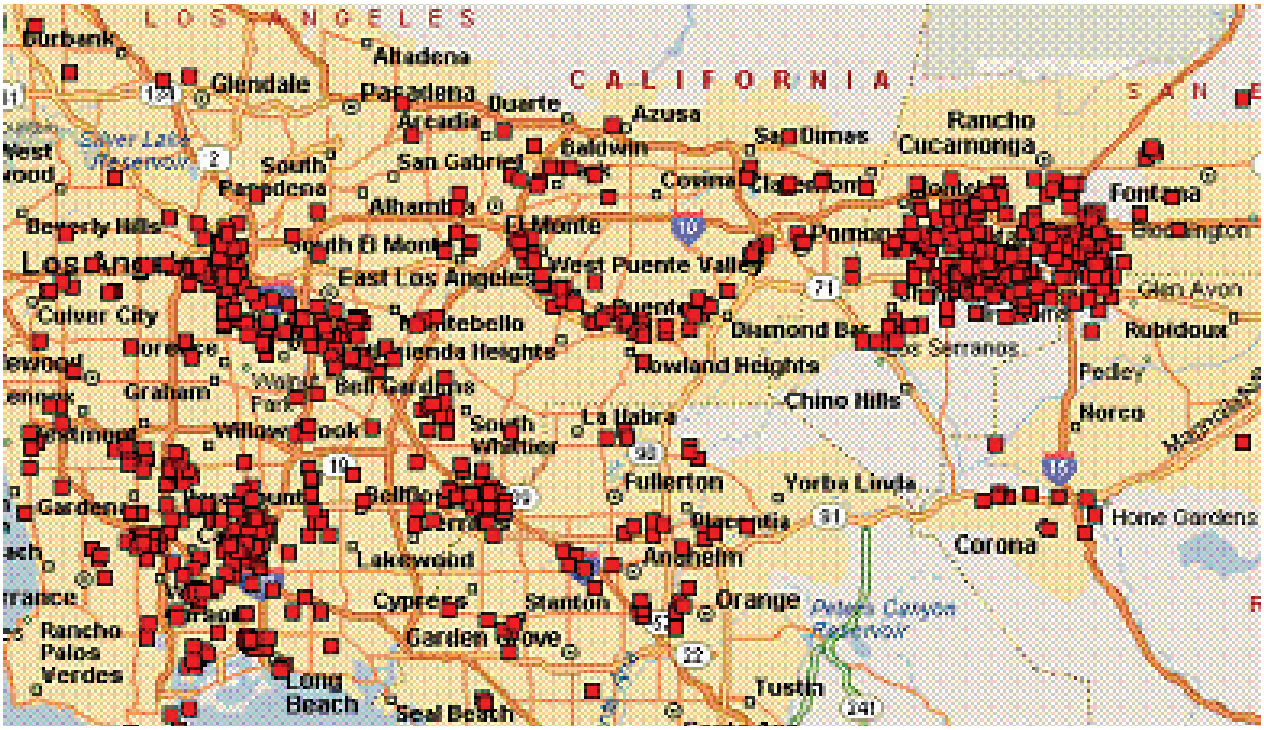
warehouses and distribution centers

WAREHOUSES AND DISTRIBUTION CENTERS are an important part of the regional goods movement system. These centers are used to receive, deliver, consolidate, distribute, and store freight. Imported goods are merged and sorted at many Southern California distribution centers for delivery to destinations across the nation. Many others serve as distribution hubs for the large retail markets in Southern California.

The locations of distribution centers overlap with manufacturing facilities and connection points between freeways, ports, where freeways connect with ports, airports, and railyards. The region's warehousing, distribution, and intermodal facilities account for 15% of the total U.S. market and 60% of the West Coast market.[58] The largest distribution centers can encompass millions of square feet. Figure 6-1 on the following page shows the location of distribution centers in the region.

Many distribution centers are clustered around major transportation links. Riverside and San Bernardino Counties support the largest cluster of warehouses, near Ontario Airport. Other warehouse clusters are found close to railyards near the intersection of I-5 and I-10, and along I-710.

FIGURE 6-1 LOCATION OF WAREHOUSES AND DISTRIBUTION CENTERS IN THE SCAG REGION



Source: SCAG. 2006. Inland Port Feasibility Study.

AIR QUALITY

Air Quality Impacts

Warehouses and distribution centers can be a significant source of air pollution for local communities. Emissions from these facilities are caused by truck traffic to and from the centers, truck idling, and the operation of equipment. The impacts of truck idling can be large; a recent warehouse study showed that 15 minutes of idling caused emissions that were 50% more than one truck trip's emissions.[59] Additional emissions can be caused by diesel-powered transportation refrigeration units (TRUs). TRUs are used for perishable goods (often called "reefers"). TRU diesel emissions can pose a health risk to individuals living or working near refrigerated distribution centers.[60]

ARB has adopted several control measures to reduce diesel emissions associated with warehouses and distribution centers. One measure targets truck idling by prohibiting unnecessary idling for more than five minutes at one location.[61] A second measure, which will be phased in between 2008 and 2019, requires

cleaner emission standards for TRUs currently in use.[62] A third measure will require existing (in-use) trucks to meet emission reduction standards beginning in 2010.[63] These warehouse-specific regulations, when combined with other EPA and ARB truck standards (Section 3.2), will improve air quality in neighborhoods surrounding warehouses and freight facilities.

The emissions from warehouse construction can also have impacts, due to the size and power of diesel equipment involved in construction projects. While construction emissions can be difficult to measure directly, they can be calculated using the URBEMIS emission model supported by the SCAQMD. URBEMIS combines data from other ARB models to characterize construction equipment, and uses a detailed schedule of construction tasks to estimate the total number and hours of equipment utilized. More information about URBEMIS can be found at the SCAQMD website.[64]

Air Quality Improvement

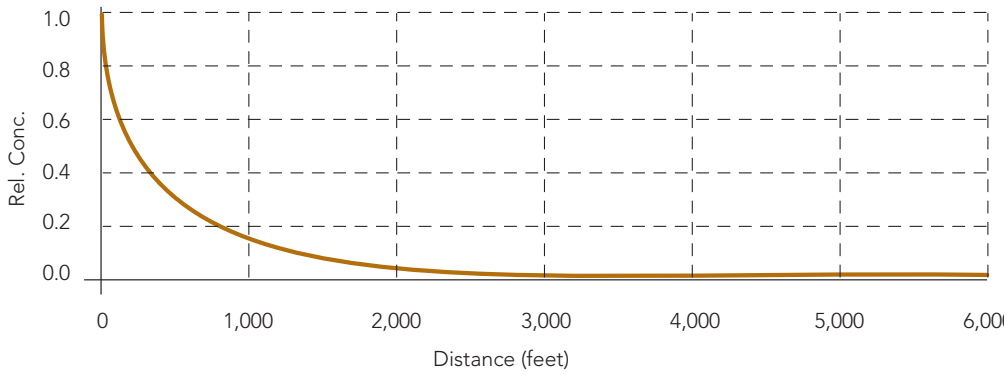
Limiting truck idling is one of the most effective strategies to reduce emissions at distribution centers. Strategies include:

- **Truck idle reduction**
- Limitations on emissions from truck trailers or containers

As described above, ARB has adopted a statewide regulation that limits truck idling. Truck idling can be reduced through on-site **truck idle reduction** policies enforced by distribution center owners and operators.

Additional strategies limit emissions from truck trailers or containers with TRUs, or "reefers." Reefers are a significant source of pollution since they operate continuously and tend to be concentrated in one location (see Figure 6-2). In 2004, ARB attempted to reduce reefer emissions by requiring TRU upgrades. The ruling is currently unenforceable and is pending a waiver from U.S. EPA.[65] Truck owners can upgrade to equipment with better

FIGURE 6-2 SENSITIVITY OF CONCENTRATION TO DOWNWIND DISTANCE FROM A DISTRIBUTION CENTER WITH TRUs



Source: California Air Resources Board. 2007. Health Risk Assessment for the Union Pacific Railroad Mira Loma Auto Facility Railyard. November.

emission controls.

NOISE

Noise Impacts

Warehouses and distribution centers can create noise impacts to neighboring communities. Typical noise sources include truck idling, truck entry and exit, and operating heavy-duty equipment. These noise impacts are greatest when heavy truck flow associated with a warehouse passes through residential neighborhoods and other sensitive land uses. In addition, warehouse activities such as freight loading and unloading can create additional noise impacts for nearby residents. Since warehouses and distribution centers are typically sited in industrial zones, noise impacts from their on-site operational activities are often lower than impacts from related truck and railroad traffic.

Doubling traffic on any given roadway causes a noise increase of approximately 3 dBA, which is considered barely perceptible to most people. When evaluating traffic noise impacts from warehouses and distribution centers, it is necessary to consider the noise-emitting characteristics of different vehicles. Truck traffic noise can be measured in terms of automobile traffic noise. For example, a medium-duty and a heavy-duty truck traveling at 55 miles per hour can produce noise similar to 5 and 13 automobiles, respectively.[66]

Noise Impact Improvement

Several strategies reduce noise impacts from warehouses and distribution centers, including:

- **Soundproofing** of affected dwellings
- Installation of **noise barriers**
- Operational **design features** or practices to reduce noise generation
- Land use planning

Typical measures, such as installing noise barriers along affected properties and soundproofing affected structures, provide noise shielding at affected land uses; the noise source can also be shielded. Noise shields could screen particular stationary equipment or along perimeter of the warehouse and distribution center.

Warehouse and distribution center operators can adjust operation practices to reduce noise generation. Practices to reduce noise generation include limiting loading and truck activities during evening and/or nighttime hours, and limiting unnecessary truck idling time. Operation practices may reduce noise emissions at lower cost than noise shielding.

Local communities reduce noise exposure from warehouse and distribution operation through land use planning and policies. Such strategies and policies discourage new residential development near the warehouse and distribution center.

CASE STUDY
COACHELLA VALLEY

Located in the eastern portion of Riverside County, the communities in the Coachella Valley anticipate significant community development in the long term, potentially including expansion of the Jacqueline Cochran Regional Airport as an inland port along with nearby supporting industrial and warehousing spaces. The area is also located close to State Route 86S (also known as a key part of the emerging "NAFTA Corridor" route connecting the California/Mexico border with points north) and Interstate 10. The Community Feedback Group identified advance land use and circulation planning for optimal placement of future facilities, residential and commercial land uses to maximize economic benefit and minimize potential impacts.

TRAFFIC AND SAFETY

Traffic and Safety Impacts

Residents near warehouses and distribution centers can experience higher traffic congestion due to heavy truck traffic. The scale of these impacts depends on the distribution center size, amount of use, and traffic levels on connecting roads. Traffic studies estimate that distribution centers in the Inland Empire region generate between 330 and 530 daily truck trips per million square feet of warehouse space.[67, 68] The amount of warehouse vehicles other than trucks causes additional traffic impacts. Vehicle trips vary between 1,100 and 1,600 daily vehicle trips per million square feet of warehouse space.[69, 70]

Truck and vehicle trip impacts can be greater if there are peaks during morning and evening hours. Studies show that most sites do not have peak periods.[71] Of 11 analyzed sites, only three showed peaks in passenger car trips and one showed peaks in truck trips.

CASE STUDY
CITY OF SOUTH GATE

Trucks frequently block local streets to back into warehouse facilities in the City of South Gate, causing traffic delays and unsafe conditions. The Community Feedback Group identified a number of potential strategies including adding signage at such facilities, and considering new City permit and code requirements that limit or prohibit backing at such facilities.

Traffic and Safety Improvement

Strategies to address traffic from distribution centers are similar to strategies for other freight facilities. Strategies include:

- Designated truck routes
- Facility improvements

Designated truck routes can help to limit traffic congestion in some locations, can channel trucks away from residential areas, and can reduce noise and air quality impacts.

Loading or unloading delays within a distribution center can lead to truck queues that spill over onto local roads, causing congestion. Delays occur when the number of shipments exceeds a facility's capacity. Facility improvements that allow for faster unloading, additional truck parking, or additional waiting areas for trucks can reduce traffic congestion on local roads.

Traffic Design

In addition to adding to the number of vehicles on local streets, large trucks require more space than cars to make turns onto streets or into driveways. Yet not all streets and intersections were originally designed to accommodate large trucks. Similarly, how driveways are positioned at facilities can force trucks to make tight turns or require backing into the facility, which may require the truck to block the connecting street and cause traffic delays and safety impacts.

Local communities can require new facility designs to ease truck traffic; well-designed access points provide easy maneuvering and are located away from nearby sensitive uses whenever possible. Specific intersections that accommodate high truck volumes and turns can be improved for safer truck travel and turns.

AESTHETICS

Aesthetic Impacts

Distribution centers can create visual impacts during construction and on-going impacts in operation. If a new facility is built on a site with scenic or aesthetic characteristics, there are visual impacts during construction. On-going impacts may be caused by excess light, by the industrial nature of building architecture or activities, or by shipping container stacking.

Distribution centers are scattered throughout Southern California and some are in close proximity to residential areas. As a result, many communities may be affected by the visual impacts of distribution centers.

Aesthetic Impact Improvement

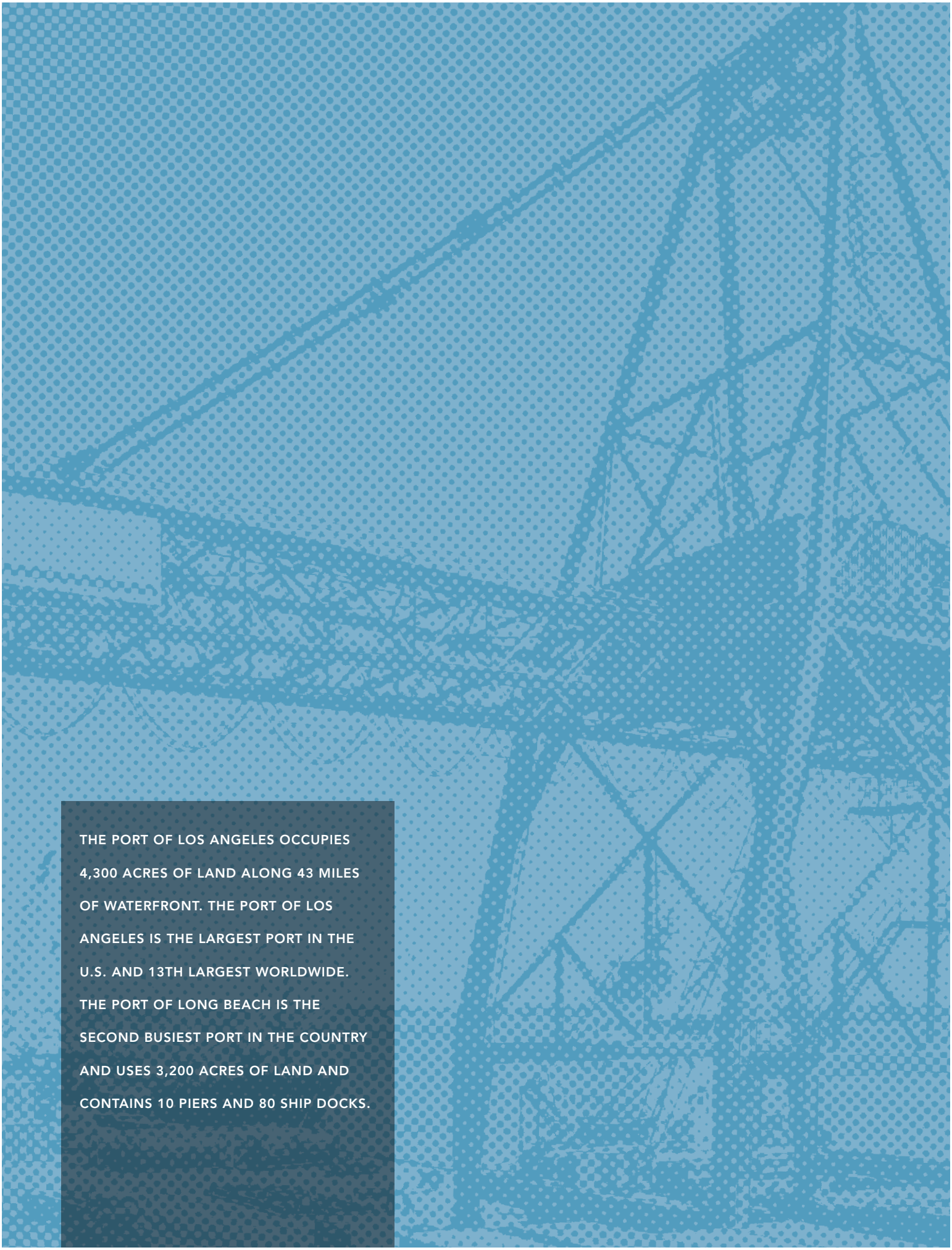
Aesthetic impact improvement strategies include:

- **Landscaping** requirements
- **Spillover light controls**

Communities can adopt regulations that target the visual impacts of distribution centers. Zoning regulations include landscaping requirements, such as trees, shrubbery, vines, and groundcovers, which serve as a visual shield between distribution centers and residential areas. These regulations can specify the number and location of plants and the total landscaping coverage.[72]

Communities can adopt regulations to limit the amount of excess light caused by light-industrial buildings. Spillover light controls include specifications on the type and location of light sources, and limits on the amount of spillover light from the property. For example, some cities require that lighting posts be less than 18 feet tall and include reflectors to direct light away from adjacent properties.[73]

Communities face different challenges in mitigating the visual impacts of distribution centers than they do with railyards and ports. The size of distribution centers can vary greatly from several thousand square feet to millions of square feet. This prevents a "one size fits all" approach. Communities must adapt improvement options to the size and operation of each distribution center, which are commonly operated by individual, independent corporations. Therefore, unlike railyards and ports, each "owner" will need to be approached individually to determine contacts and an approach to community enhancement.



THE PORT OF LOS ANGELES OCCUPIES 4,300 ACRES OF LAND ALONG 43 MILES OF WATERFRONT. THE PORT OF LOS ANGELES IS THE LARGEST PORT IN THE U.S. AND 13TH LARGEST WORLDWIDE. THE PORT OF LONG BEACH IS THE SECOND BUSIEST PORT IN THE COUNTRY AND USES 3,200 ACRES OF LAND AND CONTAINS 10 PIERS AND 80 SHIP DOCKS.

CHAPTER SEVEN

ports

THE LOS ANGELES AREA IS SERVED BY the seaports of Los Angeles, Long Beach, and Hueneme (in Ventura County). The SPB ports handle 80% of California's and over 30% of the nation's containerized trade.[74] The majority of trade is international. More than 81% of sea shipments are foreign imports. The SPB port complex is by far the largest in the nation and the fifth largest in the world.[75]

After cargo arrives at the SPB ports, it is transferred to its final destination by truck or rail. Half of container cargo travels by rail—21% is loaded onto rail cars at the dock and 20% is trucked to local railyards. Transporting goods by rail minimizes truck trips and reduces the number of trucks, which lowers emissions and increases safety in the region. The region's goods movement system is more productive with efficient railyards.[76]

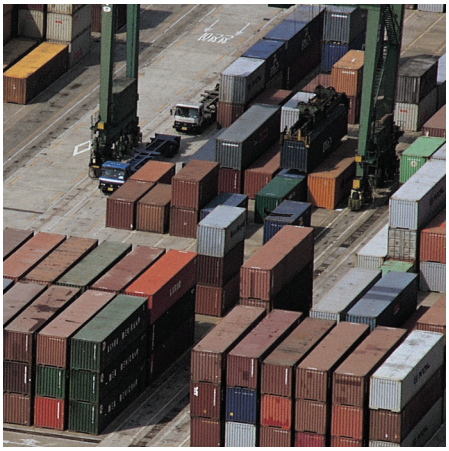
Port of Los Angeles

The Port of Los Angeles uses 4,300 acres of land along 43 miles of water-front. It is the largest port in the U.S. and 13th largest worldwide. The port handled 8.3 million containers in 2007. The port handled $240 billion in cargo and 1.2 million cruise ship passengers in 2006. Businesses at the port employ 22,800 workers in trucking, warehousing, shipping, and other non-cargo jobs.[77]

Each year 2,700 ships come to the Port of Los Angeles. This includes 80 shipping lines and 15 cruise lines.[78] The port has 27 major cargo terminals, including eight container terminals that handle bulk cargo. Most bulk cargo includes furniture, apparel, toys, electronic products, and automobile parts.

There are 71 cranes at these eight terminals. Seven of the terminals have on-dock rail (direct ship to rail car) facilities. An additional on-dock railyard will be constructed in 2009.[79] Railyards help to reduce truck trips to and from the port. The port is served by the Pacific Harbor Line, a small dispatching railroad.

