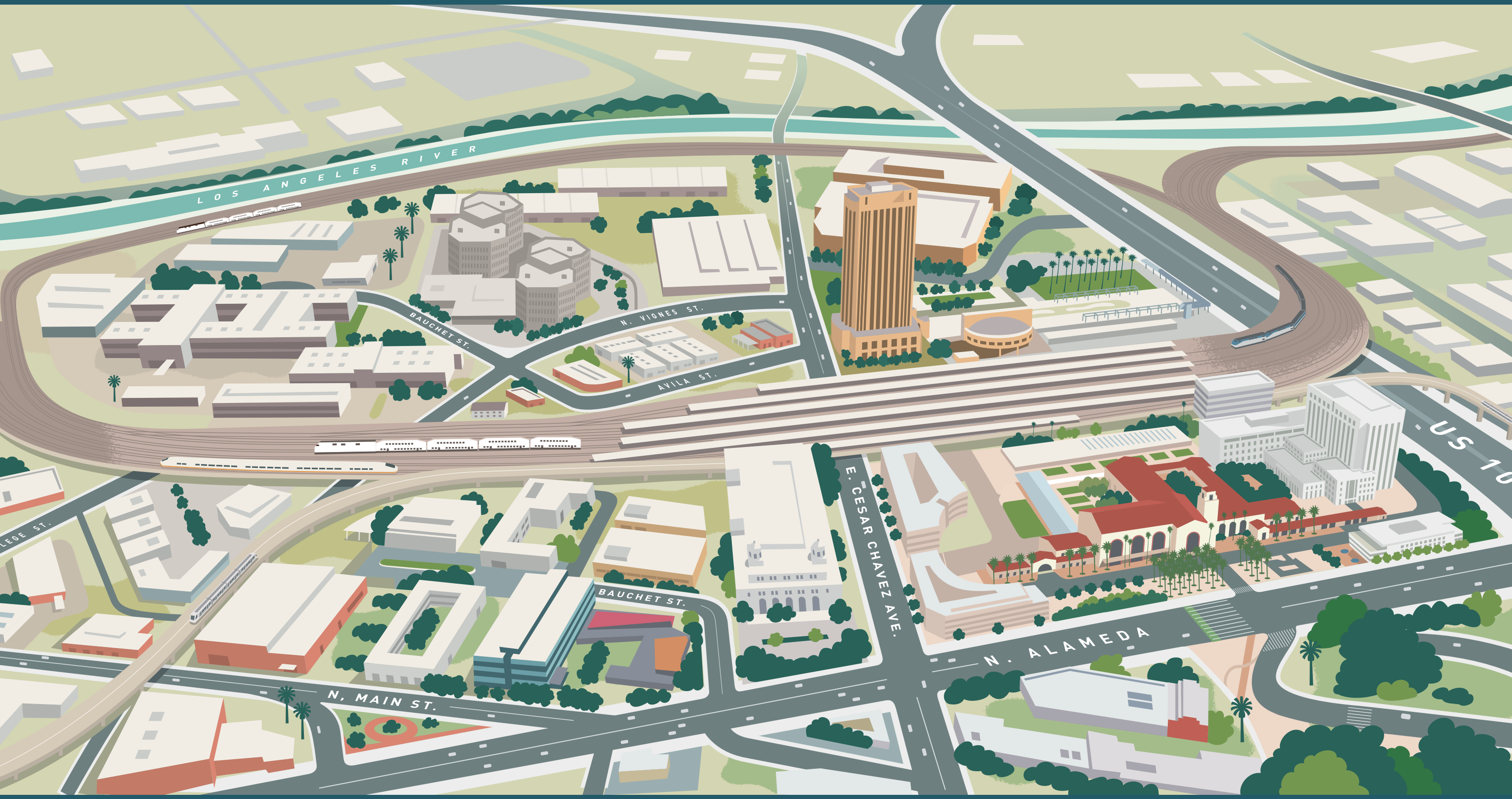
Los Angeles County
Metropolitan Transportation Authority

Link Union Station

DRAFT – Air Quality/Climate Change and Health Risk Assessment

January 2019



Metro

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ACRONYMS

μg/m³	micrograms per cubic meter
AB	Assembly Bill
ARB	Air Resources Board
BAU	business as usual
CAAQS	California Ambient Air Quality Standards
CCAA	California Clean Air Act
CEQA	California Environmental Quality Act
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
DPM	diesel particulate matter
EO	Executive Order
EPA	Environmental Protection Agency
FCAA	Federal Clean Air Act
GHG	greenhouse gas
GWP	global warming potential
HRA	health risk assessment
HSR	High-Speed Rail
LAUS	Los Angeles Union Station
lb	pound
LCFS	low carbon fuel standard
Link US	Link Union Station
LST	localized significance threshold
Metro	Los Angeles County Metropolitan Transportation Authority
MT	metric tons
NA	not applicable
NAAQS	National Ambient Air Quality Standards
N_2O	nitrous oxide
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
O_3	ozone
OEHHA	Office of Environmental Health Hazard Assessment
Pb	lead
PM_{10}	particles of 10 micrometers and smaller
$PM_{2.5}$	particles of 2.5 micrometers and smaller
ppb	parts per billion
ppm	parts per million
REL	reference exposure level
ROG	reactive organic gases
RPS	renewable portfolio standard

RTP	regional transportation plan
SB	Senate Bill
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCORE	Southern California Optimized Rail Expansion
SCS	sustainable communities strategy
SF_6	sulfur hexafluoride
SIP	state implementation plan
SO_2	sulfur dioxide
SO_X	sulfur oxides
TAC	toxic air contaminant
U.S.	United States
VOC	volatile organic compound
VMT	vehicle miles traveled

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ES.0 Executive Summary

This report identifies the physical setting of the project study area and regulatory framework relative to air quality and greenhouse gas (GHG) emissions, provides data on existing air quality, and includes an analysis of potential air quality impacts associated with construction and operation of the proposed project or the build alternative. For air quality and GHG emissions, the passenger concourse associated with the proposed project or the build alternative is the key infrastructure element that has variations in terms of the construction-related air quality and GHG analysis and associated impacts. For operations, the project-related capacity enhancements associated with the proposed project or the build alternative could facilitate a future increase in train movements through Los Angeles Union Station (LAUS) within the project study area. Although significant investments in non-project related infrastructure outside of the project study area are required to realize substantial increases in service and associated train movement through LAUS, this report includes a conservative evaluation of localized air quality impacts and GHG emissions resulting from increased train movements through LAUS that could occur as a result of project-related capacity enhancements.

ES.1 Construction

Construction of the proposed project or the build alternative would result in emissions of criteria air pollutants (pollutant concentrations) that exceed the South Coast Air Quality Management District's (SCAQMD) short-term construction thresholds.

For the proposed project or the build alternative, Mitigation Measure AQ-1 (described in Section 8.0) is proposed that would require regular watering or other dust preventive measures to be implemented in accordance with SCAQMD Rule 403. Mitigation Measure AQ-2 (described in Section 8.0) is also proposed that would require all off-road equipment to meet or exceed United States (U.S.) Environmental Protection Agency's (EPA) Tier 4 Final emission standards and be fueled using 100 percent renewable diesel. Upon implementation of AQ-1 and AQ2, construction-related air quality impacts would remain significant and unavoidable under California Environmental Quality Act (CEQA).

ES.2 Operations

Long-term air quality impacts are those associated with stationary sources and mobile sources that may occur from project-related capacity enhancements. Because the proposed project or the build alternative would have the same land uses, passenger trips, and rail operations, the proposed project and the build alternative would have similar long-term operational air quality impacts from localized increases in train activity, mobile source emissions associated with vehicular trips in the project study area, and stationary source emissions from on-site energy consumption.

The long-term on-road, stationary source, and rail emissions criteria air pollutants associated with the proposed project or the build alternative would exceed the SCAQMD's long-term localized significance thresholds (LST) for oxides of nitrogen (NO_X), particles of 10 micrometers and smaller (PM_{10}), and particles of 2.5 micrometers and smaller ($PM_{2.5}$).

For the proposed project and the build alternative, Mitigation Measure AQ-3 (described in Section 8.0) is proposed and would require implementation of emerging technologies to reduce the CO, NO_X, ROG, PM_{10}, and $PM_{2.5}$ exhaust emissions by 10, 10, 5, 30, and 30 percent, respectively. Mitigation Measure AQ-3 also requires an adaptive air quality mitigation plan to be implemented, in conjunction with replacement of the rail fleet with zero- or low-emission locomotives consistent with *2018 California State Rail Plan,* to achieve a reduction of pollutant concentrations below a level that would not exceed SCAQMD's 10 in 1 million cancer risk threshold at any of the residential uses in the project study area. Upon implementation of Mitigation Measure AQ-3, the significant operational impacts associated with the proposed project or build alternative would be reduced to a level less than significant.

ES.3 Health Risk Assessment

Construction Health Risks

Pollutant concentrations from diesel-powered construction equipment and on-site diesel-powered trucks would result in cancer risks exceeding the SCAQMD's threshold of 10 in 1 million. This is considered a significant impact.

Upon implementation of Mitigation Measures AQ-1 and AQ-2, the cancer risk associated with construction of the proposed project would be below the SCAQMD's 10 in a million threshold, and impacts would be reduced to a level less than significant. For the build alternative, the cancer risk at the Mosaic Apartments would remain above the threshold at 13.6 in 1 million. The build alternative would result in greater impacts than the proposed project due to the increased amount of truck trips associated with a greater level of excavation expected from the build alternative. As such, the impacts on sensitive receptors during construction of the build alternative would remain significant and unavoidable.

Operational Health Risks

When compared the no project condition, the increase in pollutant concentrations associated with additional train movements through LAUS would result in cancer risks exceeding the SCAQMD's threshold of 10 in 1 million. This is considered a significant impact.

Implementation of Mitigation Measure AQ-3 (described in Section 8.0), if fully implemented, would achieve reductions of average pollutant concentrations by 51 percent in 2031 and 56 percent in 2040. To achieve service levels anticipated in 2031, Mitigation Measure AQ-3 would be required to reduce the average pollutant concentrations by 51 percent. To achieve service levels anticipated in 2040, Mitigation Measure AQ-3 would be required to reduce the average pollutant concentrations by 56 percent.

Upon implementation of Mitigation Measure AQ-3, the health risks throughout operations would be reduced to level less than significant.

ES.4 Carbon Monoxide

Historical air quality data identifies that existing carbon monoxide (CO) levels for the project study area and the general vicinity do not exceed either the state or federal ambient air quality standards. The project is located in an attainment/maintenance area for federal CO standards. Using the Transportation Project-Level Carbon Monoxide Protocol (California Department of Transportation 1997), a screening CO hot spot analysis was conducted to determine whether the proposed project or the build alternative would result in any CO hot spots. It was determined that the proposed project or the build alternative would not result in any exceedances of the 1-hour or 8-hour CO standards.

ES.5 Naturally Occurring Asbestos

The project is located in Los Angeles County, which is among the counties listed as containing serpentine and ultramafic rock. However, the portion of the County in which the project lies is not known to contain serpentine or ultramafic rock. Therefore, the impact from naturally occurring asbestos during construction would be minimal to none.

ES.6 Greenhouse Gas Emissions

The impact on GHGs and global climate change resulting from the proposed project or the build alternative was determined to be beneficial because a substantial reduction of regional GHG emissions is anticipated to occur.

In parallel with project implementation, the Southern California Regional Rail Authority is currently developing the Southern California Optimized Rail Expansion (SCORE) Program, a $10 billion plan that identifies the need for substantial investments in rail infrastructure in the Southern California region to upgrade the Metrolink system and meet the current and future needs of the traveling public. The project is a critical component of the SCORE Program, providing capacity enhancements to fulfill the program objectives. Between 2026 and 2078, project-related estimated contribution to the vehicle miles traveled (VMT) and GHG reductions are 898 million miles and 13.5 million metric tons (MT) of carbon dioxide (CO2) equivalents (CO2e), respectively. The project-related capacity enhancements and improvements at LAUS are critical to achieving 26 percent, or 3.5 million MT of CO_2e, of the regional GHG emission reduction estimated from implementation of the SCORE Program. These reductions would offset the project-related annual GHG emissions for the Southern California region.

By providing increased station capacity for regional/intercity rail trains and accommodating the planned High-Speed Rail (HSR) system, the proposed project or the build alternative would indirectly reduce the number of vehicles on the road and indirectly alter regional on-road motor vehicle travel. Therefore, the proposed project or the build alternative are integral to achieving region-wide GHG reduction goals in 2040 as projected in the *2016 Regional Transportation Plan (RTP)/Sustainable Communities Strategy (SCS)* and statewide GHG reduction goals in accordance with the *California Transportation Plan 2040* and *2018 California State Rail Plan* (Caltrans 2018). Implementation of emerging technologies would further achieve regional and statewide GHG reduction goals.

1.0 Introduction

The Los Angeles County Metropolitan Transportation Authority (Metro) is proposing the Link Union Station project to transform LAUS from a "stub-end tracks station" into a "run-through tracks station" with a new passenger concourse that would improve the efficiency of the station and accommodate future growth and transportation demands in the region.

1.1 Project Background

LAUS is located at 800 Alameda Street in the City of Los Angeles, California. LAUS is bounded by US-101 to the south, Alameda Street to the west, Cesar Chavez Avenue to the north, and Vignes Street to the east. Figure 1-1 depicts the regional location and general vicinity of LAUS.

Figure 1-2 depicts the project study area, which encompasses the extent of environmental study associated with potential direct, indirect, and cumulative impacts from implementation of the project. The project study area includes three main segments (Segment 1: Throat Segment, Segment 2: Concourse Segment, and Segment 3: Run-Through Segment). The existing conditions within each segment are summarized north to south below.

- Segment 1: Throat Segment – This segment, known as the LAUS throat, includes the area north of the platforms, from Main Street at the north to Cesar Chavez Avenue at the south. In the throat segment, all arriving and departing trains traverse five lead tracks into and out of the rail yard, except for one location near the Vignes Street Bridge where the tracks reduce to four lead tracks. Currently, special track work consisting of multiple turnouts and double-slip switches are used in the throat to direct trains into and out of the appropriate assigned terminal platform tracks.
- Segment 2: Concourse Segment – This segment is between Cesar Chavez Avenue and US-101 and includes LAUS, the rail yard, the Garden Tracks (stub-end tracks where private train cars are currently stored, just north of the platforms and adjacent to the existing Gold Line aerial guideway), the East Portal building, the baggage handling building with aboveground parking areas and access roads, the ticketing/waiting halls, and the pedestrian passageway with connecting ramps and stairways below the rail yard.
- Segment 3: Run-Through Segment – This segment is south of LAUS and extends east/west from Alameda Street to the west bank of the Los Angeles River and north/south from Keller Yard to Control Point Olympic. This segment includes US-101, the Commercial Street/Ducommun Street corridor, Metro Red and Purple Lines Maintenance Yard (Division 20 Rail Yard), BNSF West Bank Yard, Keller Yard, the main line tracks on the west bank of the Los Angeles River, from Keller Yard to Control Point Olympic, and the "Amtrak Lead Track" connecting the main line tracks with Amtrak's Los Angeles Maintenance Facility. Businesses within the run-through segment are primarily industrial and manufacturing related.

The project study area has a dense street network ranging from major highways to local city streets. The roadways within the project study area include the El Monte Busway, US-101, Bolero Lane, Leroy Street, Bloom Street, Cesar Chavez Avenue, Commercial Street, Ducommun Street, Jackson Street, East Temple Street, Banning Street, First Street, Alameda Street, Garey Street, Vignes Street, Main Street, Aliso Street, Avila Street, Bauchet Street, and Center Street.

1.2 Proposed Project Overview

The proposed project components are summarized north to south below.

- Throat and Elevated Rail Yard – The proposed project includes subgrade and structural improvements in Segment 1 of the project study area (throat segment) to increase the elevation of the tracks leading to the rail yard. The proposed project includes the addition of one new lead track in the throat segment for a total of six lead tracks to facilitate enhanced operations for regional/intercity rail service providers (Metrolink/Amtrak) and accommodate the planned High-Speed Rail (HSR) system within a shared track alignment. Regional/intercity and HSR trains would share the two western lead tracks in the throat segment. The rail yard would be elevated approximately 15 feet. New passenger platforms with individualized canopies would be constructed on the elevated rail yard, with an underlying assumption that the platform infrastructure and associated vertical circulation elements (stairs, escalators, and elevators) would be modified at a later date to accommodate the planned HSR system. The existing railroad bridges in the throat segment at Vignes Street and Cesar Chavez Avenue would also be reconstructed. North of Control Point Chavez, the proposed project also includes safety improvements at the Main Street public at-grade crossing on the west bank of the Los Angeles River (medians, restriping, signals, and pedestrian and vehicular gate systems) to facilitate future implementation of a quiet zone by the City of Los Angeles.
- Above-Grade Passenger Concourse with New Expanded Passageway – The proposed project includes an above-grade passenger concourse with new expanded passageway in Segment 2 of the project study area (concourse segment). The above-grade passenger concourse with new expanded passageway would include space dedicated for passenger circulation, waiting areas, ancillary support functions (back-of-house uses, baggage handling, etc.), transit-serving retail, office/commercial uses, and open spaces and terraces. The new passenger concourse would create an opportunity for an outdoor, community-oriented space and enhance Americans with Disabilities Act accessibility at LAUS. The elevated portion of the above-grade passenger concourse would be located above the rail yard, approximately 90 feet above the existing grade with new plazas east and west of the elevated rail yard (East and West Plazas). The new expanded passageway would be located below the rail yard to provide additional passenger travel-path convenience and options. Amtrak ticketing and baggage check-in services would occur at two locations at the east and west ends of LAUS, and new carousels would be constructed within the new expanded passageway. The above-grade passenger concourse includes a canopy over the West Plaza up to 70 feet in height, with individual canopies that would extend up to 25 feet over each platform. New vertical circulation elements would also be constructed throughout the concourse to enhance passenger movements

throughout LAUS while meeting Americans with Disabilities Act and National Fire Protection Association platform egress code requirements.

- Run-Through Tracks – The proposed project includes up to 10 new run-through tracks (including a new loop track) south of LAUS in Segment 3 of the project study area (run-through segment). The run-through tracks would facilitate connections for regional/intercity rail trains and HSR trains from LAUS to the main line tracks on the west bank of the Los Angeles River. A "common" viaduct/deck over US-101 and embankment south of US-101, from Vignes Street to Center Street, would be constructed wide enough to support regional/intercity rail run-through service, and future run-through service for the planned HSR system.

The proposed project would also require modifications to US-101 and local streets (including potential street closures and geometric modifications); railroad signal, positive train control, and communications-related improvements; modifications to the Gold Line light rail platform and tracks; modifications to the main line tracks on the west bank of the Los Angeles River; modifications to Keller Yard and BNSF West Bank Yard (First Street Yard); modifications to the Amtrak lead track; new access roadways to the railroad right-of-way; additional right-of-way; new utilities; utility relocations, replacements, and abandonments; and new drainage facilities/water quality improvements.

1.3 Build Alternative Overview

The primary differences between the proposed project and the build alternative are related to the lead tracks north of LAUS and the new passenger concourse. Compared to the proposed project, the build alternative includes the following:

- Dedicated Lead Tracks North of LAUS – The build alternative includes reconstruction of the throat, with two new lead tracks that would be located outside of the existing railroad right-of-way, facilitating a dedicated track alignment, with a total of seven lead tracks. Reconfiguration of Bolero Lane and Leroy Street would also be required.
- At-Grade Passenger Concourse – The build alternative includes an at-grade passenger concourse below the rail yard.

All other infrastructure elements are similar to the proposed project. The components of the build alternative are described north to south below.

- Throat and Elevated Rail Yard – The build alternative accommodates future HSR trains on dedicated lead tracks in the throat segment. The build alternative includes the addition of two new lead tracks for a total of seven lead tracks in the throat segment (with future HSR trains and some express/intercity services using the two western dedicated lead tracks and most regional/intercity trains using the five eastern lead tracks). The rail yard would be elevated approximately 15 feet. New passenger platforms with a grand canopy covering the elevated rail yard would be constructed, with an underlying assumption that the platform infrastructure and associated vertical circulation elements (stairs, escalators, and elevators) would be modified at a later date to accommodate the planned HSR system. The existing railroad bridges in the throat segment at Vignes Street and Cesar Chavez Avenue would also be reconstructed under the build alternative. North of Control Point Chavez, the build alternative also includes safety improvements at the Main Street public at-grade crossing on the west bank of the Los Angeles River (medians, restriping, signals, and pedestrian and vehicular gate systems) to facilitate future implementation of a quiet zone by the City of Los Angeles.

- At-Grade Passenger Concourse – The build alternative includes a new at-grade passenger concourse that would include space dedicated for passenger circulation, waiting areas, ancillary support functions (back-of-house uses, baggage handling, etc.), transit-serving retail, office/commercial uses, and open spaces and terraces. The at-grade passenger concourse would also create an opportunity for an outdoor, community-oriented space and enhanced Americans with Disabilities Act accessibility. The at-grade passenger concourse would be constructed below the elevated rail yard. Amtrak ticketing and baggage check-in services would occur at a centralized location where new carousels would be constructed at the concourse level. The at-grade passenger concourse also includes new plazas east and west of the elevated rail yard (East and West Plazas), and a grand canopy that would extend up to 70 feet above the elevated rail yard and West Plaza. New vertical circulation elements would also be constructed throughout the concourse to enhance passenger movements throughout LAUS while meeting Americans with Disabilities Act and National Fire Protection Association platform egress code requirements.
- Run-Through Tracks – The build alternative includes up to 10 new run-through tracks (including a new loop track) in the run-through segment. All infrastructure south of LAUS is the same as described above for the proposed project.

The build alternative would also require modifications to US-101 and local streets (including potential street closures and geometric modifications); railroad signal, positive train control, and communications-related improvements; modifications to the Gold Line light rail platform and tracks; modifications to the main line tracks on the west bank of the Los Angeles River; modifications to Keller Yard and BNSF West Bank Yard (First Street Yard); modifications to the Amtrak lead track; new access roadways to the railroad right-of-way; additional right-of-way; new utilities; utility relocations, replacements, and abandonments; and new drainage facilities/water quality improvements.

1.4 Report Background

This air quality/climate change and HRA provides a discussion of the proposed project and the build alternative, the physical setting of the project study area, and the regulatory framework for air quality, health risk, and global climate change. This assessment provides data on existing air quality and evaluates potential air quality, health risk, and global climate change impacts associated with the short-term construction and long-term operational emissions.

