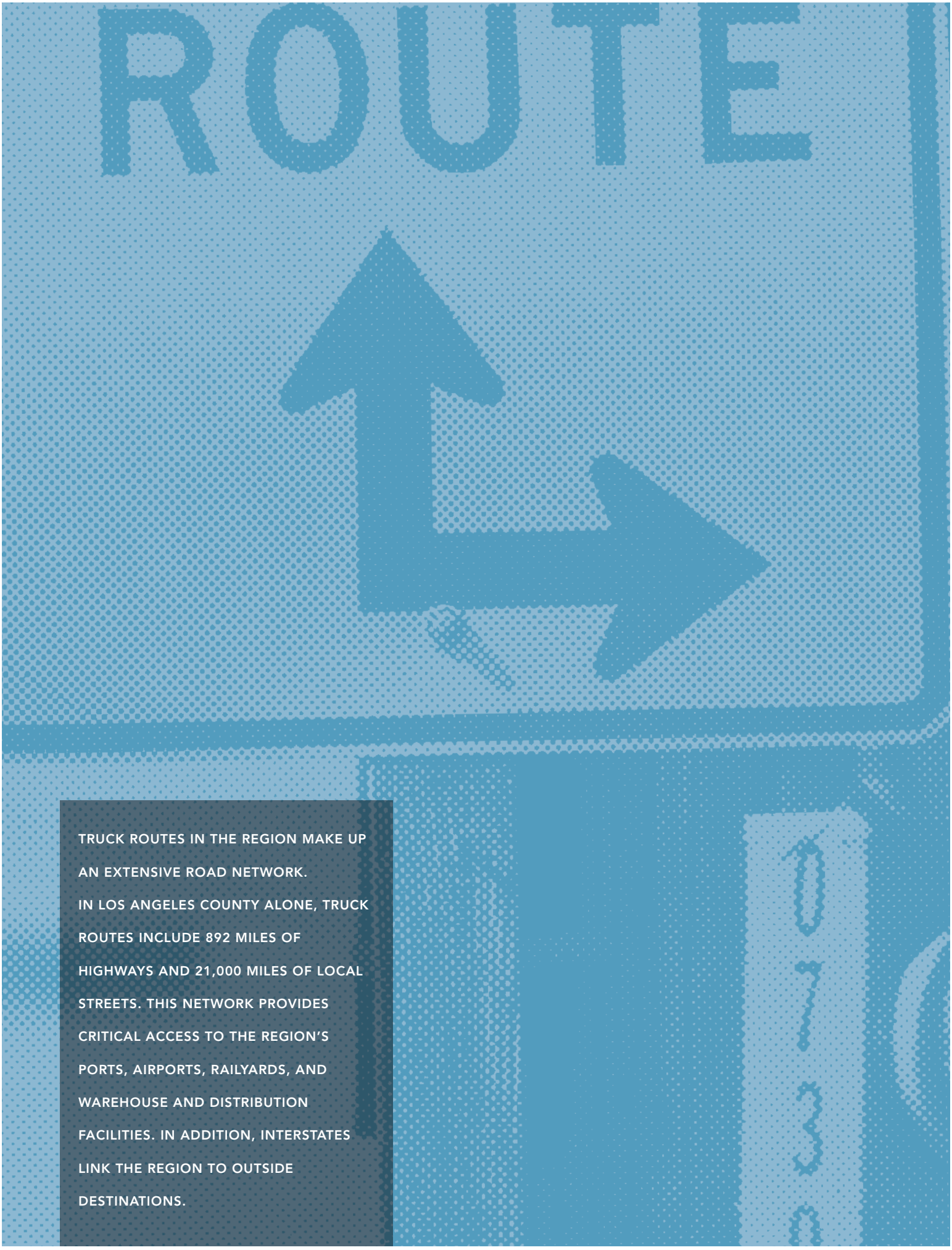


TRUCK ROUTES IN THE REGION MAKE UP AN EXTENSIVE ROAD NETWORK. IN LOS ANGELES COUNTY ALONE, TRUCK ROUTES INCLUDE 892 MILES OF HIGHWAYS AND 21,000 MILES OF LOCAL STREETS. THIS NETWORK PROVIDES CRITICAL ACCESS TO THE REGION'S PORTS, AIRPORTS, RAILYARDS, AND WAREHOUSE AND DISTRIBUTION FACILITIES. IN ADDITION,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

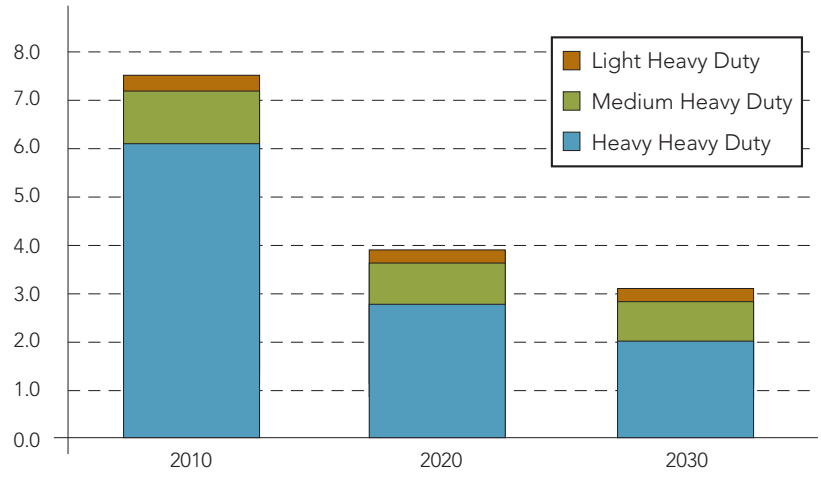
TABLE 3-4 EMISSION FACTORS IN GRAMS PER MILE, 2010*

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

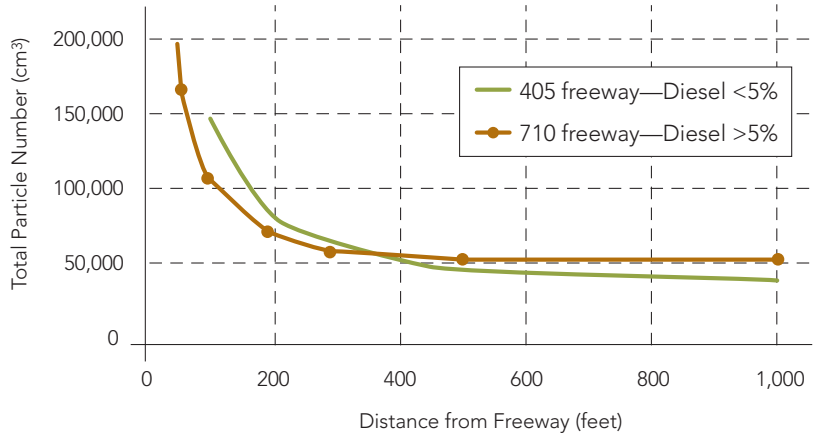
Air quality studies show that vehicle traffic, including truck traffic, directly affects air pollution. More traffic generates higher concentrations of traffic-related pollution. Research reveals that living close to freeways (500–1,000 feet) and high traffic roads can have serious impact on health, 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]