Port of Long Beach



The Port of Long Beach, adjacent to the Port of Los Angeles, occupies 3,200 acres of land and contains 10 piers and 80 ship docks. The port handles over $140 billion in cargo and 7.3 million containers. It is the second busiest port in the country. Businesses at the port employ 29,800 in terminal operations, cargo, packing, retail, and other areas.[80]

The port's terminals handle container and bulk shipments; many import finished goods and export raw and recycled materials. The top imports include electronics, plastics, furniture, and clothing, while the top exports include waste paper, chemicals, scrap metal, and plastic.

The port has seven major container terminals that operate 73 cranes. Five of the terminals have on-dock rail facilities. Like the Port of Los Angeles, the Port of Long Beach is also connected to both UP and BNSF railroads via the Alameda Corridor, and is served by the Pacific Harbor Line.

AIR QUALITY

Air Quality Impacts

Marine port activities create air pollution, which impacts the region and local communities. Diesel engine-powered ocean-going ships, harbor craft, cargo handling equipment, trucks, and locomotives produce pollution. Ports are one of the biggest sources of diesel pollution in California. It is a top priority for the ARB and region governments to reduce diesel pollution at the ports, in surrounding communities, and throughout California.

The SPB ports generated 21% of diesel pollution emissions in the South Coast Air Basin, producing 2,236 tons of diesel pollution in 2006.[81] Table 7-1 shows the sources of SPB ports' diesel emissions.

TABLE 7-1 DIESEL PARTICULATE MATTER (DPM) EMISSIONS FROM THE SPB PORTS IN 2006

Source Type	Port of Los Angeles		Port of Long Beach		Both Ports	
	tons/yr	percent	tons/yr	percent	tons/yr	percent
Ocean Going Vessels	546	49%	670	60%	1,216	54%
Harbor Craft	52	5%	47	4%	99	4%
Cargo Handling Equipment	51	5%	40	4%	91	4%
Locomotives	72	6%	47	4%	119	5%
Heavy-Duty Vehicles	404	36%	307	28%	711	32%
Total	**1,125**	**100%**	**1,111**	**100%**	**2,236**	**100%**

Source: Port of Los Angeles. 2008. 2006 Air Emissions Inventory. July; Port of Long Beach. 2008. 2006 Air Emissions Inventory. June.

Ships are the largest source of diesel pollution at the SPB ports. Ships, or ocean-going vessels (OGVs), produced 54% of the SPB ports' diesel emissions in 2006. Ocean-going vessels include container ships, tanker ships, bulk carriers, automobile carriers, general cargo ships, roll-on roll-off ships, and cruise ships. Container ships generate most of ship diesel pollution (62%), followed by tankers (13%) and cruise ships (11%). Diesel pollution comes from ship forward motion, engines, and smaller sources. Ship diesel emissions are shown in Table 7-2 on the following page.

Freight trucks are the second largest source of emissions at the SPB ports, accounting for 32% of diesel emissions in 2006. The remaining source types, harbor craft, cargo handling equipment, and locomotives, together account for 13% of diesel emissions.

Commercial harbor craft, cargo-handling equipment, and locomotives also produce diesel pollution. Commercial harbor craft, including tugboats, ferries, small excursion craft, supply vessels, dredges, and service boats, help move large ships and provide supplies to the SPB ports. Commercial harbor craft includes: tugboats, ferries, small excursion craft, supply vessels, dredges, and service boats. Harbor craft tend to run on smaller diesel engines than larger ships. Tugboats produce over 50% of diesel pollution

TABLE 7-2 DPM EMISSIONS FROM OCEAN-GOING VESSELS AT THE SPB PORTS IN 2006

Vessel Type	Port of Los Angeles		Port of Long Beach		Both Ports	
	tons/yr	percent	tons/yr	percent	tons/yr	percent
Bulk Vessel	33	6%	53	8%	86	7%
Container Ship	345	63%	404	60%	749	62%
Cruise Ship	82	15%	51	8%	133	11%
Tanker	57	10%	98	15%	155	13%
Other	30	5%	64	10%	94	8%
Total	**547**	**100%**	**670**	**100%**	**1,217**	**100%**

Source: Port of Los Angeles. 2008. 2006 Air Emissions Inventory. July; Port of Long Beach. 2008. 2006 Air Emissions Inventory. June.

from commercial harbor craft. Cargo-handling equipment moves containers and bulk shipments. Cargo-handling equipment includes yard tractors, cranes, forklifts, and picks. Construction equipment may include tractors, loaders, dozers, excavators, and backhoes. Yard tractors are the most common type of handling equipment. Yard tractors produce 60% of cargo-handling equipment emissions.[82]

A study of emissions exposure conducted by ARB indicates that cancer risk is elevated more than 15 miles from the SPB ports due to diesel pollution.[71] Near the port boundaries, potential cancer risk exceeded 500 chances per million people. Potential cancer risk decreases with distance from the ports. Emissions from the ports also cause other health effects including premature death, asthma attacks, work loss days, and minor restricted activity days. Estimated health cases each year include:

- 120 premature deaths
- 750 asthma attacks
- 6,600 days of work lost for individuals aging from 18 to 65
- 35,000 minor restricted activity days for individuals ages 18 to 65

Other studies also show that the areas surrounding the SPB ports are affected by port pollution. An EPA study showed that diesel pollution from the SPB ports was found in an area approximately 12 times the size of the Port of Long Beach. Similarly, diesel pollution was found in an area approximately 9 times the size of the Port of Los Angeles.[83]

Air Quality Improvement

Air quality improvement strategies include:

- Vessel speed reduction
- Shore power/cold ironing
- Cleaner marine vessel fuels

The SPB ports have adopted the Clean Air Action Plan to reduce port pollution. The plan includes goals, emission reductions, and funding needs through 2011.[84] It includes 12 measures to control emissions from all major emission sources at the SPB ports. The plan includes the SPB ports' Clean Truck Program, which includes a ban on older trucks from entering the ports because older trucks tend to have higher emission levels. A fee placed on containers will fund the replacement and retrofit of these trucks. The plan could reduce the SPB ports' diesel emissions by more than 50%.

The SPB ports' voluntary vessel speed reduction (VSR) program limits ship speeds to 12 knots when 24 miles from the coastline to reduce ship pollution. In 2009, the ports will increase this to 40 nautical miles from the coastline.

Pollution from ship engines in the port can be eliminated using shore power/cold ironing strategies. Instead of running an engine, ships are electrically powered from the terminal. To work effectively, this strategy requires improvements to both terminals and ships.

Switching to cleaner marine vessel fuels with lower sulfur content also reduces diesel pollution. Most ships use residual oil bunker fuel, which has high sulfur content. ARB will require the use of lower sulfur fuel when ships are near the

port in July 2009 (within 20 miles). The Port of Long Beach offers incentives for ocean-going vessels to use the cleaner fuel sooner than the ARB requirements go into effect. Extending that requirement to a larger area or requiring the use of low sulfur fuel could further reduce pollution. Barriers to carrying out these strategies include fuel costs, methods to enforce rules, particularly among foreign carriers, and legal challenges.

NOISE

Noise Impacts

Noise impacts from port operations occur on-site as well as on nearby roads and rail lines. Often, the noise impacts from on-road operations and rail lines are greater than those from port property since truck and rail traffic tend to be closer to residential areas that are sensitive to noise.

Container ships, assist tugboats, cargo handling equipment, short-haul trucks, and switcher locomotives generate noise at ports. Particularly loud noises include "clanking" of containers when moved and truck horns. Loud noises from railways include locomotive engines, train horns, rail cars starts and stops, and rail car linking.[85] Industrial equipment also produces noise. Off-port noise sources include diesel trucks and trains.

Noise Impact Improvement

Most of the noise impacts from ports are from truck and rail activity, rather than on-site activity. Several strategies reduce noise impact from trucks, including:

- Traffic planning
- **Soundproofing** of affected dwellings
- Installation of **noise barriers**

Typical strategies provide noise shielding at affected areas. Measures include installation of noise barriers along affected properties and/or soundproofing of affected structures. Providing noise shielding along the railroad right-of-way is also possible. Noise barriers are effective when located close to the noise source or the affected area.

Local communities can reduce noise exposure from ports through traffic planning and/or land use policies. Such strategies and policies move truck traffic away from residents, reduce exposure to noise, or discourage new

development near truck routes. Traffic planning and land use policies typically focus on sensitive community services, such as schools and day care centers. Traffic planning and/or land use policies designate truck routes, to reduce truck traffic in neighborhoods. Reducing and enforcing truck speeds with strict speed limits may also reduce noise impacts.

Land use planning and policies can reduce train noise impacts as well. Such strategies and policies discourage new development near rail lines.

TABLE 7-3 CONTAINER TRUCK TRIPS AT INTERMODAL RAILYARDS ASSOCIATED WITH THE SPB PORTS (2007)

Container Type	*One-Way Trips*
Import	2,565,320
Export	431,314
Empty	2,782,894
All	**5,779,528**

Source: ARB 2007. Staff Report: Initial Statement of Reasons for Proposed Rulemaking—Proposed Regulation for Drayage Trucks, Appendix B: Emissions Estimation Methodology for On-Road Diesel-Fueled Heavy Duty Drayage Trucks at California's Ports and Intermodal Railyards.

TRAFFIC AND SAFETY

Traffic and Safety Impacts

Traffic impacts near the SPB ports are especially severe. The number of trucks and vehicles, the size of local roads, and the number of vehicles on regional freeways all contribute to congestion. I-710 and I-110 have the most port truck traffic because they link the SPB ports to major yards and east-west freeways. A traffic analysis conducted by the Port of Los Angeles determined that 16 nearby intersections operate in a congested state in the morning or evening. Average daily trips at the SPB ports exceed 49,500 truck trips and 34,000 auto trips.[86]

"Drayage" trucks travel to and from ports and railyards. Drayage trucks account for nearly 6 million truck trips in the region (see Table 7-3). As the SPB port activity grows, so will the number of truck trips to and from the ports. The number of drayage truck trips is projected to increase 50% by year 2014.[87] Drayage trucks mostly move empty containers or empty truck frames to and from the ports. One study suggests that only 2% of empty containers are reloaded before returning to the SPB ports.[88]

Traffic and Safety Improvement

The impacts of port truck traffic can be reduced using several strategies, such as shifting trips to off-peak times or using rail transportation. To shift trucks to off-peak times, the SPB ports participate in the PierPass program, which

offers incentives to trucks to operate at nights and on weekends.[89] Trucks must pay a fee if they visit the port during peak daytime hours. This program could be expanded by raising user fees or prolonging the hours fees are charged. However, an expanded program may result in higher noise and emissions impacts during evenings and weekends.

Truck trips can be further shifted from peak to off-peak times using a **scheduling or appointment system.** Under this system, truck traffic is tied to specific hours in the day. The Port of Los Angeles' "Terminal Gate Appointment System" streamlines truck arrivals and departures at certain terminals.[90] Scheduling systems keep labor costs low compared to **extended hours of operation.**

Directly transferring cargo to rail at ports can reduce truck trips. This requires expanding the rail infrastructure. **On-dock rail** reduces the number of truck trips to rail stations. Currently, 21% of cargo at the SPB ports is transferred directly to rail at on-dock rail facilities. A proposed increase in on-dock rail would eliminate 30,000 daily truck trips by 2035.[91]

AESTHETICS

Aesthetic Impacts

Existing port facilities located along scenic shoreline can have large visual impacts on surrounding communities. However, impacts from new port terminals and facilities at existing facilities are relatively small as they do not tend to change the visual character of the port.

Since many ports operate day and night, spillover of lighting or glare frequently impacts surrounding areas. Due to the large size of the SPB ports, most spillover light falls on adjacent port property rather than on residential property. As a result, spillover lighting at the SPB ports is not a great concern.

Aesthetic Impact Improvement

Since the SPB ports encompass such a large area, many construction projects on port property are removed from residential areas. Thus, visual impacts from port projects can be small. Ports or local governments can choose strategies to reduce the visual impacts of port projects, including:

- Landscaping
- Barrier walls
- Lighting restrictions

THE STRATEGIES OFFER A STARTING POINT FOR DISCUSSION OF IDEAS TO ADDRESS GOODS MOVEMENT-RELATED ISSUES. EACH COMMUNITY WILL NEED TO CREATE TAILORED SOLUTIONS TO FIT THEIR SITUATION'S OPPORTUNITIES AND CONSTRAINTS.

CHAPTER EIGHT

strategies

This chapter contains fact sheets for the following strategies that may be considered to address impacts from goods movement. The strategies do not represent a set of requirements or minimum standards. Rather, they offer a starting point for discussion of ideas to address goods movement-related issues. Each community will need to create tailored solutions to fit their situation's opportunities and constraints.

TABLE 8-1 SUMMARY OF STRATEGIES, TYPE OF STRATEGIES, AND FREIGHT MODE

Strategy	*Page*	*Category*				*Freight Modes*				
		AirQuality	*Noise*	*Traffic*	*Aesthetics*	*Trucks*	*Rail*	*Railyards*	*Distri-bution Centers*	*Ports*
Section 8.1: Air Quality Strategies										
Building Filtration Systems	8-4	•				•	•	•	•	•
Land Use Siting	8-6	•				•	•	•	•	•
Truck Idle Reduction	8-8	•						•	•	•
Alternative Fuels—Biodiesel	8-10	•				•				
Alternative Fuels—Natural Gas	8-12	•				•	•			
Engine Replacement	8-14	•				•				
Exhaust Retrofit—Diesel Oxidation Catalyst	8-16	•				•				
Exhaust Retrofit—Flow-Through Filter	8-18	•				•				
Exhaust Retrofit—Diesel Particulate Filter	8-20	•				•				

TABLE 8-1 SUMMARY OF STRATEGIES, TYPE OF STRATEGIES, AND FREIGHT MODE continued

Strategy	Page	Category				Freight Modes				
		AirQuality	Noise	Traffic	Aesthetics	Trucks	Rail	Railyards	Distri-bution Centers	Ports
Accelerated Truck Replacement	8-22	•				•				
Hybrid-Electric and Hybrid-Hydraulic Trucks	8-24	•				•	•			
Locomotive Idle Reduction	8-26	•					•	•		•
Accelerated Locomotive Replacement or Rebuild	8-28	•					•	•		
Hybrid or Gen-Set Locomotives	8-30	•					•			
Ocean-Going Vessel Speed Reduction	8-32	•								•
Ocean-Going Vessel Fuel Requirements	8-34	•								•
Shore Power/ Cold Ironing	8-36	•								•
Section 8.2: Noise Strategies										
Noise Barrier	8-38		•			•	•	•	•	•
Soundproofing Features	8-40		•			•	•	•	•	•
Project Design and Operation Procedures	8-42		•		•			•	•	•
Quiet Zones	8-44		•				•			
Section 8.3: Traffic and Safety Strategies										
Traffic Planning Tools	8-46	•	•	•	•	•		•	•	•
Truck Parking Regulations	8-48			•	•	•		•	•	•
Designated Truck Routes	8-50			•		•		•	•	

TABLE 8-1 SUMMARY OF STRATEGIES, TYPE OF STRATEGIES, AND FREIGHT MODE continued

Strategy	Page	Category				Freight Modes				
		AirQuality	Noise	Traffic	Aesthetics	Trucks	Rail	Railyards	Distri-bution Centers	Ports
Highway Incident Management for Trucks	8-52			•		•				
Rail-Highway Grade Separation	8-54			•			•			
Upgraded Rail Crossing Systems	8-56			•			•			
Traffic Redirection	8-58			•			•			
Scheduling and Appointment Systems	8-60	•		•				•	•	•
Extended Hours of Operation	8-62	•		•				•	•	•
Expansion of On-Dock Rail Service	8-64			•				•		•
Virtual Container Yard	8-66			•					•	
Section 8.4: Aesthetic Impact Strategies										
Spillover Lighting Controls	8-68				•			•	•	•
Landscaping	8-70				•			•	•	•

Key to strategy timeframes

A general guide to the relative timeframe necessary to implement each strategy. These ranges are:

Short: 0–5 years

Mid: 5–10 years

Long: 10+ years

Key to strategy costs

A general guide to range of estimated costs is indicated for each strategy ($, $$, $$$ or $$$$). These ranges are:

$: less than $10,000

$$: $10,001—$100,000

$$$: $100,001—$1 million

$$$$: greater than $1 million

8.1 AIR QUALITY STRATEGIES

Strategy: Building Filtration Systems

AT A GLANCE

Building filtration systems can remove particulates from indoor air, reducing exposure to children at school.

Description

Filtration systems can be installed in residential and commercial buildings to provide fresh air filtration, reducing exposure to diesel PM. Heating, ventilation, and air conditioning (HVAC) systems can be equipped with high efficiency filters for particulates and a carbon filter can remove other chemical matter. Ventilation systems can thus protect people, especially children, elderly and those with health conditions from diesel emissions coming from trucks, locomotives and yard equipment.

The placement of the air intake for HVAC systems needs to be done so that it deals most effectively with the sources of air pollution (this is pre-determined through modeling and scientific analysis). Regular maintenance for the HVAC and filtration systems should also be planned to ensure that intake is not blocked and filters and systems are working most effectively.

The Port of Long Beach provides grants to schools, preschool and daycare centers near its facility to purchase and install high efficiency filters and HVAC systems.

Benefits

- A well-designed system would remove 80% of fine particulates and have added health benefits in terms of reducing allergens in the air.

Challenges

- Best suited for buildings near large pollution sources, such as freeways or railyards.

Costs

- Filtration systems can be added to current HVAC systems at modest cost.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Encourage schools and childcare facilities to install PM filtration systems if they are located near PM sources. *Potential Partners:* Local communities, school districts, cities, air districts, First Five Commissions of California (provide funding for programs for children ages 0-5), department of public health.	Short	$
Require health risk assessment studies for new childcare centers to determine if filtration systems are necessary. *Potential Partners: Cities and counties, department of public health.*	Short	$
Seek grants for existing child care centers to upgrade HVAC systems. *Potential Partners: Cities, counties,* air districts, *First 5 Commissions, department of public health.*	Short	$
Recommend filtration systems for new buildings constructed near pollution sources. *Potential Partners: Cities, counties, department of public health,* air districts.	Short	$

AT A GLANCE

When schools are sited at least 500 feet away from freeways, students benefit from cleaner air and health risks are reduced.

Strategy: Land Use Siting

Description

Local and regional governments and school districts can protect children and other sensitive individuals by siting new schools, libraries, day care centers, and senior centers away from diesel emission sources. ARB recommends siting new land uses likely to serve sensitive individuals at least 500 feet away from freeways or high-traffic roads, defined as roads with at least 100,000 vehicles per day in urban areas, or 50,000 per day in rural areas. Siting these land uses within 1,000 feet of a major service and maintenance railyard or directly downwind of ports should also be avoided, according to ARB. Some environmental justice community organizations recommend a minimum distance of 1,500 feet.

Benefits

- Fewer children and other sensitive individuals are exposed to diesel PM emissions.
- Also reduces noise exposure.

Challenges

- More practical to control the siting of new facilities than relocate existing facilities.
- Financially- or space-challenged facilities have difficulty finding affordable sites away from these pollution sources.
- Local and regional governments are typically not involved in school siting issues. These topics are addressed by school districts and the state government.

Costs

- New school complexes are expensive—Los Angeles Unified School District estimates $46,000 per student, or at least $50 million per school.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Locate new schools away from freeways. *Potential Partners: School districts, children's health advocates, department of public health, cities, counties.*	Long	$$$$
Encourage new daycare and senior centers to locate away from freeways. *Potential Partners: Cities, children's health advocates, department of public health.*	Short	$

AT A GLANCE

Distribution centers can reduce idling emissions by enforcing idle reduction policies for delivery trucks.

Strategy: Truck Idle Reduction

Description

Equipment at freight facilities can be left to idle for a significant amount of time, resulting in unnecessary fuel consumption and emissions. This strategy involves implementing idling reduction technologies or operational policies to eliminate unnecessary idling. Many facilities limit truck and yard equipment idling to less than five minutes, in compliance with ARB regulations.

Benefits

- Fewer people are exposed to diesel PM emissions.
- Benefits accrue throughout the life of the newly relocated facility.

Challenges

- Idling reduction might be required for all vehicles and equipment across-the-board regardless of proportion of benefit or feasibility.
- Trucks and locomotives coming into a business, yard or warehouse are operated by others and technology strategies cannot be implemented by the facilities themselves.

Costs

- Truck anti-idling devices (Auxiliary Power Units) cost between $3,000 and $5,000.
- At freight facilities, idle reduction programs may require additional truck parking or loading bays.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Encourage freight facilities to adopt anti-idling policies. *Potential Partners: States, councils of government, cities, counties, air districts, facility operators.*	Short	$
Require signage at freight facilities to inform truck drivers of ARB idling restrictions. *Potential Partners: State, cities and counties.*	Short	$
Ensure that new development projects provide adequate truck loading and unloading. *Potential Partners: Cities, counties, facility operators.*	Short	$
Promote regulations to keep trucks from idling outside of freight facilities. *Potential Partners: State, councils of government, cities and counties.*	Short	$
Encourage trucking / rail companies to install anti-idling technology. Provide funding incentives. *Potential Partners: State, councils of government, cities and counties, facility operators.*	Short	$$

AT A GLANCE

A blend of 20% biodiesel can be used in most existing diesel engines to reduce emissions at minimal additional cost.