Figure 1-1.Project Location and Regional Vicinity

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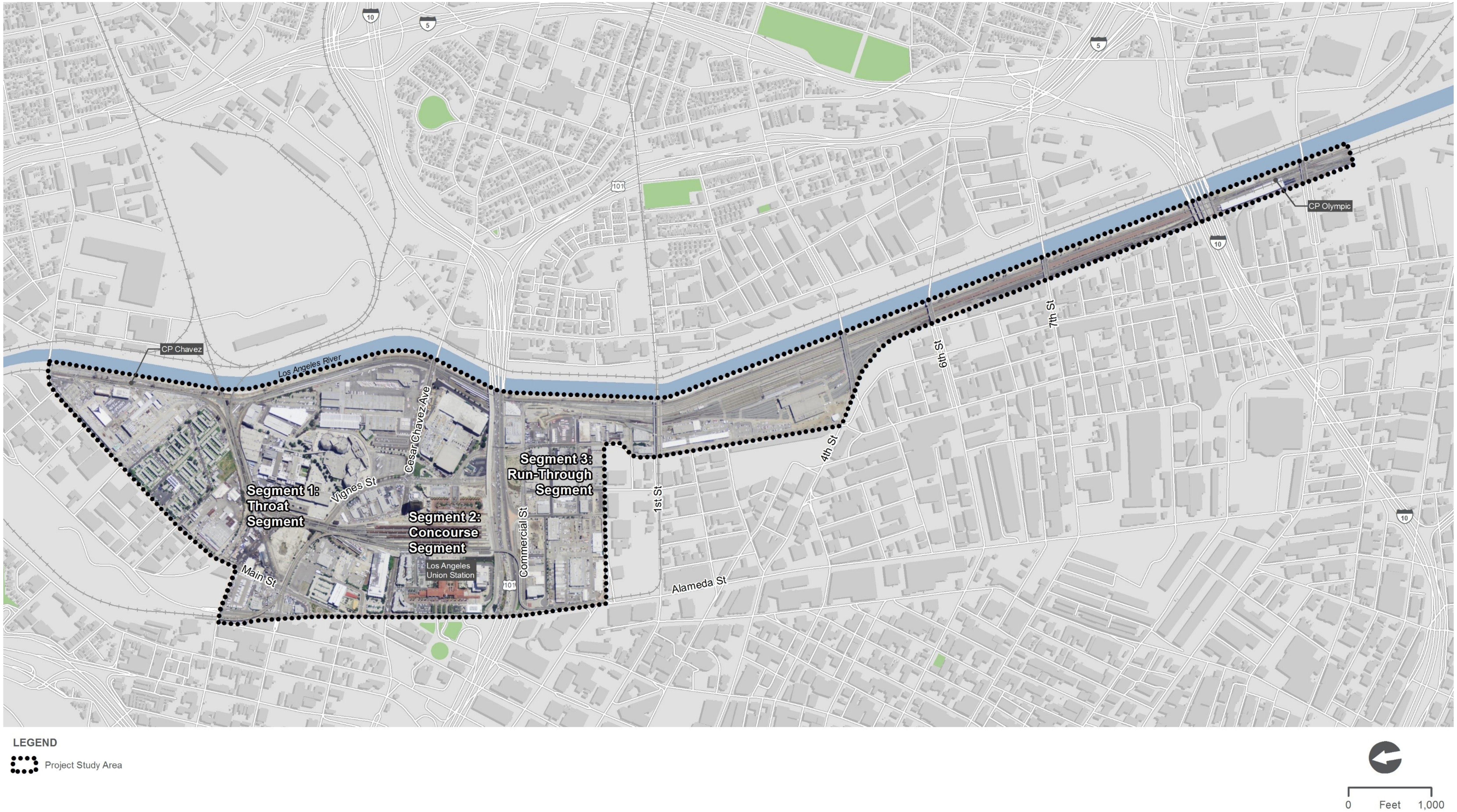
Figure 1-2. Project Study Area



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2.0 Purpose and Approach

The purpose of this report is to:

A. Describe the physical setting of the project study area, the regulatory framework for air quality, and existing air quality conditions

B. Determine the short-term construction and long-term operational air quality, health risk, and global climate change impacts based on applied thresholds

C. Identify feasible mitigation measures to be implemented to reduce significant impacts, where identified

To address the purpose, the following approach was taken to:

- Establish the federal, state, and local regulatory guidelines that govern air quality emissions in the project study area
- Establish the affected environment in the project study area, including the existing climate conditions, meteorology, and air pollution concentrations
- Identify the significance criteria against for which impacts would be compared to
- Calculate the air quality, health risk, and GHG emissions resulting from the proposed project and the build alternative in comparison to applied thresholds
- Identify feasible mitigation and minimization measures to reduce project-related impacts, where identified

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3.0 Regulatory Setting

3.1 Federal Clean Air Act

The Federal Clean Air Act (FCAA), as amended, is the primary federal law that governs air quality. These laws, and related regulations by the U.S. EPA and California Air Resources Board (ARB), set standards for the concentration of pollutants in the air. At the federal level, these standards are called National Ambient Air Quality Standards (NAAQS). NAAQS standards have been established for six transportation-related criteria pollutants that have been linked to potential health concerns:

- CO
- Nitrogen dioxide (NO_2)
- Ozone (O_3)
- Particulate matter, which is broken down for regulatory purposes into PM_{10} and $PM_{2.5}$
- Sulfur dioxide (SO_2)
- Lead (Pb)

The NAAQS standards are set at levels that protect public health with a margin of safety, and are subject to periodic review and revision. TACs are covered, as well.

Federal air quality standards and regulations provide the basic scheme for project-level air quality analysis.

The FCAA requires U.S. EPA to designate areas as attainment, nonattainment, or maintenance (previously nonattainment and currently attainment) for each criteria pollutant based on whether the NAAQS have been achieved. The federal standards are summarized in Table 3-1. The U.S. EPA has classified all or portions of the South Coast Air Basin (SCAB) as attainment for SO_2, attainment/maintenance for CO, PM_{10}, and NO_2, and nonattainment for O_3, $PM_{2.5}$, and Pb.

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Table 3-1. Federal and State Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Time	State Standard[8]	Federal Standard[9]	Principal Health and Atmospheric Effects	Typical Sources	SCAB Attainment Status
O_3[2]	1 hour 8 hours	0.09 parts per million (ppm) 0.070 ppm	— 0.070 ppm[4] (4th highest in 3 years)	High concentrations irritate lungs. Long-term exposure may cause lung tissue damage and cancer. Long-term exposure damages plant materials and reduces crop productivity. Precursor organic compounds include many known TACs. Biogenic VOC may also contribute.	Low-altitude O_3 is almost entirely formed from ROG or VOC and NO_x in the presence of sunlight and heat. Major sources include motor vehicles and other mobile sources, solvent evaporation, and industrial and other combustion processes.	Federal:| Extreme Nonattainment (8-hour) State: Nonattainment (1-hour and 8-hour)
CO	1 hour 8 hours 8 hours (Lake Tahoe)	20 ppm 9.0 ppm[1] 6 ppm	35 ppm 9 ppm —	CO interferes with the transfer of oxygen to the blood and deprives sensitive tissues of oxygen. CO also is a minor precursor for photochemical O_3.	Combustion sources, especially gasoline-powered engines and motor vehicles. CO is the traditional signature pollutant for on-road mobile sources at the local and neighborhood scale.	Federal: Attainment/ Maintenance State: Attainment
Respirable Particulate Matter (PM_{10})[2]	24 hours Annual	50 µg/m³ 20 µg/m³	150 µg/m³ —[2] (expected number of days above standard < or equal to 1)	Irritates eyes and respiratory tract. Decreases lung capacity. Associated with increased cancer and mortality. Contributes to haze and reduced visibility. Includes some TACs. Many aerosol and solid compounds are part of PM_{10}.	Dust- and fume-producing industrial and agricultural operations; combustion smoke and vehicle exhaust; atmospheric chemical reactions; construction and other dust-producing activities; unpaved road dust and re-entrained paved road dust; natural sources.	Federal: Attainment/ Maintenance State: Nonattainment

Table 3-1. Federal and State Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Time	State Standard[8]	Federal Standard[9]	Principal Health and Atmospheric Effects	Typical Sources	SCAB Attainment Status
Fine Particulate Matter ($PM_{2.5}$)[2]	24 hours Annual Secondary Standard (annual)	— 12 µg/m³ ---	35 µg/m³ 12.0 µg/m³ 15 µg/m³ (98th percentile over3 years)	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and produces surface soiling. Most DPM – a TAC – is in the $PM_{2.5}$ size range. Many toxic and other aerosol and solid compounds are part of $PM_{2.5}$.	Combustion including motor vehicles, other mobile sources, and industrial activities; residential and agricultural burning; also formed through atmospheric chemical (including photochemical) reactions involving other pollutants including NO_x, SO_x, ammonia, and ROG.	Federal: Nonattainment State: Nonattainment
NO_2	1 hour Annual	0.18 ppm 0.030 ppm	100 ppb[6] (98th percentile over 3 years) 0.053 ppm	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown. Contributes to acid rain. Part of the “NO_x” group of O_3 precursors.	Motor vehicles and other mobile sources; refineries; industrial operations.	Federal: Attainment/ Maintenance State: Attainment
SO_2	1 hour 3 hours 24 hours Annual Arithmetic Mean	0.25 ppm --- 0.04 ppm ---	75 ppb[7] (99th percentile over 3 years) 0.5 ppm[9] 0.14 ppm 0.03 ppm	Irritates respiratory tract; injures lung tissue. Can yellow plant leaves. Destructive to marble, iron, steel. Contributes to acid rain. Limits visibility.	Fuel combustion (especially coal and high-sulfur oil), chemical plants, sulfur recovery plants, metal processing; some natural sources like active volcanoes. Limited contribution possible from heavy-duty diesel vehicles if ultra-low sulfur fuel not used.	Federal: Attainment/ Unclassified State: Attainment/ Unclassified

Table 3-1. Federal and State Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Time	State Standard[8]	Federal Standard[9]	Principal Health and Atmospheric Effects	Typical Sources	SCAB Attainment Status
Pb[3]	Monthly Calendar Quarter Rolling 3-month average	1.5 µg/m³ — —	— 1.5 µg/m³ 0.15 µg/m³[10]	Disturbs gastrointestinal system. Causes anemia, kidney disease, and neuromuscular and neurological dysfunction. Also a TAC and water pollutant.	Pb-based industrial processes like battery production and smelters. Pb paint, leaded gasoline. Aerially deposited Pb from gasoline may exist in soils along major roads.	Federal: Nonattainment (Los Angeles County only) State: Attainment
Sulfate	24 hours	25 µg/m³	—	Premature mortality and respiratory effects. Contributes to acid rain. Some TACs attach to sulfate aerosol particles.	Industrial processes, refineries and oil fields, mines, natural sources like volcanic areas, salt-covered dry lakes, and large sulfide rock areas.	Federal: NA State: Attainment/ Unclassified
Hydrogen Sulfide	1 hour	0.03 ppm	—	Colorless, flammable, poisonous. Respiratory irritant. Neurological damage and premature death. Headache, nausea.	Industrial processes such as: refineries and oil fields, asphalt plants, livestock operations, sewage treatment plants, and mines. Some natural sources like volcanic areas and hot springs.	Federal: NA State: Attainment/ Unclassified
Visibility Reducing Particles	8 hours	Visibility of 10 miles or more (Tahoe: 30 miles) at relative humidity less than 70 percent	—	Reduces visibility. Produces haze. Note: not related to the Regional Haze program under the FCAA, which is oriented primarily toward visibility issues in National Parks and other "Class I" areas.	See particulate matter above.	Federal: NA State: Attainment/ Unclassified

Table 3-1. Federal and State Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Time	State Standard[8]	Federal Standard[9]	Principal Health and Atmospheric Effects	Typical Sources	SCAB Attainment Status
Vinyl Chloride[3]	24 hours	0.01 ppm	—	Neurological effects, liver damage, cancer. Also considered a TAC.	Industrial processes	Federal: NA State: Attainment/ Unclassified

Notes:

[1] *Rounding to an integer value is not allowed for the state 8-hour CO standard. Violation occurs at or above 9.05 ppm.*

[2] *Annual PM_{10} NAAQS revoked October 2006; was 50 µg/m^3. 24-hour. $PM_{2.5}$ NAAQS tightened October 2006; was 65 µg/m^3. Annual $PM_{2.5}$ NAAQS tightened from 15 µg/m^3 to 12 µg/m^3 December 2012, and secondary standard set at 15 µg/m^3.*

[3] *The ARB has identified vinyl chloride and the particulate matter fraction of DPM as TACs. DPM is part of PM_{10} and, in larger proportion, $PM_{2.5}$. Both the ARB and the U.S. EPA have identified Pb and various organic compounds that are precursors to O_3 and $PM_{2.5}$ as TACs. There are no exposure criteria for substantial health effects because of TACs, and control requirements may apply at ambient concentrations below any criteria levels specified above for these pollutants or the general categories of pollutants to which they belong.*

[4] *Prior to June 2005, the 1-hour NAAQS was 0.12 ppm. Emission budgets for 1-hour O_3 are still in use in some areas where 8-hour O_3 emission budgets have not been developed, such as the San Francisco Bay Area. On October 1, 2015, the national 8-hour O_3 primary and secondary standards were lowered from 0.075 to 0.070 ppm.*

[5] *The 0.08 ppm 1997 O_3 standard is revoked FOR CONFORMITY PURPOSES ONLY when area designations for the 2008 0.75 ppm standard become effective for conformity use (July 20, 2013). Conformity requirements apply for all NAAQS, including revoked NAAQS, until emission budgets for newer NAAQS are found adequate, SIP amendments for the newer NAAQS are approved with an emission budget, U.S. EPA specifically revokes conformity requirements for an older standard, or the area becomes attainment/unclassified. SIP-approved emission budgets remain in force indefinitely unless explicitly replaced or eliminated by a subsequent approved SIP amendment. During the "Interim" period prior to availability of emission budgets, conformity tests may include some combination of build versus no build, build versus baseline, or compliance with prior emission budgets for the same pollutant.*

[6] *Final 1-hour NO_2 NAAQS published in the Federal Register on February 9, 2010, effective March 9, 2010. Initial area designation for California (2012) was attainment/unclassifiable throughout. Project-level hot-spot analysis requirements do not currently exist. Near-road monitoring starting in 2013 may cause redesignation to nonattainment in some areas after 2016.*

[7] *The U.S. EPA finalized a 1-hour SO_2 standard of 75 ppb in June 2010. Nonattainment areas have not yet been designated as of September 2012.*

[8] *California standards for O_3, CO (except 8-hour Lake Tahoe), SO_2 (1 and 24 hour), NO_2, and particulate matter (PM_{10}, $PM_{2.5}$, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. CAAQS are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.*

[9] *National standards (other than O_3, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The O_3 standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.*

[10] *Lead NAAQS are not considered in Transportation Conformity analysis.*

µg/m^3= micrograms per cubic meter; ARB=Air Resources Board; CAAQS=California Ambient Air Quality Standards; CO=carbon monoxide; DPM=diesel particulate matter; FCAA=Federal Clean Air Act; NA=not applicable; NAAQS=National Ambient Air Quality Standards; NO_2 = nitrogen dioxide; NO_x=oxides of nitrogen; O_3=ozone; Pb = lead; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ppb=parts per billion; ppm = parts per million; ROG=reactive organic gas; SCAB=South Coast Air Basin; SIP=state implementation plan; SO_2=sulfur dioxide; TAC=toxic air contaminant; U.S. EPA=United States Environmental Protection Agency; VOC=volatile organic compound

3.2 California Clean Air Act

In California, the California Clean Air Act (CCAA) is administered by the Air Resources Board (ARB) at the state level and by the air quality management districts and air pollution control districts at the regional and local levels. The ARB, which became part of the California EPA in 1991, is responsible for meeting the state requirements of the FCAA, administering the CCAA, and establishing the California Ambient Air Quality Standards (CAAQS). The CCAA, as amended in 1992, requires all air districts in the state to endeavor to achieve and maintain the CAAQS. CAAQS are generally more stringent than the corresponding federal standards and incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

ARB regulates mobile air pollution sources, such as motor vehicles. ARB is responsible for setting emission standards for vehicles sold in California and for other emission sources, such as consumer products and certain off-road equipment. ARB established passenger vehicle fuel specifications, which became effective in March 1996. ARB oversees the functions of local air pollution control districts and air quality management districts, which, in turn, administer air quality activities at the regional and county levels.

The state standards are summarized in Table 3-1. The CCAA requires ARB to designate areas within California as either attainment or nonattainment for each criteria pollutant based on whether the CAAQS have been achieved. Under the CCAA, areas are designated as nonattainment for a pollutant if air quality data shows that a state standard for the pollutant was violated at least once during the previous 3 calendar years. Exceedances that are affected by highly irregular or infrequent events are not considered violations of a state standard and are not used as a basis for designating areas as nonattainment. Under the CCAA, the SCAB is designated as a nonattainment area for O_3, $PM_{2.5}$, and PM_{10}. The Los Angeles County portion of the SCAB is in attainment for Pb.

3.3 California State Implementation Plan

The 1990 amendments to the FCAA set new deadlines for attainment based on the severity of the pollution problem and launched a comprehensive planning process for attaining the NAAQS. The promulgation of the national 8-hour O_3 standard and the fine particulate matter ($PM_{2.5}$) standards in 1997 resulted in additional statewide air quality planning efforts. In response to new federal regulations, state implementation plans (SIP) also began to address ways to improve visibility in national parks and wilderness areas. SIPs are not single documents, but rather a compilation of new and previously submitted plans, programs, district rules, state regulations, and federal controls.

Many of California's SIPs rely on the same core set of control strategies, including emission standards for cars and heavy trucks, fuel regulations, and limits on emissions from consumer products. State law makes ARB the lead agency for all purposes related to the SIP. Local air districts and other agencies prepare SIP elements and submit them to ARB for review and approval. ARB then forwards SIP revisions to the U.S. EPA for approval and publication in the *Federal Register*. Code of Federal Regulations, Title 40, Chapter I, Part 52, Subpart F, Section 52.220 lists all of the items which are included in the California SIP.

3.4 South Coast Air Quality Management District

The 1977 Lewis Air Quality Management Act created SCAQMD to coordinate air quality planning efforts throughout Southern California. This Act merged four county air pollution control agencies into one regional district to better address the issue of improving air quality in Southern California. Under the Act, renamed the Lewis-Presley Air Quality Management Act in 1988, the SCAQMD is the agency principally responsible for comprehensive air pollution control in the region. Specifically, the SCAQMD is responsible for monitoring air quality, as well as planning, implementing, and enforcing programs designed to attain and maintain state and federal ambient air quality standards in the district. Programs that were developed include air quality rules and regulations that regulate stationary sources, area sources, point sources, and certain mobile source emissions. The SCAQMD is also responsible for establishing stationary source permitting requirements and for ensuring that new, modified, or relocated stationary sources do not create net emission increases.

3.4.1 Air Quality Management Plan

All areas designated as nonattainment under the CCAA are required to prepare plans showing how the area would meet the CAAQS by its attainment dates. The air quality management plan (AQMP) is the SCAQMD plan for improving regional air quality. It addresses CCAA requirements and demonstrates attainment with state and federal ambient air quality standards. The AQMP is prepared by SCAQMD and SCAG. The AQMP provides policies and control measures that reduce emissions to attain both state and federal ambient air quality standards by their applicable deadlines. Environmental review of individual projects within the SCAB must demonstrate that daily construction and operational emissions thresholds, as established by the SCAQMD, would not be exceeded. The environmental review must also demonstrate that individual projects would not increase the number or severity of existing air quality violations.

The AQMP (SCAQMD 2016) was adopted by the SCAQMD Governing Board on March 3, 2017. It incorporates the latest scientific and technological information and planning assumptions, including the 2016 RTP/SCS and updated emission inventory methodologies for various source categories. The 2016 AQMP includes the integrated strategies and measures needed to meet the NAAQS.

3.5 Climate Change

Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other elements of the earth's climate system. An ever-increasing body of scientific research attributes these climatological changes to GHG emissions, particularly those generated from the production and use of fossil fuels.

While climate change has been a concern for several decades, the establishment of the Intergovernmental Panel on Climate Change by the United Nations and World Meteorological Organization in 1988 has led to increased efforts devoted to GHG emissions reduction and climate change research and policy. These efforts are primarily concerned with the emissions of GHGs generated by human activity including

CO_2, methane (CH_4), nitrous oxide (N_2O), tetrafluoromethane, hexafluoroethane, sulfur hexafluoride (SF_6), fluoroform, 1,1,1,2-tetrafluoroethane, and 1,1-difluoroethane.

In the U.S., the main source of GHG emissions is electricity generation, followed by transportation. In California, however, transportation sources (including passenger cars, light-duty trucks, other trucks, buses, and motorcycles) make up the largest source of GHG-emitting sources. The dominant GHG emitted is CO_2, mostly from fossil fuel combustion.

There are typically two terms used when discussing the impacts of climate change: “GHG Mitigation” and “Adaptation.” GHG Mitigation is a term for reducing GHG emissions to reduce or "mitigate" the impacts of climate change. Adaptation refers to the effort of planning for and adapting to impacts resulting from climate change (such as adjusting transportation design standards to withstand more intense storms and higher sea levels).

There are four primary strategies for reducing GHG emissions from transportation sources: 1) improving the transportation system and operational efficiencies, 2) reducing travel activity, 3) transitioning to lower GHG-emitting fuels, and 4) improving vehicle technologies/efficiency. To be most effective, all four strategies should be pursued cooperatively.

GHGs vary considerably in terms of global warming potential (GWP), which is a concept developed to compare the ability of each GHG to trap heat in the atmosphere relative to another gas. The GWP is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and length of time that the gas remains in the atmosphere (“atmospheric lifetime”). The GWP of each gas is estimated in terms of its expected effects at a particular time horizon (e.g., 100 years from present) relative to CO_2, the most abundant GHG. The definition of GWP for a particular GHG is the ratio of heat trapped by 1 unit mass of the GHG to the ratio of heat trapped by 1 unit mass of CO_2 over a specified time period. GHG emissions are typically measured in terms of pounds or tons of CO_2e. Table 3-2 shows the GWPs for each type of GHG. For example, SF_6 is 23,900 times more potent at contributing to global warming than CO_2.

Table 3-2. Global Warming Potential of Greenhouse Gases

Gas	Atmospheric Lifetime (Years)	GWP (100-year Time Horizon)
CO_2	50–200	1
Methane (CH_4)	12	28
N_2O	114	265
Fluoroform (CHF_3)	270	12,400
1,1,1, 2-tetrafluoroethane	14	1,300
1,1-difluoroethane	1.4	138

Table 3-2. Global Warming Potential of Greenhouse Gases

Gas	Atmospheric Lifetime (Years)	GWP (100-year Time Horizon)
Perfluorocarbon Tetrafluoromethane	50,000	6,630
Perfluorocarbon Hexafluoromethane	10,000	11,100
SF_6	3,200	23,500

Source: Intergovernmental Panel on Climate Change 2014

Notes:
CO_2=carbon dioxide; GWP=global warming potential; N_2O=nitrous oxide; SF_6=sulfur hexafluoride

3.5.1 State Regulations

Executive Order S-3-05 – Statewide Greenhouse Gas Emission Targets

On June 1, 2005, the Governor issued Executive Order (EO) S-3-05, which set the following GHG emission reduction targets:

- By 2010, reduce GHG emissions to 2000 levels
- By 2020, reduce GHG emissions to 1990 levels
- By 2050, reduce GHG emissions to 80 percent below 1990 levels

This EO also directed the secretary of the California EPA to oversee the efforts made to reach these targets, and to prepare biannual reports on the progress made toward meeting the targets and on the impacts on California related to global warming. The first such Climate Action Team Assessment Report was produced in March 2006 and has been updated every 2 years thereafter.

California Global Warming Solutions Act (Assembly Bill 32)

In 2006, the California State Legislature enacted the California Global Warming Solutions Act of 2006, also known as Assembly Bill (AB) 32. AB 32 focuses on reducing GHG emissions in California. GHGs, as defined under AB 32, include CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorinated compounds, and SF_6. AB 32 requires that GHGs emitted in California be reduced to 1990 levels by the year 2020. ARB is the state agency charged with monitoring and regulating sources of emissions of GHGs that cause global warming in order to reduce emissions of GHGs. AB 32 also requires that by January 1, 2008, the ARB must determine what the statewide GHG emissions level was in 1990, and it must approve a statewide GHG emissions limit so it may be applied to the 2020 benchmark. ARB approved a 1990 GHG emissions level of 427 million MT of CO_2e, on December 6, 2007 in its Staff Report. Therefore, in 2020, emissions in California are required to be at or below 427 million MT of CO_2e.

Under the "business as usual" (BAU) scenario established in 2008, statewide emissions were increasing at a rate of approximately 1 percent per year as noted below. It was estimated that the 2020 estimated BAU of 596 million MT of CO_2e would have required a 28 percent reduction to reach the 1990 level of 427 million MT of CO_2e.

Executive Order B-30-15

On April 20, 2015, Governor Edmund G. Brown Jr. signed EO B-30-15 to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. The Governor's EO aligns California's GHG reduction targets with those of leading international governments such as the 28-nation European Union which adopted the same target in October 2014. California is on track to meet or exceed its legislated target of reducing GHG emissions to 1990 levels by 2020, as established in the California Global Warming Solutions Act of 2006 (AB 32, summarized above).

California's new emission reduction target of 40 percent below 1990 levels by 2030 will make it possible to reach the ultimate goal of reducing emissions 80 percent below 1990 levels by 2050. This is in line with the scientifically established levels needed in the U.S. to limit global warming below 2 degrees Celsius, the warming threshold at which there will likely be major climate disruptions such as super droughts and rising sea levels. The targets stated in EO B-30-15 have not been adopted by the state legislature.

Senate Bill 32

Senate Bill 32 (SB) 32 was signed into law on September 8, 2016 and expands upon AB 32 to reduce GHG emissions. SB 32 sets into law the mandated GHG emissions target of 40 percent below 1990 levels by 2030 written into EO B-30-15.

Climate Change Scoping Plan

The Scoping Plan released by ARB in 2008 outlined the state's strategy to achieve the AB32 goals. This Scoping Plan, developed by ARB in coordination with the Climate Action Team, proposed a comprehensive set of actions designed to reduce overall GHG emissions in California, improve the environment, reduce dependence on oil, diversify our energy sources, save energy, create new jobs, and enhance public health. It was adopted by ARB at its meeting in December 2008. According to the Scoping Plan, the 2020 target of 427 million MT of CO_2e requires the reduction of 169 million MT of CO_2e, or approximately 28.3 percent, from the state's projected 2020 BAU emissions level of 596 million MT of CO_2e.