Strategy: Alternative Fuels—Biodiesel

Description

Biodiesel is a renewable fuel made of vegetable oils, animal fats, and recycled cooking oils. It is most commonly used as a blend of 20% biodiesel and 80% conventional diesel (B20). Higher blends of biodiesel, up to pure biodiesel (B100), can also be used in many applications, but require special handling. Biodiesel blends also require upgrades to seals, gaskets and hoses.

While pure biodiesel has slightly less energy content than regular diesel fuel, the energy content of B20 biodiesel blend is nearly equal to that of regular diesel. There is a 2% loss of energy content when switching from diesel to biodiesel.

Benefits

- Use of B20 results in approximately a 10-15% reduction in PM emissions. PM reductions increase with the percentage of biodiesel. Biodiesel also reduces emissions of CO and hydrocarbons (HC). However, emission results vary depending on engine size.

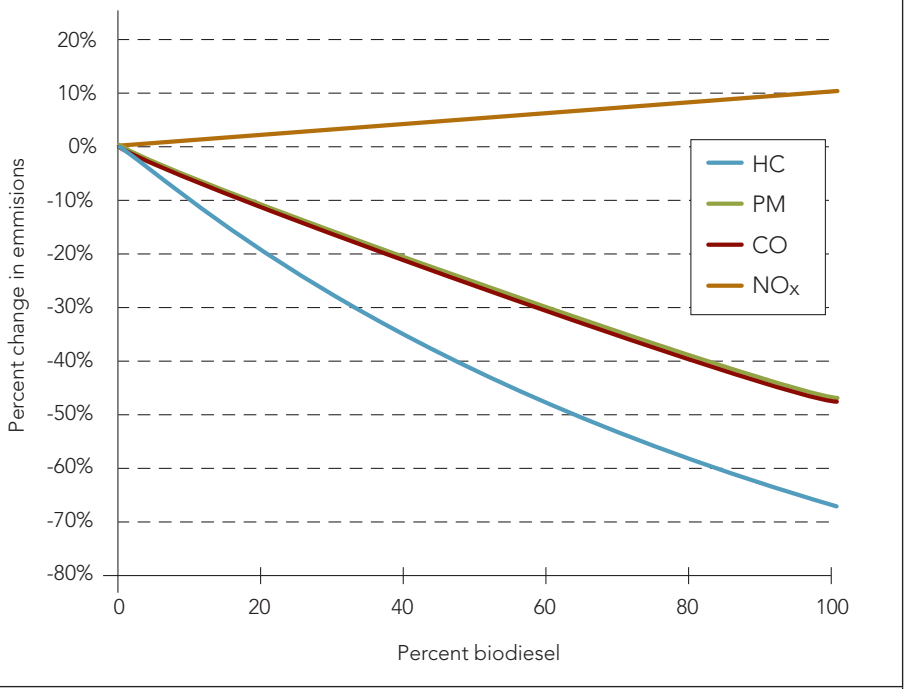
Challenges

- Biodiesel can slightly increase oxides of nitrogen (NOx) emissions (a precursor to smog).
- There are few biodiesel fueling stations, and biodiesel must be transported by truck or rail, instead of by pipeline.
- Truck fueling systems must be inspected or upgraded to ensure compatibility with biodiesel.

Costs

- The retail price of B20 is very similar to conventional diesel, due in part to a federal excise tax credit.
- Development of biodiesel fueling stations can be prohibitively expensive.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Develop infrastructure for biodiesel distribution and sale. *Potential Partners: Federal and State governments, ports, councils of government.*	Short to Mid	$$$$
Partner with truck fleet owners and freight facilities to encourage voluntary use of biodiesel. *Potential Partners: Ports, trucking associations, councils of government.*	Short	$
Use biodiesel in municipal fleets (refuse trucks, fire engines, buses, etc.). *Potential Partners: Councils of government, cities, counties.*	Short	$$



U.S. EPA (2002): A Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions - Draft Technical Report. EPA420-P-02-001.

AT A GLANCE

Natural gas equipment can reduce port and railyard emissions, but requires refueling stations.

Strategy: Alternative Fuels—Natural Gas (LNG)

Description

With commercially available low emission vehicles and fueling stations, natural gas is the leading alternative fuel in California. In 2004, there were just over 2,400 natural gas heavy-duty vehicles in the U.S., with about two thirds in California. By some estimates, more than 120,000 heavy-duty trucks can be fueled by LNG nationwide every year. Natural gas options are also available for cargo handling and yard equipment, as well as locomotives. Currently BNSF is operating four LNG switching locomotives (used to combine and re-combine cars into trains) in Southern California.

Natural gas vehicles store fuel in one of two forms: compressed natural gas (CNG) is stored as a gas in high-pressure cylinders, and liquefied natural gas (LNG) is stored as a liquid in cryogenic tanks. While both LNG and CNG vehicles produce fewer emissions than diesel vehicles, each has different strengths. LNG tanks store much more fuel than CNG tanks and can power vehicles further before refueling, but LNG requires more expensive refueling stations. In contrast, CNG tanks carry less fuel but are much lighter and more appropriate for smaller vehicles such as forklifts and cargo loaders.

Benefits

- Natural gas equipment reduces emissions through cleaner combustion.
- A new natural gas truck can reduce emission by more than 80% compared to a pre-2007 truck.

Challenges

- Because natural gas has less energy per gallon, a LNG or CNG vehicle has a 40-75% reduction in operating range as compared to diesel vehicles.
- This strategy requires development of LNG & CNG fueling infrastructure (stations, getting fuel from where it is generated to the site, etc.).
- High-purity natural gas is required for current BNSF LNG switcher locomotives.

Costs

- Cost of new natural gas equipment can exceed cost of new diesel equipment.
- LNG vehicles have higher maintenance costs and require additional equipment and expertise as compared to diesel vehicles.
- While prices vary, natural gas can be more expensive than diesel. However, recent natural gas prices are below diesel prices.

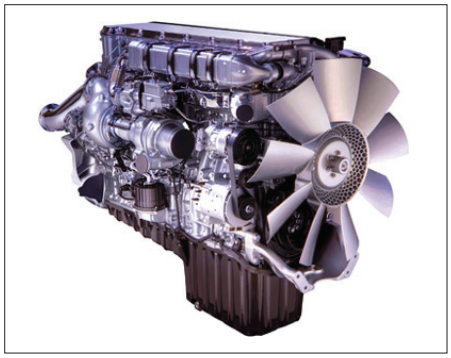
POTENTIAL LOCAL ACTIONS AND PARTNERS

Action	*Timeframe*	*Relative Cost*
Provide incentives and regulation to encourage facility operators to upgrade cargo handling equipment to natural gas. *Potential Partners: ARB, ports*	Short	$
Build out natural gas fueling & distribution infrastructure. *Potential Partners: LNG providers, ports, local communities.*	Short to Mid	$$$$
Use natural gas in municipal fleets (refuse trucks, buses, etc.). *Potential Partners: Cities, counties.*	Short	$$$

Strategy: Engine Replacement

AT A GLANCE

New, efficient engines can replace older engines to save fuel and reduced emissions.



Description

Engine replacement strategies are similar in approach to strategies to replace the entire vehicle, but can be more cost effective. Diesel engines last much longer than gasoline-powered engines; 20-year-old engines are not uncommon. Many older vehicles are powered by engines built prior to the implementation of clean air standards. By replacing the current engine with a new engine or a newer used engine, owners can reduce pollutants significantly without replacing the entire vehicle. This strategy is most cost effective in freight trucks.

Benefits

- Engine replacement can introduce improvements faster than a replacement strategy.
- While engine retrofits are cheaper than retiring and replacing vehicles, the emission reductions are smaller.

Challenges

- Older trucks are often owned by individuals or small businesses, who cannot afford to invest in engine upgrades.
- While grant and loan programs can reduce program costs, funding of these programs competes with other public funding priorities.
- Model year 2007 and newer engines are not compatible with pre-2007 truck bodies.

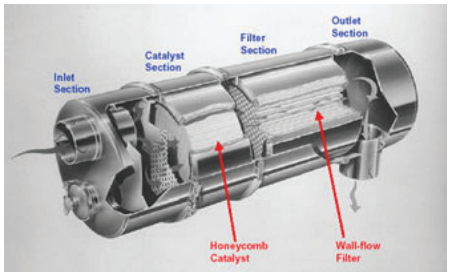
Costs

- The cost of engine repowering ranges from $20,000 to $40,000. This strategy can be more cost effective than vehicle replacement strategies.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Provide incentives for equipment owners to upgrade to new engines. *Potential Partners: Ports, councils of government, Federal and State government.*	Short	$$
Inform equipment owners about ways to comply with ARB regulations for trucks that are in service. *Potential Partners: Ports, trucking associations, councils of government.*	Short	$

AT A GLANCE

DOCs are more economical than other filters, but offer less benefit.



Strategy: Exhaust Retrofit—Diesel Oxidation Catalyst (DOC)

Description

A DOC retrofit system (a similar technology is known as a "particulate trap" when used on buses) consists of either an in-line engine muffler replacement or an add-on control device. The DOC sits in the exhaust stream of a vehicle and all exhaust from the engine passes through it. Retrofits of DOCs have been under way for more than 20 years in the off-road vehicle sector, with over 250,000 engine retrofits, most notably in the underground mining industry, on some public transportation industry buses where CNG is not in use, and on over 1.5 million heavy duty highway trucks in the U.S since 1994.

Benefits

- DOCs are certified by the California Air Resources Board to reduce PM emissions by at least 25%.

Challenges

- DOCs must be sized for each engine, and fit within existing engine compartment dimensions and design.
- DOC technology cannot be directly transferred from truck engines to locomotive engines.

Costs

- Costs vary according to engine size and application.
- On-road trucks: $1000 - $4000.
- Off-road and marine vehicles: significantly more expensive, vary by horsepower.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Provide incentives for equipment owners to upgrade to new technology. *Potential Partners: Federal, State and local governments, ports.*	Short to Mid	$$ (per truck)
Inform equipment owners that grants and loans are available to upgrade vehicles with DOCs and other exhaust retrofits. *Potential Partners: ARB, ports, trucking associations.*	Short	$
Retrofit municipal diesel vehicles with DOCs. *Potential Partners: Cities and counties.*	Short	$$

AT A GLANCE

FTFs can capture more pollution than DOCs, but at greater cost.

Strategy: Exhaust Retrofit—Flow-Through Filter (FTF)

Description

Monetary incentives for truck retrofit can encourage emissions reductions from the in-use fleet at relatively low cost. As with DOCs, FTF devices often can be retrofitted to existing trucks with only minor modifications to the exhaust system. This section analyzes scenarios for the installation of FTFs on trucks that can accept this technology.

FTFs are appropriate for applications that may be unsuitable for traditional filters, which can become blocked when used on equipment with a stop-and-go duty cycle and low exhaust temperatures.

Benefits

- FTFs are certified by the California ARB to reduce PM emissions by at least 50%.
- Applicable to older, dirtier engines without size or design restrictions of other technologies.

Challenges

- Limited commercial production.
- FTF technology cannot be directly transferred from truck engines to locomotive engines.
- Current FTF equipment is only approved for trucks built after 1991.

Costs

- More expensive than DOCs.
- On-road trucks: $6,000-8,000.
- Off-road and marine vehicles: unknown costs but likely to be considerably more expensive.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Provide incentives for equipment owners to upgrade to new technology. *Potential Partners: Federal and State government, ports.*	Short to Mid	$$ (per truck)
Inform equipment owners that grants and loans are available to upgrade vehicles with FTFs and other exhaust retrofits. *Potential Partners: ARB, ports, trucking associations.*	Short	$
Retrofit municipal diesel vehicles with FTFs. *Potential Partners: Cities and counties.*	Short	$$

Strategy: Exhaust Retrofit—Diesel Particulate Filter (DPF)

AT A GLANCE

DPFs are the most effective technology to remove particulate matter from engine exhaust.

Description

As with DOCs and FTFs, DPF devices often can be retrofitted to existing trucks with only minor modifications to the exhaust system. Around the world, more than 200,000 DPFs have been installed as retrofits and more than 1 million DPF-equipped cars have been sold in Europe. DPFs have also been used successfully on a variety of off-road engines since the mid-1980s. DPFs are required in all new on-road 2007 and newer diesel vehicles.

Benefits

- Several models of DPF are certified by the ARB to reduce PM emissions by at least 85%.
- DPFs also reduce CO and HC emissions.

Challenges

- DPFs can significantly increase back-pressure on the engine, which can reduce engine life.
- DPF technology cannot be directly transferred from truck engines to locomotive engines.
- As with DOCs, DPFs must be properly sized for each engine.

Costs

- DPFs are generally more expensive than FTFs. For on-road mobile sources such as cars and trucks, the price ranges from $6,000-$15,000.
- For construction equipment, the cost of a DPF will increase as engine horsepower increases: $6,000-$9,000 for a 250 hp engine found in equipment such as large bulldozers and construction cranes.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Provide incentives for equipment owners to upgrade to new technology. *Potential Partners: Federal and State government, ports.*	Short to Mid	$$ (per truck)
Inform equipment owners that grants and loans are available to upgrade vehicles with DPFs and other exhaust retrofits. *Potential Partners: ARB, ports, trucking associations.*	Short	$
Retrofit municipal diesel vehicles with DPFs. *Potential Partners: ARB, ports, trucking associations.*	Short	$$ - $$$

Strategy: Accelerated Truck Replacement

AT A GLANCE

Replacement strategies phase out the oldest, dirtiest equipment, but can take many years to implement.

Description

Many trucks in operation today were built before the adoption of stringent federal and state emission standards. By retiring older vehicles and replacing them with newer trucks with modern engine and exhaust technology, emissions can be significantly reduced. Retired trucks should always be scrapped to ensure that they are not sold and continue to cause pollution. Monetary incentives for truck replacement can promote more rapid turnover of the truck fleet.

Currently, the ARB and the SPB ports have several programs in place to speed up the process of upgrading truck fleets. Local governments in the area impacted by port-generated traffic and pollution, led by the Gateway Cities, took an early lead in finding funding for truck replacement.

Benefits

- Can reduce PM and NOx emissions by 90%.
- New equipment can reduce operating or maintenance costs for vehicle owners.

Challenges

- Older trucks are often owned by individuals or small businesses, who cannot afford to invest in vehicle upgrades.
- Grant and loan programs can assist these owners, but funding for these competes with many other government needs and programs.

Costs

- New heavy-duty trucks can cost more than $75,000.
- It is cheaper to replace old trucks with newer used trucks (1 or 2 years old), but there is less benefit as well.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Provide incentives for equipment owners to upgrade to new vehicles. *Potential Partners: Federal and State government, ports.*	Short	$$ (per truck)
Inform equipment owners about ways to comply with ARB regulations for in-use trucks. *Potential Partners: ARB, ports, trucking associations.*	Short	$

AT A GLANCE

Hybrid trucks can save fuel and reduce emissions, especially in stop-and-go delivery vehicles.

Strategy: Hybrid-Electric and Hybrid-Hydraulic Trucks

Description

Hybrid vehicles contain a secondary energy source (usually batteries or hydraulic accumulators to absorb energy lost in braking) in addition to the primary engine, and electronic control systems to allow both energy sources to power the truck in varying combinations depending on operating conditions. Hybrid truck technology is developing rapidly. Diesel-electric and diesel-hydraulic medium-duty trucks for specific applications have entered commercial production, and hybrid heavy-duty trucks are expected to be widely available by 2010. A truck replacement strategy with hybrids would be implemented the same way as a pure diesel strategy, except that the target markets or truck populations must be more precisely defined in order to gain the emissions benefits of hybrid technology.

Benefits

- Estimated for current technology: 30% reduction in fuel use, PM and NOx.
- Benefits may increase as technology matures.

Challenges

- Hybrid technology needs to be developed further before it can be applied to many truck types.
- Only certain, smaller types of vehicles such as parcel delivery trucks, are in testing as of 2009.

Costs

- Cost to purchase a hybrid truck is much higher than a comparative conventional truck.
- How much a hybrid freight (tractor-trailer) truck would cost is not known yet, since this type is currently not being manufactured.
- Cost effectiveness expected to be lower than that of diesel-for-diesel truck replacement.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Educate truck operators about new developments and options for hybrid trucks. *Potential Partners: Trucking associations, councils of government, air quality agencies.*	Short	$
Provide financial incentives for truck operators to adopt hybrid technology. *Potential Partners: SCAQMD, State and Federal governments, ports.*	Short	$$

AT A GLANCE

In recent years, railyards have greatly reduced emissions from idling. Further reductions bring air quality improvements.

Strategy: Locomotive Idle Reduction

Description

Idling locomotives are responsible for a large portion of emissions at railyards. Locomotives idle at railyards to power cabin equipment, communications, air conditioning, and brakes. Idling is often necessary for maintenance purposes and while waiting for dispatch orders, but some idling time is unnecessary for operations and can be eliminated. Idling can be reduced through railroad policies, operator training, and new technology. As part of a 2005 agreement with ARB, the UP and BNSF have installed idling reduction devices on nearly all of their locomotives that operate within California. The devices shut down the engine after 15 minutes in cases where idling is unnecessary. Rail employees are also being trained to shut down locomotives that idle in excess of 60 minutes, and the railroads are subject to fines if a locomotive idles unnecessarily for longer than 60 minutes.

Benefits

- Depending on how a locomotive is operated, idling reduction strategies can reduce idling emissions 25-75%.
- Annual fuel savings can be greater than $1,000 per year per locomotive.

Challenges

- While most new and recent-model locomotives are equipped with anti-idling devices, older locomotives still need to be upgraded.
- Many line-haul locomotives operate across multiple states and may not be subject to ARB's agreement with the railroads.

Costs

- Typical locomotive idle reduction devices cost $10,000 plus $3,000 for installation.
- Anti-idling devices save money over time—the lifetime fuel savings are greater than the upfront cost.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Encourage railroads to adopt facility-wide anti-idling policies (locomotives, trucks, cargo equipment). *Potential Partners: FRA, ARB, cities and counties, railroad and facility operators.*	Short	$
Encourage railroads and ARB to extend idle reduction agreements to interstate locomotives. *Potential Partners: ARB, FRA, railroad operators.*	Short	$

AT A GLANCE

Replacement strategies phase out the oldest, dirtiest equipment, but can take many years to implement.

Strategy: Accelerated Locomotive Replacement or Rebuild

Description

Locomotives have a long service life. This strategy would accelerate the replacement or rebuilding of existing locomotives with those meeting the new federal emission standards. The new standards will require that locomotives built after 2004 meet lower emission standards when they are rebuilt as part of normal service intervals. Starting in 2015, new locomotives will be required to meet more stringent standards.

UP has acquired (by mid-2009) almost 3,600 new EPA certified (Tiers 0, 1, 2) locomotives out of 8,500 total, and has been focusing its Tier 2 locomotives on trains to / from Southern California.

Benefits

- The Tier 2 rebuild standards will reduce PM by 50% compared to existing Tier 2 engines.
- When available beginning in 2015, Tier 4 locomotives will reduce emission by 75-90% compared to existing Tier 2 engines.
- By 2010, railroads in Southern California will have upgraded locomotives to reduce NOx by 67%.

Challenges

- Tier 4 standards do not become effective until 2015.
- Railroads operate nationally, so keeping upgraded locomotives concentrated in areas with the greatest air quality impact, such as Southern California is voluntary.

Costs

- A new long-distance (line-haul locomotive) costs more than $2 million. A new switcher locomotive designed to move cars locally from route to route (a switcher locomotive) costs more than $1 million.
- EPA estimates Tier 4 locomotives will cost $100,000 more than current generation locomotives
- Grant and loan programs can reduce program costs.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Provide incentives for railroads to upgrade to cleaner locomotives. *Potential Partners: Federal, State and local governments.*	Short	$$$$
Work with railroads to encourage deployment of cleaner locomotives in Southern California service. *Potential Partners: Local legislators, railroads, councils of government, cities, ports.*	Short	$

AT A GLANCE

Hybrid locomotives can reduce emissions more than 60%. They are best suited for railyard activities.

Strategy: Hybrid or Gen-Set Locomotives

Description

This strategy involves replacing a fraction of locomotive yard/switching engines with a hybrid-electric or generator set ("gen-set") switching engine. Hybrid-electric ("Green Goat") engines use a combination of a 50,000 lb. heavy-duty battery rack to supply electrical power, and a small diesel generator to provide additional prime power, and charge the battery rack. A gen-set switching locomotive is similar to the Green Goat, but is entirely powered by two, three, or perhaps four smaller diesel generator engines meeting lower emission standards than the current locomotive standards.

Hybrid and gen-set locomotives are appropriate for switching activities at railyards, which involve significant periods of idling or low-power use. This technology is currently not feasible for line-haul locomotives, which are much higher horsepower units that haul large loads over long distances at high power settings.

As of 2009, UP is operating 61 gen-set locomotives and 10 hybrid switchers in the South Coast Air Basin.

Benefits

- Hybrid: reduce fuel consumption 40-60%, reduce emissions by 80-90%.
- Gen-Set: reduce emissions by 80-90% and fuel consumption 16-37%.

Challenges

- The technology is still in development.
- Few models are currently in production.
- While gen-set switchers are as powerful as existing switchers, hybrid switchers are not as powerful.
- Green Goats are less reliable than Gen-Sets because of challenges with the battery packs.
- Railyards need two Green Goat locomotives to replace one diesel locomotive, since the Green Goats need downtime to recharge batteries.
- Personnel must be trained to maintain new technology switchers.

Costs

- Initial cost of hybrid switcher: $750k for 1000 HP locomotive.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Support research programs to develop new retrofit options since it is cheaper to retrofit existing switchers than replace them. *Potential Partners: Air regulatory agencies, ports, railroads, councils of government, cities and counties.*	Short	$
Support incentive programs to defray the cost of new switchers. *Potential Partners: Air regulatory agencies, ports, railroads, councils of government, cities and counties.*	Short	$
Replace switcher locomotives at railyards. *Potential Partners: Railroads.*	Short to Mid	$$$

AT A GLANCE

If ships reduce their speed near port, they emit up to 25% less pollution.

Strategy: Ocean-Going Vessel Speed Reduction

Description

Ocean-going vessels (OGVs) or cargo ships typically operate at reduced speed within 24 miles of the coastline. Beyond this boundary, they operate at full cruising speed. At full speed, ships have much higher emissions. This strategy extends the coastal zone further away from shore, to reduce ship emissions.

Since May 2001, the SPB ports have enacted a voluntary speed reduction program to encourage ships to reduce their speed from cruise to 12 knots (approximately 14 miles per hour) within 20 nautical miles or 23 land miles of Point Fermin (in San Pedro, Los Angeles County), both during entrance and exit.

Benefits

- Expanding the current speed reduction zone would result in 26% less nitrous oxide (NOx).

Challenges

- Voluntary speed reduction programs require participation from shippers. However, participation can be encouraged through incentives and fee rebates.

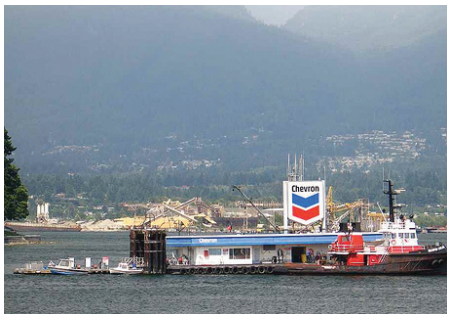
Costs

- Ship operators face highest costs due to added delay.
- Expanded program: $4.4 million (Port costs), $39 million (delay costs) annually.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Initiate pilot project with ARB or the U.S. EPA. *Potential Partners: Ports, councils of government, State, ARB, U.S. EPA.*	Short	$
Coordinate with shipping companies to change operating practices. *Potential Partners: Ports, councils of government.*	Short	$

AT A GLANCE

By substituting conventional marine bunker oil with cleaner diesel fuels, ship operators can reduce marine emissions.



Strategy: Ocean-Going Vessel Fuel Requirements

Description

Most OGVs use high-sulfur bunker fuel in their main and auxiliary engines. In 2007, the ARB began enforcing a rule mandating the use of low-sulfur fuel in auxiliary engines. This ruling is projected to decrease PM emissions from ships within 24 miles of the coastline. This strategy extends the fuel requirement to main engines, so that all fuel consumed is low-sulfur.

Main engines on OGVs are responsible for approximately 60% of total OGV NOx emissions and 80% of total OGV PM emissions at the SPB ports. While ARB's adopted Auxiliary Engine Rule requires use of lower sulfur fuel in OGV auxiliary engines, there is currently no similar regulation for main engines.

Benefits

- Reduce NOx emissions by 7% and PM emissions by 62% by the year 2035.

Challenges

- Expenses of fuel replacement could lead to further diversion of cargo and/or price increases of imported goods.

Costs

- Infrastructure costs to shippers for upgrading ships to accommodate new fuel type.
- Incremental fuel costs due to price differential between bunker fuel and low-sulfur fuel.
- Both the port / terminal and the ship owner must install expensive electrical infrastructure.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Coordinate with fuel suppliers to bring cleaner fuels to port. *Potential Partners: Ports, cities of Los Angeles and Long Beach, SCAQMD, councils of government.*	Short	$
With EPA or ARB, develop clean-fuels pilot program. *Potential Partners: SCAQMD, councils of government, ports.*	Short	$

Strategy: Shore Power/Cold Ironing

AT A GLANCE

Shore power allows berthed ships to operate using electricity rather than auxiliary diesel engines.

Description

According to the most recent assessment of the sources of pollution-causing emissions almost half of the emissions from ocean going vessels in the SCAB occur at the berth where the ship unloads or loads and lays over while waiting to depart. Cold ironing enables ships to shut down their (diesel) auxiliary engines and run off the shore-side electrical power grid to supply power at the dock for refrigeration, electricity, and other needs.

The U.S. Navy has been using shore power for many decades to provide electricity to its ships while docked for long periods of time. A growing number of U.S. West Coast and European ports are also adopting shore power to reduce emissions from commercial vessels.

Benefits

- Reduce berthed emissions by 90-95%.

Challenges

- Both the port / terminal and the ship owner must install expensive electrical infrastructure.

Costs

- The ARB calculated per-ship costs at $500,000 per vessel.
- ARB reported port costs to be $3.5 million per terminal plus $1.5 million per berth.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Work with ARB and EPA for shore power pilot projects. *Potential Partners: Ports, councils of government, cities.*	Short	$
Provide incentives to ship owners to upgrade vessels. *Potential Partners: SCAQMD, Federal and State government, ports.*	Short	$$$

AT A GLANCE

Natural and man-made barriers absorb noise and reduce visual impacts.

8.2 NOISE STRATEGIES

Strategy: Noise Barrier

Description

A noise or sound barrier is a natural or man-made feature (such as a wall or a berm) designed to reduce noise experienced by people in buildings, parks or homes near a noise source and a receiver that reduces noise.

When a direct path along the line of sight between the noise source and the receptor is interrupted, some of the acoustical energy will be transmitted through the barrier material and continue to the source, albeit at a reduced level. The amount of this reduction depends on the barrier material's mass and rigidity, and is called the transmission loss. The remaining direct noise is either partially or entirely absorbed by the noise barrier material (if sound absorptive), and/ or partially or entirely reflected (if the barrier material is sound reflective). A smooth, hard barrier surface, such as masonry or concrete, is considered to be almost perfectly reflective. A barrier surface material that is porous with many voids is said to be absorptive.

Benefits

Typically, when a barrier just breaks the line of sight between the source and the receiver, the sound level at the receiver is reduced by approximately 5 dB. As the height of the barrier increases above the line of sight, the noise reduction at the receiver increases.

A noise barrier is most effective when located closer either to the source or the receiver. For instance, barriers close to vehicles can provide noise reductions of 6 to 10 dB. For barriers further away, such as the right-of-way line or for trains on the far track, the height must be increased to provide equivalent effectiveness.

Challenges

- A noise barrier is ineffective for reducing noise for a receiver located much higher than the barrier.
- Barrier height restrictions.
- Property rights to construct noise barrier at the receiver.
- May create additional maintenance costs.
- Graffiti and lack of maintenance may cause aesthetic issues (although barrier may have aesthetic benefits as well if it hides unsightly land uses).

Costs

- As a rule of thumb, sound walls cost $150 to $280 per foot of length, assuming a wall 6 to 8 feet high.
- Sound barriers are easier to install at ground level. Costs may be twice as high on bridges and elevated railways.
- Maintenance costs may increase due to graffiti.

POTENTIAL LOCAL ACTIONS AND PARTNERS

Action	*Timeframe*	*Relative Cost*
Install sound walls along property line of affected sensitive land uses. *Potential Partners: Agency or company with oversight of the affected property, Caltrans, cities, counties, freight rail operators, facility operators.*	Mid	$$-$$$
Require developers to consider sound barriers as an option for mitigating noise impacts. *Potential Partners: Cities, counties, Caltrans.*	Short	$
For existing facilities, work with facility operator to focus operations away from properties not separated by sound barriers. *Potential Partners: Cities, counties, facility operators.*	Short	$
If highway or rail projects are expected to create excess noise, install sound walls along the right-of-way. *Potential Partners: Caltrans, freight rail operators, cities, counties.*	Short	$$$

AT A GLANCE

Soundproofing features insulate residences from excess noise.

Strategy: Soundproofing Features

Description

By installing soundproofing features, homes affected by noise can be insulated against that noise. The two main methods of soundproofing are reducing the sound and/or absorbing the sound. Typical soundproofing features include installation of dual-pane/soundproofing windows, and/or soundproofing doors with higher sound-blocking ratings, known officially as Sound Transmission Class, or STC ratings.

STC ratings are the official way to measure noise reduction through a partition, such as a window. It is roughly equivalent to the decibels (dBs) that are blocked. Every 10 STC points reduces noise by 50%. Double-paned windows can block more sound than many typical windows but often, to achieve significant noise reduction, soundproof windows and walls need to be installed. The table below shows the range of noise reduction for typical installations.

	Single-Pane Window	*Double-Pane Window*	*Soundproof Window*	*Soundproof Window over Double Pane*	*Regular Wall*	*Sound-Proofed Wall*
STC "Points"	15-24	24-29 (or higher)	33-40	43-49	34-38	35-58
Percentage Increase in Noise Blocked	–	0-50%	61-76%	80-87%	–	1-78%

Benefits

- Soundproofing using proven materials has been successful near major facilities in Southern California. Currently, the Federal Aviation Administration is working with Los Angles World Airports (LAWA) to fund soundproofing in residential areas near LAX and Van Nuys Airports. Approximately 8,200 residents are eligible for home upgrades as part of this program.
- Requires significant funding but avoids need for relocation of either residence or freight line/facility (which can be much more costly and disruptive).

Challenges

- Soundproofing projects require cooperation from owners of affected dwellings.
- Determining responsibility for requiring, funding and implementing sound-proofing programs –cities cannot require retrofit of existing facilities so incentives or cooperative programs are required.
- Windows must be completely closed to reduce noise; this can be an issue in hot weather, and it may be necessary to install ventilation and air conditioning systems. (This may already be an issue along noisy transportation corridors.)
- Does not address noise intrusion on outdoor activities.

Costs

- A typical double-pane window costs about $350 to $900, depending on the size and specifications.
- Typical cost to add soundproof windows to existing windows is $350 to $800 per window.

POTENTIAL LOCAL ACTIONS AND PARTNERS

Action	*Timeframe*	*Relative Cost*
Add soundproofing features to local building codes in areas affected by excess noise. *Potential Partners: Cities, counties.*	Short	$
Instruct developers to pay for soundproofing for affected home owners when new projects cause noise impacts. *Potential Partners: Cities, counties.*	Short	$
Research ways to secure funding (for example, grants and new legislation) for programs which would help homeowners sound-proof windows and doors. *Potential Partners: Cities, counties.*	Short	$

AT A GLANCE

Noise reduction features, such as barriers and shielding can be installed at the noise source.

Strategy: Project Design and Operation Procedures

Description

Noise can be reduced at the source by making changes to how a project is designed or operated. Such measures may include, but are not limited to, shielding of on-site stationary equipment, locating noise-generating activities or equipment away from adjacent sensitive land uses such as homes and schools, and increasing the distance between the source of the noise and the adjacent residents and businesses.

Benefits

- Reduce noise generation from the source.

Challenges

- Limited effectiveness on a small site.
- There may not be enough room for an increased distance or buffer zone between the source of the noise and the people affected by it in highly-developed areas.
- Requirements cannot be dictated by cities or counties for railroads.

Costs

- The costs vary depending on project scope.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
For new projects, require shielding of noise-generating equipment. *Potential Partners: Cities, counties.*	Short	$
For new projects, require noise-generating activities or equipment to be located away from adjacent sensitive land uses such as homes, schools and hospitals. *Potential Partners: Cities, counties.*	Short	$
For existing and new projects, facilitate communication between operators and local communities to build mutual awareness of operational needs, impact concerns, and potential solutions. *Potential Partners: Cities, counties, facility operators.*	Short	$

AT A GLANCE

Quiet zone regulations reduce noise from train horns, but require additional safety measures.

Strategy: Quiet Zones

Description

Federal safety regulations require locomotives to sound horns when approaching public rail crossings. Due to local concerns with locomotive horn noise, the FRA has published regulations allowing the creation of zones where locomotive horns could be silenced under non-emergency circumstances. The FRA requires that the railroad crossings in quiet zones be upgraded so drivers are aware of upcoming trains. These upgrades may include concrete barriers preventing drivers from circumventing the gates, sealed or "quad" gates or automatic whistles (also called wayside horns) mounted at the crossing. Beyond major infrastructure improvements, in specific circumstances there could be options for reduced horn length, volume and/or frequency that still meet FRA requirements.

Benefits

- Minimizes excess noise from train horns impacting neighborhoods near rail crossings.

Challenges

- Very high cost if it involves multiple crossings in densely-developed areas.
- Dead-end streets can limit access for residents, businesses and emergency vehicles.
- Requires coordination among local government, rail operator, and the FRA.
- It is the responsibility of local government to fund and maintain quiet zones.

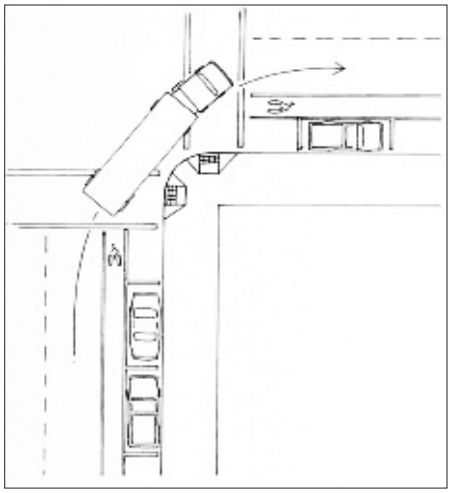
Costs

- Four-quadrant gate systems cost approximately $2,000,000.
- Maintenance of quiet rail crossings would cost approximately $10,000 a year.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Explore opportunities with railroads for reduced horn use, frequency and or volume at specific locations that still meet FRA requirements. *Potential Partners: Railroads, FRA, cities, counties.*	Short	$
Designate a section of rail corridor as a "quiet zone." *Potential Partners: Railroads, FRA, cities, counties.*	Short	$
Search for funding from legislation and grants for new rail crossing systems, compatible with quiet zone regulations. *Potential Partners: Councils of government, cities, counties.*	Short	$
Install four-quadrant gates at rail crossings. *Potential Partners: Railroads, FRA, cities, counties.*	Mid	$$$$
Install permanently mounted whistles at grade crossings to replace sounding of train horns. *Potential Partners: Railroads, FRA, cities, counties.*	Mid	$$

AT A GLANCE

Traffic planning tools are used by local governments to make their streets "freight friendly."



8.3 TRAFFIC STRATEGIES

Strategy: Traffic Planning Tools

Description

Traffic planning encompasses a number of tools that local governments can use to reduce the impacts of freight trucks on local streets. These strategies, which can be implemented either at the time of new development or as roadside redevelopment, can reduce the frequency of trucks blocking passenger cars. However, it can be very costly to correct design decisions after they are installed. Some specific strategies include:

- As part of local land use planning, cluster freight facilities to minimize the total exposure of goods movement activities to sensitive land uses.
- Require that new freight facilities be designed with sufficient space for truck queuing inside the facility.
- Position driveways so trucks can turn in and out without blocking intersections. To the extent possible, locate driveways and loading docks away from sensitive receptors.
- Intersection improvements: widen turning radii, provide sufficient through- and turn-lanes.
- Discourage loading and unloading on public streets.
- Require new warehouses and distribution centers to specify driveway and circulation details when plans are submitted for review and approval.
- In new communities, design street systems to facilitate truck movement and minimize queuing.

Benefits

- Reduces local road congestion.
- Improves roadway safety.
- Allows freight facilities to be a "good neighbor" to share public roads with local residents.

Challenges

- Once design decisions are made, it is costly to rebuild existing lanes or intersections.

Costs

- Public works projects can cost hundreds of thousands or millions of dollars.
- Many planned projects can be made "freight friendly" at little additional cost.
- When a new freight facility is built, a portion of the infrastructure costs could be paid by the developers, if specific infrastructure improvements reduce impacts caused by the facility.

POTENTIAL LOCAL ACTIONS AND PARTNERS

Action	*Timeframe*	*Relative Cost*
Coordinate impacts of new roadway connections with adjacent cities and counties to ensure consistent design and operations. *Potential Partners: City/county public works departments, facility operators.*	Short	$
Assess truck volumes and travel patterns on roadways to identify priority improvement areas. *Potential Partners: City/county public works departments, Caltrans.*	Short	$$
Coordinate signal systems with adjacent jurisdictions, and with county transportation agencies and Caltrans.	Mid	$$$
Assess the need for industry or truck impact fees in local communities to support financing of infrastructure improvements. *Potential Partners: City/county public works departments.*	Short	$

AT A GLANCE

Cities and counties can reduce truck parking on public streets through a variety of codes and ordinances.

Strategy: Truck Parking Regulations

Description

Truck parking on local streets can be a significant issue in some residential areas, creating visual and noise impacts. Trucks park on local streets when they are waiting for access to a port terminal, delivery dock, railyard, or other freight facility. In some cases, trucks may be parking overnight in residential areas.

To minimize the impact of truck parking on communities, local governments can require proposed freight facilities to set aside sufficient truck parking for their operations. Cities can also establish and enforce parking restrictions in residential areas, and can designate alternative areas that are acceptable for truck parking.

Benefits

- Reduces the noise and aesthetic impacts of parked trucks.
- Creates more available parking.
- Allows freight facilities to be a "good neighbor."

Challenges

- Cities have little leverage to expand or change existing facilities.
- Truck parking regulations may be opposed by truck operator associations.

Costs

- Public works projects can cost hundreds of thousands or millions of dollars.
- In the planning stage, parking can be added to freight facilities at low cost.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Enact planning codes to ensure that new freight facilities have adequate truck parking. *Potential Partners: City/county planning and public works departments.*	Short	$
Post street signage pointing truckers to designated truck parking sites. *Potential Partners: City/county public works departments, Caltrans.*	Short	$
Cities and counties can pass ordinances to prohibit vehicle parking on certain roadways. *Potential Partners: City/county planning and public works departments.*	Short	$
Design and install traffic calming measures, i.e. oblique parking spaces, can make road segments friendlier to cars and pedestrians. *Potential Partners: City/county public works departments, Caltrans.*	Mid	$$$
Create or designate areas for truck staging or resting (public or private facilities) in areas outside of residential and other sensitive land uses. *Potential Partners: City/county planning and public works departments.*	Short	$-$$$
In addition to enforcement, communicate new or existing route information to truckers through trucking companies or places where truckers are, such as rest areas or fueling stations. *Potential Partners: City/county public works departments, trucking companies and associations.*	Short	$
Assess the need for industry or truck impact fees in local communities to support financing of infrastructure improvements. *Potential Partners: City/county.*	Short	$

AT A GLANCE

Designated truck routes focus truck traffic on routes that best accommodate it, reducing delays on other routes and increasing safety.

Strategy: Designated Truck Routes

Description

Due to the forecast growth in freight traffic, a system of designated truck routes can maintain and leverage Southern California's competitiveness as a hub for international trade. Designated truck routes concentrate trucks on roads with adequate truck capacity, while preserving other lanes or roads for passenger vehicles. This tool is best suited for communities and corridors with high levels of truck volumes passing by residential areas. Reduction in local road congestion results in travel time savings for drivers. Another benefit is safety, separating trucks from local traffic, pedestrians and bicyclists.

As an alternate or companion approach, cities can designate residential streets or neighborhoods as "truck free zones." This would minimize noise and traffic impacts on local residents.

Benefits

- Dedicated truck routes can direct truck traffic away from homes, schools and other "sensitive receptor" sites, minimizing pollution exposure.
- By reducing the number of truck / passenger car interactions, this strategy can increase roadway and pedestrian safety.
- Can speed truck travel and save companies money.

Challenges

- Enforcement is key to success—requires coordinated monitoring by local law enforcement.
- Requires coordinated traffic planning among cities on the route and, in some cases Caltrans.