However, in August 2011, the Scoping Plan was re-approved by the Board and includes the Final Supplement to the Scoping Plan Functional Equivalent Document. This document includes expanded analysis of project alternatives, as well as updates the 2020 emission projections in light of the current economic forecasts. Considering the updated 2020 BAU estimate of 507 million MT of CO_2e, only a 16 percent reduction below the estimated new BAU levels would be necessary to return to 1990 levels by 2020. The Scoping Plan (ARB 2011) expands the list of 9 Early Action Measures into a list of 39 Recommended Actions.

However, in May 2014, ARB developed, in collaboration with the Climate Action Team, the First Update to California's Climate Change Scoping Plan (Update), which shows that California is on track to meet the near-term 2020 GHG limit and is well positioned to maintain and continue reductions beyond 2020 as required by AB32. In accordance with the United Nations Framework Convention on Climate Change, ARB is beginning to transition to the use of the AR4's 100-year GWPs in its climate change programs. ARB has recalculated the 1990 GHG emissions level with the AR4 GWPs to be 431 million MT of CO_2e, therefore the 2020 GHG emissions limit established in response to AB32 is now slightly higher than the 427 million MT of CO_2e in the initial Scoping Plan.

In 2016, the Legislature passed SB 32, which codifies a 2030 GHG emissions reduction target of 40 percent below 1990 levels. With SB 32, the Legislature passed companion legislation AB 197, which provides additional direction for developing the Scoping Plan. ARB is moving forward with a second update to the Scoping Plan to reflect the 2030 target set by EO B-30-15 and codified by SB 32. According to the 2017 Scoping Plan, the 2030 target of 260 million MT of CO_2e requires the reduction of 129 million MT of CO_2e, or approximately 33.2 percent, from the state's projected 2030 BAU emissions level of 389 million MT of CO_2e.

Assembly Bill 1493 – Light-Duty Vehicle Greenhouse Gas Emissions Standards

AB 1493 (Pavley) requires the ARB to develop and adopt regulations that achieve "the maximum feasible reduction of GHGs emitted by passenger vehicles and light-duty truck and other vehicles determined by ARB to be vehicles whose primary use is noncommercial personal transportation in the state."

On September 24, 2009, ARB adopted amendments to the Pavley regulations that intend to reduce GHG emissions in new passenger vehicles from 2009 through 2016. The amendments bind California's enforcement of AB 1493 (starting in 2009), while providing vehicle manufacturers with new compliance flexibility. The amendments also prepare California to merge its rules with the federal Corporate Average Fuel Economy rules for passenger vehicles. In January 2012, ARB approved a new emissions-control program for model years 2017 through 2025. The program combines the control of smog, soot, and global warming gases and requirements for greater numbers of zero-emission vehicles into a single packet of standards called Advanced Clean Cars.

Executive Order S-01-07

This EO, signed by Governor Schwarzenegger on January 18, 2007, directs that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by the year 2020. It orders that a low carbon fuel standard (LCFS) for transportation fuels be established for California and directs ARB to determine whether a LCFS can be adopted as a discrete early action measure pursuant to AB 32.

ARB approved the LCFS as a discrete early action item with a regulation adopted and implemented in April 2010. On December 29, 2011, District Judge Lawrence O'Neill in the Eastern District of California issued a preliminary injunction blocking ARB from implementing LCFS for the remainder of the *Rocky Mountain*

Farmers Union litigation. The injunction was lifted in April 2012 so that ARB can continue enforcing the LCFS pending ARB's appeal of the federal district court ruling.

Renewable Portfolio Standard

The renewable portfolio standard (RPS) promotes diversification of the state's electricity supply and decreased reliance on fossil fuel energy sources. Originally adopted in 2002 with a goal to achieve a 20 percent renewable energy mix by 2020 (referred to as the initial RPS), the goals have been accelerated and increased by EOs S-14-08 and S-21-09 to a goal of 33 percent by 2020.

In April 2011, the Governor signed SB 2 (1X) codifying California's 33 percent RPS goal; Section 399.19 requires the California Public Utilities Commission, in consultation with the California Energy Commission, to report to the Legislature on the progress and status of RPS procurement and other benchmarks. The purpose of the RPS upon full implementation is to provide 33 percent of the state's electricity needs through renewable energy sources. Renewable energy includes (but is not limited to) wind, solar, geothermal, small hydroelectric, biomass, anaerobic digestion, and landfill gas.

The RPS is included in ARB's Scoping Plan list of GHG reduction measures to reduce energy sector emissions. It is designed to accelerate the transformation of the electricity sector through such means as investment in the energy transmission infrastructure and systems to allow integration of large quantities of intermittent wind and solar generation. Increased use of renewables would decrease California's reliance on fossil fuels, thus reducing emissions of GHGs from the electricity sector. In 2008, as part of the Scoping Plan original estimates, ARB estimated that full achievement of the RPS would decrease statewide GHG emissions by 21.3 million MT of CO_2e. In 2010, ARB revised this number upwards to 24.0 million MT of CO_2e.

Senate Bill 375 – Regional Emissions Targets

SB 375 was signed into law in September 2008 and requires ARB to set regional targets for reducing passenger vehicle GHG emissions in accordance with the Scoping Plan. The purpose of SB 375 is to align regional transportation planning efforts, regional GHG reduction targets, and fair-share housing allocations under state housing law. SB 375 requires Metropolitan Planning Organizations to adopt an SCS or Alternative Planning Strategy to address GHG reduction targets from cars and light-duty trucks in the context of that Metropolitan Planning Organization's RTP.

Senate Bill 97 – CEQA Greenhouse Gas Amendments

SB 97 acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. The California Natural Resources Agency adopted amendments to the CEQA Guidelines to address GHG emissions, consistent with the Legislature's directive in Public Resources Code section 21083.05.

State of California Building Energy Efficiency Standards (Title 24, Part 6)

California's Energy Efficiency Standards for Residential and Nonresidential Buildings (24 California Code of Regulations Part 6) were first established in 1978 in response to a legislative mandate to reduce

California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. The premise for the standards is that energy efficient buildings require less electricity, natural gas, and other fuels. Electricity production from fossil fuels and on-site fuel combustion (typically for space and water heating) results in GHG emissions.

The California Energy Commission adopted new 2013 Building Energy Efficiency Standards effective July 1, 2014. The 2013 Standards improve upon the 2008 Standards for new construction of, and additions and alterations to, residential and nonresidential buildings. The 2008 standards were updated for a number of reasons, including:

- To respond to AB 32, the Global Warming Solutions Act of 2006
- To pursue California energy policy that will establish energy efficiency as the resource of first choice for meeting California's energy needs
- To act on the findings of California's Integrated Energy Policy Report that indicates standards in general (as opposed to incentives or other mechanisms) are the most cost- effective means to achieve energy efficiency
- To meet California's commitment to include aggressive energy efficiency measures in updates of state building codes
- To meet California's commitment to improve the energy efficiency of nonresidential buildings through aggressive standards

Senate Bill 350

SB 350 was signed into law in September 2015. SB 350 establishes tiered increases to the RPS of 40 percent by 2024, 45 percent by 2027, and 50 percent by 2030. SB 350 also set a new goal to double the energy efficiency savings in electricity and natural gas through energy efficiency and conservation measures.

Short-Lived Climate Pollutant Reduction Strategy

This final proposed Short-Lived Climate Pollutant Reduction Strategy was developed pursuant to SB 605 and SB 1383 and lays out a range of options to accelerate short-lived climate pollutant emission reductions in California, including regulations, incentives, and other market-supporting activities.

Achievable Goals through implementation of the Short-Lived Climate Pollutant Reduction Strategy include:

- The following reductions by 2030 (from 2013 levels):
  - 50 percent for anthropogenic Black Carbon
  - 40 percent for methane
  - 40 percent for hydrofluorocarbons

- Convert manure and organic wastes into valuable energy and soil amendment products
- Reduce disposal of edible foods by diverting them to food banks and other outlets
- Reduce harmful emissions from residential wood stoves
- Accelerate the reduction of the fastest growing source of GHG emissions by building on global hydrofluorocarbon phasedown agreements

California Green Building Code

The California Green Building Standards Code (2016), referred to as CalGreen, took effect on January 1, 2017, and instituted mandatory minimum environmental performance standards for all ground-up new construction of commercial and low-rise residential buildings, state-owned buildings, schools, and hospitals.

3.5.2 Local Regulations

Regional Transportation Plan/Sustainable Communities Strategy

On April 7, 2016, SCAG's Regional Council adopted the 2016 RTP/SCS. The 2016 RTP/SCS is a long-range visioning plan that balances future mobility and housing needs with economic, environmental and public health goals. It charts a course for closely integrating land use and transportation – so that the region can grow smartly and sustainably. It outlines more than $556.5 billion in transportation system investments through 2040.

The State of California has set targets for the SCAG region to reduce GHG emissions from passenger vehicles by 8 percent per capita by 2020 and 13 percent by 2035 (compared with a 2005 baseline). Reductions outlined in the 2016 RTP/SCS are projected to reach 13.6 percent by 2020 and 27.9 percent by 2040.

The LAUS improvements are included in the 2016 RTP under the following listing:

> *Project ID LA0G1051: Extend several of the stub-end tracks in Union Station to connect with existing main line tracks. The project would serve the existing Metrolink, Amtrak, and new High Speed Rail train project in the corridor. It would include the preparation of an updated environmental report and clearance, preparation of the P/E documentation, preparation of final plans, specifications, and estimates, and the construction of the project.*

Los Angeles County Metropolitan Transportation Authority's Climate Action and Adaptation Plan

Metro's Climate Action and Adaptation Plan (2012) establishes the framework for Metro to both reduce GHG emissions and prepare for the impacts of climate change. Emissions from 2010 are used as a baseline in the Climate Action and Adaptation Plan because at the time it was prepared, 2010 emissions data was the most up to date and complete data set available.

In 2010, Metro emitted 476,000 MT of CO_2e from its operations, or roughly 1.04 $MTCO_2e$ per thousand passenger boardings. For comparison, these emissions account for roughly 1.9 percent of the GHG emissions from all road- and rail-based passenger transportation in Los Angeles County. Metro's transit service accounts for almost 90 percent of the agency's emissions; facilities and non-transit vehicles account for the remainder.

By removing private vehicles from the road, the agency also prevents GHG emissions from entering the atmosphere. In 2010, Metro saved approximately 411,000 $MTCO_2e$ from being emitted by displacing vehicle driving. As a result, Metro's net GHG emissions in 2010 were only 65,000 $MTCO_2e$.

By 2020, Metro's internal emissions will increase by 34,733 MT, or 7 percent, to 511,220 $MTCO_2e$. In 2020, annual boardings are expected to increase to 516 million, up 12 percent from 2010, and GHG emissions per boarding will fall 4.4 percent, from 1.04 $MTCO_2e$ per thousand boardings to 0.99 $MTCO_2e$ per thousand boardings.

Los Angeles County Metropolitan Transportation Authority's Green Construction Policy

Metro implemented a Green Construction Policy in 2011 to commit to using emission-reducing construction equipment and vehicles, where feasible, and implementing best practices to reduce harmful diesel emissions on all Metro construction projects performed on Metro properties and rights-of-way. The policy includes limitations on construction equipment to be used, idling time restrictions, best management practices, and outlines implementation and enforcement activities. All contractors will be required to comply with the Green Construction Policy.

4.0 Existing Conditions

4.1 Climate

The project is located in Los Angeles County, an area within the SCAB, which includes Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. Air quality regulation in the SCAB is administered by SCAQMD, a regional agency created for the SCAB.

The SCAB climate is determined by its terrain and geographical location. The SCAB is a coastal plain with connecting broad valleys and low hills. The Pacific Ocean forms the southwestern boundary, and high mountains surround the rest of the SCAB. The region lies in the semipermanent high pressure zone of the eastern Pacific. The resulting climate is mild and tempered by cool ocean breezes. This climatological pattern is rarely interrupted. However, periods of extremely hot weather, winter storms, and Santa Ana wind conditions do occur.

The annual average temperature varies little throughout the SCAB, ranging from the low to middle 60s, measured in degrees Fahrenheit. With a more pronounced oceanic influence, coastal areas show less variability in annual minimum and maximum temperatures than inland areas. The annual average maximum temperature recorded at the Los Angeles Downtown University of Southern California Campus Station, the closest climatological station to the project study area, is 74.0 degrees Fahrenheit and the annual average minimum is 55.8 degrees Fahrenheit. January is typically the coldest month in this area of the SCAB (Western Regional Climate Center 2018).

The majority of annual rainfall in the SCAB occurs between November and April. Summer rainfall is minimal and generally limited to scattered thundershowers in coastal regions and slightly heavier showers in the eastern part of the SCAB along the coastal side of the mountains. Average monthly rainfall measured at the Los Angeles Downtown University of Southern California Campus Station varies from 3.38 inches in February to 0.27 inches or less between May and September, with an average annual total of 14.77 inches. (WRCC, 2018)

The SCAB experiences a persistent temperature inversion (increasing temperature with increasing altitude) as a result of the Pacific high. This inversion limits the vertical dispersion of air contaminants, holding them relatively near the ground. As the sun warms the ground and the lower air layer, the temperature of the lower air layer approaches the temperature of the base of the inversion (upper) layer until the inversion layer finally breaks, allowing vertical mixing with the lower layer. This phenomenon is observed from midafternoon to late afternoon on hot summer days, when the smog appears to clear up suddenly. Winter inversions frequently break by midmorning.

Inversion layers are essential in determining O_3 formation. O_3 and its precursors will mix and react to produce higher concentrations under an inversion. The inversion will also trap and hold directly emitted pollutants such as CO. PM_{10} is both directly emitted and created indirectly in the atmosphere as a result of chemical reactions. Concentration levels are directly related to inversion layers because of the limitation of mixing space.

Surface or radiation inversions are formed when the ground surface becomes cooler than the air above it during the night. The earth's surface goes through a radiative process on clear nights, when heat energy is transferred from the ground to a cooler night sky. As the earth's surface cools during the evening hours, the air directly above it also cools, while air higher up remains relatively warm. The inversion is destroyed when heat from the sun warms the ground, which in turn heats the lower layers of air; this heating stimulates the ground level air to float up through the inversion layer.

The combination of stagnant wind conditions and low inversions produces the greatest concentration of pollutants. On days of no inversion or high wind speeds, ambient air pollutant concentrations are the lowest. During periods of low inversions and low wind speeds, air pollutants generated in urbanized areas are transported predominantly onshore and east into Riverside and San Bernardino Counties. In the winter, the greatest pollution problems are from CO and NO_X because of extremely low inversions and air stagnation during the night and early morning hours. In the summer, the longer daylight hours and the brighter sunshine combine to cause a reaction between hydrocarbons and NO_X to form photochemical smog.

4.2 Monitored Air Quality Pollutants

SCAQMD monitors air quality conditions at 37 locations throughout the SCAB. The closest monitoring station to the project study area is the Los Angeles North Main Street Station. This station monitors all criteria pollutants (O_3, CO, PM_{10}, $PM_{2.5}$, SO_2, and NO_2). Table 4-1 shows pollutant levels, the state and federal standards, and the number of exceedances recorded at this station from 2015 to 2017.

4.2.1 Carbon Monoxide

CO is a colorless and odorless gas formed by the incomplete combustion of fossil fuels. CO is emitted almost exclusively from motor vehicles, power plants, refineries, industrial boilers, ships, aircraft, and trains. CO is a non-reactive air pollutant that dissipates relatively quickly, so ambient CO concentrations generally follow the spatial and temporal distributions of vehicular traffic. CO concentrations are influenced by local meteorological conditions; primarily wind speed, topography, and atmospheric stability. As identified in Table 4-1, the CO concentrations in the project area have not exceeded the federal or state standards in the past 3 years.

Table 4-1. Ambient Air Quality Monitoring Concentrations

Pollutant	Pollutant Concentration and Standard	Maximum Concentration		
		2015	2016	2017
CO	Maximum 1-hour concentration (ppm)	3.2	1.9	2.0
	Days> 20 ppm (state 1-hour standard)	0	0	0
	Days> 35 ppm (federal 1-hour standard)	0	0	0
	Maximum 8-hour concentration (ppm)	1.8	1.4	1.8
	Days> 9 ppm (state 8-hour standard)	0	0	0
	Days> 9 ppm (federal 8-hour standard)	0	0	0
O_3	Maximum 1-hour concentration (ppm)	0.104	0.103	0.116
	Days> 0.09 ppm (state 1-hour standard)	2	2	6
	Maximum 8-hour concentration (ppm)	0.074	0.078	0.086
	Days> 0.070 ppm (state 8-hour standard)	6	4	14
	Days> 0.070 ppm (federal 8-hour standard)	6	4	14
NO_2	Maximum 1-hour concentration (ppm)	0.079	0.065	0.081
	Days> 0.18 ppm (state 1-hour standard)	0	0	0
	Days> 0.10 ppm (federal 1-hour standard)	0	0	0
	Annual arithmetic mean (ppm)	0.022	0.021	0.021
	Exceed 0.030 ppm? (state annual standard)	No	No	No
	Exceed 0.053 ppm? (federal annual standard)	No	No	No

Table 4-1. Ambient Air Quality Monitoring Concentrations				
		Maximum Concentration		
Pollutant	Pollutant Concentration and Standard	2015	2016	2017
SO_2	Maximum 1-hour concentration (ppb)	12.6	13.4	5.7
	Days> 250 ppb (state 1-hour standard)	0	0	0
	Days> 75 ppb (federal 1-hour standard)	0	0	0
	Maximum 24-hour concentration (ppb)	1.1	1.8	NA
	Days> 40 ppb (state 24-hour standard)	0	0	NA
Coarse Particulate Matter (PM_{10})	Maximum 24-hour concentration (µg/m³)	73.0	64.0	64.6
	Days> 50 µg/m³ (state 24-hour standard)	30	21	40
	Days> 150 µg/m³ (federal 24-hour standard)	0	0	0
	Annual arithmetic mean (µg/m³)	27.1	25.8	25.7
	Exceed 20 µg/m³? (state annual standard)	Yes	Yes	Yes
Fine Particulate Matter ($PM_{2.5}$)	Maximum 24-hour concentration (µg/m³)	56.4	44.3	54.9
	Days> 35 µg/m³ (federal 24-hour standard)	7	2	6
	Annual arithmetic mean (µg/m³)	12.3	11.7	12.0
	Exceed 12 µg/m³? (state annual standard)	Yes	No	No
	Exceed 12 µg/m³? (federal annual standard)	Yes	No	No

Notes:
µg/m³=micrograms per cubic meter; CO= carbon monoxide; NA = Not Available; NO_2=nitrogen dioxide; O_3=ozone; $PM_{2.5}$=particles of 2.5micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ppb=parts per billion; ppm=parts per million; SO_2= sulfur dioxide

4.2.2 Ozone

O_3 is a colorless gas that is formed in the atmosphere when reactive organic gases (ROG), which includes volatile organic compounds (VOC), and NO_X react in the presence of ultraviolet sunlight. O_3 is not a primary pollutant; it is a secondary pollutant formed by complex interactions of two pollutants directly emitted into the atmosphere. The primary sources of ROG and NO_X, the components of O_3, are automobile exhaust and industrial sources. Meteorology and terrain play major roles in O_3 formation. Ideal conditions occur during summer and early autumn, on days with low wind speeds or stagnant air, warm temperatures, and cloudless skies.

The greatest source of smog-producing gases is the automobile. Short-term exposure (lasting for a few hours) to O_3 at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. As identified in Table 4-1, the state 1-hour O_3 standard was exceeded twice in 2015 and 2016 and 6 times in 2017. The state and federal 8-hour O_3 standards were exceeded 6 times in 2015, 4 times in 2016, and 14 times in 2017.

4.2.3 Nitrogen Dioxide

NO_2, like O_3, is not directly emitted into the atmosphere but is formed by an atmospheric chemical reaction between nitric oxide and atmospheric oxygen. Nitric oxide and NO_2 are collectively referred to as NO_X and are major contributors to O_3 formation. NO_2 also contributes to the formation of PM_{10}. High concentrations of NO_2 can result in a brownish-red cast to the atmosphere with reduced visibility and can cause breathing difficulties. As identified in Table 4-1, the NO_2 concentrations in the project area have not exceeded the federal or state standards in the past 3 years.

4.2.4 Sulfur Oxides

SO_2 is a colorless, pungent gas formed primarily by the combustion of sulfur-containing fossil fuels. Main sources of SO_2 are coal and oil used in power plants and industries. Generally, the highest levels of SO_2 are found near large industrial complexes. In recent years, SO_2 concentrations have been reduced by the increasingly stringent controls placed on stationary source emissions of SO_2 and limits on the sulfur content of fuels. SO_2 is an irritant gas that attacks the throat and lungs. It can cause acute respiratory symptoms and diminished ventilator function in children. As identified in Table 4-1, the SO_2 concentrations in the project area have not exceeded the federal or state standards in the past 3 years.

4.2.5 Coarse Particulate Matter

Particulate matter pollution consists of very small liquid and solid particles floating in the air, which can include smoke, soot, dust, salts, acids, and metals. Particulate matter also forms when gases emitted from industries and motor vehicles undergo chemical reactions in the atmosphere. Inhalable particulate matter, or PM_{10}, is about 1/7 the thickness of a human hair. Major sources of PM_{10} include crushing or grinding operations; dust stirred up by vehicles traveling on roads; wood burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions. When inhaled, PM_{10} particles can penetrate the human respiratory system's natural defenses and damage the respiratory tract. PM_{10} can increase the number and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections. As identified in Table 4-1, the state PM_{10} standards were exceeded in each of the past 3 years. The federal standards were not exceeded in the in the last 3 years.

4.2.6 Fine Particulate Matter

Fine particulate matter, or $PM_{2.5}$, is roughly 1/28 the diameter of a human hair. $PM_{2.5}$ results from fuel combustion (e.g., motor vehicles, power generation, and industrial facilities), residential fireplaces, and wood stoves. In addition, $PM_{2.5}$ can be formed in the atmosphere from gases such as SO_2, NO_X, and VOC.

Very small particles of substances, such as Pb, sulfates, and nitrates can cause lung damage directly. These substances can be absorbed into the blood stream and cause damage elsewhere in the body. These substances can transport absorbed gases, such as chlorides or ammonium, into the lungs and cause injury. Whereas PM_{10} tends to collect in the upper portion of the respiratory system, $PM_{2.5}$ is so tiny that it can penetrate deeper into the lungs and damage lung tissues. Suspended particulates also damage and discolor surfaces on which they settle, as well as produce haze and reduce regional visibility. As identified in Table 4-1, the federal 24-hour $PM_{2.5}$ standard was exceeded in each of the past 3 years. The state and federal annual $PM_{2.5}$ standards were exceeded in 2015.