Costs

- Low implementation costs, once appropriate truck corridors are identified.
- Truck companies may save money due to time savings from reduced congestion.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Identify truck corridors that would most benefit from designated truck routes. *Potential Partners: Caltrans, city/county public works and planning departments, councils of government, major trucking companies/local warehouses.*	Short	$
Designate "truck free zones" on streets or in neighborhoods. *Potential Partners: City/county public works and planning departments, local residents.*	Short	$
Require new distribution centers to establish truck routes through local neighborhoods and add on-site signage to direct trucks exiting the facility. *Potential Partners: City/county public works and planning departments, distribution centers.*	Short	$
Implement truck routes on selected corridors. *Potential Partners: Caltrans, city/county public works department, councils of government, major trucking companies and distributors.*	Short	$$
Repave roadways with rubberized asphalt materials that reduce road noise. *Potential Partners: City public works department, Caltrans.*	Short to Mid	$$
In addition to enforcement, communicate new or existing route information to truckers through trucking companies or places where truckers are such as rest areas or fueling stations. *Potential Partners: City public works department, trucking companies.*	Short	$
Assess the need for industry or truck impact fees in local communities to support financing of infrastructure improvements. *Potential Partners: City public works and finance departments.*	Short	$

AT A GLANCE

Coordinated systems for quick response to accidents or stalls (Highway incident management systems) can reduce traffic congestion by quickly identifying vehicle incidents and dispatching assistance.

Strategy: Highway Incident Management for Trucks

Description

Incident management programs seek to detect and clear roadway incidents such as accidents, stalls and spills quickly and effectively, thereby minimizing their congestion impacts. The strategy can be applied region-wide or can be focused on a specific corridor, and can address delay caused by traffic incidents (crashes, stalls, cargo spills) or non-traffic incidents (bridge collapse, emergency road work). Freeway service patrol programs currently exist for passenger cars throughout Southern California. Metro and Caltrans currently operate the Big Rig Service Patrol on the I-710 and SR-91 freeways. This service logged 7,276 assists between October 2005 and April 2008.

Benefits

- Reduce congestion and increase average speeds.
- By one estimation, over half of total roadway delay is caused by traffic incidents.

Challenges

- Requires coordinated communication among Caltrans, CHP and local traffic management and reporting systems to detect and report events.
- Requires ongoing funding commitment by operating agencies.

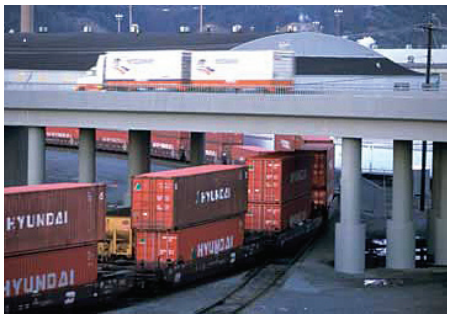
Costs

- The estimated cost is $1.6 million annually for equipment, labor, fuel, and maintenance for the Big Rig Service Patrol being operated by Caltrans and Metro on the I-710 and SR-91 freeways.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Secure funding for incident management pilot program. *Potential Partners: County transportation commissions, Mobile Source Air Pollution Reduction Review Committee, councils of government, ports and cities.*	Short	$
Search for public-private partnerships to implement a program. *Potential Partners: County transportation commissions, councils of government, ports and cities.*	Short	$
Provide incident management services along truck corridors. *Potential Partners: Caltrans, CHP, County transportation commissions.*	Mid	$$$$

AT A GLANCE

By grade-separating roadways and railroad crossings, both trains and vehicles can travel through the crossing with no delay or safety impacts.



Strategy: Rail-Highway Grade Separation

Description

Unseparated (at-grade) street-railroad crossings increase traffic delay and pose a safety risk due to the possible collision of vehicles and trains. They can also delay emergency service vehicles such as ambulances. Grade-separated crossings eliminate these risks, since roads and rail tracks no longer intersect. Grade separation can be accomplished by building road overpasses or underpasses around the rail line.

Local governments can reduce traffic congestion as well as noise and air quality impacts by aggressively pursuing grade separation projects.

Benefits

- Elimination of traffic delay due to passing trains.
- Safety benefits.
- Reduced pollution and fuel savings.
- Improved access for emergency vehicles.

Challenges

- More practical to build grade-separation when constructing new roadways than to retrofit existing rail crossings with new infrastructure.
- Grade separation projects are very expensive.

Costs

- The Trade Corridor Improvement Fund estimates most planned grade separations to cost between $30 and $90 million.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Pursue funding opportunities to fund grade separation projects. *Potential Partners: Councils of government, county transportation commissions, Caltrans, Public Utilities Commission, local communities.*	Short	$
Identify crossings which benefit most from grade separation. *Potential Partners: Local communities, railroads, councils of government, county transportation commissions, Caltrans, Public Utilities Commission.*	Short	$
With state or federal partners, replace at-grade crossings with grade-separated crossings. *Potential Partners: Caltrans, FRA, Public Utilities Commission, railroads, councils of government, County transportation commissions, local communities.*	Mid	$$$$

AT A GLANCE

Rail crossing systems can reduce delay and increase safety at a much lower cost than building grade-separated rail crossing.

Strategy: Upgraded Rail Crossing Systems

Description

Rail crossing systems prevent conflicts between vehicles and oncoming trains. "Second Train Coming" systems alert drivers to situations in which one train follows another while crossing gates are down.

Upgraded rail crossing systems can improve overall traffic flow by coordinating signals with nearby traffic lights. With coordinated signals, traffic can be redirected away from the railroad crossing, or stopped at intersections before reaching the crossing.

Further, photo-enforced systems can reduce traffic violations in which motorists drive around rail crossing gates. In Los Angeles, a photo enforcement system reduced violations by 92%.

Benefits

- Increase safety by discouraging drivers from driving around crossing gates.
- Reduce traffic delays using "intelligent" traffic lights at nearby intersections to coordinate traffic signals and reduce traffic violations.

Challenges

- Larger systems require electrical and communication infrastructure for expanded coordination with nearby signals.
- Funding and implementation responsibilities are often unclear, leading to lack of action.

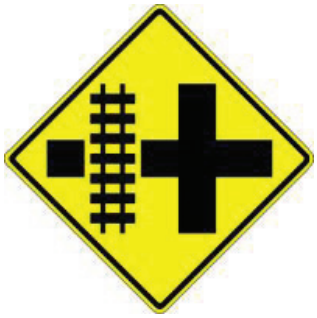
Costs

- Average cost of crossing signal system is $150,000.
- Costs potentially can be shared among state and local agencies, and may be eligible for legislative funding or grants.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Identify at-risk traffic intersections. *Potential Partners: City/county public works department, Public Utilities Commission, community members, railroads, Caltrans.*	Short	$
Coordinate with state agencies and rail operators to select and implement crossing signal system. *Potential Partners: County transportation commission, FRA, Public Utilities Commission, city/county public works department, railroads, Caltrans.*	Short to Mid	$$$
Work with state and federal agencies as well as *railroads* to minimize safety hazards and congestion at rail crossings. *Potential Partners: County transportation commission, FRA, Public Utilities Commission, city/county public works department, railroads, Caltrans.*	Short	$$

AT A GLANCE

By redirecting traffic away from rail crossings to grade separated lanes, municipalities can reduce traffic congestion and safety risks.



Strategy: Traffic Redirection

Description

Communities can alleviate congestion at busy at-grade rail crossing by diverting or redirecting vehicles to less-congested intersections. This strategy is most effective when traffic is directed to a nearby grade-separated crossing, where all vehicles can cross the rail corridor without any delay. Even when there is no nearby grade-separated crossing, traffic redirection can reduce delay by moving vehicles from overly congested crossings to under-used crossings.

Traffic redirection plans can be implemented using additional signage to inform drivers, and roadside improvements to increase the number of vehicles that can travel through grade-separated crossings. In addition, traffic calming techniques, such as speed bumps and dead-end streets, can redirect vehicles away from railroad crossings. Traffic redirection strategies are implemented by local transportation agencies and public works departments, not by railroad companies.

Benefits

- Traffic redirection reduces costs associated with congestion and accidents.
- Communities experience regional benefits from improved traffic flow.
- Cars are directed to safer crossings.

Challenges

- Implementation requires coordination among local governments and regional traffic agencies.
- Traffic calming measures may inconvenience local community members traveling to and from work and other activities.
- Dead-end streets can limit access for residents, businesses and emergency vehicles.

Costs

- Implementation costs will vary depending on degree of new construction.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Identify crossings best suited for traffic redirection. *Potential Partners: City/county public works departments, councils of government, local community members.*	Short	$
Develop alternative vehicle routes & determine if street upgrades are necessary. *Potential Partners: City/county public works departments, local community members.*	Short	$
Implement redirection strategies. *Potential Partners: City/county public works departments.*	Short	$$

AT A GLANCE

Truck scheduling systems reduce traffic congestion both at the freight facility and on nearby streets.

Strategy: Scheduling and Appointment Systems

Description

This strategy schedules the arrival of vehicles to ports and intermodal (truck/rail) facilities to reduce congestion on roadways. Efficient scheduling can reduce idling time and loading time, helping to reduce emissions and noise impacts.

The Port of Los Angeles "Terminal Gate Appointment System" schedules truck arrival times at nine terminals. Appointment systems are also used at railyards to smooth the flow of truck traffic. BNSF operates a "pre-mount" appointment system in which truck operators can reserve a container for pickup the following morning.

The PierPass system for the Ports of Los Angeles and Long Beach provides incentives for delivery of goods during less-congested times.

Benefits

- Freeway congestion reduced by moving truck trips to off-peak times.
- Less idling at freight facilities.
- Significant reductions in pollutants caused by congestion and idling.

Challenges

- System must have approval of all parties: facility operators, shippers, truck and rail operators.
- Shifting trips to off-peak times may conflict with driver hours-of-service restrictions.
- Evening and nighttime operation may increase noise and light impacts on neighboring communities.

Costs

- Transactions with appointments take longer than transactions without appointments—potentially lower efficiency for terminals.
- At the Port of Los Angeles, terminals operating appointment systems are exempt from PierPass charges for peak-time shipments.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Coordinate with freight facilities on implementing scheduling system. *Potential Partners: Ports, shipping companies, cities, trucking companies.*	Short	$

AT A GLANCE

By extending operating hours, ports, railyards and warehouses can load trucks outside of peak traffic times.

Strategy: Extended Hours of Operation

Description

Many freight facilities handle the majority of truck volume during the daytime, when roadway congestion is high due to auto use. Modified operating hours can reduce truck traffic during peak traffic times (morning and evening commute periods). The resulting drop in truck volume reduces impacts on freeways and local roads during the most congested periods.

Extended hours-of-operation was implemented at the Ports of Los Angeles and Long Beach in July 2005. Under this program, also known as PierPass, marine container terminals offer extended hours of operation (currently 6pm-3am Monday-Thursday and 9am-6pm Saturday) with up to 40% of containers being moved by truck occurring during off peak hours.

In addition, many rail intermodal stations operate with extended hours. The BNSF Hobart railyard near Los Angeles operates 24 hours a day, 7 days a week.

Benefits

- Increases utilization of current port and railyard terminals, lifts and other infrastructure.
- Reduced truck traffic on roadways during peak congestion and commute times.

Challenges

- Implementation requires coordination among shippers, facility operators, and truck operators.
- This strategy puts more trucks on the road in early morning and late evening hours, causing additional noise impacts.
- For short trips, there may be conflicts if the shipper operates with extended hours, but the receiver does not.
- Port terminals bear additional operating costs due to expanded labor needs.

Costs

- Main costs are operating and labor costs associated with extended hours.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Coordinate with freight facilities on extending hours-of-operation into off-peak periods. *Potential Partners: Shippers, ports, truck operators, local communities.*	Short	$
For existing and new projects, facilitate communication between operators and local communities to build mutual awareness of operational needs, impact concerns, and potential solutions. *Potential Partners: Cities and counties, local operators.*	Short	$

AT A GLANCE

On-dock rail replaces truck trips from ports with direct rail service.

Strategy: Expansion of On-Dock Rail Service

Description

Although approximately 50% of freight from and to the SPB ports is intermodal, only about 20% is loaded directly to/from the rail docks . The remaining cargo is shipped using rail terminals located away from the ports (off-dock), and requires the use of local, or drayage trucks for transportation between the terminals and the rail and distribution yards. Because the transfer or drayage trucks tend to be older and emit more pollution, elimination of drayage trips can result in significant health and air quality benefits.

Infrastructure improvements can increase the capacity and utilization of on-dock rail ramps at the SPB ports. Railroad operational improvements are also necessary. The Ports are currently pursuing on-dock rail strategies, but face significant cost and regulatory hurdles.

Benefits

- By shifting truck traffic to rail, on-dock rail can eliminate 30,000 daily truck trips by 2020.
- Reduction in traffic congestion, especially near the ports.
- Reduction in pollution and improved air quality.

Challenges

- Requires major infrastructure changes to bring new rail service to terminals.
- On-dock rail projects require lengthy environmental review.

Costs

- The SPB ports have analyzed $1 billion of new projects to increase on-dock rail capacity.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Support efforts to increase on-dock rail and coordinate with ports and terminal operators to build on-dock rail. *Potential Partners: Ports, port-adjacent communities, railroads, terminal operators, councils of government.*	Short	$
Expand on-dock rail infrastructure at ports.	Long	$$$$
Expand rail line capacity to handle additional port shipments, especially targeting bottlenecks in the rail network. *Potential Partners: Ports, railroads, port-adjacent communities, terminal operators, councils of government.*	Short to Mid	$$$$

AT A GLANCE

A Virtual Container Yard electronic system pairs shippers with receivers to reduce the number of empty container trips.

Strategy: Virtual Container Yard

Description

When a container delivery is unloaded, the empty container is returned to a storage location or another shipper. Moving empty containers from place to place is unproductive and creates unnecessary congestion and cost. Currently, only about 2% of emptied import containers are matched with shippers needing an export container. The rest are typically brought back empty to the ports. This strategy would electronically match shippers needing containers with nearby empty containers so that unnecessary container movements are avoided.

Benefits

- Reduces truck trips and truck vehicles miles traveled associated with moving empty containers.
- Reduces emissions of all pollutants. Magnitude depends on effectiveness of strategy.

Challenges

- In order to implement a virtual container yard, shippers must coordinate with truckers, ports, and customers to manage the flow of containers.
- Institutional, risk, and legal issues may also exist.

Costs

- Several companies offer Virtual Container Yard internet services. Truck operators and shippers pay a monthly fee for participation.
- Trucking companies will save money, by reducing VMT, which lowers fuel and maintenance costs.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Partner with private firm to publicize and roll out virtual container yard services. *Potential Partners: Councils of government, ports, cities.*	Short	$$

AT A GLANCE

Spillover light can create distractions for local residents. Lighting controls limit spillover light.

8.4 AESTHETICS AND APPEARANCE STRATEGIES

Strategy: Spillover Lighting Controls

Description

Ambient levels of lighting from freight facilities can be intense according to the density of site development. Installation of new lighting structures can lower the amount of light entering neighborhoods from adjacent and nearby facilities such as ports, distribution centers and railyards. Some communities in other areas have adopted "nighttime sky" ordinances requiring lowered light levels.

What is called spillover lighting can be reduced or eliminated by setting limits on allowable types or sizes of outdoor lighting, or specifying how the lighting should be shielded.

Shielding regulations may specify the shape of shielding fixtures or the angle of lighting with respect to the ground, all designed to reduce or eliminate light leaking into adjacent areas or communities.

Benefits

- Reduced spillover light and nighttime glare for adjacent residents.

Challenges

- Lighting specifications must shield residents while allowing sufficient light for project site.
- While relatively simple for cities to require for new construction projects, they have less ability to place requirements on pre-existing facilities.
- Cities and counties have no jurisdiction over railroad facilities.

Costs

- Low cost—does not require new implementation technologies.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
For new facilities: Include lighting specifications in building codes and zoning ordinances. *Potential Partners: City/county planning departments, freight facilities, distribution centers, manufacturers.*	Short	$
For existing facilities: Promote lighting controls and encourage owners of existing facilities to modify lighting. *Potential Partners: City/county planning and public works departments, freight facilities, distribution centers, manufacturers.*	Short	$

AT A GLANCE

Landscaping in front of freight facilities can soften their appearance from the road or nearby housing, reducing visual impacts.

Strategy: Landscaping

Description

Freight facilities can have high visibility from surrounding roadways and residential zones. These visual impacts can be reduced using landscaping to block or soften aesthetic characteristics of the site.

Landscaping can create a buffer zone between land uses, and allow freight facilities to better match the visual characteristics of surrounding communities.

The selection of landscaping plants, shrubbery, or trees is often made with priorities given to native plants, fast-growing plants, and landscaping that requires less water and upkeep.

Benefits

- Hides or soften visual impacts of freight facilities from surrounding residents.
- Some funding is available from the federal government through Transportation Enhancement Activities (TEA) grants.

Challenges

- Must be compatible with project site, must be maintained by responsible party.
- Cities and counties cannot place requirements on railroad owned and operated facilities.

Costs

- Landscaping is a low-cost strategy for reducing the visual impact of facilities.

POTENTIAL LOCAL ACTIONS AND PARTNERS		
Action	***Timeframe***	***Relative Cost***
Include landscaping ordinances and maintenance plans in zoning regulations. *Potential Partners: City/county planning departments, current distribution centers.*	Short	$
Coordinate with Caltrans and county transportation agencies to provide landscaping on state roads. *Potential Partners: Caltrans, county transportation commissions, councils of government, local communities.*	Short	$
Provide funding to maintain landscaping on or near public property. *Potential Partners: Cities, counties, councils of government, local communities, Federal Highway Administration.*	Short	$$
Create design guidelines to promote the best features of a landscaping project. *Potential Partners: Caltrans, councils of government, local communities, city/county planning and public works departments.*	Short	$

COMMUNITY MEMBERS, PUBLIC AGENCIES AND GOODS MOVEMENT REPRESENTATIVES MUST WORK TOGETHER IN A WAY THAT BUILDS COMMON UNDERSTANDING, TRUST AND AGREEMENT ON DESIRED OUTCOMES.

CHAPTER NINE

how to get involved

GOODS MOVEMENT IS GETTING MORE AND more attention. This toolkit gives an idea of some of the phrases—or keywords—that are used to describe goods movement issues and projects. Now that you have an idea of these keywords and possible strategies to address impacts, how do you get started? Where can you go for more information? Who can help in your efforts to take action? Following are potential first steps to consider.

Monitor agendas and news items and attend meetings

Most communities have a Planning Commission, Public Works Commission and/or Traffic/Transportation Commission that advises the city or county and elected officials on decisions about community development including land use, transportation and community design. Agendas are posted on city/county websites. Newspapers (especially local community papers) report on upcoming issues and meetings. By attending meetings when related issues come up you can become familiar with others (elected officials, staff, freight-related industries and operators and interest groups) who are involved in goods movement. You can also contact community and homeowner associations, attend their meetings, ask questions and find sources of support for addressing local impacts.

Contact local planning, transportation and other resource agencies

As described in Chapter 1 of this toolkit, local planning and transportation or public works departments deal most directly with goods movement. Staff members can provide much information on the history of and potential future efforts related to the impacts in question. They can let you know when General Plan updates are scheduled and how specific concerns or issues are being addressed through the planning process. Other resource agencies such as councils of governments, transportation commissions, and regional transportation planning agencies work closely with local agencies on specific projects and have additional information. The quickest way to access this information is on their websites, but a call to the agency asking to speak to the department dealing with freight or goods movement issues is another way to find useful information and contacts.

Contact your local elected official (councilmember or supervisor)

Local elected officials and their staffs (a councilmember in an incorporated city, or a supervisor in an unincorporated area) are particularly important in keeping current and making sure the community is informed about goods movement-related programs and actions. They direct their planning and transportation departments and request support from other resource agencies to find solutions to community issues. In addition to directly contacting a local elected official's office, you may attend their regularly scheduled meetings to speak during public comment periods and meet others who are involved in resolving goods movement-related issues in the community.

How can everyone work together?

Creating the right solutions to address impacts is not always simple or easy. One solution could be very helpful for a goods movement representative, but may not meet the needs of a local community that experiences impacts. Likewise, a local community may decide that there is only one solution they will accept, but is impossible for a goods movement representative to include in their operations, or is not enforceable by a public agency. How can everyone work together to create meaningful, realistic solutions that keep goods moving and reduce or eliminate impacts on communities?

There is no universal approach, but there are guiding principles to consider when taking action. In general, community members, public agencies, and goods movement representatives must work together in a way that builds

common understanding, trust, and agreement on desired outcomes. Here are guiding principles to consider:

- **Bring everyone together:** Invite everyone to the table including goods movement representatives, residents, businesses, local agencies, and any others with a stake in the impacts.
- **Create a clear, open process** for understanding the impacts and developing potential solutions.
- **Establish ground rules** to support an atmosphere of mutual respect and productive discussion.
- **Identify roles:** Ensure that everyone understands how their participation is part of the process, and how decision-making occurs.
- Keep clear records of communications and discussions.
- **Make the process accessible to everyone:** Hold open public meetings at times and locations for the greatest number of people. Post communications and discussion records at local information sources such as public buildings and on websites. Let others contribute ideas and comments in ways other than attending and speaking at meetings.