4.2.7 Volatile Organic Compounds or Reactive Organic Gases

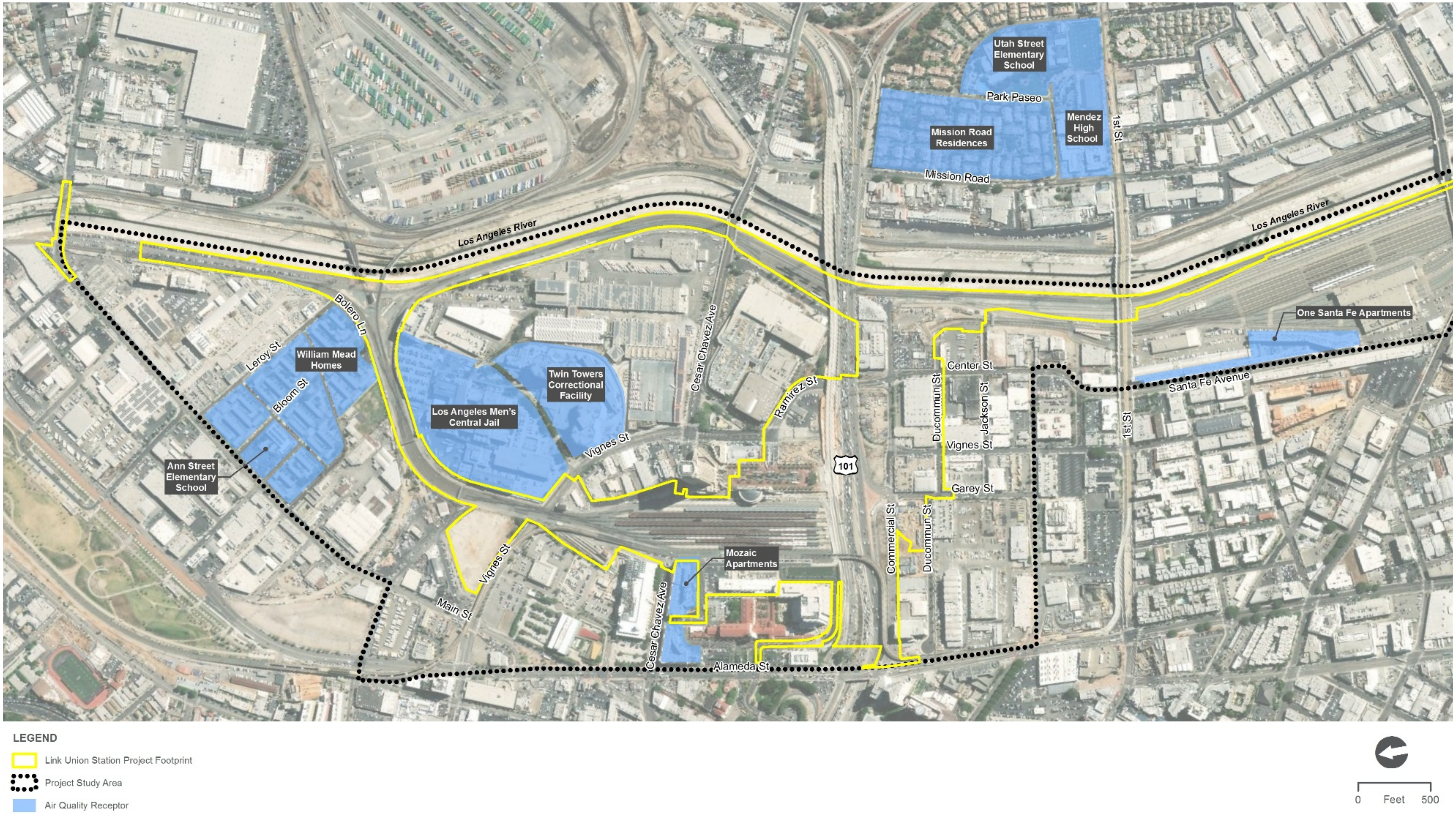
VOCs are carbon-containing compounds that evaporate into the air. VOCs contribute to the formation of smog and/or may be toxic. VOCs often have an odor, and examples include gasoline, alcohol, and the solvents used in paints. The SCAQMD does not directly monitor VOCs. There are no specific state or federal VOC thresholds, as they are regulated by individual air districts as O_3 precursors.

4.3 Sensitive Receptors

Sensitive populations are more susceptible to the effects of air pollution than the general population. Sensitive populations (sensitive receptors) that are in proximity to localized sources of toxics, particulate matter, and CO are of particular concern. Land uses considered sensitive receptors include residences, schools, playgrounds, childcare centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. The majority of the sensitive receptors within or adjacent to the project study area are residential uses. The nearby sensitive receptors within or adjacent to the project study area are summarized below and depicted on Figure 4-1:

- William Mead Homes
- Mozaic Apartments
- Utah Street Elementary School
- Twin Towers Correctional Facility
- Los Angeles Men's Central Jail
- One Santa Fe Apartments
- Metro Offices
- Ann Street Elementary School
- Terminal Annex
- Mission Road Residences
- Mendez High School

Figure 4-1. Sensitive Receptors



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5.0 Thresholds of Significance

For the purposes of this air quality analysis, the proposed project or the build alternative would have a significant impact on air quality or global climate change if it would:

A. Conflict with or obstruct implementation of the applicable air quality plan

B. Violate any air quality standard or contribute substantially to an existing or projected air quality violation

C. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for O_3 precursors)

D. Expose sensitive receptors to substantial pollutant concentrations

E. Create objectionable odors affecting a substantial number of people

F. Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment

G. Conflict with applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs

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6.0 Methods and Significance Thresholds

The proposed project accommodates the planned HSR system within the limits of the project footprint. Indirect emissions associated with the operation of the planned HSR system are not included in this analysis and are addressed separately in the environmental document(s) being prepared by the California High-Speed Rail Authority for the Burbank to Los Angeles and Los Angeles to Anaheim Project Sections. The following provides a summary of the methodology and significance thresholds used to determine project-related impacts.

- No Project – By 2040, all of the trains operating at LAUS are assumed to meet Tier 4 emission standards; therefore, a large reduction in emissions between 2016 and 2040 is anticipated to occur resulting from the No Project alternative. The reduction in emissions between the existing (2016) and future No Project conditions is incorporated into this impact assessment methodology.
- Construction – The passenger concourse associated with the proposed project or the build alternative is the key infrastructure element that has variations in terms of the construction-related air quality and GHG analysis and associated impacts. The construction emissions reflect the additional haul truck trips, earth movement, and material handling required for the build alternative with the at-grade passenger concourse.
- Operations – The project-related capacity enhancements associated with the proposed project or the build alternative could facilitate a future increase in train movements through LAUS within the project study area. Although significant investments in non-project related infrastructure outside of the project study area are required to realize substantial increases in service and associated train movement through LAUS, this report includes a conservative evaluation of localized air quality impacts and GHG emissions resulting from increased train movements through LAUS that could occur as a result of project-related capacity enhancements. It should be noted that other non-project related capacity enhancements are required as part of the SCORE Program to realize the maximum train movements through LAUS considered in this evaluation.

  Within the limits of the project study area, a localized air quality impact analysis was conducted based on the project-related capacity enhancements and associated increases in train movements through LAUS for 2026, 2031, and 2040. Impacts are presented without taking into consideration reductions in regional VMT because any reductions in VMT and associated GHG emissions are considered cumulative benefits.
- Cumulative Impacts – Increases in service that occur regionally are considered cumulative impacts, and for the purposes of this report, are evaluated for the 2040 horizon year. Future service scenarios will depend on ongoing negotiations between the railroad operators, available infrastructure (corridors, maintenance facilities, etc.) throughout the Metrolink system and beyond, and available operating funding from the Metrolink JPA member agencies including but not limited to Amtrak, the LOSSAN Rail Corridor Agency and Metro. Implementation of off-site infrastructure to implement future increases in service is the responsibility of the service operators or JPA member

agencies; including the evaluation of related air quality impacts that may occur from off-site rail infrastructure improvements.

Cumulative benefits for the region, including a regional reduction of GHG emissions and VMT are considered in the 2016 RTP/SCS Program Environmental Impact Report (SCAG 2015) through 2040, which is incorporated by reference.

Criteria Air Pollutants. Emissions of criteria air pollutants were estimated using existing conditions information, detailed construction scenarios prepared for the proposed project and the build alternative, estimates for future train movements through LAUS identified in Appendix A, as well as a combination of emission factors from the following sources.

- ARB modeling software EMFAC2017 and SCAQMD's Off-Road Mobile Source Emission Factors for estimating exhaust emissions from off-road construction equipment and on-road motor vehicles
- U.S. EPA re-entrained paved road dust methodology
- U.S. EPA locomotive emission factors for locomotives and associated methodology
- CalEEMod (Version 2016.3.1) emission calculation methodologies for calculating the long-term mobile, energy, and area source emissions

HRA. Since diesel-related exhaust, specifically diesel particulate matter (DPM), is considered a TAC by the ARB, a HRA was conducted to assess the risk to human health associated with the proposed project or the build alternative. An HRA consists of three parts: (1) a TAC emissions inventory, (2) air dispersion modeling to evaluate off-site pollutant concentrations of TAC emissions, and (3) assessment of risks associated with predicted pollutant concentrations. The HRA was conducted using the guidelines provided by the California Office of Environmental Health Hazard Assessment (OEHHA) for the Air Toxics Hot Spots Program and the HRA guidelines developed by the California Air Pollution Control Officers Association.

Quantification of GHGs. For the purposes of determining whether or not GHG emissions from affected projects are significant, SCAQMD specifies that project emissions must include direct, indirect, and, to the extent information is available, life cycle emissions during construction and operation. Based on this direction, construction emissions were amortized over the life of the project (defined as 30 years) added to the operational emissions, and compared with the applicable GHG significance thresholds.

6.1 South Coast Air Quality Management District Guidelines

Specific criteria for determining whether the potential air quality impacts of a project are significant are set forth in the SCAQMD's *CEQA Air Quality Handbook*. Table 6-1 lists the daily thresholds for construction and operational emissions that have been established by the SCAQMD and would be used in the analysis of air quality impacts for the project to determine significance.

Table 6-1. South Coast Air Quality Management District Air Quality Thresholds of Significance

Pollutant	Construction (lb/day)	Operation (lb/day)
NO_X	100	55
VOC	75	55
PM_{10}	150	150
$PM_{2.5}$	55	55
SO_X	150	150
CO	550	550

Source: SCAQMD 1993

Notes:
CO=carbon monoxide; lb=pound; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; SO_X=sulfur oxides; VOC=volatile organic compound

6.1.1 Localized Significance Thresholds

The SCAQMD has developed LST methodology and mass rate look-up tables by source receptor area that can be used by public agencies to determine whether or not a project may generate significant adverse localized air quality impacts. LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard, and are developed based on the ambient concentrations of that pollutant for each source receptor area.

LSTs are developed based on the ambient concentrations of four criteria pollutants within each defined source receptor area and distance to the nearest sensitive receptor. LSTs are derived based on the location of the activity (i.e., the source receptor area); the emission rates of NO_X, CO, $PM_{2.5}$, and PM_{10}; the size of the project study area, and the distance to the nearest exposed individual. The project study area is located within Source Receptor Area No. 1 (Central Los Angeles). As LAUS and the surrounding tracks must continue to operate throughout the construction period, the area of disturbance each day within each segment (throat, concourse, and run-through) would not exceed 5 acres. Table 6-2 lists the LST emission rates for a 5-acre site located within 25 meters (the shortest distance with a LST) of a sensitive use.

Table 6-2. South Coast Air Quality Management District Localized Significance Thresholds

Pollutant	Construction (lb/day)	Operation (lb/day)
NO_X	161	161
PM_{10}	16	4
$PM_{2.5}$	8	2
CO	1,861	1,861

Source: SCAQMD 1993

Notes:
CO=carbon monoxide; lb=pound; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller

6.1.2 Local Carbon Monoxide Concentrations

The significance of localized project impacts under CEQA depends on whether ambient CO levels in the vicinity of the project are above or below state and federal CO standards. If ambient levels are below the standards, a project is considered to have a significant impact if project emissions result in an exceedance of one or more of these standards. If ambient levels already exceed a state or federal standard, project emissions are considered significant if they increase 1-hour CO concentrations by 1.0 part per million (ppm) or more or 8-hour CO concentrations by 0.45 ppm or more. The following are applicable local emission concentration standards for CO:

- California State 1-hour CO standard of 20.0 ppm
- California State 8-hour CO standard of 9.0 ppm

6.1.3 Greenhouse Gas Emission Threshold

The SCAQMD's Interim Thresholds for commercial, residential, mixed use and industrial development projects are as follows:

- Industrial projects – 10,000 MT of CO_2e per year
- Residential, commercial, and mixed use projects (including parks, warehouses, etc.) 3,000 MT CO_2e per year

The project is a transportation use that does not fit into the industrial, commercial, or residential project categories. The SCAQMD has not proposed or adopted a threshold level for transportation projects. For purposes of this analysis, both direct and indirect GHG emissions from the project are discussed in the context of the 3,000 MT threshold levels. In accordance with scientific consensus regarding the cumulative nature of GHGs, the analysis herein analyzes the cumulative contribution of project-related GHG emissions; therefore, effects are analyzed with respect to 2040 cumulative emissions only.

6.1.4 Incremental Health Risk Significance Threshold

The SCAQMD *CEQA Air Quality Handbook* (1993) lists significance thresholds for TACs. TACs refer to a diverse group of air pollutants that are capable of causing chronic and acute adverse effects on human health. They include both organic and inorganic chemical substances that may be emitted from a variety of common sources including gasoline stations, motor vehicles, dry cleaners, and painting operations that may use substances such as ammonia, asbestos, benzene, cadmium, Pb, and trichloroethylene. The SCAQMD's TAC thresholds are as follows:

- Maximum Incremental Cancer Risk ≥ 10 in 1 million
- Cancer Burden > 0.5 excess cancer cases
- Chronic & Acute Hazard Index ≥ 1.0

Cancer risks are typically calculated for all carcinogenic TACs and summed to calculate the overall increase in cancer risk to an individual. The calculation procedure assumes that cancer risk is proportional to concentrations at any level of exposure and that risks from various TACs are additive. This is generally considered a conservative assumption at low doses and is consistent with the current OEHHA-recommended approach.

Non-cancer health impact of an inhaled TAC is measured by the hazard quotient, which is the ratio of the ambient concentration of a TAC in units of $\mu g/m^3$ divided by the reference exposure level (REL), also in units of $\mu g/m^3$. The inhalation REL is the concentration at or below which no adverse health effects are anticipated. The REL is typically based on health effects on a particular target organ system, such as the respiratory system, liver, or central nervous system. Hazard quotients are then summed for each target organ system to obtain a hazard index.

To estimate the ambient pollutant concentrations resulting from construction activities and operations at nearby sensitive receptors, a dispersion modeling analysis was performed using the Lakes Environmental AERMOD-View air quality dispersion model, Version 9.6.5 (Lakes Environmental 2018), which uses the U.S. EPA's AERMOD model, adding a user friendly interface to allow more flexibility for formatting input and reporting.

The cancer risk calculations were performed by multiplying the predicted annual DPM concentrations from AERMOD by the appropriate risk values. The exposure and risk equations that are used to calculate the cancer risk at residential, recreation, and school receptors are taken from the *Air Toxics Hot Spots Program Guidance Manual* (OEHHA 2015).

The potential exposure pathway for DPM includes inhalation only. Cancer risks were evaluated using the inhalation Cancer Potency Factor published by the OEHHA. The cancer risks were calculated using the "derived (adjusted)" approach in the OEHHA risk assessment manual. The cancer potency factor for DPM is 1.1 per milligram per kilogram of body weight per day. The potential exposure through other pathways (e.g., ingestion) requires substance and site-specific data, and the specific parameters for DPM are not known for these pathways.

The following equations were used to calculate the cancer risk because of inhalation using the modeled DPM concentrations:

Risk = Inhalation potency factor * Dose Inhalation

where: Inhalation potency factor = 1.1 per milligram per kilogram of body weight per day for DPM

and: Dose Inhalation = Cair*DBR*A*EF*ED*10-6 / AT

where: Cair = concentration of DPM in micrograms per cubic meter (µg/m^3)

DBR = breathing rate in liter per kilogram of body weight per day

A = inhalation absorption factor (1 for DPM)

EF = exposure frequency in days per year

ED = exposure duration in years

AT = averaging time period over which exposure is averaged in days (25,550 days for 70 years)

7.0 Impacts

This section includes a discussion of project-related air quality, health risk, and climate change impacts based on the significance criteria identified in Section 6.0.

THRESHOLD	Violate Air Quality Standards

7.1 Air Quality

7.1.1 Construction

Construction activities associated implementation of the proposed project or the build alternative have the potential to create air quality impacts through the use of heavy-duty construction equipment, construction worker vehicle trips, material delivery trips, and heavy-duty haul truck trips generated from construction activities. In addition, earthwork activities would result in fugitive dust emissions and paving operations and would also release ROGs from off-gassing. Construction emissions can vary substantially from day to day, depending on the level of activity, the specific type of operation, and, for dust, the prevailing weather conditions. The assessment of construction air quality impacts considers each of these potential sources.

Construction activities produce combustion emissions from various sources such as utility engines, on-site heavy-duty construction vehicles, equipment hauling materials to and from the site, and motor vehicles transporting the construction crew. Exhaust emissions from these sources would vary daily as construction progresses. The use of construction equipment on site would result in localized exhaust emissions. Construction-related effects can also occur because of relocated emissions from traffic on temporarily relocated or diverted tracks. While the actual amount of emissions may not increase if traffic volumes and operating conditions do not change, the effect of emissions may increase if they are moved closer to sensitive receptors or if traffic temporarily increases in the vicinity of sensitive receptor locations.

Two separate design options are being considered for the passenger concourse; an above-grade passenger concourse with new expanded passageway that corresponds to the proposed project, and an at-grade passenger concourse that corresponds to the build alternative. The construction air-quality analysis varies substantially based on the passenger concourse options considered, with negligible variations based on the track alignment (shared or dedicated tracks). The impact evaluation includes a conservative evaluation of potential air quality impacts for the proposed project and the build alternative, with each respective passenger concourse.

This air quality impact evaluation is conservative, and adequately addresses any potential impacts that could occur for the interim condition because the detailed construction scenario prepared to support the environmental impact evaluation assumes all major project elements would be constructed concurrently. If run-through track infrastructure south of LAUS is constructed prior to the elevated rail yard and new passenger concourse, fewer construction related air quality and GHG impacts (based on fewer truck trips) are anticipated than reported herein because fewer emissions would be generated at once. The greatest amount of potential impacts are addressed within this air quality analysis for both construction and operational scenarios.

Equipment Exhaust and Related Construction Activities

The construction equipment hours, haul truck trips, and employee commute trips required to build the proposed project or the build alternative were estimated (HDR 2018). The construction equipment estimates are included in Appendix B. The construction emissions for the proposed project and the build alternative were calculated using the equipment list contained in Appendix A, Appendix B, and U.S. EPA and SCAQMD emission rates. The total exhaust emissions generated during the entire construction period are listed in Table 7-1 and Table 7-2 for the proposed project and the build alternative, respectively. The construction emission estimates are also detailed in Appendix C.

As identified in Table 7-1 and Table 7-2 the daily construction emissions for the proposed project and the build alternative would exceed the SCAQMD's daily thresholds for NO_X, PM_{10}, and $PM_{2.5}$.

Table 7-1. Daily Construction Emissions – Proposed Project with Above-Grade Passenger Concourse with New Expanded Passageway

Source	CO	ROG	NO_X	PM_{10}	$PM_{2.5}$	CO_2e
Off-Road Equipment (lb)	211,520	30,234	200,783	15,418	11,073	58,493,453
On-Road Equipment (lb)	15,259	1,227	57,020	6,147	2,488	24,650,247
Fugitive Dust (lb)	—	—	—	450,000	94,500	—
Total (lb)	226,780	31,460	257,803	471,564	108,061	83,143,700
Average Day (lb/day)	151.2	21.0	171.9	314.4	72.0	55,429.1
SCAQMD Thresholds	550	75	100	150	55	NA
Exceedance	No	No	Yes	Yes	Yes	—

Notes:
CO = carbon monoxide; CO_2e = carbon dioxide equivalents; lb = pound; NA=not applicable; NO_X = oxides of nitrogen;
$PM_{2.5}$ = particles of 2.5 micrometers and smaller; PM_{10} = particles of 10 micrometers and smaller; ROG = reactive organic gas; SCAQMD = South Coast Air Quality Management District

Table 7-2. Daily Construction Emissions – Build Alternative with At-Grade Passenger Concourse

Source	CO	ROG	NO_x	PM_{10}	$PM_{2.5}$	CO_2e
Off-Road Equipment (lb)	313,419	48,753	318,352	21,206	16,012	95,487,445
On-Road Equipment (lb)	20,577	1,671	77,800	8,339	3,376	33,557,056
Fugitive Dust (lb)	—	—	—	450,000	94,500	—
Total (lb)	333,996	50,424	396,151	479,545	113,888	129,044,501
Average Day (lb/day)	222.7	33.6	264.1	319.7	75.9	86,029.7
SCAQMD Thresholds	550	75	100	150	55	NA
Exceedance	No	No	Yes	Yes	Yes	—

Notes:
CO = carbon monoxide; CO_2e = carbon dioxide equivalents; lb = pound; NA=not applicable; NO_x = oxides of nitrogen; $PM_{2.5}$= particles of 2.5 micrometers and smaller; PM_{10} = particles of 10 micrometers and smaller; ROG = reactive organic gas; SCAQMD=South Coast Air Quality Management District

The annual construction emissions generated during the average construction year are listed in Table 7-3 and Table 7-4 for the proposed project and the build alternative.

Table 7-3. Annual Construction Emissions – Proposed Project with Above-Grade Passenger Concourse with New Expanded Passageway
(tons)

Source	CO	ROG	NO_x	PM_{10}	$PM_{2.5}$	CO_2e
Off-Road Equipment	105.8	15.1	100.4	7.7	5.5	29,246.7
On-Road Equipment	7.6	0.6	28.5	3.1	1.2	12,325.1
Fugitive Dust	—	—	—	225.0	47.3	—
Total	113.4	15.7	128.9	235.8	54.0	41,571.8
Average Year	18.9	2.6	21.5	39.3	9.0	6,928.6

Notes:
CO = carbon monoxide; CO_2e = carbon dioxide equivalents; NO_x = oxides of nitrogen; $PM_{2.5}$ = particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG = reactive organic gas

Table 7-4. Annual Construction Emissions – Build Alternative with At-Grade Passenger Concourse (tons)

Source	CO	ROG	NO_X	PM_{10}	$PM_{2.5}$	CO_2e
Off-Road Equipment	156.7	24.4	159.2	10.6	8.0	47,743.7
On-Road Equipment	10.3	0.8	38.9	4.2	1.7	16,778.5
Fugitive Dust	—	—	—	225.0	47.3	—
Total	167.0	25.2	198.1	239.8	56.9	64,522.3
Average Year	27.8	4.2	33.0	40.0	9.5	10,753.7

Notes:
CO=carbon monoxide; CO_2e=carbon dioxide equivalents; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas

Fugitive Dust

Fugitive dust emissions are generally associated with land clearing, exposure, and cut-and-fill operations. Dust generated daily during construction would vary substantially, depending on the level of activity, the specific operations, and weather conditions. Nearby sensitive receptors and on-site workers may be exposed to blowing dust, depending upon prevailing wind conditions. Fugitive dust also would be generated as construction equipment or trucks travel on unpaved areas of the construction site.

$PM_{2.5}$ and PM_{10} emissions from construction activities were calculated using the total acreage that would be disturbed during each construction phase and are included in the emissions listed in Table 7-1 through Table 7-4. SCAQMD has established Rule 403 for reducing fugitive dust emissions through the use of best available control measures. As identified in Table 7-1 and Table 7-2, the proposed project or the build alternative would exceed the SCAQMD's significance thresholds for PM_{10} emissions. These estimates do not assume compliance with SCAQMD Rule 403.

LST Analysis

Table 7-5 and Table 7-6 show the construction-related emissions of CO, NO_X, PM_{10}, and $PM_{2.5}$ compared with the LSTs for the Central Los Angeles area at a distance of 25 m for the proposed project and build alternative. As required by the SCAQMD's LST Methodology (SCAQMD 2008), only the on-site construction emissions are included in Table 7-5 and Table 7-6. As identified in Table 7-5, the calculated emissions rates for on-site construction activities associated with the proposed project would exceed the LSTs for PM_{10} and $PM_{2.5}$. As identified in Table 7-6, calculated emission rates for the build alternative would exceed the LSTs for NO_X, PM_{10}, and $PM_{2.5}$.

Table 7-5. Summary of On-Site Construction Emissions, Localized Significance – Proposed Project with Above-Grade Concourse

	Emissions			
	CO	NO_X	PM_{10}	$PM_{2.5}$
Total (lb)	212,283.3	203,633.6	465,725.1	105,697.8
Daily (lb)	141.5	135.8	310.5	70.5
SCAQMD Thresholds	1,861	161	16	8
Exceeds Daily SCAQMD Threshold?	No	No	Yes	Yes

Notes:
CO=carbon monoxide; lb=pound; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; SCAQMD=South Coast Air Quality Management District

Table 7-6. Summary of On-Site Construction Emissions, Localized Significance – Build Alternative with At-Grade Concourse

	Emissions			
	CO	NO_X	PM_{10}	$PM_{2.5}$
Total (lb)	314,447.4	322,241.9	471,622.5	110,681.2
Daily (lb)	209.6	214.8	314.4	73.8
SCAQMD Thresholds	1,861	161	16	8
Exceeds Daily SCAQMD Threshold?	No	Yes	Yes	Yes

Notes:
CO=carbon monoxide; lb=pound; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; SCAQMD=South Coast Air Quality Management District

Based on the results of the construction air quality analysis, impacts would be significant upon implementation of the proposed project or the build alternative. Mitigation Measures AQ-1 and AQ-2, (described in Section 8.0), would reduce the exhaust and fugitive dust emissions (CO, NO_X, ROG, PM_{10}, and $PM_{2.5}$) generated on site during construction.