THE GOODS MOVEMENT SYSTEM IS CONSTANTLY CHANGING DUE TO MANY FACTORS. USERS OF THE TOOLKIT ARE ENCOURAGED TO CONSULT AS MANY ADDITIONAL, UPDATED SOURCES OF INFORMATION AS POSSIBLE.

where to go for more information

PLANS AND REPORTS

2007 Air Quality Management Plan, South Coast Air Quality Management District, 2007. Available online at http://www.aqmd.gov/aqmp/07aqmp/draft/07aqmp.pdf

2008 Regional Transportation Plan, Goods Movement Report, Southern California Association of Governments, 2007. Available online at http://www.scag.ca.gov/rtp2008/pdfs/draftrtp/reports/Goods_Movement.pdf

Air Quality and Land Use Handbook: A Community Health Perspective, California Air Resources Board, 2005. Available online at http://www.arb.ca.gov/ch/handbook.pdf

Analysis of Goods Movement Emission Reduction Strategies, Task 1 Final Report, Southern California Association of Governments, 2008. Available online at http://www.scag.ca.gov/goodsmove/pdf/AnalysisGoodsMovementEmission_FinalReport.pdf

Compendium of Truck and Freight Information for the Greater Los Angeles Metropolitan Area, Metropolitan Transportation Authority, 2004

Emission Reduction Plan for Ports and Goods Movement in California, California Air Resources Board 2006. Available online at http://www.arb.ca.gov/planning/gmerp/gmerp.htm

Goods Movement Action Plan, Business, Transportation and Housing Agency and California Environmental Protection Agency, 2007. Available online at http://www.arb.ca.gov/gmp/docs/gmap-1-11-07.pdf

Goods Movement Action Plan – Phase I: Foundations, Business, Transportation and Housing Agency and California Environmental Protection Agency, 2005. http://www.arb.ca.gov/gmp/docs/finalgmp-plan090205.pdf

Growth of California Ports: Opportunities and Challenges, California Marine and Intermodal Transportation System Advisory Council, 2006. Available online at http://www.mtsnac.org/docs/060217CALMITSAC%20Interim%20Report%20021306%20ENTIRE%20REPORT.pdf

Inland Empire Railroad Main Line Study, SCAG, 2005. Available online at http://www.scag.ca.gov/goodsmove/pdf/InlandEmpireRailStudyFinalReport.pdf

Integrating Freight Facilities and Operations with Community Goals, NCHRP Synthesis 320, Transportation Research Board, 2003

Multi-County Goods Movement Action Plan, Metropolitan Transportation Authority, 2008. Available online at http://www.metro.net/projects_studies/mcgmap/action_plan.htm

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Railyard health risk assessments, Air Resources Board, 2006. Available online at http://www.arb.ca.gov/railyard/railyard.htm

San Pedro Bay Ports Clean Air Action Plan, Port of Los Angeles and Port of Long Beach, 2006. Available online at http://www.polb.com/civica/filebank/blobdload.asp?BlobID=3452

Southern California Regional Strategy for Goods Movement: A Plan for Action, Southern California Association of Governments, 2005. Available online at http://www.scag.ca.gov/rtp2008/pdfs/draftrtp/reports/Goods_Movement.pdf

Summary of Mitigation Measures for Marine Ports, Natural Resources Defense Council, 2004

Technical Options to Achieve Additional Emissions and Risk Reductions from California Locomotives and Railyards, Air Resources Board, 2008. Available online at http://www.arb.ca.gov/railyard/ted/122208ted.pdf

Trade Impact Study Final Report, Port of Los Angeles, Port of Long Beach, Alameda Corridor Transportation Authority, 2007. Available online at http://www.portoflosangeles.org/DOC/REPORT_ACTA_Trade_Impact_Study.pdf

SELECTED WEBSITES

Southern California Association of Governments
http://www.scag.ca.gov/

- Regional Transportation Plan

  http://www.scag.ca.gov/rtp2008/
- Goods Movement Program

http://www.scag.ca.gov/goodsmove/

- Corridor Planning Program

  http://www.scag.ca.gov/corridor/

Alameda Corridor Transportation Authority
http://www.acta.org/

Air Resources Board

- Air Quality and Land Use

http://www.arb.ca.gov/ch/landuse.htm

- Goods Movement Program

  http://www.arb.ca.gov/gmp/gmp.htm

- Railyard Emission Reduction Program

  http://www.arb.ca.gov/railyard/railyard.htm

Port of Los Angeles

http://www.portoflosangeles.org/

- Environmental Documents

  http://www.portoflosangeles.org/newsroom/archive.asp

Port of Long Beach

http://www.polb.com/

- Environmental Projects

  http://www.polb.com/news/displaynews.asp?NewsID=496&TargetID=16

- Air Quality Documents

  http://www.polb.com/environment/air_quality/documents.asp

Caltrans Office of Goods Movement

http://www.dot.ca.gov/hq/tpp/offices/ogm/index.html

SEVERAL RATING SCALES HAVE BEEN DEVELOPED TO ANALYZE ADVERSE EFFECTS OF COMMUNITY NOISE ON PEOPLE. SINCE ENVIRONMENTAL NOISE FLUCTUATES OVER TIME, THESE SCALES CONSIDER THAT THE EFFECT OF NOISE ON PEOPLE DEPENDS LARGELY UPON THE TOTAL ACOUSTICAL ENERGY CONTENT OF THE NOISE, AS WELL AS THE TIME OF DAY WHEN THE NOISE OCCURS.

characteristics of sound

SOUND IS A PRESSURE WAVE TRANSMITTED THROUGH THE AIR. IT IS described in terms of loudness or amplitude (measured in decibels), frequency or pitch (measured in hertz [Hz] or cycles per second), and duration (measured in seconds or minutes). The decibel (dB) scale is a logarithmic scale that describes the physical intensity of the pressure vibrations that make up any sound. "Logarithmic" is a scale of measurement in which an increase of one unit represents a tenfold change in the quantity measured. The pitch of the sound is related to the frequency of the pressure vibration. Because the human ear is not equally sensitive to all frequencies, a special frequency-dependent rating scale is used to relate noise to human sensitivity. The A-weighted decibel scale (dBA) provides this compensation by discriminating against upper and lower frequencies in a manner approximating the sensitivity of the human ear. The scale is based on a reference pressure level of 20 micropascals (zero dBA). The scale ranges from zero (for the average least perceptible sound) to about 130 (for the average human pain level).

The normal range of conversation is between 34 and 66 dBA. Between 70 and 90 dBA, sound is distracting and presents an obstacle to conversation, thinking, or learning. Above 90 dBA, sound can cause permanent hearing loss. Examples of various sound levels in different environments are shown in Table A-1 (Typical Sound Levels).

TABLE A-1 TYPICAL SOUND LEVELS		
Common Sounds	*A-Weighted Sound Level in Decibels*	*Subjective Impression*
Oxygen Torch	120	Pain Threshold
Rock Band	110	
Pile Driver at 50 feet	100	Very Loud
Ambulance Siren at 100 feet	90	
Garbage disposal	80	
Vacuum Cleaner at 10 feet	70	Moderately Loud
Air Conditioner at 100 feet	60	
Quiet Urban Daytime	50	
Quiet Urban Nighttime	40	Quiet
Bedroom at Night	30	
Recording Studio	20	Just Audible
	10	Threshold of Hearing
	0	

Source: Aviation Planning Associates. 1978. Calculations of Maximum A-weighted Sound Levels (dBA) Resulting from Civil Aircraft Operations.

A noise environment consists of a base of steady "background" noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. These local sources can vary from an occasional aircraft or train passing by to virtually continuous noise from, for example, traffic on a major highway. To the human ear, a sound that is 10 dBA higher than another is judged to be twice as loud; 20 dBA higher is four times as loud; and so forth. In general, a difference of more than 3 dBA is a perceptible change in environmental noise, while a 5 dBA difference typically causes a change in community reaction, and an increase of 10 dBA is perceived by people as doubling of loudness.

Noise Measurement Scales

Several rating scales have been developed to analyze adverse effects of community noise on people. Since environmental noise fluctuates over time, these scales consider that the effect of noise on people depends largely upon the total acoustical energy content of the noise, as well as the time of day when the noise occurs. Those that are applicable to looking at freight-related issues in communities are as follows:

- L_{eq}, the equivalent noise level, is an average of sound level over a defined time period (such as 1 minute, 15 minutes, 1 hour, or 24 hours). Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure.
- L_{90} is a noise level that is exceeded 90 percent of the time at a given location; it is often used as a measure of "background" noise.
- CNEL, the Community Noise Equivalent Level, is a 24-hour average L_{eq} with a 5 dBA "penalty" added to noise during the hours of 7:00 p.m. to 10:00 p.m., and a 10 dBA penalty added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and night-time. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.7 dBA CNEL.
- L_{dn}, the day-night average noise, is a 24-hour average L_{eq} with an additional 10 dBA "penalty" added to noise that occurs between 10 p.m. and 7 a.m. The Ldn metric yields similar values (within 1 dBA) as do the CNEL metric. As a matter of practice, Ldn and CNEL values are considered to be equivalent and are treated as such in this assessment.

Noise Attenuation

The noise level from a particular source generally declines as the distance to the receptor increases. Other factors such as the weather and reflecting or shielding also intensify or reduce the noise level at any given location. Typically, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA. Exterior noise levels can normally be reduced by 15 dBA inside buildings constructed with no special noise insulation. The U.S. EPA estimates that residences in "warm" climates provide at least 12 dBA of exterior-to-interior noise attenuation with windows open and 24 dBA with windows closed.

Noise from traffic on roads depends on the volume and speed of traffic and the distance from the traffic. A commonly used rule of thumb for traffic noise is that for every doubling of distance from the road, atmospheric spreading over "hard" or "soft" sites reduces the noise level by about 3 or 4.5 dBA, respectively. For a stationary source, the noise is reduced by at least 6 dBA for each doubling of distance. Further, because of the logarithmic nature of the decibel scale, a doubling of traffic on any given roadway or doubling a stationary source would cause a noise increase of approximately 3 dBA.

Environmental Justice Analysis and Outreach Study

SUMMARY REPORT: PROCESS AND OUTCOMES

Prepared for:

California Department of Transportation

Los Angeles County Metropolitan Transportation Authority

Riverside County Transportation Commission

San Bernardino Associated Governments

Prepared by:

MIG, Inc.

ICF International

In association with UltraSystems

MARCH 30, 2009

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introduction

Southern California is our nation's largest and most important center for transferring and moving merchandise from container ships to people throughout the country. It is an international gateway for foreign trade. This area connects cities throughout the country to manufacturers and markets in Asia and Mexico. "Goods movement", put simply, is the transfer of merchandise from one location to another location. But the moving parts are many and complex.

Millions of Southern California residents and businesses purchase merchandise and thousands of manufacturers produce goods for U.S. and international consumption. The result: a massive goods movement network or infrastructure, including ports, airports, railyards, and distribution centers, connected by a large system of truck routes and rail lines.

Goods movement benefits the economy of the area by supporting hundreds of thousands of jobs and providing state and local tax revenues. But goods movement also has negative effects, causing air pollution, noise, traffic jams, safety problems, and visual blight. These impacts are most felt by people who live near cargo centers, freeways, and railways—and these communities are predominantly low-income and minority, raising concerns about environmental justice.

The Southern California Association of Governments (SCAG) estimates that, over the next 20 years, overall freight volumes in the region will at least double and possibly triple. This will elevate the region's status as the most important gateway for international trade and the importance of goods movement to the region's economy and overall prosperity, but will also increase impacts on our environmental justice communities. What can be done to better understand the impacts experienced by these communities? What are the potential solutions that can be applied to these impacts? What roles can the full range of stakeholders have in these solutions? How can all of these stakeholders—including community members, industry representatives, public agencies, and more—work together to reduce these impacts and preserve or improve quality-of-life, all while supporting an important economic engine for the region?

STUDY OVERVIEW

The purpose of the Environmental Justice Analysis and Community Outreach Study was (a) to expand the region's understanding of goods movement impacts on communities of concern, and (b) to identify strategies for the region and within prototype communities to address these impacts and maintain or enhance quality-of-life, all while supporting the expansion of goods movement.

The Study objectives included:

- Creating meaningful environmental justice and goods movement information for the Southern California region
- Combining community insight and experiences with goods movement impacts in environmental justice communities with the latest and best data about impacts and mitigation strategies
- Creating a practical "toolkit" for use among all stakeholders—particularly community members—that:
    - addresses regional and localized needs;
    - is grounded in current data;
    - produces measurable and lasting results;
    - and is updateable in the future.

The Study represented a partnership of Southern California transportation and regional planning agencies including Caltrans Districts 8 and 12, Riverside County Transportation Commission, Los

Angeles County Metropolitan Transportation Authority, and San Bernardino Associated Governments. The Study team of consultants led by MIG, Inc. included ICF International and UltraSystems. The Study was funded by a Caltrans Environmental Justice Planning Grant.

APPROACH AND PROCESS OVERVIEW

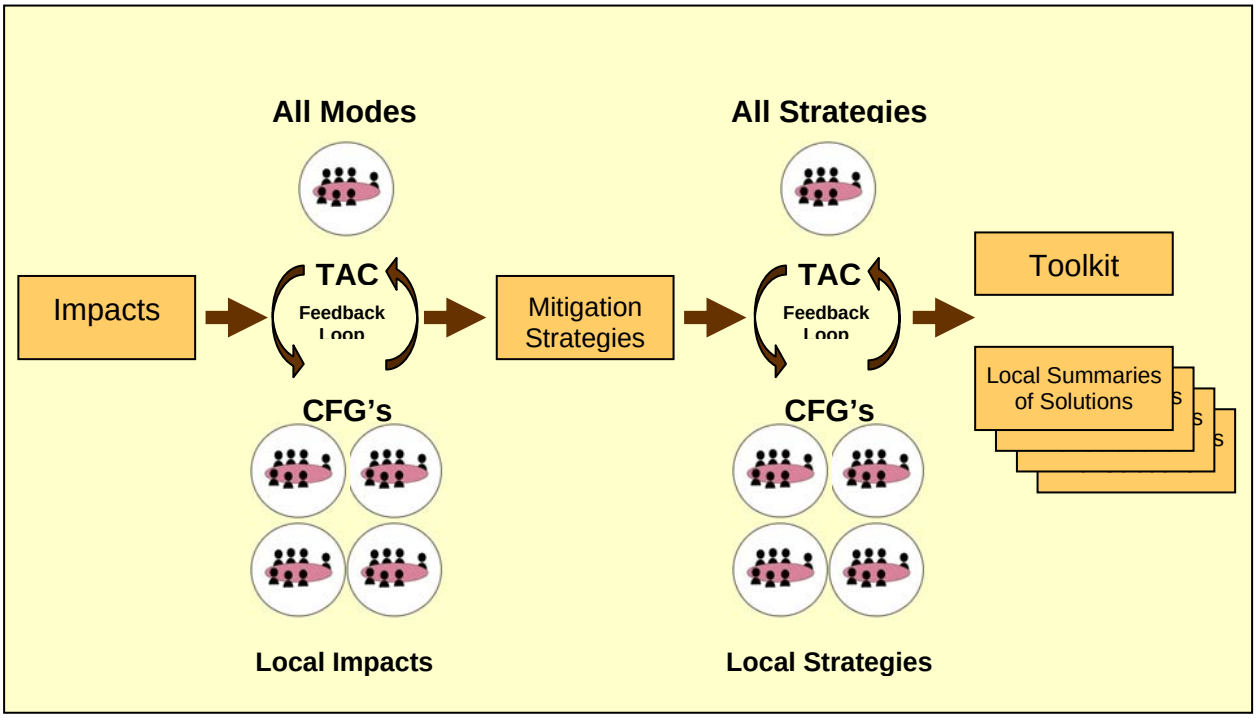
The Study approach integrated technical analyses from recently-developed plans such as the Multi-County Goods Movement Action Plan (MCGMAP) and best practices and solutions for environmental justice issues, all of which was coordinated with a broad-based community outreach approach involving technical experts and representatives of impacted communities.

- A **Technical Advisory Committee (TAC)** of experts and community representatives provided overall guidance to the study team in developing data and outcomes. Members included representatives of the participating transportation commissions, staff from local agencies including planning, public works and public health, representatives of goods movement industries, and community members involved in the Study's localized analysis of goods movement impacts in case study communities.
- A total of four (4) **Community Feedback Groups (CFGs)** of experts and community representatives—one group for each case study community—also provided guidance to the Study's localized analysis of goods movement impacts. Membership in each CFG was similar to the TAC, but focused on localized stakeholders. Some CFG members also served on the TAC, though all CFG members were invited to do so.

The TAC and CFGs guided the Study process in a continuous feedback loop that is summarized simply in the following steps:

- Identifying environmental justice communities
- Conducting an impacts analysis
- Identifying strategies and solutions
- Creating the "toolkit"

Following is a simplified graphic depiction of this process, and a more detailed description follows thereafter. A more detailed graphic depiction of the process is available at the end of this report.



Identifying Environmental Justice and Case Study Communities

Early in the process, the Study team conducted **initial consultations** with staff from the represented transportation commission agencies and stakeholders with a keen understanding of goods movement in their respective communities. The consultations provided early insight as to known goods movement facilities in their counties, as well as specific communities who may be considered environmental justice communities and experience disproportionate impacts.

The Study team **collected and mapped demographic data** for the Southern California region based on minority and low-income status, and applied the data in geographic information system (GIS) format. In this format, the data appeared in transportation analysis zones, or TAZs, which are defined geographic boundaries throughout the region. The TAZs were at a small enough scale to allow the Study team to view where environmental justice communities exist on maps of the region.

The Southern California region is one of the most diverse in both income and ethnicity. As such, and due to the relatively high cost of living, the Study team recommended use of TAZs that are greater than the regional average. With the minority population representing approximately 63% of the total population (2000 U.S. Census), the Study team recommended the following criteria to identify three levels of minority TAZs:

- 70-79% of the total population is minority
- 80-89% of the total population is minority
- Over 90% of the total population is minority

The Study team also recommended the following criteria to identify three levels of low-income TAZs:

- 30-39% of households have an income below $25,000
- 40-49% of households have an income below $25,000
- More than 50% of households have an income below $25,000

The minority criteria resulted in selection of 41% of all SCAG TAZs, and the low income criteria resulted in selection of 38% of all SCAG TAZs.

The Study team then applied this data against the emerging data and recommendations from the **Multi-County Goods Movement Action Plan (MCGMAP)**, a multi-jurisdictional effort in the same study area. The MCGMAP is the "Master Plan" for the study area, representing a regional consensus-based framework for goods movement initiatives, including planned improvements, public policy and legislation regarding mitigation strategies, and funding and institutional arrangements. The Study team also reviewed the project applications for Trade Corridor Improvement Funds from each county transportation commissions to assess their locations related to identified environmental justice communities. As these projects are imminent and require development of mitigation strategies, the Study offered a unique opportunity to support those projects.

With feedback and guidance from the TAC, this collection of data and additional coordination and discussions with local communities by transportation commission staff led to identification of the following case study communities that represent the Study's Community Feedback Groups and their respective impacts for study:

- **Coachella Valley**, Riverside County:
    - The majority of the corridor features over 90% minority populations and more than 50% of households with income below $25,000
    - Primary impacts: Emerging truck traffic on local highways, and potential development of an inland port centered on the local airport
- **Mira Loma**, Riverside County:

  - The adjacent communities include neighborhoods with 40-49% of households with incomes below $25,000, and other neighborhoods with incomes with more than 50% of households below $25,000
  - Primary impacts: Rail yard and rail operation impacts, truck traffic on local streets, and warehouse and distribution centers
- **City of Colton**, San Bernardino County:
  - Many neighborhoods near goods movement facilities feature 30-39% of households with income below $25,000, and 80-89% of the population are minorities
  - Primary impacts: Rail line noise and street crossings
- **City of South Gate**, Los Angeles County:
  - With a population of over 100,000, more than 90% of its residents are minorities and many pockets of the City have 30%-50% of households with incomes under $25,000
  - Primary impacts: Truck traffic on local streets, and warehouse and distribution centers

Conducting an Impacts Analysis

The purpose of the analysis was to summarize the best available data about the types of impacts from each goods movement facility type. The data provided a framework for identifying potential strategies and solutions that are best addressed at the local community level. The analysis organized data in the following structure:

- Economic
- Truck Routes
- Rail Lines
- Railyards
- Warehouses and Distribution Centers
- Ports

Additionally, the CFGs identified localized impacts from goods movement based on local experiences. Both the CFGs and the TAC provided feedback regarding the analysis outcomes and how to incorporate the data in the toolkit.