- Mitigation Measure AQ-1 (described in Section 8.0) requires compliance with the SCAQMD's Rule 403 (fugitive dust control measures) and would reduce on-site fugitive dust emissions by 50 percent.

- Mitigation Measure AQ-2 (described in Section 8.0) requires all on-site construction equipment to meet or exceed U.S. EPA's Tier 4 Final emission standards and for all off-road construction equipment to be fueled using 100 percent renewable diesel. This measure would reduce the on-site exhaust emissions by up to 95 percent when compared with the average construction fleet for the SCAB.

Construction Emissions after Mitigation

Table 7-7 and Table 7-8 identify the mitigated construction emission levels for the peak day for the proposed project and the build alternative, respectively. As identified in Table 7-7 and Table 7-8, after mitigation the peak daily construction emissions for the proposed project or the build alternative would still exceed the SCAQMD's PM_{10} threshold.

Table 7-9 and Table 7-10 identify the annual mitigated construction emission levels for the proposed project and the build alternative, respectively.

Table 7-7. Daily Construction Emissions After Mitigation – Proposed Project with Above-Grade Passenger Concourse with New Expanded Passageway

Source	CO	ROG	NO_X	PM_{10}	$PM_{2.5}$	CO_2e
Off-Road Equipment (lb)	57,593	11,316	32,029	5,449	2,569	37,924,387
On-Road Equipment (lb)	15,259	1,227	57,020	6,147	2,488	24,650,247
Fugitive Dust (lb)	—	—	—	225,000	47,250	—
Total (lb)	72,852	12,543	89,049	236,596	52,307	62,574,634
Average Day (lb/day)	48.6	8.4	59.4	157.7	34.9	41,716.4
SCAQMD Thresholds	550	75	100	150	55	NA
Exceedance	No	No	No	Yes	No	—

Notes:
CO=carbon monoxide; CO_2e=carbon dioxide equivalents; lb=pound; NA=not applicable; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SCAQMD=South Coast Air Quality Management District

Table 7-8. Daily Construction Emissions After Mitigation – Build Alternative with At-Grade Concourse

Source	CO	ROG	NO_x	PM_{10}	$PM_{2.5}$	CO_2e
Off-Road Equipment (lb)	70,192	19,008	49,296	6,763	3,370	58,849,564
On-Road Equipment (lb)	20,577	1,671	77,800	8,339	3,376	33,557,056
Fugitive Dust (lb)	—	—	—	225,000	47,250	—
Total (lb)	90,769	20,679	127,096	240,102	53,996	92,406,620
Average Day (lb/day)	60.5	13.8	84.7	160.1	36.0	61,604.4
SCAQMD Thresholds	550	75	100	150	55	NA
Exceedance	No	No	No	Yes	No	—

Notes:
CO=carbon monoxide; CO_2e=carbon dioxide equivalents; NA=not applicable; NO_x=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SCAQMD=South Coast Air Quality Management District

Table 7-9. Annual Construction Emissions After Mitigation – Proposed Project with Above-Grade Passenger Concourse with New Expanded Passageway
(tons)

Source	CO	ROG	NO_x	PM_{10}	$PM_{2.5}$	CO_2e
Off-Road Equipment	28.8	5.7	16.0	2.7	1.3	18,962.2
On-Road Equipment	7.6	0.6	28.5	3.1	1.2	12,325.1
Fugitive Dust	—	—	—	112.5	23.6	—
Total	36.4	6.3	44.5	5.8	2.5	31,287.3
Average Year	6.1	1.0	7.4	1.0	0.4	5,214.5

Notes:
CO = carbon monoxide; CO_2e = carbon dioxide equivalents; NO_x = oxides of nitrogen; $PM_{2.5}$ = particles of 2.5 micrometers and smaller; PM_{10} = particles of 10 micrometers and smaller; ROG = reactive organic gas

Table 7-10. Annual Construction Emissions After Mitigation – Build Alternative with At-Grade Concourse
(tons)

Source	CO	ROG	NO_X	PM_{10}	$PM_{2.5}$	CO_2e
Off-Road Equipment	35.1	9.5	24.6	3.4	1.7	29,424.8
On-Road Equipment	10.3	0.8	38.9	4.2	1.7	16,778.5
Fugitive Dust	—	—	—	112.5	23.6	—
Total	45.4	10.3	63.5	7.6	3.4	46,203.3
Average Year	7.6	1.7	10.6	1.3	0.6	7,700.5

Notes:
CO=carbon monoxide; CO_2e=carbon dioxide equivalents; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas

Table 7-11 and Table 7-12 identify the on-site construction emissions after implementing Mitigation Measures AQ-1 and AQ-2 for the proposed project and the build alternative, respectively. As shown, after implementation of mitigation, the calculated emissions rates for the on-site construction activities associated with the proposed project or the build alternative would continue to exceed the LSTs for PM_{10} and $PM_{2.5}$.

Table 7-11. Summary of On-Site Construction Emissions After Mitigation, Localized Significance – Proposed Project with Above-Grade Passenger Concourse with New Expanded Passageway

	Emissions			
	CO	NO_X	PM_{10}	$PM_{2.5}$
Total (lb)	58,355.8	34,879.6	230,756.7	49,943.0
Daily (lb)	38.9	23.3	153.8	33.3
SCAQMD Thresholds	1,861	161	16	8
Exceeds Daily SCAQMD Threshold?	No	No	Yes	Yes

Notes:
CO=carbon monoxide; lb=pound; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; SCAQM =South Coast Air Quality Management District

Table 7-12. Summary of On-Site Construction Emissions After Mitigation, Localized Significance – Build Alternative with At-Grade Concourse

	Emissions			
	CO	NO_X	PM_{10}	$PM_{2.5}$
Total (lb)	71,220.9	53,186.1	232,179.9	50,789.0
Daily (lb)	47.5	35.5	154.8	33.9
SCAQMD Thresholds	1,861	161	16	8
Exceeds Daily SCAQMD Threshold?	No	No	Yes	Yes

Notes:
CO=carbon monoxide; lb=pound; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; SCAQMD=South Coast Air Quality Management District

Based on these results, after implementation of proposed mitigation, construction-related emissions resulting from the proposed project or the build alternative would continue to exceed the localized SCAQMD significance thresholds; therefore, after mitigation the impacts would remain significant and unavoidable. As discussed in Table 3-1, particulate matter emissions can contribute to localized health effects. Specific effects include, but are not limited to, irritated eyes and respiratory tract, decreased lung capacity, and increased cancer and mortality. While it is common practice to analyze the correlation between an individual facility's TAC emissions and expected localized human health impacts, a similar analysis is not feasible for criteria pollutants. Instead, potential human health impacts associated with criteria air pollutants are evaluated on a regional level based on the NAAQS established by the EPA. Available modeling tools are not equipped to provide a meaningful analysis of the correlation between an individual project's air emissions and specific human health impacts.

Attempting to identify a change in background pollutant concentrations that can be attributed to a single project would be a theoretical exercise. A single project's emissions constitute only a miniscule portion of the immense volume of air contained in a regional air basin. Additionally, background concentrations of regional pollutants are not temporally or geographically uniform throughout an air basin and are constantly fluctuating based on meteorology and other environmental factors. An analysis attempting to take "tons per year" regional mass emissions data and translate that into precise pollutant concentrations, and project-specific health effects, would not be practical or meaningful.

For the same reason, even if a model were developed to accurately ascertain local increases in concentrations of criteria pollutants, it would remain impossible to correlate that increase in concentration to a specific health impact. Such models are designed to determine regional, population-wide health impacts, and are not accurate when applied at the local level. Please refer to Section 7.2 for an evaluation of the project's health risks associate with DPM emissions prepared pursuant to OEHHA guidelines.

7.1.2 Operations

Long-term air pollutant emission impacts are those associated with stationary sources and mobile sources that may occur from project-related capacity enhancements. Because the proposed project or the build alternative would have the same land uses, passenger trips, and rail operations, the proposed project and the build alternative would have similar long-term operational air quality impacts from localized increases in train activity, mobile source emissions associated with vehicular trips in the project study area, and stationary source emissions from on-site energy consumption.

On-Road, Energy, and Area Source Emissions

According to the *Link US Impact Assessment*, there would be 1,428 daily trips associated with the proposed expansion of the passenger concourse. The CalEEMod model (version 2016.3.2) was used to calculate the operational emissions associated with the proposed project and the build alternative.

- Table 7-13 and Table 7-14 identify the 2031 peak daily and annual emissions from operation of the proposed project or the build alternative.
- Table 7-15 and Table 7-16 identify the 2040 peak daily and annual emissions from operation of the proposed project or the build alternative.
- Table 7-13 through Table 7-16 identify the area source (architectural coatings, consumer products, and landscaping), energy source (electricity and natural gas), and mobile source (increased traffic) emissions associated with the new passenger concourse. The proposed retail areas in the new passenger concourse are anticipated to use a small amount of consumer products (cleaning supplies, hair spray, perfume, etc.), would have minimal landscaping, and would require minor amounts of architectural coating after construction. Utilizing these assumptions, the area source emissions associated with the new passenger concourse are negligible. The CalEEMod emission calculations are included in Appendix D.

Table 7-13. Daily Operational Emissions (2031)
(lb/day)

Source	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Area	0.1	0.0	13.4	0.0	0.0	0.0
Energy	0.3	0.3	0.0	0.0	0.0	0.0
Mobile	13.1	6.5	1.3	0.1	6.0	1.6
Total	13.4	6.9	14.7	0.1	6.0	1.7

Notes:
Columns may not add up because of rounding.

CO=carbon monoxide; lb=pound; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SO_X = sulfur oxides

Table 7-14. Annual Operational Emissions (2031)
(tons/year)

Source	CO	NO_x	ROG	SO_x	PM_{10}	$PM_{2.5}$
Area	0.0	0.0	2.4	0.0	0.0	0.0
Energy	0.1	0.1	0.0	0.0	0.0	0.0
Mobile	2.1	1.1	0.2	0.0	1.0	0.3
Total	2.1	1.2	2.6	0.0	1.0	0.3

Notes:
Columns may not add up because of rounding.

CO=carbon monoxide; NO_x=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SO_x = sulfur oxides

Table 7-15. Daily Operational Emissions (2040)
(lb/day)

Source	CO	NO_x	ROG	SO_x	PM_{10}	$PM_{2.5}$
Area	0.1	0.0	13.4	0.0	0.0	0.0
Energy	0.3	0.3	0.0	0.0	0.0	0.0
Mobile	10.3	6.5	0.9	0.1	6.0	1.6
Total	10.6	6.8	14.4	0.1	6.0	1.6

Notes:
Columns may not add up because of rounding.

CO=carbon monoxide; lb=pound; NO_x=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SO_x=sulfur oxides

Table 7-16. Annual Operational Emissions (2040)
(tons/year)

Source	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Area	0.0	0.0	2.4	0.0	0.0	0.0
Energy	0.0	0.1	0.0	0.0	0.0	0.0
Mobile	1.6	1.1	0.1	0.0	1.0	0.3
Total	1.7	1.1	2.6	0.0	1.0	0.3

Notes:
Columns may not add up because of rounding.

CO=carbon monoxide; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SO_X=sulfur oxides

Local Rail Emissions

Operational Benefits from Project-Related Capacity Enhancements

In parallel with project implementation, the Southern California Regional Rail Authority is currently developing the SCORE Program, a $10 billion plan that identifies the need for substantial investments in rail infrastructure in the Southern California region to upgrade the Metrolink system and meet the current and future needs of the traveling public. The project is a critical component of the SCORE Program, providing capacity enhancements to fulfill the program objectives.

The proposed project and the build alternative would increase the capacity of LAUS by adding new run-though tracks over US-101. This additional capacity would reduce the duration of time it takes trains to clear track segments in the throat. Additionally, the run-through tracks could reduce train dwell times by eliminating the need for crews to change operating ends before departing the station. With the addition of the run-through tracks, train operators could offer “one seat” through train services along certain routes, potentially attracting additional customers through new service offerings throughout the region.

Along with the run-through tracks, the integration of a loop track connecting the regional/intercity rail run-through tracks to the main line tracks to the north would add additional operational flexibility within LAUS. This additional track would allow southbound trains to loop through LAUS and travel northbound toward Antelope Valley, Ventura County, or the Central Maintenance Facility. Based on the proposed track improvements, train operations would realize not only an increase in capacity within the rail yard, but should also experience improved on-time performance.

Tier 4 Equipment Assumptions - No Project

As discussed above in Section 6.0, Methodology, by 2040, all of the trains operating at LAUS are anticipated to meet Tier 4 emission standards; therefore, a gradual reduction in emissions between the existing condition (2016) and future No Project conditions is assumed in this analysis, and presented accordingly to correspond to the reduction in emissions between 2016 and 2040 resulting from continued implementation of Tier 4 technology.

Localized Air Quality Analysis

Impacts resulting from project-related infrastructure improvements and forecasted increases in train movements at LAUS are evaluated in this air quality analysis equally for the proposed project and the build alternative. The operational scenarios for 2026, 2031, and 2040 as presented in the Appendix A would apply to the proposed project or the build alternative, and are influenced by statewide and regional plans for service increases and other required off-site infrastructure (i.e., SCORE Program). The operational scenarios represent a conservative estimate of the greatest potential impacts based on forecasted increases in regional/intercity rail and HSR train movements that could occur through LAUS and are therefore incorporated into this impact evaluation.

The emissions from train operations were calculated by multiplying the 2016, 2026, 2031, and 2040 emission factors listed in U.S. EPA's *Emission Factors for Locomotives* (U.S. EPA 2009) to the inverse of mileage of the train as derived from the most recent information provided by the Bureau of Transportation Statistics (Bureau of Transportation Statistics 2017) . Table 7-17 and Table 7-18 list daily and annual rail emissions generated within the project study area for Years 2016 (Existing Condition), 2026, 2031, and 2040. The data is presented for the "With Project" condition, relative to the "No Project" condition because the operational impact analysis does not vary between the proposed project and the build alternative.

The increase between the two conditions in 2026, 2031, and 2040 is because of the localized project-related capacity enhancements at LAUS and within the project study area. The train emission calculations are included in Appendix D. It should be noted that the increase in emissions listed in Table 7-17 and Table 7-18 for 2026, 2031, and 2040 do not take into consideration the associated regional VMT reductions anticipated from increased ridership. As identified in Table 3.3.4-1 of the *2016 RTP/SCS Program Environmental Impact Report*, under the with Plan conditions (which include region wide transit and rail improvements) the regional criteria pollutant emissions are substantially lower than under the existing conditions. VMT reductions are considered cumulative benefits.

Table 7-17. Daily Rail Emissions within the Study Area
(lb/day)

Year	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Existing (2016)	113.6	508.3	23.4	0.4	13.2	12.8
2026 No Project	113.6	273.4	8.1	0.4	5.1	5.0
Increase from Existing	0.0	-234.9	-15.3	0.0	-8.1	-7.9
2026 with Project	105.5	253.8	7.5	0.4	4.8	4.6
Increase from Existing	-8.1	-254.5	-15.9	0.0	-8.5	-8.2
Increase from No Project	-8.1	-19.6	-0.6	0.0	-0.4	-0.4
2031 No Project	113.6	196.5	5.0	0.4	3.0	2.9
Increase from Existing	0.0	-311.8	-18.5	0.0	-10.3	-9.9
2031 with Project	173.8	300.6	7.6	0.6	4.6	4.4
Increase from Existing	60.2	-207.7	-15.8	0.2	-8.7	-8.4
Increase from No Project	60.2	104.1	2.6	0.2	1.6	1.5
2040 No Project	113.6	98.2	2.3	0.4	1.3	1.2
Increase from Existing	0.0	-410.0	-21.1	0.0	-12.0	-11.6
2040 with Project	190.0	164.2	3.8	0.7	2.1	2.1
Increase from Existing	76.3	-344.0	-19.6	0.3	-11.1	-10.8
Increase from No Project	76.3	66.0	1.5	0.3	0.9	0.8

Notes:
CO=carbon monoxide; lb=pound; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SO_X=sulfur oxides

Table 7-18. Annual Rail Emissions within the Study Area
(tons/year)

Year	CO	NO_x	ROG	SO_x	PM_{10}	$PM_{2.5}$
Existing (2016)	17.0	75.8	3.5	0.1	2.0	1.9
2026 No Project	17.0	40.8	1.2	0.1	0.8	0.7
Increase from Existing	0.0	-35.1	-2.3	0.0	-1.2	-1.2
2026 (with Project)	15.7	37.9	1.1	0.1	0.7	0.7
Increase from Existing	-1.2	-38.0	-2.4	0.0	-1.3	-1.2
Increase from No Project	-1.2	-2.9	-0.1	0.0	-0.1	-0.1
2031 No Project	17.0	29.3	0.7	0.1	0.4	0.4
Increase from Existing	0.0	-46.5	-2.8	0.0	-1.5	-1.5
2031 with Project	25.9	44.8	1.1	0.1	0.7	0.7
Increase from Existing	9.0	-31.0	-2.4	0.0	-1.3	-1.3
Increase from No Project	9.0	15.5	0.4	0.0	0.2	0.2
2040 No Project	17.0	14.7	0.3	0.1	0.2	0.2
Increase from Existing	0.0	-61.2	-3.2	0.0	-1.8	-1.7
2040 with Project	28.3	24.5	0.6	0.1	0.3	0.3
Increase from Existing	11.4	-51.3	-2.9	0.0	-1.7	-1.6
Increase from No Project	11.4	9.8	0.2	0.0	0.1	0.1

Notes:
CO=carbon monoxide; NO_x=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SO_x=sulfur oxides

Total Combined Emissions

An indicator of the project's regional operational impact is the net influence on emissions for a future year, relative to the emissions for the same year under the No Project condition. The calculated results of the daily train cruising, train idling, on-road, and operational emissions are presented in Table 7-19, Table 7-20, and Table 7-21 for the 2026, 2031, and 2040 conditions, respectively. In addition, the annual emissions are presented in Table 7-22, Table 7-23, and Table 7-24 for the 2026, 2031, and 2040 conditions, respectively. As shown in Table 7-19 and Table 7-22, the daily and annual rail emissions decrease with the proposed project. This reduction is due to the small increase in rail operations being offset by the reduced dwell and travel times.

As identified in Table 7-20 and Table 7-21, the net increase in daily emissions would exceed the SCAQMD threshold for NO_X. Impacts would be significant. Mitigation Measure AQ-3 (described in Section 8.0) would reduce the rail exhaust emissions (CO, NO_X, ROG, PM_{10}, and $PM_{2.5}$).

Table 7-19. Daily Operational Emissions (2026)

Source	Pollutant Emissions (lb/day)					
	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Rail Emissions No Project	113.6	273.4	8.1	0.4	5.1	5.0
Rail Emissions with Project	105.5	253.8	7.5	0.4	4.8	4.6
Total Project Emissions	105.5	253.8	7.5	0.4	4.8	4.6
Net Increase	-8.1	-19.6	-0.6	0.0	-0.4	-0.4
SCAQMD Threshold	550	55	55	150	150	55
Exceedance	No	No	No	No	No	No

Notes:
The new passenger concourse would not be constructed by 2026; therefore, no operational emissions generated by on-site uses and vehicle trips are included.

CO=carbon monoxide; lb=pound; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SCAQMD=South Coast Air Quality Management District; SO_X=sulfur oxides

Table 7-20. Daily Operational Emissions (2031)

Source	Pollutant Emissions (lb/day)					
	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Rail Emissions No Project	113.6	196.5	5.0	0.4	3.0	2.9
Rail Emissions with Project	173.8	300.6	7.6	0.6	4.6	4.4
Operational Emissions with Project	13.4	6.9	14.7	0.1	6.0	1.7
Total Project Emissions	187.2	307.5	22.3	0.7	10.6	6.1
Net Increase	73.6	111.0	17.3	0.3	7.6	3.2
SCAQMD Threshold	550	55	55	150	150	55
Exceedance	No	Yes	No	No	No	No

Notes:
CO=carbon monoxide; lb=pound; NO_X=oxides of nitrogen; $PM_{2.5}$= particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SCAQMD=South Coast Air Quality Management District; SO_X=sulfur oxides

Table 7-21. Daily Operational Emissions (2040)

Source	Pollutant Emissions (lb/day)					
	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Rail Emissions No Project	113.6	98.2	2.3	0.4	1.3	1.2
Rail Emissions with Project	190.0	164.2	3.8	0.7	2.1	2.1
Operational Emissions with Project	10.6	6.8	14.4	0.1	6.0	1.6
Total Project Emissions	200.6	171.0	18.2	0.8	8.1	3.7
Net Increase	86.9	72.8	15.9	0.4	6.9	2.4
SCAQMD Threshold	550	55	55	150	150	55
Exceedance	No	Yes	No	No	No	No

Notes:
CO=carbon monoxide; lb=pound; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SCAQMD=South Coast Air Quality Management District; SO_X=sulfur oxides

Table 7-22. Annual Operational Emissions (2026)

Source	Pollutant Emissions (tons)					
	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Rail Emissions – No Project	17.0	40.8	1.2	0.1	0.8	0.7
Rail Emissions with Project	15.7	37.9	1.1	0.1	0.7	0.7
Total Project Emissions	15.7	37.9	1.1	0.1	0.7	0.7
Net Increase	-1.2	-2.9	-0.1	0.0	-0.1	-0.1

Notes:
The new passenger concourse would not be constructed by 2026; therefore, no operational emissions generated by on-site uses and vehicle trips are included.

CO=carbon monoxide; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SO_X=sulfur oxides

Table 7-23. Annual Operational Emissions (2031)

Source	Pollutant Emissions (tons)					
	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Rail Emissions – No Project	17.0	29.3	0.7	0.1	0.4	0.4
Rail Emissions with Project	25.9	44.8	1.1	0.1	0.7	0.7
Operational Emissions with Project	2.1	1.2	2.6	0.0	1.0	0.3
Total Project Emissions	28.0	46.0	3.7	0.1	1.7	1.0
Net Increase	11.1	16.7	3.0	0.0	1.2	0.5

Notes:
CO=carbon monoxide; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SO_X=sulfur oxides

Table 7-24. Annual Operational Emissions (2040)

Source	Pollutant Emissions (tons)					
	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Rail Emissions – No Project	17.0	14.7	0.3	0.1	0.2	0.2
Rail Emissions with Project	28.3	24.5	0.6	0.1	0.3	0.3
Operational Emissions with Project	1.7	1.1	2.6	0.0	1.0	0.3
Total Project Emissions	30.0	25.6	3.2	0.1	1.3	0.6
Net Increase	13.1	10.9	2.8	0.0	1.1	0.4

Notes:
CO=carbon monoxide; NO_X =oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SO_X=sulfur oxides

LST Analysis

Table 7-25, Table 7-26, and Table 7-27 identify the operational emissions of CO, NO_X, PM_{10}, and $PM_{2.5}$ compared with the LSTs for the Central Los Angeles area at a distance of 25 m for the 2026, 2031 and 2040 conditions, respectively. As required by the SCAQMD's LST Methodology (SCAQMD 2008), only the on-site emissions are included in Table 7-25, Table 7-26, and Table 7-27. Table 7-25, Table 7-26, and Table 7-27 include all of the net increase in rail operation emissions generated within the project study area, all of the area source and energy source emissions, and 5 percent of the on-road emissions.

As shown in Table 7-25, Table 7-26, and Table 7-27, the calculated emissions rates for proposed on-site operational activities would not exceed the LSTs.