Identifying Strategies and Solutions

Based on the impacts analysis, the Study team provided the TAC and CFGs with **initial options for mitigation strategies**, which provided a framework for what strategies and solutions could be developed in detail as part of the toolkit, as well as those most pertinent to the CFGs' respective impacts.

After confirming the options for mitigation strategies, the Study team developed **detailed strategies**, providing general descriptions, benefits, challenges, and cost data for each strategy. Also included were more specific action steps that could be taken, as well as the potential partners and relative implementation timeframes and cost ranges. At the same time, the CFGs developed localized strategies for their respective impacts, which also informed development of the detailed strategies in the toolkit.

Creating the "Toolkit"

To bring all of the Study's work together, the Study team created the Toolkit, more formally titled: "Healthy Communities and Healthy Economies: A Toolkit for Goods Movement." Throughout the Study process, the Study team developed and refined an outline for the toolkit based on feedback from the TAC and CFGs. The Toolkit was structured as follows:

- Foreword: how to use the Toolkit
- Introduction: basic information about the goods movement system
- Economic impacts: benefits and jobs for the region
- Truck routes: description and impacts
- Rail lines: description and impacts
- Railyards: description and impacts

- Warehouses and distribution centers: description and impacts
- Ports: description and impacts
- Mitigation strategies: description and impacts
- How to get involved
- Where to go for more information

The TAC and CFGs reviewed two content drafts (data and information) followed by a final design draft (fully formatted with revisions from the content drafts). The Study's partner agencies provided final reviews prior to submitting to Caltrans as part of the grant requirements and distributing to local communities.

SUMMARY OF LOCALIZED STRATEGIES AND SOLUTIONS

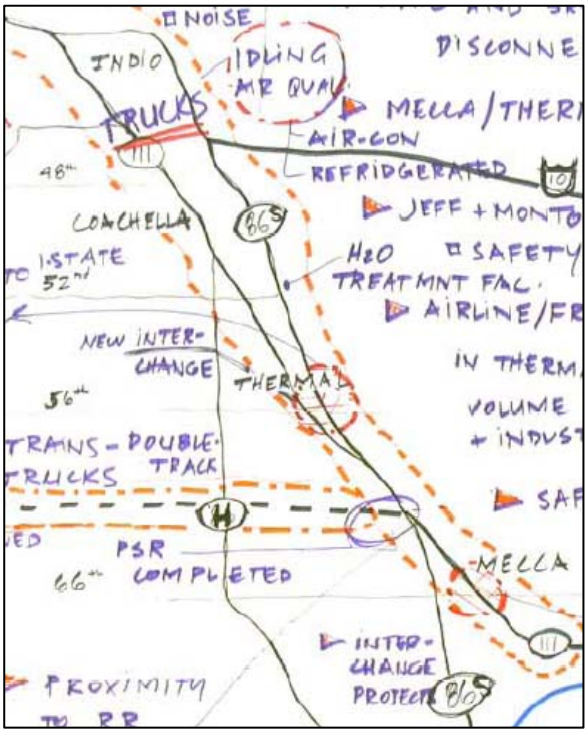
The remaining portion of this report summarizes the potential strategies and solutions developed within the CFGs as part of this process. Overall, each CFG developed a range of strategies and solutions to address their respective impacts as follows:

- **Coachella Valley**, Riverside County: Emerging truck traffic on local highways, and potential development of an inland port
- **Mira Loma**, Riverside County: Railyard and rail operation impacts, truck traffic on local streets, and warehouse and distribution centers
- **City of Colton**, San Bernardino County: Rail line noise, and safety at street crossings
- **City of South Gate**, Los Angeles County: Truck traffic on local streets, and warehouse and distribution centers

COACHELLA VALLEY
Riverside County

Description
Situated in the far eastern area of Riverside County, the Coachella Valley is relatively removed from core areas of goods movement activity in Southern California. However, the area does have its share of goods movement facilities, and local stakeholders have seen their growth over time.

Specifically, State Route 86S (a.k.a. the "NAFTA Corridor") is identified as an important, growing highway facility for freight trucks connecting the U.S., Mexico and Canada. Additionally, State Route 111 and a parallel rail line, and nearby Interstate 10, a high-volume highway, are also key parts of the local network for goods movement. Furthermore, the Jacqueline Cochran Regional Airport in the County of Riverside may expand to become a significant inland port, potentially with the growth of supporting warehousing uses nearby.



Portion of the wallgraphic from Coachella Valley Community Feedback Group Meeting #1

Impacts
Overall, given the anticipated growth of goods movement on local highways and potentially of an inland port at the Cochran Airport, as well as the likely growth of residential areas, the Coachella Valley CFG identified impacts that reflect current experiences, as well as anticipated experiences in the future. The CFG recognized that currently the Coachella Valley does not experience the same level of impacts as other communities in the region, such as Mira Loma. However, the possible growth of the local goods movement system has the potential of imposing many new burdens.

Specifically, over the course of four meetings, the CFG identified the following perceptions about impacts and concerns that may become more significant over time due to growth of goods movement:

- Expanding airport operations for goods movement that:
  - Increase air quality impacts
  - Develop more industrial, warehousing or distribution centers potentially adjacent to residential areas
  - Increase traffic congestion on local streets
  - Potentially limit job development opportunities by precluding other uses of the land that might offer more or better jobs.
- Increasing traffic congestion on local highways that:
  - Increase air quality impacts
  - Contribute to increasing traffic congestion on local streets
  - Reduce traffic safety levels, particularly with under-developed interchanges and railroad crossings
- Increasing railroad traffic that:
  - Increase the chance for accidents at street crossings
  - Block access to some local communities at times, including first responders
  - Increase chances of spilling hazardous materials

Potential Local Strategies and Partners

Following are local strategies and potential partners organized by goods movement mode as identified by the CFG and recommended for consideration by the Study team. Also noted are estimates for the number of years and relative cost that may be necessary for implementation of each strategy.

A general guide to the range of costs is as follows:

$: less than $10,000
$$: $10,001 – $100,000
$$$: $100,001 – $1 million
$$$$: greater than $1 million

A general guide to the relative timeframe to implement strategies is as follows:

Short: 0–5 years
Mid: 5–10 years
Long: 10+ years

INLAND PORT AND WAREHOUSING

Strategies	*Timeframe*	*Relative Cost*
Engage the region regarding a vision for potentially developing an inland port with clear data about impacts and benefits. Potential Partners: Airport authority, local cities, county, CVAG	Short	$$
Study economic impacts and cost/benefit data—particularly related jobs—from inland port and warehousing development versus other uses. Potential Partners: CVAG, County	Short	$$
Develop localized air quality data, and forecast potential impacts from port development. Potential Partners: SCAQMD, County, CVAG	Short	$$
Refine land use zoning to ensure that incompatible uses are separated by appropriate buffers in next General Plan Update, as needed. Potential Partners: County	Short	$$
Study opportunities for off-peak scheduling at inland port facilities and warehouses to minimize daytime impacts on local communities. Potential Partners: Airport, County, CVAG	Short	$$
For new projects, require noise-generating activities or equipment to be located away from adjacent sensitive land uses such as homes, schools and hospitals. Potential Partners: County, local cities, operators	Short	$
For existing and new projects, facilitate communication between facility operators and local communities to build mutual awareness of operational needs, impact concerns, and potential solutions. Potential Partners: County, cities, facility operators	Short	$
Require new distribution centers to establish truck routes and to add on-site signage to direct trucks exiting the facility to those routes. Potential Partners: City/county public works and planning departments, distribution centers.	Short	$

TRUCKS

Strategies	*Timeframe*	*Relative Cost*
Conduct traffic studies on local highways to forecast traffic growth and facility improvement needs. Potential Partners: Caltrans, RCTC, CVAG	Short	$$-$$$
Coordinate impacts of new roadway connections with adjacent cities and counties to ensure consistent design and operations. Potential Partners: City/county public works departments, facility operators.	Short	$
Assess truck volumes and travel patterns on roadways to identify priority improvement areas. Potential Partners: City/county public works departments, Caltrans.	Short	$$
Coordinate signal systems with adjacent jurisdictions, and with county transportation agencies and Caltrans. Potential Partners: City/county public works departments, Caltrans.	Mid	$$$
Assess the need for industry or truck impact fees in local communities to support financing of infrastructure improvements. Potential Partners: City/county public works departments, CVAG.	Short	$
Enact zoning codes to ensure that new freight facilities have adequate truck parking. Potential Partners: City/county planning and public works departments.	Short	$
Cities and county can pass ordinances to prohibit vehicle parking on certain roadways. Potential Partners: City/county planning and public works departments.	Short	$
In addition to enforcement, communicate new or existing route information to truckers through trucking companies or places where truckers are, such as rest areas or fueling stations. Potential Partners: City/county public works departments, trucking companies and associations.	Short	$
Identify truck corridors that would most benefit from designated truck routes. Potential Partners: Caltrans, city/county public works and planning departments, CVAG, major trucking companies/local warehouses.	Short	$
Implement truck routes on selected corridors. Potential Partners: Caltrans, city/county public works department, CVAG.	Short	$$

RAIL LINES AND CROSSINGS

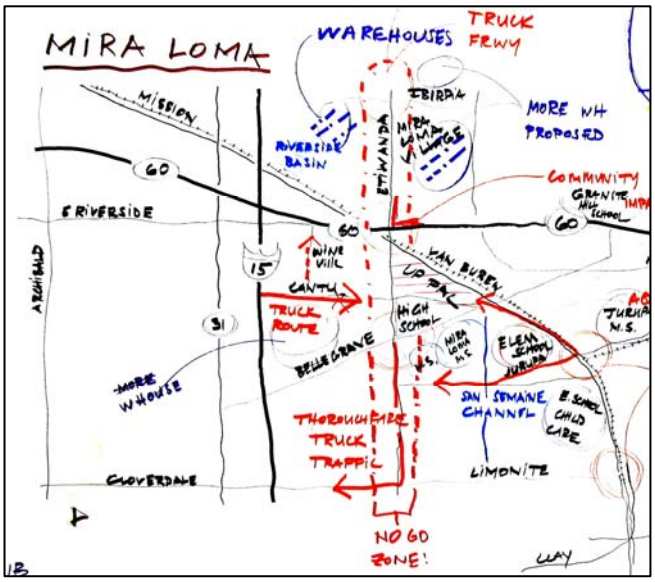
Strategies	*Timeframe*	*Relative Cost*
Build grade-separations at Avenues 56 and 66. Potential Partners: County public works, rail operators	Mid	$$$$
Identify crossings best suited for traffic redirection. Potential Partners: City/county public works departments, CVAG, local community members.	Short	$
Develop alternative vehicle routes & determine if street upgrades are necessary. Potential Partners: City/county public works departments, local community members.	Short	$
Implement redirection strategies.	Short	$$

Strategies	*Timeframe*	*Relative Cost*
Potential Partners: City/county public works departments.		
Identify at-risk traffic intersections. Potential Partners: City/county public works department, community members, railroads Caltrans.	Short	$
Pursue additional funding for grade separations throughout the corridor Potential Partners: CVAG, RCTC, Caltrans, State, cities	Short	$
Coordinate with state and local agencies and rail operators to select and implement crossing signal systems and/or grade separations. Potential Partners: RCTC, FRA, city/county public works department, railroads Caltrans.	Short-Mid	$$$-$$$$
Coordinate with local agencies to implement interim safety improvements (e.g., raised medians, pre-signed quad gates) in advance of implementing grade separation projects. Potential Partners: RCTC, CVAG, city/county public works departments, Caltrans.	Short	$$$
Work with state, federal and local agencies as well as rail operators to minimize safety hazards and congestion at rail crossings. Potential Partners: RCTC, CVAG, FRA, city/county public works department, railroads Caltrans.	Short	$$

MIRA LOMA
Riverside County

Description

Located in the western portion of Riverside County, the Mira Loma community is an unincorporated area where the remnants of a farming and dairy society are still visible among a mix of modern goods movement facilities and some old and new residential areas. At the center of the community is the Mira Loma Railyard operated by Union Pacific, surrounded by supporting warehouses and distribution centers, as well as State Route 60 and Interstate 15.



Portion of the wallgraphic from Mira Loma Community Feedback Group Meeting #1

The Mira Loma community has experienced significant impacts from these goods movement facilities. Community members and activists have spearheaded and documented efforts to quantify community health impacts from situating sensitive land uses—particularly schools and residential areas—near goods movement facilities. Specifically, they have identified significant health disparities related to air quality from the railyard and supporting truck operations including premature deaths, reduced lung development and capacity, and cancer rates. Additionally, community members and activists have worked to gain more influence over land use decision-making in their community, which they believe is central to creating a safer and healthier community for residents.

Impacts

Overall, the Mira Loma CFG identified impacts that primarily reflect ongoing perceptions, experiences and issues, but also identified some anticipated experiences in the future. Specifically, over the course of three meetings, the CFG identified:

- Land use:
  - Lack of local control of land use decision-making because of the area's status as an unincorporated area of the County
- Air quality:
  - Highest levels of PM 10 and PM 2.5 in the nation due to trucks and rail
- Trucks in residential areas:
  - Traveling, idling and parking on residential streets and near school areas
    - Appropriate truck rest areas are not available
  - Contribute to local congestion
  - Incomplete and under-signed designated truck routes
  - Lack of enforcement of current laws
- Warehousing and distribution centers:
  - Pressure to expand or locate adjacent to residential areas
  - Avoiding the placement of low-income housing as "buffers" between incompatible uses and goods movement facilities
  - Facilitate truck traffic
- Rail crossings:
  - Trains proceed slowly or park at crossings for extended periods
- Local economy:

- Local jobs in goods movement industries are low wage, temporary and unstable without adequate compensation, or are higher, managerial level positions filled by others who do not live in Mira Loma
- Overall, some CFG members believe that the community health impacts far outweigh any local economic benefits

Potential Local Strategies and Partners

Following are local strategies and potential partners organized by goods movement mode as identified by the CFG and recommended for consideration by the Study team. Also noted are estimates for the number of years and relative cost that may be necessary for implementation of each strategy. A general guide to the range of costs is as follows:

$: less than $10,000
$$: $10,001 – $100,000
$$$: $100,001 – $1 million
$$$$: greater than $1 million

A general guide to the relative timeframe to implement strategies is as follows:

Short: 0–5 years
Mid: 5–10 years
Long: 10+ years

TRUCKS

Strategies	*Timeframe*	*Relative Cost*
Complete previous truck route study that identified Cantu-Galleano as a preferred route Potential Partners: County transportation, Caltrans, truck operators, local residents	Short	$-$$
Implement truck routes on selected corridors. Potential Partners: Caltrans, city/county public works department, Councils of Government, major trucking companies and distributors.	Short	$$
Assess truck volumes and travel patterns on roadways to identify priority improvement areas. Potential Partners: County public works departments, Caltrans.	Short	$$
Enact planning codes to ensure that new freight facilities have adequate truck parking. Potential Partners: County planning and public works departments.	Short	$
Consider ordinance to prohibit vehicle parking on certain roadways. Potential Partners: County planning and public works departments.	Short	$
In addition to enforcement, communicate new or existing route information to truckers through trucking companies or places where truckers are, such as rest areas or fueling stations. Potential Partners: County public works departments, trucking companies and associations.	Short	$
Repave roadways with "quiet pavement" materials that reduce road noise. Potential Partners: County public works department, Caltrans.	0-10	$$
Assess the need for industry or truck impact fees in local communities to support	Short	$

Strategies	*Timeframe*	*Relative Cost*
financing of infrastructure improvements. Potential Partners: County public works department		

RAIL LINES AND CROSSINGS

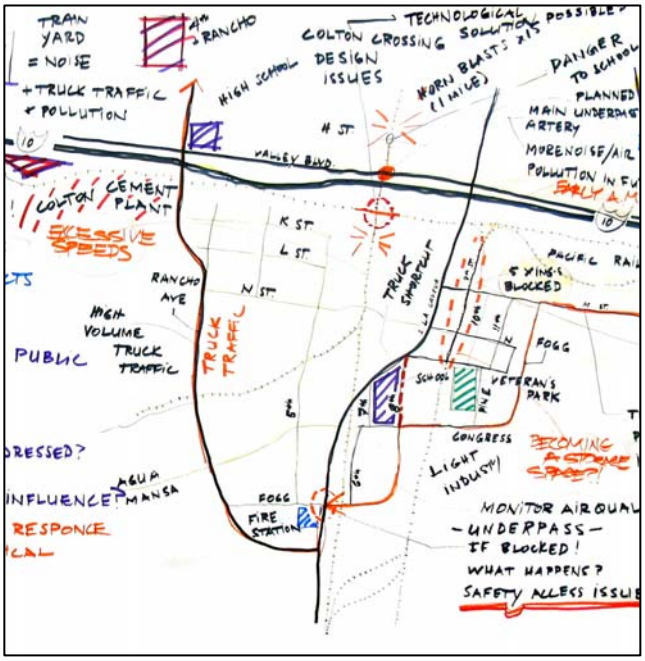
Strategies	*Timeframe*	*Relative Cost*
Identify at-risk traffic intersections, particularly along the "Cement Plant Spur." Potential Partners: County public works department, community members, UP, Caltrans.	Short	$
Work with state and federal agencies as well as UP to minimize safety hazards and congestion at rail crossings. Potential Partners: RCTC, FRA, county public works department, UP, Caltrans.	Short	$$
For existing and new projects, facilitate communication between operators and local communities to build mutual awareness of operational needs, impact concerns, and potential solutions. Potential Partners: County, facility operators, community members	Short	$

RAILYARD AND WAREHOUSING (NOISE)

Strategies	*Timeframe*	*Relative Cost*
Employ a range of sound barriers (walls, landscaping, etc.) along property line of affected sensitive land uses. Potential Partners: Railyard, county, warehouses.	5-10	$$-$$$
Work with railyard to focus operations away from properties not separated by sound barriers. Potential Partners: Railyard, county.	Short	$
Research ways to secure funding (for example, grants and new legislation) for programs which would help homeowners sound-proof windows and doors. Potential Partners: County, community members.	Short	$
Explore opportunities with railyard for reduced horn use, frequency and or volume Potential Partners: Railyard, county, community members.	Short	$
Facilitate communication between railyard and local communities to build mutual awareness of operational needs, impact concerns, and potential solutions. Potential Partners: Railyard, county, community members	Short-Mid	$

CITY OF COLTON
San Bernardino County

Description
The southern portion of the City of Colton is an old residential neighborhood with families who have lived in the area for many generations. Having started as a railroad town, it continues as such to this date with significant railroad traffic traveling along two main lines that cross each other, one operated by BNSF and the other by UP. A locally-serving spur line serves locations south of the neighborhood, with the line traveling directly down the middle of a local street.



Portion of the wallgraphic from South Colton Community Feedback Group Meeting #1

Impacts
Over the course of four meetings, the CFG identified the following perceptions about impacts and concerns that may become more significant over time due to growth of goods movement:

- Noise
  - Frequently impacts the community during day and night operations, primarily in the northern part of the community
  - The added third rail line has increased the frequency of train noise
  - Over 10 train horn blasts occur within a one mile stretch
- Safety
  - Train traffic on 9th Street poses public safety risks to residents
    - No safety barriers
    - Occasionally blocks up to five street crossings by parking for extended periods, including M Street, a critical thoroughfare
  - The Fogg Street underpass is narrow and short, potentially resulting in blocked passage for first responders
  - Unsafe railroad crossings at Valley Blvd., H Street, and 9th Street pose dangers to school children
  - Trucks take illegal short-cuts on residential streets
  - Trains travel local rail lines at excessive speeds
- Air Quality
  - High volume of truck traffic on Rancho Avenue may produce dangerous emission levels
  - A new Colton Crossing may facilitate higher emission levels

Potential Local Strategies and Partners

Following are local strategies and potential partners organized by goods movement mode as identified by the CFG and recommended for consideration by the Study team. Also noted are estimates for the number of years and relative cost that may be necessary for implementation of each strategy. A general guide to the range of costs is as follows:

$: less than $10,000
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A general guide to the relative timeframe to implement strategies is as follows:

Short: 0–5 years
Mid: 5–10 years
Long: 10+ years

RAIL LINES (NOISE)

Strategies	*Timeframe*	*Relative Cost*
Research ways to secure funding (for example, grants and new legislation) for programs which would help homeowners sound-proof windows and doors. Potential Partners: SANBAG, city, county	Short	$
Explore opportunities with railroads for reduced horn use, frequency and or volume (similar to passenger rail levels) at specific locations—particularly in residential areas and on 9th Street—that still meet FRA requirements. Potential Partners: Railroads, FRA, City	Short	$
Explore opportunities with railroads to adjust positioning of horns on locomotives to reduce horn impacts on residential areas that still meet FRA requirements. Potential Partners: Railroads, FRA, City	Short	$
Study the possibility of designating a section of 9th Street and other areas as a "quiet zone." Potential Partners: FRA, City, UP	Short	$
Search for funding from legislation and grants for new rail crossing systems, compatible with quiet zone regulations. Potential Partners: SANBAG, City.	Short	$
Study options for sound barriers—including native landscaping, berms, and walls—along property lines of affected sensitive land uses where possible, ensuring adequate safety access for rail operators. Target the 600 block of East M Street, and link to the development of the Colton Crossing project. Potential Partners: Railroads, City.	Mid	$$-$$$

RAIL CROSSINGS

Strategies	*Timeframe*	*Relative Cost*
Study possibility of removing the 9th Street rail line and relocating rail operations onto the BNSF line. Potential Partners: Railroads, FRA	Short	$
Identify at-risk traffic intersections for pedestrians and vehicles. Potential Partners: City public works department, community members, railroads, Caltrans.	Short	$
Study options to eliminate at-grade crossings in the community. Potential Partners: City planning and public works departments, community members	Short	$
Study options to improve congestion levels at the Valley Blvd crossing. Potential Partners: City planning and public works departments, BNSF.	Short	$
Work with state and federal agencies as well as rail operators to minimize safety hazards and congestion at rail crossings. Potential Partners: SANBAG, FRA, city public works department, railroads Caltrans.	Short	$$
Study feasibility and cost of installing four-quadrant gates at rail crossings, particularly on 9th Street. Potential Partners: UP, FRA, City	Short	$
Install four-quadrant gates at rail crossings. Potential Partners: Railroads, FRA, City	Mid	$$$
Improve the Fogg Street undercrossing to improve public safety access. Potential Partners: BNSF, City	Mid	$$$
Coordinate with state agencies and rail operators to select and implement additional crossing signal systems in the community including wayside horns and signage. Potential Partners: SANBAG, FRA, city public works department, railroads Caltrans.	Short-Long	$$$

TRUCKS

Strategies	*Timeframe*	*Relative Cost*
Study opportunities to change delivery hours of local trucking operators to minimize or eliminate travel during peak hours, particularly related to schools. Potential Partners: City, truck operators, local residents	Short	$
Enforce current truck routes. Potential Partners: City police, truck operators	Short	$

PUBLIC AWARENESS AND ACTION

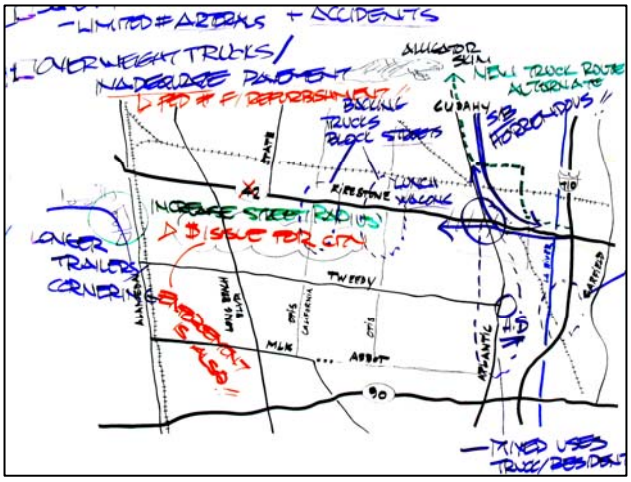
Strategies	*Timeframe*	*Relative Cost*
Share info with the community about goods movement impacts and potential solutions to build support for taking action and promote safety. Potential Partners: City, local residents.	Short	$
Document goods movement impacts with photos and maps to illustrate impacts. Potential Partners: City, local residents.	Short	$
Build awareness of goods movement impacts on the community among local goods	Short	$

Strategies	*Timeframe*	*Relative Cost*
movement operators. Potential Partners: City, local residents, railroads, truck operators.		
Partner with local schools to distribute information to youth and parents about safety and potential solutions to goods movement impacts. Potential Partners: City, school district.	Short	$
Translate this document and other education materials into Spanish language with terms that are easy to understand. Potential Partners: SANBAG, City.	Short	$

CITY OF SOUTH GATE
Los Angeles County

Description

The City of South Gate is one of many communities situated near the Ports of Los Angeles and Long Beach and their supporting infrastructure, particularly the I-710 freeway and warehousing and distribution centers. There are many businesses linked to port activities that negatively impact the community. The City experiences high volumes of truck traffic on major arterials like Firestone Boulevard, Garfield Avenue, and Atlantic Avenue, which have sensitive land uses along the corridor such as schools.



Portion of the wallgraphic from South Gate Community Feedback Group Meeting #2

Impacts

Over the course of four meetings, the CFG identified the following perceptions about impacts and concerns that may become more significant over time due to growth of goods movement:

- Truck traffic on major arterials
  - Longer trailers are unable to negotiate a turn properly and some of the intersections are not designed to accommodate these turning movements
  - There is significant congestion between 4 and 6 p.m.
  - Southbound traffic congestion on Atlantic Avenue at the Firestone Boulevard intersection is heavy
- Warehouses and distribution centers
  - Trucks backing out from warehouses create safety issues
  - Trucks double park to unload at facilities, creating safety issues
- Air quality impacts
  - There are 28 schools in South Gate plus a community college
  - Truck- and freight-generated pollution is a major concern relating to the health of school children and residents alike
- Noise
  - Trucks arrive at 4 a.m. and run refrigerator compressors while parked adjacent to neighborhoods
- Other
  - Pavement structure is inadequate in some areas to deal with overweight trucks; streets have "alligator cracks" and "ruts"
  - More enforcement of existing city ordinances is needed, specifically for truck parking and illegal dumping in commercial and residential neighborhoods
  - Many warehouse/distribution facilities receive shipments from out-of-state, long-distance sources.

Potential Local Strategies and Partners

Following are local strategies and potential partners organized by goods movement mode as identified by the CFG and recommended for consideration by the Study team. Also noted are estimates for the number of years and relative cost that may be necessary for implementation of each strategy. A general guide to the range of costs is as follows

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A general guide to the relative timeframe to implement strategies is as follows:

Short: 0–5 years
Mid: 5–10 years
Long: 10+ years

TRUCKS (PARKING AND ROUTING)

Strategies	*Timeframe*	*Relative Cost*
Implement new "staging area" to keep trucks out of residential areas. Potential Partners: City, truck operators.	Short	$$$
Explore opportunities to allow extended parking at new inspection facilities along I-710 or near the ports. Potential Partners: GCCOG, Ports	Short	$
Implement new alternative truck route that bypasses the Firestone/Atlantic intersection, which is currently under consideration as part of the City's General Plan update. Potential Partners: City, truck operators	Long	$$$$
Post street signage directing truckers to designated truck parking sites and routes. Potential Partners: City, trucking associations	Short	$$
In addition to enforcement, communicate new or existing route information to truckers through truck drivers or places where drivers are, such as rest areas or fueling stations. Potential Partners: City, trucking companies and associations.	Short	$
Enact planning codes to ensure that new freight facilities have adequate truck parking. Potential Partners: City.	Short	$
Consider an ordinance to prohibit vehicle parking on certain roadways. Potential Partners: City.	Short	$
Consider feasibility of developing a "freight overlay zone" as part of the City's General Plan policy framework, potentially in coordination with neighboring cities. Potential Partners: City, adjacent cities, GCCOG.	Mid	$

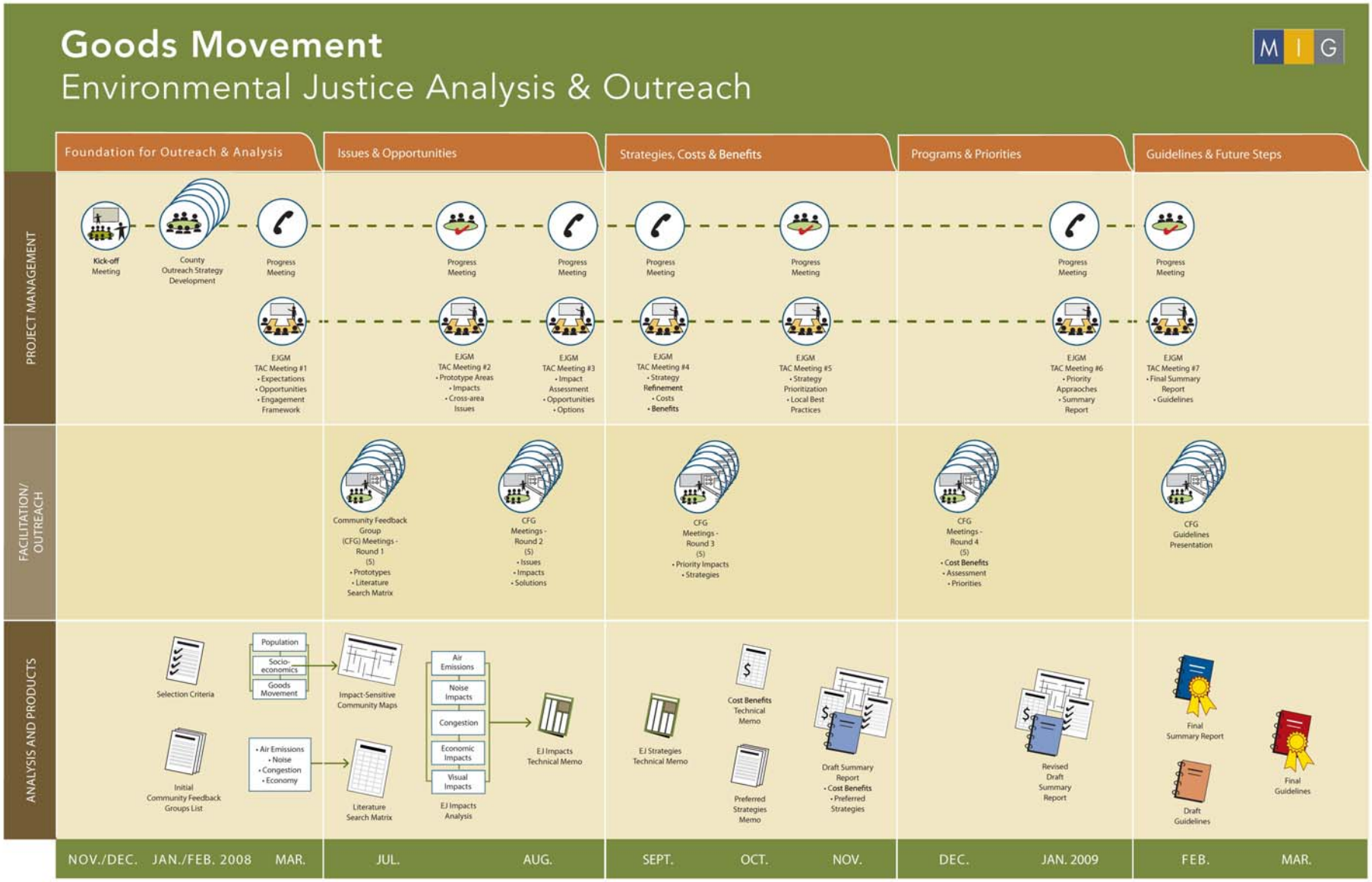
TRUCKS (TRAFFIC, SAFETY AND NOISE)

Strategies	*Timeframe*	*Relative Cost*
Coordinate roadway improvements with adjacent cities to ensure consistent design. Potential Partners: City.	Short	$
Identify funding opportunities to design and install traffic calming measures. Potential Partners: City.	Short	$
Coordinate signal systems with adjacent jurisdictions, and with county transportation agencies and Caltrans. Potential Partners: City, County, Caltrans, GCCOG, adjacent cities.	Short	$$
Designate "truck free zones" on streets or in neighborhoods. Potential Partners: City, trucking companies, local residents.	Short	$
Assess the need for industry or truck impact fees in the City to support financing of infrastructure improvements. Potential Partners: City.	Long	$$
Continue repaving roadways with "rubberized asphalt" materials that reduce roadway noise. Potential Partners: City.	Ongoing	$$$$
Coordinate construction of soundwalls at key locations. Potential Partners: City, Caltrans, GCCOG.	Ongoing	$

WAREHOUSING AND DISTRIBUTION CENTERS

Strategies	*Timeframe*	*Relative Cost*
Study opportunities for freight facilities to implement scheduling system to support preferred truck traffic hours on local arterials. Potential Partners: Shipping companies, City, trucking companies.	Mid	$
Study opportunities for freight facilities to extend hours-of-operation into off-peak periods in support of preferred truck traffic hours on local arterials. Potential Partners: Shipping companies, City, trucking companies.	Mid	$
For new projects, prohibit facility design that forces or encourages trucks to back into the facility from public streets Potential Partners: City	Mid	$
Consider additional soundproofing requirements to applicable City codes in areas affected by excess noise. Potential Partners: City.	Mid	$
Research ways to secure funding (for example, grants and new legislation) for programs which would help homeowners sound-proof windows and doors. Potential Partners: City.	Mid	$
Study potential caps to warehouse and distribution center volumes to mitigate truck traffic impacts. Potential Partners: City.	Mid	$$
For existing and new projects, facilitate communication between operators and local communities to build mutual awareness of operational needs, impact concerns, and potential solutions. Potential Partners: City, facility operators.	Ongoing	$$

PROCESS GRAPHIC



glossary and acronyms

GLOSSARY

California Environmental Quality Act (CEQA): California Environmental Quality Act, enacted in 1970, requires government agencies in California to identify the significant environmental impacts of their actions, and avoid or mitigate those impacts if possible. CEQA applies to all projects undertaken by public agencies, as well as to private projects that are subject to the review or approval of a public agency.

Cargo Handling Equipment: Cargo-handling equipment refers to equipment used at ports, railyards, and other freight facilities to moves containers and bulk shipments. Examples include yard tractors, cranes, forklifts, top picks, and side picks.

Diesel Particulate Matter (DPM): Diesel particulate matter is the particulate component of diesel exhaust from diesel fuel, which includes diesel soot and aerosols such as ash particulates, metallic abrasion particles, sulfates, and silicates.

Drayage Trucks: Drayage trucks are those that travel short distances to move goods to and from ports and rail yards.

EMFAC: The EMission FACtors (EMFAC) model is used to calculate emission rates from all motor vehicles, such as passenger cars to heavy-duty trucks, operating on highways, freeways and local roads in California. Developed by the California Air Resources Board, EMFAC2007 is the most recent version of this model.

Gen-set Locomotive: A generator set ("Gen Set") locomotives uses a series of smaller diesel engines (each approximately 700 horsepower) to directly power the traction motors. One or two of the engines can be shut down in operations with lower power demand, saving fuel and reducing emissions.

Grade Crossing: A grade crossing is the intersection of a roadway and a railroad line "at grade," so vehicles must wait when a train is passing through the crossing.

Harbor Craft: Commercial harbor craft help move large ships and provide supplies to the port. They include tugboats, ferries, small excursion craft, supply vessels, dredges, and service boats.

Health Risk Assessment: Heath Risk Assessments are used to estimate whether current or future chemical exposures will pose health risks to a broad population, such as a city or a community. The U.S. Environmental Protection Agency (U.S. EPA) is a leading risk assessment agency at the federal level. In California, the Office of Environmental Health Hazard Assessment (OEHHA) in the California Environmental Protection Agency (Cal/EPA) has the primary responsibility for developing procedures and practices for performing health risk assessments.

Hybrid Locomotive: A hybrid-electric locomotive uses a small, low-emission diesel engine to charge a battery pack that powers the traction motors. These engines can also recover braking energy to improve fuel efficiency. Used in rail yards, these locomotives use less fuel and reduce emissions compared to conventional switcher locomotives.

Intermodal: Intermodal transportation involves the use of more than one mode of transport for a journey. Intermodal freight typically refers to shipments that travel by both truck and railroad.

Level of Service (LOS): Level of Service (LOS) is a letter grading system ranging from ranging from A (best) to F (worst) that measures the congestion levels on roadways or at intersections. Grades are assigned based on the average delay per vehicle.

National Environmental Policy Act (NEPA): The National Environmental Policy Act of 1969 requires agencies to evaluate the environmental impacts of any "major federal action significantly affecting the quality of the human environment." NEPA applies to any action that involves the use of federal funds, the need for federal approval in the form of permits, or a location on federal land.

Ocean Going Vessels (OGV): Ocean going vessels or ships include container ships, tanker ships, bulk carriers, automobile carriers, general cargo ships, roll-on roll-off ships, and cruise ships.

Oxides of Nitrogen (NOx): Oxides of Nitrogen are compounds of oxygen and nitrogen such as Nitric Oxide (NO), nitrogen dioxide (NO2) and Nitrous Oxide (N2O). Along with reactive organic gas (ROG), NOx is the main ingredient in ground level ozone, commonly called smog.

Particulate Matter (PM): Particulate matter is the term for solid or liquid particles found in the air. Some particles are large or dark enough to be seen as soot or smoke. Because particles originate from a variety of mobile and stationary sources (diesel fuel, woodstoves, power plants, etc.), their chemical and physical compositions vary widely. Particulate matter can be directly emitted or can be formed in the atmosphere when gaseous pollutants such as SO2 and NOx react to form fine particles. PM10 refers to particles less than or equal to 10 microns and PM 2.5: refers to particles less than or equal to 2.5 microns), also called fine particulate matter or "Fine particles" such as those found in smoke and haze.

Reactive Organic Gas (ROG): Reactive Organic Gas are organic chemical compounds that react in the atmosphere (nitrogen oxides) to form ground level ozone, commonly called smog. They are released by a variety of sources including burning of petroleum fuels, use of solvents, petroleum processing and storage, and pesticides. The U.S. EPA refers to these gases ad volatile organic compounds (VOCs).

Sound Exposure Level (SEL): SEL is the basic noise unit, also known as the "single-event level." The SEL describes the amount of noise exposure from a single event, such as a freight train passing by one residence.

Switching locomotive: Switching locomotives are just used in the rail yards to move rail cars to tracks for loading or unloading intermodal containers or move rail cars onto a track to assemble an outbound train.

Transportation Refrigeration Units (TRUs): Transportation refrigeration units (TRUs), or "reefers", are gasoline and diesel powered cooling units that are installed on vehicles used in transporting produce, meat, dairy products, and other perishable goods. TRUs are found on refrigerated vans, trucks, trailers, and railcars.

URBEMIS: The URBan EMISsions (URBEMIS) is a software program which is used to estimate emissions from construction and operation of land use development. The URBEMIS 2007 model uses the California Air Resources Board's EMFAC2007 model for on-road vehicle emissions and the OFFROAD2007 model for off-road vehicle emissions.

ACRONYMS

AESS	Automatic Engine Start-Stop Device
APU	Auxiliary Power Unit
AQMP	Air Quality Management Plan
ARB	Air Resources Board
B100	Biofuel blend, 100% biodiesel
B20	Biofuel blend, 20% biodiesel
BNSF	Burlington Northern Santa Fe Railway
CA EDD	California Employment Development Department
CEQA	California Environmental Quality Act
CFG	Community Feedback Group
CHE	Cargo Handling Equipment
CHP	California Highway Patrol
CNEL	Community Noise Equivalent Level
CNG	Compressed Natural Gas
CO	Carbon Monoxide
COG	Council of Government
dB	Decibel
dBA	Decibel Adjusted
DOC	Diesel Oxidation Catalyst
DPF	Diesel Particulate Filter
DPM	Diesel Particulate Matter
EMFAC	ARB EMission FACtor model
EPA	Environmental Protection Agency

FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FTF	Flow-through Filter
GCCOG	Gateway Cities Council of Governments
GVWR	Gross Vehicle Weight Rating
HC	Hydrocarbon
HP	Horsepower
HRA	Health Risk Assessment
HVAC	Heating, Ventilation and Air Conditioning System
ICTF	Intermodal Container Transfer Facility
LAUSD	Los Angeles Unified School District
LAWA	Los Angeles World Airports
LAX	Los Angeles International Airport
Leq	Equivalent Sound Level
LNG	Liquefied Natural Gas
LOS	Level Of Service
MSW	Municipal Solid Waste
NAFTA	North America Free Trade Agreement
NEPA	National Environmental Policy Act
NHTSA	National Highway Traffic Safety Administration
NOx	Oxides of Nitrogen
OGV	Ocean-Going Vessel

OPR	California Office of Planning and Research
PHIMF	Puente Hills Intermodal Facility
PM	Particulate Matter
PM-10	Particulate Matter less than 10 microns in diameter
PM-2.5	Fine Particulate Matter (less than 2.5 micron2 in diameter)
PMI	Point of Maximum Impact
POLA	Port of Los Angeles
POLB	Port of Long Beach
ROG	Reactive Organic Gas
SANBAG	San Bernardino Associated Governments
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SEL	Sound Exposure Level
SPB	San Pedro Bay
STC	Sound Transmission Class
TEA	Transportation Enhancement Activities Grant
TRU	Transport Refrigeration Unit
UP	Union Pacific Railroad
URBEMIS	URBan EMISsion Model
USDOT	United States Department of Transportation
VMT	Vehicle-Miles Traveled
VSR	Vessel Speed Reduction

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