Table 7-25. Summary of On-Site Operational Emissions, Localized Significance (2026)

Source	Emission Rates (lbs/day)			
	CO	NO_X	PM_{10}	$PM_{2.5}$
Rail Operations	-8.1	-19.6	-0.4	-0.4
SCAQMD Thresholds	1,861	161	4	2
Exceeds Daily SCAQMD Threshold?	No	No	No	No

Notes:
The new passenger concourse would not be constructed by 2026; therefore, no operational emissions generated by on-site uses and vehicle trips are included.
CO=carbon monoxide; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; SCAQMD=South Coast Air Quality Management District

Table 7-26. Summary of On-Site Operational Emissions, Localized Significance (2031)

Source	Emission Rates (lbs/day)			
	CO	NO_X	PM_{10}	$PM_{2.5}$
Rail Operations	60.2	104.1	1.6	1.5
Area, Energy, and On-Road	1.1	0.6	0.3	0.1
Total	61.2	104.7	1.9	1.6
SCAQMD Thresholds	1,861	161	4	2
Exceeds Daily SCAQMD Threshold?	No	No	No	No

Notes:
CO=carbon monoxide; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; SCAQMD=South Coast Air Quality Management District

Table 7-27. Summary of On-Site Operational Emissions, Localized Significance (2040)				
	Emission Rates (lbs/day)			
Source	CO	NO_X	PM_{10}	$PM_{2.5}$
Rail Operations	76.3	66.0	0.9	0.8
Area, Energy, and On-Road	0.9	0.6	0.3	0.1
Total	77.2	66.6	1.2	0.9
SCAQMD Thresholds	1,861	161	4	2
Exceeds Daily SCAQMD Threshold?	No	No	No	No

Notes:
CO=carbon monoxide; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; SCAQMD=South Coast Air Quality Management District

Operational Emissions after Mitigation

Based on the results of the operational air quality analysis, impacts would be significant upon implementation of the proposed project or the build alternative. Mitigation Measure AQ-3, (described in Section 8.0), would require implementation of emerging technologies to reduce the CO, NO_X, ROG, PM_{10}, and $PM_{2.5}$ exhaust emissions by 10, 10, 5, 30, and 30 percent, respectively. Mitigation Measure AQ-3 also requires an adaptive air quality mitigation plan to be implemented, in conjunction with replacement of the rail fleet with zero- or low-emission locomotives consistent with *2018 California State Rail Plan,* to achieve a reduction of pollutant concentrations below a level that would not exceed SCAQMD's 10 in 1 million cancer risk threshold at any of the residential uses in the project study area. Requiring the use of emerging technologies to reduce pollutant concentrations below a level that would not exceed SCAQMD health risk thresholds would further reduce the 2031 emissions by 30 percent and the 2040 emissions by 37 percent.

The mitigated results of the daily operational emissions are presented in Table 7-28, Table 7-29, and Table 7-30 for the 2026, 2031, and 2040 conditions, respectively. In addition, the mitigated annual emissions are presented in Table 7-31, Table 7-32, and Table 7-33 for the 2026, 2031, and 2040 conditions, respectively. As identified in Table 7-28, Table 7-29, and Table 7-30, the net increase in daily emissions would be reduced to below the SCAQMD thresholds after mitigation.

Table 7-28. Daily Operational Emissions (2026) - Mitigated

Source	Pollutant Emissions (lb/day)					
	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Rail Emissions No Project	113.6	273.4	8.1	0.4	5.1	5.0
Rail Emissions with Project	94.9	228.4	7.2	0.4	3.3	3.2
Total Project Emissions	94.9	228.4	7.2	0.4	3.3	3.2
Net Increase	-18.7	-45.0	-0.9	0.0	-1.8	-1.8
SCAQMD Threshold	550	55	55	150	150	55
Exceedance	No	No	No	No	No	No

Notes:
The new passenger concourse would not be constructed by 2026; therefore, no operational emissions generated by on-site uses and vehicle trips are included.

CO=carbon monoxide; lb=pound; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SCAQMD=South Coast Air Quality Management District; SO_X=sulfur oxides

Table 7-29. Daily Operational Emissions (2031) - Mitigated

Source	Pollutant Emissions (lb/day)					
	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Rail Emissions No Project	113.6	196.5	5.0	0.4	3.0	2.9
Rail Emissions with Project	123.8	214.0	5.7	0.5	2.5	2.5
Operational Emissions with Project	13.4	6.9	14.7	0.1	6.0	1.7
Total Project Emissions	137.2	220.9	20.4	0.6	8.5	4.2
Net Increase	23.6	24.4	15.4	0.2	5.5	1.3
SCAQMD Threshold	550	55	55	150	150	55
Exceedance	No	No	No	No	No	No

Notes:
CO=carbon monoxide; lb=pound; NO_X=oxides of nitrogen; $PM_{2.5}$= particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SCAQMD=South Coast Air Quality Management District; SO_X=sulfur oxides

Table 7-30. Daily Operational Emissions (2040) - Mitigated

Source	Pollutant Emissions (lb/day)					
	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Rail Emissions No Project	113.6	98.2	2.3	0.4	1.3	1.2
Rail Emissions with Project	126.9	109.7	2.7	0.5	1.1	1.1
Operational Emissions with Project	10.6	6.8	14.4	0.1	6.0	1.6
Total Project Emissions	137.5	116.5	17.1	0.6	7.1	2.7
Net Increase	23.9	18.3	14.8	0.2	5.8	1.5
SCAQMD Threshold	550	55	55	150	150	55
Exceedance	No	No	No	No	No	No

Notes:
CO=carbon monoxide; lb=pound; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SCAQMD=South Coast Air Quality Management District; SO_X=sulfur oxides

Table 7-31. Annual Operational Emissions (2026) - Mitigated

Source	Pollutant Emissions (tons)					
	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Rail Emissions – No Project	17.0	40.8	1.2	0.1	0.8	0.7
Rail Emissions with Project	14.2	34.1	1.1	0.1	0.5	0.5
Total Project Emissions	14.2	34.1	1.1	0.1	0.5	0.5
Net Increase	-2.8	-6.7	-0.1	0.0	-0.3	-0.2

Notes:
The new passenger concourse would not be constructed by 2026; therefore, no operational emissions generated by on-site uses and vehicle trips are included.

CO=carbon monoxide; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SO_X=sulfur oxides

Table 7-32. Annual Operational Emissions (2031) - Mitigated						
	Pollutant Emissions (tons)					
Source	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Rail Emissions – No Project	17.0	29.3	0.7	0.1	0.4	0.4
Rail Emissions with Project	18.5	31.9	0.9	0.1	0.4	0.4
Operational Emissions with Project	2.1	1.2	2.6	0.0	1.0	0.3
Total Project Emissions	20.6	33.1	3.5	0.1	1.4	0.7
Net Increase	3.6	3.8	2.8	0.0	1.0	0.3

Notes:
CO=carbon monoxide; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SO_X=sulfur oxides

Table 7-33. Annual Operational Emissions (2040) - Mitigated						
	Pollutant Emissions (tons)					
Source	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Rail Emissions – No Project	17.0	14.7	0.3	0.1	0.2	0.2
Rail Emissions with Project	18.9	16.4	0.4	0.1	0.2	0.2
Operational Emissions with Project	1.7	1.1	2.6	0.0	1.0	0.3
Total Project Emissions	20.6	17.5	3.0	0.1	1.2	0.5
Net Increase	3.6	2.8	2.7	0.0	1.0	0.3

Notes:
CO=carbon monoxide; NO_X =oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; ROG=reactive organic gas; SO_X=sulfur oxides

Table 7-34, Table 7-35, and Table 7-36 identify the mitigated operational emissions of CO, NO_X, PM_{10}, and $PM_{2.5}$ compared with the LSTs for the Central Los Angeles area at a distance of 25 m for the 2026, 2031 and 2040 conditions, respectively.

As shown in Table 7-34, Table 7-35, and Table 7-36, the calculated emissions rates for proposed on-site operational activities would not exceed the LSTs after implementation of proposed mitigation.

Table 7-34. Summary of On-Site Operational Emissions, Localized Significance (2026) - Mitigated

Source	Emission Rates (lbs/day)			
	CO	NO_X	PM_{10}	$PM_{2.5}$
Rail Operations	-18.7	-45.0	-1.8	-1.8
SCAQMD Thresholds	1,861	161	4	2
Exceeds Daily SCAQMD Threshold?	No	No	No	No

Notes:
CO=carbon monoxide; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; SCAQMD=South Coast Air Quality Management District

Table 7-35. Summary of On-Site Operational Emissions, Localized Significance (2031) - Mitigated

Source	Emission Rates (lbs/day)			
	CO	NO_X	PM_{10}	$PM_{2.5}$
Rail Operations	-2.8	-6.7	-0.3	-0.2
Area, Energy, and On-Road	1.1	0.6	0.3	0.1
Total	-1.7	-6.1	0.0	-0.1
SCAQMD Thresholds	1,861	161	4	2
Exceeds Daily SCAQMD Threshold?	No	No	No	No

Notes:
CO=carbon monoxide; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; SCAQMD=South Coast Air Quality Management District

Table 7-36. Summary of On-Site Operational Emissions, Localized Significance (2040) - Mitigated

Source	Emission Rates (lbs/day)			
	CO	NO_X	PM_{10}	$PM_{2.5}$
Rail Operations	13.3	11.5	-0.2	-0.1
Area, Energy, and On-Road	0.9	0.6	0.3	0.1
Total	14.2	12.1	0.1	0.0
SCAQMD Thresholds	1,861	161	4	2
Exceeds Daily SCAQMD Threshold?	No	No	No	No

Notes:
CO=carbon monoxide; NO_X=oxides of nitrogen; $PM_{2.5}$=particles of 2.5 micrometers and smaller; PM_{10}=particles of 10 micrometers and smaller; SCAQMD=South Coast Air Quality Management District

Carbon Monoxide Screening Analysis

The methodology required for a CO local analysis is summarized in the Transportation Project-Level Carbon Monoxide Protocol (California Department of Transportation 1997), Section 3 (Determination of Project Requirements), and Section 4 (Local Analysis).

Section 4 contains Figure 3 (Local CO Analysis [included in Appendix F of this report]). This flowchart is used to determine the type of CO analysis required for the proposed project or the build alternative. Below is a step-by-step explanation of the flowchart. Each level cited is followed by a response, which in turn, determines the next applicable level of the flowchart for the build alternatives. The flowchart begins at Level 1:

- Level 1. Is the Project in a CO non-attainment area?
  Response: No.

  The project site is located in an area that has demonstrated attainment with the federal CO standards and is in attainment for the state standards.

- Level 1 (cont.). Was the area redesignated as "attainment" after the 1990 Clean Air Act?
  Response: Yes.

- Level 1 (cont.). Has "continued attainment" been verified with the local Air District, if appropriate?
  Response: Yes.

  The SCAB was designated as attainment/maintenance by the U.S. EPA on June 11, 2007. (Proceed to Level 7.)

- Level 7. Does the Project worsen air quality?
  Response: No.

As the project does not meet any of the following criteria that would worsen air quality:

a. *The project significantly increases the percentage of vehicles operating in cold start mode. Increasing the number of vehicles operating in cold start mode by as little as 2 percent should be considered potentially significant.*

   No additional parking is contemplated as part of this project. The trips associated with Metrolink and Amtrak are considered transit-oriented in nature and are not expected to result in additional vehicular trips because they would be arriving/departing LAUS as pedestrians. The additional vehicle trips associated with this retail space will be limited to vendors, deliveries, and employees required to serve the transit riders at this retail space. Therefore, the percentage of vehicles operating in cold start mode is the same or lower for the intersection under study compared with those used for the intersection in the attainment plan. It is assumed that all vehicles are in a fully warmed-up mode. Therefore, this criterion is not met.

b. *The project significantly increases traffic volumes. Increases in traffic volumes in excess of 5 percent should be considered potentially significant. Increasing the traffic volume by less than 5 percent may still be potentially significant if there is also a reduction in average speeds.*

   Based on the *Link US Traffic Impact Assessment* (Appendix E of this EIR), the project's contribution to the local intersection volumes is less than 5 percent of the total. Figures 7-2, 7-3, 7-30, and 7-31 from the *Link US Traffic Impact Assessment* (included in Appendix F of this report) show the 2031 and 2040 with and without project AM and PM peak hour traffic volumes in the project study area.

c. *The project worsens traffic flow. For uninterrupted roadway segments, a reduction in average speeds (within a range of 3 to 50 mph) should be regarded as worsening traffic flow. For intersection segments, a reduction in average speed or an increase in average delay should be considered as worsening traffic flow.*

   As identified in Table 12-1 of the *Link US Traffic Impact Assessment* (included in Appendix F of this report), there are two intersections where the project would result in significant changes in delay (Intersection #2 Garey Street and Commercial Street and Intersection #4 Center Street and Commercial Street). With implementation of Mitigation Measure TR-2, the LOS at Intersection #4 would operate at acceptable LOS B (AM and PM Peak Hours) under the 2031 and 2040 with project conditions. Implementation of Mitigation Measure TR-2 would improve operations at Intersection #4 to better than pre project conditions, and would minimize the operational traffic delay at Intersection #4; thereby reducing the operational traffic impact at Intersection #4 to a level less than significant. No additional feasible mitigation measures would minimize the operational traffic delay at Intersection #2 under the 2031 and 2040 with project conditions. The project-related increased delays would continue to exceed LADOT guidelines for Intersection #2. Therefore, this criterion is not met.

The proposed project or the build alternative are not expected to result in any concentrations exceeding the 1-hour or 8-hour CO standards. Therefore, a detailed CALINE4 CO hot-spot analysis is not required. Impacts are considered less than significant.

7.2 Health Risk Analysis

7.2.1 Construction

Project construction would result in emissions of DPM from heavy-duty construction equipment and trucks operating in the project study area (e.g., water trucks and haul trucks). DPM is characterized as a TAC by ARB. The OEHHA has identified carcinogenic and chronic noncarcinogenic effects from long-term (chronic) exposure, but it has not identified health effects because of short-term (acute) exposure to DPM.

Cancer risk is defined as the increase in lifetime probability (chance) of an individual developing cancer because of exposure to a carcinogenic compound, typically expressed as the increased probability in 1 million. The cancer risk from inhalation of a TAC is estimated by calculating the inhalation dose in units of milligrams/kilogram body weight per day based on an ambient concentration in $\mu g/m^3$, breathing rate, and exposure period, and multiplying the dose by the inhalation cancer potency factor, expressed as (milligrams/kilogram body weight per day). Typically, cancer risks for residential receptors and similar sensitive receptors are estimated based on a lifetime (30 years) of continuous exposure; however, for the purposes of this analysis, a 6-year exposure scenario, corresponding to the approximate construction period for the proposed project or the build alternative was evaluated. To be conservative, this exposure scenario was applied to the proposed project and the build alternative. In addition, 100 percent of the PM_{10} exhaust from diesel equipment is assumed to be DPM.

The DPM (PM_{10}) emissions for all emission sources, during the construction period were compiled and added together to represent worst-case emission source for DPM. Because of the long-term nature of health risks, the modeling used the average day emissions instead of the peak day emissions. The equipment and vehicles included in this total are:

Proposed Project with Above-Grade Passenger Concourse with New Expanded Passageway

- Off-road vehicles and equipment: 5.78 lbs/day PM_{10}
- Haul Trucks (Assume last mile on site): 0.10 lbs/day PM_{10}
    - Total DPM (PM_{10}): 5.88 lbs/day PM_{10}

Build Alternative with At-Grade Passenger Concourse

- Off-road vehicles and equipment: 8.85 lbs/day PM_{10}
- Haul Trucks (Assume last mile on -site): 0.13 lbs/day PM_{10}
    - Total DPM (PM_{10}): 8.98 lbs/day PM_{10}

The DPM emissions from diesel-powered construction equipment and on-site diesel-powered trucks that would be used during construction are provided in Appendix C (Construction Emission Calculations). Total emissions of construction-related exhaust PM_{10}, as a surrogate for DPM, during the overall construction period were calculated and then converted to grams per second for use in the AERMOD model. Table 7-37 and Table 7-38 identify the modeled annual average DPM concentration, and the associated cancer risks, at the closest land uses to the proposed project and the build alternative. The complete results are included in Appendix E. As shown, the peak cancer risks during construction would exceed the SCAQMD's threshold of 10 in 1 million. This impact is considered significant.

Table 7-37. Modeled Cancer Risks During Construction – Proposed Project with Above-Grade Passenger Concourse with New Expanded Passageway (per million)

Receptor	Land Use Type	Modeled Annual Concentrations (μg/m³)	Cancer Risks
William Mead Homes	Residential	0.045	16.5
William Mead Homes	Residential	0.040	14.8
Mozaic Apartments	Residential	0.231	85.0
Mission Road Residences	Residential	0.016	5.9
Mission Road Residences	Residential	0.013	4.9
One Santa Fe Apartments	Residential	0.002	0.7
Utah Street Elementary School	School	0.009	0.1
Mendez High School	School	0.010	0.2
Ann Street Elementary School	School	0.061	0.9
Twin Towers Correctional Facility	Commercial Worker	0.161	1.8
Los Angeles Men's Central Jail	Commercial Worker	0.102	1.1
Metro Offices	Commercial Worker	0.491	5.4
Terminal Annex	Commercial Worker	0.171	1.9

Source: ZM Associates Environmental Corporation 2018

Notes:
μg/m³= micrograms per cubic meter; Metro=Los Angeles County Metropolitan Transportation Authority

Table 7-38. Modeled Cancer Risks During Construction – Build Alternative with At-Grade Passenger Concourse (per million)

Receptor	Land Use Type	Modeled Annual Concentrations (μg/m³)	Cancer Risks
William Mead Homes	Residential	0.068	25.2
William Mead Homes	Residential	0.061	22.6
Mozaic Apartments	Residential	0.353	129.8
Mission Road Residences	Residential	0.024	9.0
Mission Road Residences	Residential	0.020	7.4
One Santa Fe Apartments	Residential	0.003	1.0
Utah Street Elementary School	School	0.014	0.2
Mendez High School	School	0.016	0.2
Ann Street Elementary School	School	0.093	1.4
Twin Towers Correctional Facility	Commercial Worker	0.247	2.7
Los Angeles Men's Central Jail	Commercial Worker	0.156	1.7
Metro Offices	Commercial Worker	0.750	8.2
Terminal Annex	Commercial Worker	0.260	2.8

Source: ZM Associates Environmental Corporation 2018

Notes:
μg/m³= micrograms per cubic meter; Metro=Los Angeles County Metropolitan Transportation Authority

After implementing Mitigation Measure AQ-2 (described in Section 8.0), requiring all off-road equipment to meet or exceed U.S. EPA's Tier 4 Final emission standards and fueled using 100 percent renewable diesel, the DPM emissions associated with the equipment and vehicles are:

Proposed Project with Above-Grade Passenger Concourse with New Expanded Passageway

- Off-road vehicles and equipment: 0.48 lbs/day PM_{10}
- Haul Trucks (Assume last mile on-site): 0.10 lbs/day PM_{10}
- Total DPM (PM_{10}): 0.58 lbs/day PM_{10}

Build Alternative with At-Grade Passenger Concourse

- Off-road vehicles and equipment: .81 lbs/day PM_{10}
- Haul Trucks (Assume last mile on-site): 0.13 lbs/day PM_{10}

- Total DPM (PM_{10}): 0.94 lbs/day PM_{10}

Table 7-39 and Table 7-40 identify the modeled annual average DPM concentration, and the associated cancer risks, at the closest land uses to the project footprint for the proposed project and the build alternative. The complete results are included in Appendix E. As shown, the peak cancer risks would continue to exceed the SCAQMD's threshold of 10 in 1 million at the Mozaic Apartments under the build alternative. This impact is considered significant.

Table 7-39. Modeled Cancer Risks – Proposed Project with Above-Grade Passenger Concourse with New Expanded Passageway - Mitigated (per million)

Receptor	Land Use Type	Modeled Annual Concentrations (µg/m³)	Cancer Risks
William Mead Homes	Residential	0.004	1.6
William Mead Homes	Residential	0.004	1.5
Mozaic Apartments	Residential	0.023	8.4
Mission Road Residences	Residential	0.002	0.6
Mission Road Residences	Residential	0.001	0.5
One Santa Fe Apartments	Residential	0.000	0.1
Utah Street Elementary School	School	0.001	0.0
Mendez High School	School	0.001	0.0
Ann Street Elementary School	School	0.006	0.1
Twin Towers Correctional Facility	Commercial Worker	0.016	0.2
Los Angeles Men's Central Jail	Commercial Worker	0.010	0.1
Metro Offices	Commercial Worker	0.048	0.5
Terminal Annex	Commercial Worker	0.017	0.2

Source: ZM Associates Environmental Corporation 2018

Notes:
µg/m³= micrograms per cubic meter; Metro=Los Angeles County Metropolitan Transportation Authority

Table 7-40. Modeled Cancer Risks – Build Alternative with At-Grade Passenger Concourse - Mitigated (per million)

Receptor	Land Use Type	Modeled Annual Concentrations (µg/m³)	Cancer Risks
William Mead Homes	Residential	0.007	2.6
William Mead Homes	Residential	0.006	2.4
Mozaic Apartments	Residential	0.037	13.6
Mission Road Residences	Residential	0.003	0.9
Mission Road Residences	Residential	0.002	0.8
One Santa Fe Apartments	Residential	0.000	0.1
Utah Street Elementary School	School	0.001	0.0
Mendez High School	School	0.002	0.0
Ann Street Elementary School	School	0.010	0.2
Twin Towers Correctional Facility	Commercial Worker	0.026	0.3
Los Angeles Men's Central Jail	Commercial Worker	0.016	0.2
Metro Offices	Commercial Worker	0.079	0.9
Terminal Annex	Commercial Worker	0.027	0.3

Source: ZM Associates Environmental Corporation 2018

Notes:
µg/m³= micrograms per cubic meter; Metro=Los Angeles County Metropolitan Transportation Authority

Table 7-41 identifies the chronic hazard index for the maximally exposed individual under the unmitigated and mitigated conditions. A chronic hazard index is calculated by dividing the annual average concentration of a toxic pollutant by the chronic REL for that pollutant. For DPM the chronic REL is 5.0. As shown, the chronic hazard index at this location is lower than the SCAQMD significance threshold of less than 1.0.

Table 7-41. Chronic Hazard Index

Receptor	Chronic Hazard Index	
	Unmitigated	Mitigated
Maximally Exposed Individual – Proposed Project	0.046	0.005
Maximally Exposed Individual – Build Alternative	0.071	0.007

Source: ZM Associates Environmental Corporation 2018

In summary, after implementation of mitigation, the anticipated cancer risk associated with construction of the proposed project would be below the SCAQMD's 10 in a million threshold, and impacts would be reduced to a level less than significant. However, at the Mozaic Apartments under the build alternative the risk would remain above the threshold at 13.6 in 1 million, and impacts would remain significant and unavoidable. As such, the exposure of project-related TAC emission impacts on sensitive receptors during construction would be considered a significant impact.

7.2.2 Operations

Implementation of the proposed project or the build alternative would alter the flow of train movements within the project study area. In addition, the proposed project and the build alternative would facilitate an increase in rail operations through LAUS. The number of train movements through LAUS would increase through 2040. Because of the flexibility provided by the new run-through tracks, the future daily operations on a track by track basis are unknown. Therefore, for the purpose of the DPM risk analysis, the project study area was modeled as point sources for idling within the station and as line sources for the rail operations within the project study area. Table 7-42 identifies the PM_{10} emissions, in pounds per day, generated for the existing, 2026, 2031, and 2040 conditions. As the number of trains operating at LAUS is the same for both alternatives, the data in Table 7-42 is representative of both the proposed project and the build alternative.

Table 7-42. Summary of Operational Particles of 10 micrometers and Smaller Emissions by Source
(lb/day)

Source	Existing	2026 No Project	2026 with Project	2031 No Project	2031 with Project	2040 No Project	2040 with Project
Train Idling	6.43	2.49	1.94	1.45	1.39	0.62	0.65
Train Operations	6.81	2.64	2.82	1.54	3.18	0.66	1.49

Notes:
lb=pound

Table 7-43 through Table 7-49 list the peak cancer risks at 13 locations within the project study area for the Existing, 2026 No Project, 2026 with Project, 2031 No Project, 2031 with Project, 2040 No Project, and 2040 with Project condition, respectively.

The cancer risks at the residential land uses were calculated using a 30-year exposure while the school and office uses were calculated using 9 and 25-year exposures, respectively. As shown, when compared with conditions without the project, the project-related increase in cancer risk would exceed the SCAQMD's threshold of 10 in 1 million. However, when compared to the existing (2016) conditions, the cancer risks would be substantially lower at all of the receptor locations.

Table 7-43. Summary of the Existing Cancer Risks at Specific Receptors
(per million)

Receptor	Land Use Type	Modeled Annual Concentrations (μg/m³)	Cancer Risks
William Mead Homes	Residential	1.537	910.3
William Mead Homes	Residential	1.174	695.5
Mozaic Apartments	Residential	1.446	856.5
Mission Road Residences	Residential	0.360	213.3
Mission Road Residences	Residential	0.339	200.5
One Santa Fe Apartments	Residential	0.151	89.7
Utah Street Elementary School	School	0.322	7.2
Mendez High School	School	0.326	7.3
Ann Street Elementary School	School	1.481	33.3
Twin Towers Correctional Facility	Commercial Worker	0.838	38.1
Los Angeles Men's Central Jail	Commercial Worker	0.946	42.9
Metro Offices	Commercial Worker	1.119	50.8
Terminal Annex	Commercial Worker	1.059	48.1

Source: ZM Associates Environmental Corporation 2018

Notes:
μg/m³=micrograms per cubic meter; Metro=Los Angeles County Metropolitan Transportation Authority

Table 7-44. Summary of 2026 No Project Cancer Risks at Specific Receptors
(per million)

Receptor	Land Use Type	Modeled Annual Concentrations (µg/m3)	Cancer Risks	Increase from Existing Conditions
William Mead Homes	Residential	0.596	352.9	-557.4
William Mead Homes	Residential	0.455	269.6	-425.8
Mozaic Apartments	Residential	0.561	332.3	-524.1
Mission Road Residences	Residential	0.140	82.7	-130.6
Mission Road Residences	Residential	0.131	77.8	-122.8
One Santa Fe Apartments	Residential	0.059	34.8	-54.9
Utah Street Elementary School	School	0.125	2.8	-4.4
Mendez High School	School	0.126	2.8	-4.5
Ann Street Elementary School	School	0.574	12.9	-20.4
Twin Tower Correctional Facility	Commercial Worker	0.325	14.8	-23.3
Los Angeles Men's Central Jail	Commercial Worker	0.367	16.6	-26.3
Metro Offices	Commercial Worker	0.434	19.7	-31.1
Terminal Annex	Commercial Worker	0.411	18.6	-29.4

Source: ZM Associates Environmental Corporation 2018

Notes:
µg/m³=micrograms per cubic meter; Metro=Los Angeles County Metropolitan Transportation Authority

Table 7-45. Summary of 2026 with Project Cancer Risks at Specific Receptors
(per million)

Receptor	Land Use Type	Modeled Annual Concentrations (µg/m³)	Cancer Risks	Increase from Existing Conditions	Increase from No Project Conditions
William Mead Homes	Residential	0.507	300.3	-610.1	-52.7
William Mead Homes	Residential	0.384	227.2	-468.3	-42.4
Mzsaic Apartments	Residential	0.406	240.6	-615.8	-91.7
Mission Road Residences	Residential	0.204	120.7	-92.6	37.9
Mission Road Residences	Residential	0.186	110.2	-90.3	32.4
One Santa Fe Apartments	Residential	0.058	34.1	-55.6	-0.7
Utah Street Elementary School	School	0.148	3.3	-3.9	0.5
Mendez High School	School	0.163	3.7	-3.7	0.8
Ann Street Elementary School	School	0.532	12.0	-21.4	-1.0
Twin Towers Correctional Facility	Commercial Worker	0.252	11.4	-26.6	-3.3
Los Angeles Men's Central Jail	Commercial Worker	0.271	12.3	-30.6	-4.3
Metro Offices	Commercial Worker	0.349	15.8	-35.0	-3.9
Terminal Annex	Commercial Worker	0.290	13.2	-34.9	-5.5

Source: ZM Associates Environmental Corporation 2018

Notes:
µg/m³=micrograms per cubic meter; Metro=Los Angeles County Metropolitan Transportation Authority

Table 7-46. Summary of 2031 No Project Cancer Risks at Specific Receptors
(per million)

Receptor	Land Use Type	Modeled Annual Concentrations (µg/m³)	Cancer Risks	Increase from Existing Conditions
William Mead Homes	Residential	0.348	205.8	-704.5
William Mead Homes	Residential	0.265	157.2	-538.2
Mozaic Apartments	Residential	0.327	193.4	-663.1
Mission Road Residences	Residential	0.081	48.2	-165.1
Mission Road Residences	Residential	0.077	45.3	-155.2
One Santa Fe Apartments	Residential	0.034	20.3	-69.4
Utah Street Elementary School	School	0.073	1.6	-5.6
Mendez High School	School	0.074	1.7	-5.7
Ann Street Elementary School	School	0.335	7.5	-25.8
Twin Towers Correctional Facility	Commercial Worker	0.189	8.6	-29.5
Los Angeles Men's Central Jail	Commercial Worker	0.214	9.7	-33.2
Metro Offices	Commercial Worker	0.253	11.5	-39.3
Terminal Annex	Commercial Worker	0.239	10.9	-37.2

Source: ZM Associates Environmental Corporation 2018

Notes:
µg/m³=micrograms per cubic meter; Metro=Los Angeles County Metropolitan Transportation Authority

Table 7-47. Summary of 2031 with Project Cancer Risks at Specific Receptors
(per million)

Receptor	Land Use Type	Modeled Annual Concentrations (µg/m³)	Cancer Risks	Increase from Existing Conditions	Increase from No Project Conditions
William Mead Homes	Residential	0.563	333.6	-576.7	127.8
William Mead Homes	Residential	0.425	251.6	-418.8	94.3
Mozaic Apartments	Residential	0.330	195.6	-1.3	2.2
Mission Road Residences	Residential	0.220	130.1	-17.8	81.8
Mission Road Residences	Residential	0.201	119.3	-25.3	74.0
One Santa Fe Apartments	Residential	0.061	35.9	-30.8	15.6
Utah Street Elementary School	School	0.161	3.6	-22.7	2.0
Mendez High School	School	0.177	4.0	-371.4	2.3
Ann Street Elementary School	School	0.591	13.3	-13.8	5.8
Twin Towers Correctional Facility	Commercial Worker	0.237	10.8	-24.2	2.2
Los Angeles Men's Central Jail	Commercial Worker	0.279	12.7	-5.9	3.0
Metro Offices	Commercial Worker	0.329	15.0	-10.7	3.5
Terminal Annex	Commercial Worker	0.245	11.1	-1.0	0.3

Source: ZM Associates Environmental Corporation 2018

Notes:
µg/m³=micrograms per cubic meter; Metro=Los Angeles County Metropolitan Transportation Authority

Table 7-48. Summary of 2040 No Project Cancer Risks at Specific Receptors
(per million)

Receptor	Land Use Type	Modeled Annual Concentrations (µg/m³)	Cancer Risks	Increase from Existing Conditions
William Mead Homes	Residential	0.149	88.2	-822.1
William Mead Homes	Residential	0.114	67.4	-628.1
Mozaic Apartments	Residential	0.140	82.9	-773.6
Mission Road Residences	Residential	0.035	20.7	-192.6
Mission Road Residences	Residential	0.033	19.4	-181.1
One Santa Fe Apartments	Residential	0.015	8.7	-81.0
Utah Street Elementary School	School	0.031	0.7	-6.5
Mendez High School	School	0.032	0.7	-6.6
Ann Street Elementary School	School	0.143	3.2	-30.1
Twin Towers Correctional Facility	Commercial Worker	0.081	3.7	-34.4
Los Angeles Men's Central Jail	Commercial Worker	0.092	4.2	-38.8
Metro Offices	Commercial Worker	0.108	4.9	-45.9
Terminal Annex	Commercial Worker	0.102	4.7	-43.4

Source: ZM Associates Environmental Corporation 2018

Notes:
µg/m³=micrograms per cubic meter; Metro=Los Angeles County Metropolitan Transportation Authority

Table 7-49. Summary of 2040 with Project Cancer Risks at Specific Receptors
(per million)

Receptor	Land Use Type	Modeled Annual Concentrations (µg/m³)	Cancer Risks	Increase from Existing Conditions	Increase from No Project Conditions
William Mead Homes	Residential	0.264	156.3	-754.0	68.1
William Mead Homes	Residential	0.199	117.9	-577.6	50.5
Mozaic Apartments	Residential	0.155	91.6	-764.9	8.7
Mission Road Residences	Residential	0.103	60.9	-152.4	40.3
Mission Road Residences	Residential	0.094	55.9	-144.6	36.5
One Santa Fe Apartments	Residential	0.028	16.8	-72.9	8.1
Utah Street Elementary School	School	0.075	1.7	-5.5	1.0
Mendez High School	School	0.083	1.9	-5.5	1.2
Ann Street Elementary School	School	0.277	6.2	-27.1	3.0
Twin Towers Correctional Facility	Commercial Worker	0.111	5.0	-33.0	1.4
Los Angeles Men's Central Jail	Commercial Worker	0.131	5.9	-37.0	1.8
Metro Offices	Commercial Worker	0.154	7.0	-43.8	2.1
Terminal Annex	Commercial Worker	0.115	5.2	-42.8	0.6

Source: ZM Associates Environmental Corporation 2018

µg/m³= micrograms per cubic meter; Metro=Los Angeles County Metropolitan Transportation Authority

Table 7-50 shows the chronic hazard index for the maximally exposed individual for the existing, 2026, 2031, and 2040 conditions (with and without the project). As shown, the chronic hazard index is lower than the SCAQMD significance threshold of less than 1.0.

Table 7-50. Chronic Hazard Index

Maximally Exposed Individual	Chronic Hazard Index
Existing Conditions	0.31
2026 No Project	0.12
2026 with Project	0.10
2031 No Project	0.07
2031 with Project	0.11
2040 No Project	0.03
2040 with Project	0.05
SCAQMD Threshold	1.0

Source: ZM Associates Environmental Corporation 2018

Notes:
SCAQMD=South Coast Air Quality Management District

In summary, when compared to the no project conditions, the sensitive land uses within the project study area would be exposed to an increased cancer risk of more than 10 in 1 million. When compared to the existing (2016) conditions the proposed project or the build alternative would result in lower health risks at all of the land uses in the project area.

Operational Health Risks after Mitigation

Implementation of Mitigation Measure AQ-3 (described in Section 8.0) would reduce the DPM concentrations in the project area. Implementation of Mitigation Measure AQ-3 would achieve reductions of average pollutant concentrations by 51 percent in 2031 and 56 percent in 2040.

- To achieve service levels anticipated in 2031, Mitigation Measure AQ-3 would be required to reduce the average pollutant concentrations by up to 51 percent.
- To achieve service levels anticipated in 2040, Mitigation Measure AQ-3 (described in Section 8.0) would be required to reduce the average pollutant concentrations by up to56 percent.

Upon implementation of Mitigation Measure AQ-3, the operational health risk impacts would be reduced to a level less than significant.

7.2.3 Naturally Occurring Asbestos

All project construction is located in Los Angeles County, which is among the counties listed as containing serpentine and ultramafic rock. However, the project study area is not contained in regions of the County that has been identified as containing serpentine or ultramafic rock (A General Location Guide for Ultramafic Rocks in California—Areas More Likely to Contain Naturally Occurring Asbestos, Department of Conservation, Division of Mines and Geology, August 2000). Therefore, the impact from naturally occurring asbestos during project construction would be minimal to none. No impact would result.

THRESHOLD	Generate GHG

7.3 Climate Change

GHG emissions for transportation projects can be divided into those generated during construction and those generated during operations. Construction GHG emissions include emissions generated as a result of material processing, emissions produced by on-site construction equipment, and emissions arising from traffic delays because of construction. These emissions would be generated at different levels throughout the construction phase; their frequency and occurrence can be reduced through contractor means and methods, and implementation of innovations in plans and specifications for better traffic management during construction phases.

Table 7-51 and Table 7-52 list the annual GHG emissions that would be generated during construction of the proposed project with an above-grade passenger concourse with new expanded passageway, and the build alternative with an at-grade passenger concourse, respectively.

Up to 41,570 tons of CO_2e would be generated during the 6-year construction period for the proposed project; this is equivalent to 37,705 MT of CO_2e. Amortized over a 30-year period, the approximate life of the project, the yearly contribution to GHG from the construction of the proposed project would be 1,256.9 MT of CO_2e per year.

Up to 64,520 tons of CO_2e would be generated during 6-year construction period for the build alternative; this is equivalent to 58,520 MT of CO_2e. Amortized over a 30-year period, the approximate life of the project, the yearly contribution to GHG from the construction of the build alternative would be 1,950.7 MT of CO_2e per year.

The following activities associated with project operations could directly or indirectly contribute to the generation of GHG emissions:

- Gas, Electricity, and Water Use – Natural gas use results in the emissions of two GHGs: CH_4 (the major component of natural gas) and CO_2 from the combustion of natural gas. Electricity use can result in GHG production if the electricity is generated by combusting fossil fuel.
- Solid Waste Disposal – Solid waste generated could contribute to GHG emissions in a variety of ways. Landfilling and other methods of disposal use energy for transporting and managing the

waste, and they produce additional GHGs to varying degrees. Landfilling, the most common waste management practice, results in the release of CH_4 from the anaerobic decomposition of organic materials. CH_4 is 21 times more potent a GHG than CO_2. However, landfill CH_4 can also be a source of energy. In addition, many materials in landfills do not decompose fully, and the carbon that remains is sequestered in the landfill and not released into the atmosphere.

- Motor Vehicle Use – Vehicular traffic would result in GHG emissions from the combustion of fossil fuels. According to the traffic analysis conducted for the project, total project generated daily traffic throughout operation is estimated to be 1,428 trips per day from the on-site office and retail uses
- Train Emissions – As discussed above and in Appendix A, Metro estimates the project-related capacity enhancements to reduce dwell time at LAUS and contribute to other cumulative benefits for the region, including a regional reduction of GHG emissions and VMT. Future service scenarios will depend on ongoing negotiations between the railroad operators, available infrastructure (corridor, maintenance facility, etc.) throughout the Metrolink system and beyond, and available operating funding. The project, by itself, does not enable regional/intercity rail providers to meet the objectives of the SCORE Program, nor does it enable CHSRA to meet their service goals, primarily because other infrastructure improvements on the entire system are required to meet the forecasted service levels by 2040. Therefore, the GHG emissions analysis provided herein only considers the change in localized idling emissions and not the system wide change in rail emissions.

The projected GHG emissions for the proposed project and the build alternative would be the summation of the individual sources identified above.

As identified in Table 7-51, for the proposed project with an above-grade passenger concourse with new expanded passageway, the total annual GHG emissions from construction of the proposed project and operation would be approximately 11,230 MT of CO_2e per year, which exceeds the SCAQMD's 3,000 MT CO_2e interim significance threshold for commercial, residential, and mixed use projects.

As identified in Table 7-52, for the build alternative with an at-grade concourse, the total annual GHG emissions from construction and operation would be approximately 11,925 MT of CO_2e per year, which exceeds the SCAQMD's 3,000 MT CO_2e interim threshold for commercial, residential, and mixed use projects.

Table 7-51. Greenhouse Gas Emissions – Proposed Project with Above-Grade Passenger Concourse with New Expanded Passageway (2040)						
	Pollutant Emissions (MT/year)					
Source	**Bio-CO_2**	**NBio-CO_2**	**CO_2**	**CH_4**	**N_2O**	**CO_2e**
Construction Emissions Amortized over 30 Years	0.0	1,255.7	1,255.7	0.1	0.0	1,256.9
Operational Emissions						
Area Sources	0.0	0.0	0.0	0.0	0.0	0.0
Energy Sources	0.0	4,272.0	4,272.0	0.11	0.023	4,281.7
Mobile Sources	0.0	843.2	843.2	0.03	0.0	844.0
Waste Sources	127.2	0.0	127.2	7.51	0.0	315.0
Water Usage	15.1	485.5	500.6	1.56	0.039	551.3
Total Operational Emissions	142.3	5,600.6	5,742.9	9.22	0.06	5,992.0
Rail Emissions						
No Project	0.0	6,168.2	6,168.2	0.0	0.0	6,168.2
Proposed Project	0.0	10,149.0	10,149.0	0.0	0.0	10,149.0
Net Increase	0.0	3,980.8	3,980.8	0.0	0.0	3,980.8
Total Operational Emissions	142.3	9,581.4	9,723.7	9.2	0.1	9,972.8
Total Emissions with Construction	142.3	10,837.1	10,979.4	9.3	0.1	11,229.7

Notes:
CO_2–carbon dioxide; CO_2e=carbon dioxide equivalents; MT=metric tons; N_2O=nitrous oxide

Table 7-52. Greenhouse Gas Emissions – Build Alternative with At-Grade Passenger Concourse (2040)						
	Pollutant Emissions (MT/year)					
Source	Bio-CO_2	NBio-CO_2	CO_2	CH_4	N_2O	CO_2e
Construction Emissions Amortized over 30 Years	0.0	1,949.0	1,949.0	0.1	0.0	1,950.7
Operational Emissions						
Area Sources	0.0	0.0	0.0	0.0	0.0	0.0
Energy Sources	0.0	4,272.0	4,272.0	0.11	0.023	4,281.7
Mobile Sources	0.0	843.2	843.2	0.03	0.0	844.0
Waste Sources	127.2	0.0	127.2	7.51	0.0	315.0
Water Usage	15.1	485.5	500.6	1.56	0.039	551.3
Total Operational Emissions	142.3	5,600.6	5,742.9	9.22	0.06	5,992.0
Rail Emissions						
No Project	0.0	6,168.2	6,168.2	0.0	0.0	6,168.2
Build Alternative	0.0	10,149.0	10,149.0	0.0	0.0	10,149.0
Net Increase	0.0	3,980.8	3,980.8	0.0	0.0	3,980.8
Total Operational Emissions	142.3	9,581.4	9,723.7	9.2	0.1	9,972.8
Total Emissions with Construction	142.3	11,530.4	11,672.7	9.3	0.1	11,923.5

Notes:
CO_2=carbon dioxide; CO_2e=carbon dioxide equivalents; MT=metric tons; N_2O=nitrous oxide

As discussed above, this analysis evaluates the localized emissions associated with the regional/intercity rail operations within the LAUS. Therefore, this analysis does not evaluate the system wide change in rail emissions or the associated change in regional VMT.

In 2015, Metro emitted 457,400 MT of CO_2e from its operations. By removing private vehicles from the road, the agency also prevents GHG emissions from entering the atmosphere. During the same period, Metro saved approximately 464,493 MT of CO_2e from being emitted by displacing vehicle driving. As a result, Metro's GHG emissions in 2015 were a net reduction of 7,093 MT of CO_2e. The addition of 5,992 MT of CO_2e from the operation of LAUS would increase Metro's operation emissions to approximately 463,400 MT. Therefore, Metro would continue to offset over 100 percent of its operating GHG emissions through regional VMT reductions.

As discussed above, Metrolink is currently developing the SCORE Program, which will upgrade the regional rail system to meet the current and future needs of the traveling public. By adding tracks, grade separations and upgrading signal systems across the entire Metrolink system, trains will operate more frequently and reliably, making regional travel by train easier and creating an even more appealing alternative to driving. Between 2026 and 2078 the estimated contribution to the VMT and GHG reductions are 898 million miles and 13.5 million MT of CO_2e, respectively. The project-related capacity enhancements and improvements at LAUS are critical to achieving 26 percent, or 3.5 million MT of CO2e, of the GHG emission reduction. These reductions would easily offset the project-related annual GHG emissions of 11,230 to 11,925 MT of CO_2e.

Further and from a regional perspective, by providing increased station capacity for regional/intercity rail, Metro rail and bus, and accommodation of the planned HSR system, the proposed project and the build alternative would indirectly reduce the number of vehicles on the road and indirectly alter regional on-road motor vehicle travel. Therefore, the project is a key component to achieving the RTP/SCS (2016) GHG reduction goals for the SCAG region as listed in Table 7-53 in addition to statewide GHG reduction targets. The 2016 RTP/SCS would achieve GHG emission reductions of up to 35 percent for Los Angeles County in 2040 and up to 24 percent for the SCAG region as a whole. In this context, the reductions in GHGs in 2040 as facilitated by the proposed project or the build alternative would be considered a beneficial impact.

Table 7-53. Greenhouse Gas Emissions from Transportation by County

County	2005	2012 Base Year	2020 Plan	2040 Plan	2040 Plan vs. 2012 Base Year (%)
Imperial	3,806.6	3,500.7	3,809.5	4,683.4	34
Los Angeles	133,629.0	120,929.1	106,253.9	78,830.9	-35
Orange	40,202.9	38,664.1	34,199.4	24,082.5	-38
Riverside	32,937.6	33,447.2	33,593.3	32,489.4	-3
San Bernardino	36,397.3	36,690.1	35,595.0	39,019.9	6
Ventura	10,416.1	9,920.4	8,813.9	6,413.2	-35
SCAG Total	257,389.5	243,151.7	222,265.0	185,519.2	-24

Source: SCAG 2016

Notes:
SCAG=Southern California Association of Governments

7.3.1 Climate Change after Mitigation

Although not required for the project's climate change impacts, Mitigation Measures AQ-2 through AQ-3 (described in Section 8.0) would reduce the construction and operational GHG emissions of the proposed project and build alternative. Mitigation Measure AQ-2 would reduce the off-road GHG emissions by 30 percent. Mitigation Measure AQ-3 would reduce the locomotive emissions by 51 percent in 2031 and by 56 percent in 2040. Table 7-54 and Table 7-55 identify the mitigated GHG emissions for the proposed project and build alternative, respectively. With the addition of the SCORE Program benefits, the GHG emissions for the proposed project and build alternative would be reduced to less than zero.

Table 7-54. Cumulative Greenhouse Gas Emissions – Proposed Project with Above-Grade Passenger Concourse with New Expanded Passageway (2040) - Mitigated

Source	Pollutant Emissions (MT/year)					
	Bio-CO_2	NBio-CO_2	CO_2	CH_4	N_2O	CO_2e
Construction Emissions Amortized over 30 Years	0.0	944.8	944.8	0.1	0.0	945.9
Operational Emissions						
Area Sources	0.0	0.0	0.0	0.0	0.0	0.0
Energy Sources	0.0	4,272.0	4,272.0	0.11	0.023	4,281.7
Mobile Sources	0.0	843.2	843.2	0.03	0.0	844.0
Waste Sources	127.2	0.0	127.2	7.51	0.0	315.0
Water Usage	15.1	485.5	500.6	1.56	0.039	551.3
Total Operational Emissions	142.3	5,600.6	5,742.9	9.22	0.06	5,992.0
Rail Emissions						
No Project	0.0	6,168.2	6,168.2	0.0	0.0	6,168.2
Proposed Project	0.0	6,082.9	6,082.9	0.0	0.0	6,082.9
Net Increase	0.0	-85.3	-85.3	0.0	0.0	-85.3
Total Operational Emissions	142.3	5,515.3	5,657.6	9.2	0.1	5,906.7
Total Emissions with Construction	142.3	6,460.1	6,602.4	9.3	0.1	6,852.6

Notes:
CO_2–carbon dioxide; CO_2e=carbon dioxide equivalents; MT=metric tons; N_2O=nitrous oxide

Table 7-55. Cumulative Greenhouse Gas Emissions – Build Alternative with At-Grade Concourse (2040) - Mitigated

Source	Pollutant Emissions (MT/year)					
	Bio-CO_2	NBio-CO_2	CO_2	CH_4	N_2O	CO_2e
Construction Emissions Amortized over 30 Years	0.0	1,395.1	1,395.1	0.1	0.0	1,396.9
Operational Emissions						
Area Sources	0.0	0.0	0.0	0.0	0.0	0.0
Energy Sources	0.0	4,272.0	4,272.0	0.11	0.023	4,281.7
Mobile Sources	0.0	843.2	843.2	0.03	0.0	844.0
Waste Sources	127.2	0.0	127.2	7.51	0.0	315.0
Water Usage	15.1	485.5	500.6	1.56	0.039	551.3
Total Operational Emissions	142.3	5,600.6	5,742.9	9.22	0.06	5,992.0
Rail Emissions						
No Project	0.0	6,168.2	6,168.2	0.0	0.0	6,168.2
Build Alternative	0.0	6,082.9	6,082.9	0.0	0.0	6,082.9
Net Increase	0.0	-85.3	-85.3	0.0	0.0	-85.3
Total Operational Emissions	142.3	5,515.3	5,657.6	9.2	0.1	5,906.7
Total Emissions with Construction	142.3	6,910.4	7,052.7	9.3	0.1	7,303.6

Notes:
CO_2=carbon dioxide; CO_2e=carbon dioxide equivalents; MT=metric tons; N_2O=nitrous oxide

THRESHOLD	Conflict with an Air Quality Plan

An AQMP describes air pollution control strategies to be taken by counties or regions classified as nonattainment areas. The AQMP's main purpose is to bring the area into compliance with the requirements of federal and state air quality standards. The AQMP uses the assumptions and projections by local planning agencies to determine control strategies for regional compliance status. Therefore, any projects causing a significant impact on air quality would impede the progress of the AQMP.

Air quality models are used to demonstrate a project's emissions would not contribute to the deterioration or impede the progress of air quality goals stated in the local AQMPs. The air quality models use project-specific data to estimate the quantity of pollutants generated from the implementation of a project.

As discussed in Section 7.1.2, by providing increased station capacity for regional/intercity rail and accommodating the planned HSR system, the proposed project and the build alternative would indirectly reduce the number of vehicles on the road and indirectly alter regional on-road motor vehicle travel. The proposed project and the build alternative would also indirectly contribute to other cumulative benefits for the region, including a regional reduction of GHG emissions and VMT. Therefore, the increased emissions from rail operations identified in Table 7-17 and Table 7-18 would be offset by reductions in VMT in 2026, 2031, and 2040. For this reason, it is reasonable to conclude that the proposed project and the build alternative would not exceed SCAQMD's thresholds and would more than likely contribute to net reductions. In addition, as identified in Table 7-30, Table 7-31, and Table 7-32, after implementing Mitigation Measure AQ-3, the net increase in daily emissions would be reduced to below the SCAQMD thresholds. Therefore, the proposed project and the build alternative is considered consistent with the objectives of the AQMPs and would not affect implementation of the AQMPs. A less than significant impact would result.

RTP/SCS (2016). The project is included in the 2016 RTP/SCS as a financially constrained project. Table 7-56 demonstrates the project's consistency with the nine goals established as part of the 2016 RTP/SCS. Based on the project's consistency with the regional goals and policies of the 2016 RTP/SCS, a less than significant impact would result. The project and the build alternative are evaluated in Table 7-56 collectively as the project.

Table 7-56. Consistency with Regional Transportation Plan/Sustainable Communities Strategy Goals

RTP/SCS Goal	Link Union Station Consistency Analysis
G1: Align the plan investments and policies with improving regional economic development and competitiveness	Not applicable.
G2: Maximize mobility and accessibility for all people and goods in the region	Consistent. By increasing capacity the project is maximizing intermodal connections and improving mobility. The project is also leveraging and integrating existing transit systems and infrastructure into multi-modal improvements. Although the project does not directly increase train service, the improvements facilitate future increases in service to the levels forecasted in the 2016 RTP/SCS because other infrastructure improvements on the regional rail system, including LOSSAN Corridor are required to meet the forecasted rail increases.
G3: Ensure travel safety and reliability for all people and goods in the region	Consistent. By providing increased station capacity for regional/intercity rail and accommodation of HSR, the project would indirectly reduce the number of vehicles on the road and indirectly alter regional on-road motor vehicle travel. In addition, the project will promote ease of access and enhance safety features for non-motorized transportation.

Table 7-56. Consistency with Regional Transportation Plan/Sustainable Communities Strategy Goals

RTP/SCS Goal	Link Union Station Consistency Analysis
G4: Preserve and ensure a sustainable regional transportation system	Consistent. Construction of the project would improve the efficiency through and around LAUS by providing infrastructure to support potential one-seat rides to key destinations in Southern California.
G5: Maximize the productivity of our transportation system	Consistent. The elimination of the stub-end tracks at LAUS would increase the productivity/efficiency of the transportation system in the project study area and Southern California as a whole. Reduced train idling times would result in shortened wait times for passengers.
G6: Protect the environment and health of our residents by improving air quality and encouraging active transportation (e.g., bicycling and walking)	Consistent. The project would reduce train idling times at LAUS by anywhere from 5 to 25 minutes through improved operating efficiencies, which will significantly reduce local diesel emissions and improve air quality. In addition, the project will improve active transportation by improving pedestrian linkages within one quarter mile and through the addition of bike infrastructure/hubs, racks, and lockers.
G7: Actively encourage and create incentives for energy efficiency, where possible	Consistent. The proposed passenger concourse (above-grade or at-grade) is being designed to meet Leadership in Energy and Environmental Design Silver requirements. By introducing high efficiency lighting the project can reduce energy consumption. LED technology, dimmer driver, or designs for lights would minimize light pollution.
G8: Encourage land use and growth patterns that facilitate transit and active transportation	Consistent. The project enhances transit options at LAUS and has the potential to stimulate transit-related land use and growth patterns. The project facilitates and does not preclude active transportation projects in the vicinity of LAUS.
G9: Maximize the security of the regional transportation system through improved system monitoring, rapid recovery planning, and coordination with other security agencies	Consistent. The proposed passenger concourse is being designed to meet applicable security requirements.

Notes:
HSR=High-Speed Rail; LAUS=Los Angeles Union Station; RTP=regional transportation plan; SCS=sustainable communities strategy

THRESHOLD	Create objectionable odors affecting a substantial number of people

Construction of the proposed project or the build alternative could result in emission of odors from construction equipment and vehicles (e.g., diesel exhaust). It is anticipated that these odors would be short-term, limited in extent at any given time, and distributed throughout the project study area during the duration of construction, and, therefore, would not affect a substantial number of individuals. This impact is considered less than significant.

THRESHOLD	Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including release emissions which exceed quantitative thresholds for O_3 precursors)

Cumulative projects include local development, as well as general growth within the project area. However, as with most development, the greatest source of emissions is from vehicular traffic that can travel well out of the local area. Therefore, from an air quality standpoint, the cumulative analysis would extend beyond any local projects and, when wind patterns are considered, would cover an even larger area. Accordingly, the cumulative analysis for a project's air quality analysis must be regional by nature.

Construction and operation of cumulative projects would further degrade the local air quality, as well as the air quality of the SCAB. Air quality would be temporarily degraded during construction activities that occur separately or simultaneously. Construction of the following projects could occur concurrently with the construction of the proposed project or the build alternative:

- Emergency Security Operations Center Project
- El Monte Busway Station at LAUS
- Bus Maintenance and Compressed Natural Gas Facility
- California High-Speed Train Project
- LAUS Forecourt and Esplanade Improvements Project
- Los Angeles County Central Men's Jail
- Los Angeles River Master Plan
- Park 101 Project
- Purple Line Extension Project Sections 1, 2 and 3
- Division 20 Portal Widening and Turnback Tracks
- West Santa Ana Branch Line Project
- Channel 35 Studio Relocation Project

- College Station Project
- Blossom Plaza
- 1101 N Main Condos
- Metropolitan Transportation Authority CNG Bus Maintenance Facility
- Los Angeles Civic Center Office
- 700 W Cesar Chavez Ave Mixed Use
- 963 E 4th Street Mixed Use
- Metro Operations Control Center
- La Plaza Cultura Village Project
- 520 S Mateo Street Mixed Use
- 1115 S Boyle Ave Office
- 2051 E 7th Street Mixed Use
- 2030 E 7th Street Mixed Use

However, the greatest potential for a cumulative impact on the regional air quality would be the incremental addition of pollutants from increased traffic from residential, commercial, and industrial development and the use of heavy equipment and trucks associated with construction of these projects.

With respect to emissions that may contribute to regional impacts, although the proposed project and the build alternative results in increased regional criteria pollutant and GHG emissions, the analysis does not take into consideration the associated regional VMT reductions that can be expected from the increased ridership. As identified in Table 3.3.4-1 of the 2016 RTP/SCS *Program Environmental Impact Report*, under the plan conditions (which include region wide transit and rail improvements) the regional criteria pollutant emissions are substantially lower than under the existing conditions. Therefore, the proposed project or the build alternative would not present a long-term significant cumulative impact.

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8.0 Mitigation Measures

8.1 Construction

The following measures would be implemented during construction activities:

AQ-1 Fugitive Dust Control: In compliance with South Coast Air Quality Management District (SCAQMD) Rule 403, during clearing, grading, earthmoving, or excavation operations, fugitive dust emissions shall be controlled by regular watering or other dust preventive measures using the following procedures, as specified in SCAQMD Rule 403:

- Minimize land disturbed by clearing, grading, and earth moving, or excavation operations to prevent excessive amounts of dust
- Provide an operational water truck on-site at all times; use watering trucks to minimize dust; watering should be sufficient to confine dust plumes to the project work areas; watering shall occur at least twice daily with complete coverage, preferably in the late morning and after work is done
- Suspend grading and earth moving when wind gusts exceed 25 miles per hour unless the soil is wet enough to prevent dust plumes
- Securely cover trucks when hauling materials on- or off-site
- Stabilize the surface of dirt piles if not removed immediately
- Limit vehicular paths and limit speeds to 15 miles per hour on unpaved surfaces and stabilize any temporary roads
- Minimize unnecessary vehicular and machinery activities
- Sweep paved streets at least once per day where there is evidence of dirt that has been carried on to the roadway
- Revegetate or stabilize disturbed land, including vehicular paths created during construction to avoid future off-road vehicular activities

The following measures shall also be implemented to reduce construction emissions:

- The construction contractor shall prepare a comprehensive inventory list of all heavy-duty off-road (portable and mobile) equipment (50 horsepower and greater) (i.e., make, model, engine year, horsepower, emission rates) that could be used an aggregate of 40 or more hours throughout the duration of construction to demonstrate how the construction fleet is consistent with the requirements of Metro's Green Construction Policy
- Ensure that all construction equipment is properly tuned and maintained

- Minimize idling time to 5 minutes, whenever feasible, which saves fuel and reduces emissions
- Utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary power generators, whenever feasible
- The construction contractor shall arrange for appropriate consultations with the ARB or the SCAQMD to determine registration and permitting requirements prior to equipment operation at the site, and obtain ARB Portable Equipment Registration with the state or a local district permit for portable engines and portable engine-driven equipment units used at the project work site, with the exception of on-road and off-road motor vehicles, as applicable

These control techniques shall be included in project specifications, and shall be implemented by the construction contractor.

AQ-2 **Compliance with EPA's Tier 4 Exhaust Emission Standards and Renewable Diesel Fuel for Off-Road Equipment:** In compliance with Metro's Green Construction Policy, all off-road diesel powered construction equipment greater than 50 horsepower shall comply with EPA's Tier 4 Final exhaust emission standards (40 CFR Part 1039). In addition, if not already supplied with a factory-equipped diesel particulate filter, all construction equipment shall be outfitted with Best Available Control Technology (BACT) devices certified by the California Air Resources Board (CARB). Any emissions control device used by the contractor shall achieve emissions reductions that are no less than what could be achieved by a Level 3 diesel emissions control strategy for a similarly sized engine as defined by CARB regulations.

In addition to the use of Tier 4 equipment, all off-road construction equipment shall be fueled using 100 percent renewable diesel.

8.2 Operation

The following measures would be implemented during operation:

AQ-3 **Adaptive Air Quality Mitigation Plan:** Prior to implementation of regional/intercity rail run-through service, an Adaptive Air Quality Mitigation Plan shall be prepared by Metro, in coordination with the SCRRA, as the operator of the commuter rail service in Southern California and the program manager and grant recipient of the SCORE Program, Amtrak, and the LOSSAN Rail Corridor Agency. The Plan shall identify the methodology and requirements for annual emission inventories to be prepared by Metro, based on actual/current train movements and corresponding pollutant concentrations through the Year 2040.

Mitigation Plan Requirements: Upon implementation of regional/intercity run-through service, and on an annual basis, Metro shall compile and summarize the current Metrolink, Pacific Surfliner, and Amtrak long-distance train schedules to determine the actual level of daily and peak-period train movements (including non-revenue train movements) that operate through LAUS.

On an annual basis, Metro shall retain the services of an air quality specialist to conduct an annual emissions inventory to determine if actual train movements through LAUS are forecasted to increase criteria pollutant emissions to a level that would exceed the SCAQMD significance thresholds or diesel pollutant concentrations to a level that would exceed the SCAQMD's 10 in a million threshold at any residential land use in the project study area. An annual report shall be prepared by Metro that summarizes the quantitative results of pollutant emissions and diesel pollutant concentrations in the project study area. If pollutant emissions or diesel pollutant concentrations are projected to exceed the SCAQMD thresholds, the regional and intercity rail operators, in coordination with Metro and CalSTA, shall either implement rail fleet emerging technologies consistent with *2018 California State Rail Plan* Goal 6: *Practice Environmental Stewardship*, Policy 4: *Transform to a Clean and Energy Efficient Transportation System* (Caltrans 2018a, pg. 10 and 110), or reduce the train movements through LAUS to lower the criteria pollutant emissions below the SCAQMD significance thresholds and the diesel pollutant concentrations below the SCAQMD thresholds in the project study area.

After implementation of emerging technologies, Metro shall continue to prepare an emissions inventory in coordination with SCRRA, Amtrak, and the LOSSAN Rail Corridor Agency annually to report the quantitative results of criteria pollutant emissions and diesel pollutant concentrations in the project study area. The annual report shall include an analysis of the actual (current) and proposed changes in train schedules relative to criteria pollutant emissions and diesel pollutant concentration levels in the project study area. The report shall be prepared annually by December 31 of each year, beginning the calendar year after implementation of regional/intercity rail run-through service through 2040 and shall include results of the emissions inventory and effectiveness of the measures implemented.

Rail Fleet Emerging Technologies: To achieve a reduction of criteria pollutant emissions below the SCAQMD thresholds and diesel pollutant concentrations below a level that would not exceed SCAQMD thresholds, the regional and intercity rail operators may replace, retrofit, or supplement some or all of their existing fleet with zero or low-emission features. The types of emerging technologies that can be implemented, include, but are not limited to the following:

- Electric multiple unit systems
- Diesel multiple units
- Battery-hybrid multiple units
- Renewable diesel and other alternative fuels

Metro shall coordinate with regional rail/intercity rail operators to incorporate these emerging technologies into existing and/or future funding and/or operating agreements to reduce locomotive exhaust emissions in the project study area.

8.3 Level of Significance after Mitigation

The construction emissions associated with the proposed project would continue to exceed the SCAQMD's daily criteria pollutant and localized significance thresholds after implementing Mitigation Measures AQ-1 and AQ-2. Impacts would remain significant and unavoidable.

The construction emissions associated with the build alternative would continue to exceed the SCAQMD's daily criteria pollutant, localized significance, and health risk thresholds after implementing Mitigation Measures AQ-1 and AQ-2. Impacts would remain significant and unavoidable.

The operational emissions associated with the proposed project or the build alternative would be reduced to below the SCAQMD's daily criteria pollutant, localized significance, and health risk thresholds. In addition, the long-term GHG emissions would be reduced to less than zero. Impacts would be less than significant after mitigation.

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Appendix A:
Rail Planning Technical Memorandum

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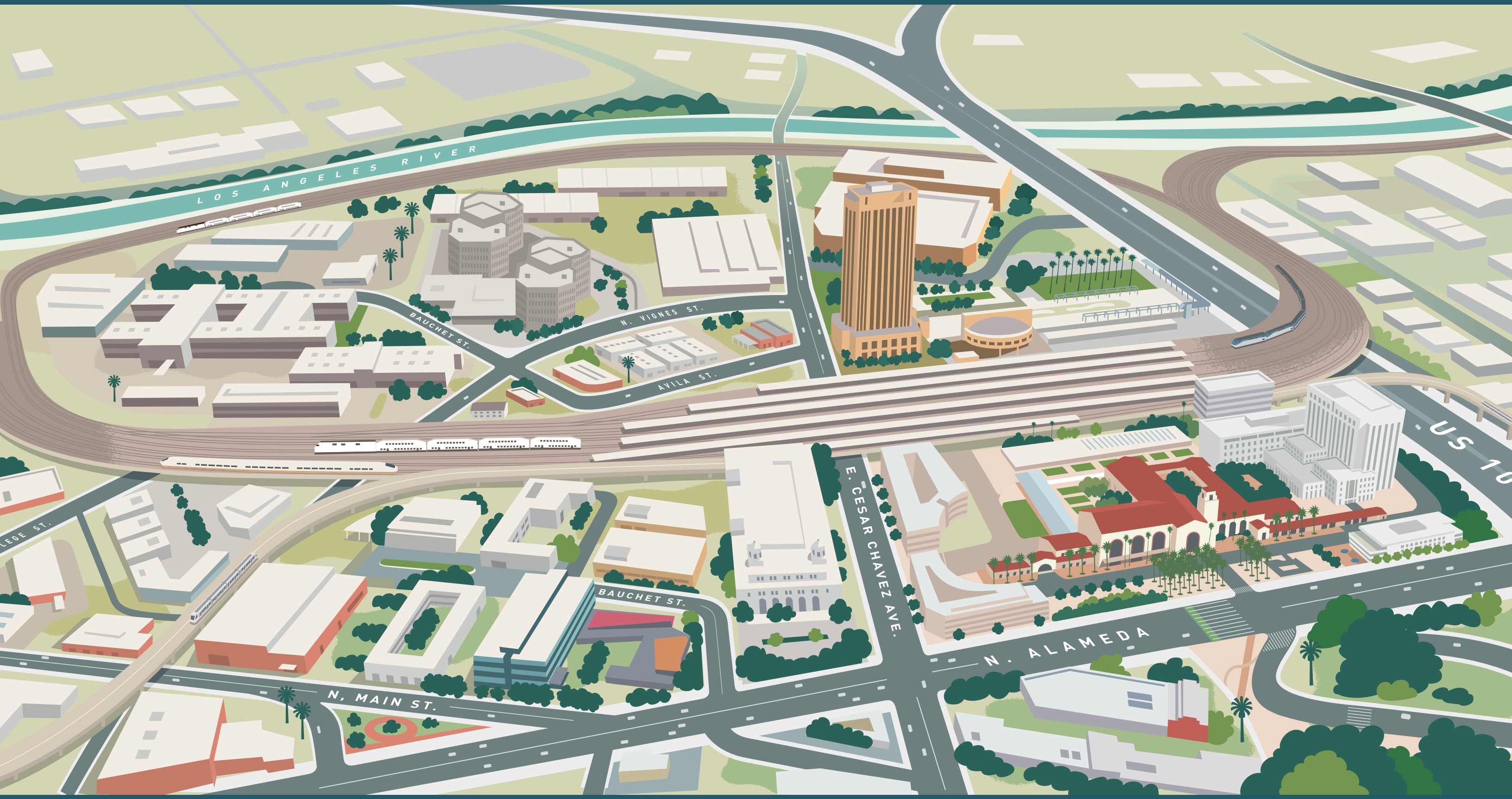
Los Angeles County
Metropolitan Transportation Authority

Link Union Station

Rail Planning Technical Memorandum

January 2019



Metro

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ACRONYMS

Caltrans	California Department of Transportation
CHSRA	California High-Speed Rail Authority
FRA	Federal Railroad Administration
HSR	High-Speed Rail
LAUS	Los Angeles Union Station
Link US	Link Union Station
LOSSAN	Los Angeles-San Diego-San Luis Obispo
Metro	Los Angeles County Metropolitan Transportation Authority
project	Link Union Station project
SCORE	Southern California Optimized Rail Expansion
SCRRA	Southern California Regional Rail Authority
TIRCP	Transit and Intercity Rail Capital Program

1.0 Introduction

The Federal Railroad Administration (FRA) and the Los Angeles County Metropolitan Transportation Authority (Metro) are proposing the Link Union Station project (Link US or project) to transform Los Angeles Union Station (LAUS) from a "stub-end tracks station" into a "run-through tracks station" with a new passenger concourse that would improve the efficiency of the station and accommodate future growth and transportation demands in the region.

The purpose of this memorandum is to provide an estimate of daily train movements (i.e., train counts) for all Metrolink, Pacific Surfliner, Amtrak, and High-Speed Rail (HSR) trains that are planned to pass through LAUS for 2016 and future horizon years anticipated to be considered in the Link US environmental documentation (2026[1], 2031, and 2040). Improvements to the Gold Line and/or Regional Connector are not considered in this memorandum. Although both Gold Line and the Regional Connector light rail trains will use LAUS, all operational aspects and train movements through LAUS are addressed through separate Metro documentation[2]. The information contained within this memorandum was prepared solely to provide a conservative estimate of the number of trains planned to pass through LAUS to facilitate evaluation of potential localized traffic, air quality and noise and vibration impacts that may result from project-related capacity enhancements proposed at LAUS and in the surrounding area in the Link US environmental documentation. The environmental impacts resulting from increased train activity at LAUS is addressed in the Link US Draft Environmental Impact Report (HDR 2019).

The information contained within this memorandum represents an estimate of future train movements through LAUS to provide a basis for the environmental evaluation only, and is not intended in any way to indicate future rail operational scenarios or stakeholder consensus on future service levels for shared train operations at LAUS. The findings from ongoing operational analyses, if significantly different from the estimated service levels described in this memorandum, could be incorporated into the environmental documentation at a later date at the discretion of the lead agencies.

1.1 Project Background and Concurrent Operational Analysis

1.1.1 Project Background

In parallel with project implementation, the Southern California Regional Rail Authority (SCRRA) is currently developing the Southern California Optimized Rail Expansion (SCORE) Program, a $10 billion plan that identifies the need for substantial investments in rail infrastructure in the Southern California region to upgrade the Metrolink system and meet the current and future needs of the traveling public. The project is

[1] The 2026 horizon year was added to reflect Metrolink's growth plans under Phase 1 of the Transit and Intercity Rail Capital Program; although the ability of LAUS to accommodate increased off-peak services during construction has not been tested.
[2] Regional Connector Transit Corridor, Final Environmental Impact Statement/Environmental Impact Report, Metro 2012

a critical component of the SCORE Program, providing capacity enhancements to fulfill the program objectives.

Localized environmental impacts resulting from project-related infrastructure improvements and forecasted increases in train movements at LAUS will be evaluated in the Link US environmental documentation. The Link US project operational scenarios for 2026, 2031, and 2040 are influenced by statewide and regional plans for service increases and other required off-site infrastructure (i.e., SCORE program). The operational scenarios represent a conservative estimate of the forecasted increases in regional/intercity rail trips and new HSR train trips that could occur at LAUS.

Infrastructure improvements outside of the project study area that are required to implement system-wide efficiencies and changes in regional/intercity operations from implementation of the SCORE Program are not part of the project, and are the responsibility of Southern California Regional Rail Authority and other agency partners. Furthermore, the operational aspects of the planned HSR system and the associated environmental impacts are not evaluated in the Link US environmental documentation because operation of the planned HSR system and the associated impacts are addressed separately in the environmental documentation being prepared by the FRA and California High-Speed Rail Authority for the Burbank to Los Angeles and Los Angeles to Anaheim Project Sections.

1.1.2 Concurrent Operational Analysis

Although general operational planning information and background data are presented in this memorandum, this document is not intended to be a detailed rail operations technical memorandum.

The reader should note that there are ongoing rail operations modeling activities concurrently underway by the California High-Speed Rail Authority (CHSRA).

In addition to CHSRA's work, Metrolink is currently in the process of creating a comprehensive operations plan to help independently analyze the optimal infrastructure design and service plan for the LAUS terminal, with or without the project, which is necessary for the successful implementation of the SCORE Program. Lastly, Metro's project team will continue to perform operational analyses of LAUS infrastructure and service alternatives.

1.2 Project Location and Study Area

LAUS is located at 800 Alameda Street in the City of Los Angeles, California. LAUS is bounded by US-101 to the south, Alameda Street to the west, Cesar Chavez Avenue to the north, and Vignes Street to the east. The project study area, as depicted on Figure 1-1, encompasses the extent of environmental study associated with potential direct, indirect, and cumulative impacts from implementation of the project and includes three main segments (Segment 1: Throat Segment, Segment 2: Concourse Segment, and Segment 3: Run-Through Segment). The existing conditions within each segment are summarized below, from north to south.

- Segment 1: Throat Segment – This segment, known as the LAUS throat, includes the area north of the platforms, from Control Point Chavez and Mission Tower at the north to Cesar Chavez Avenue at the south. In the throat segment, all arriving and departing trains traverse five lead tracks into and out of the rail yard, except for one location near the Vignes Street Bridge where the tracks reduce to four lead tracks. Currently, special track work consisting of multiple turnouts and double-slip switches are used in the throat to direct trains into and out of the appropriate assigned terminal platform tracks.
- Segment 2: Concourse Segment – This segment is between Cesar Chavez Avenue and US-101; and includes LAUS, the rail yard, the Garden Tracks, the East Portal Building, the baggage handling building with aboveground parking areas and access roads, the ticketing/waiting halls, and the pedestrian passageway with connecting ramps and stairways below the rail yard.
- Segment 3: Run-Through Segment – This segment is south of LAUS and extends east/west from Alameda Street to the west bank of the Los Angeles River and north/south from Keller Yard to Control Point Olympic. This segment includes US-101, the Commercial Street/Ducommun Street corridor, Metro Red and Purple Lines Maintenance Yard (Division 20 Rail Yard), BNSF West Bank Yard, Keller Yard, the main line tracks on the west bank of the Los Angeles River, from Keller Yard to Control Point Olympic, and the "Amtrak Lead Track" connecting the main line tracks with Amtrak's Los Angeles Maintenance Facility. Businesses within the run-through segment are primarily industrial and manufacturing related.

The project study area has a dense street network ranging from major highways to local city streets. The roadways within the project study area include the El Monte Busway, US-101, Bolero Lane, Leroy Street, Bloom Street, Cesar Chavez Avenue, Commercial Street, Ducommun Street, Jackson Street, East Temple Street, Banning Street, First Street, Alameda Street, Garey Street, Vignes Street, Aliso Street, Avila Street, Bauchet Street, and Center Street.

Figure 1-2 depicts the existing LAUS track and platform layout as well as other key facilities in and around LAUS.

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Figure 1-1. Project Study Area

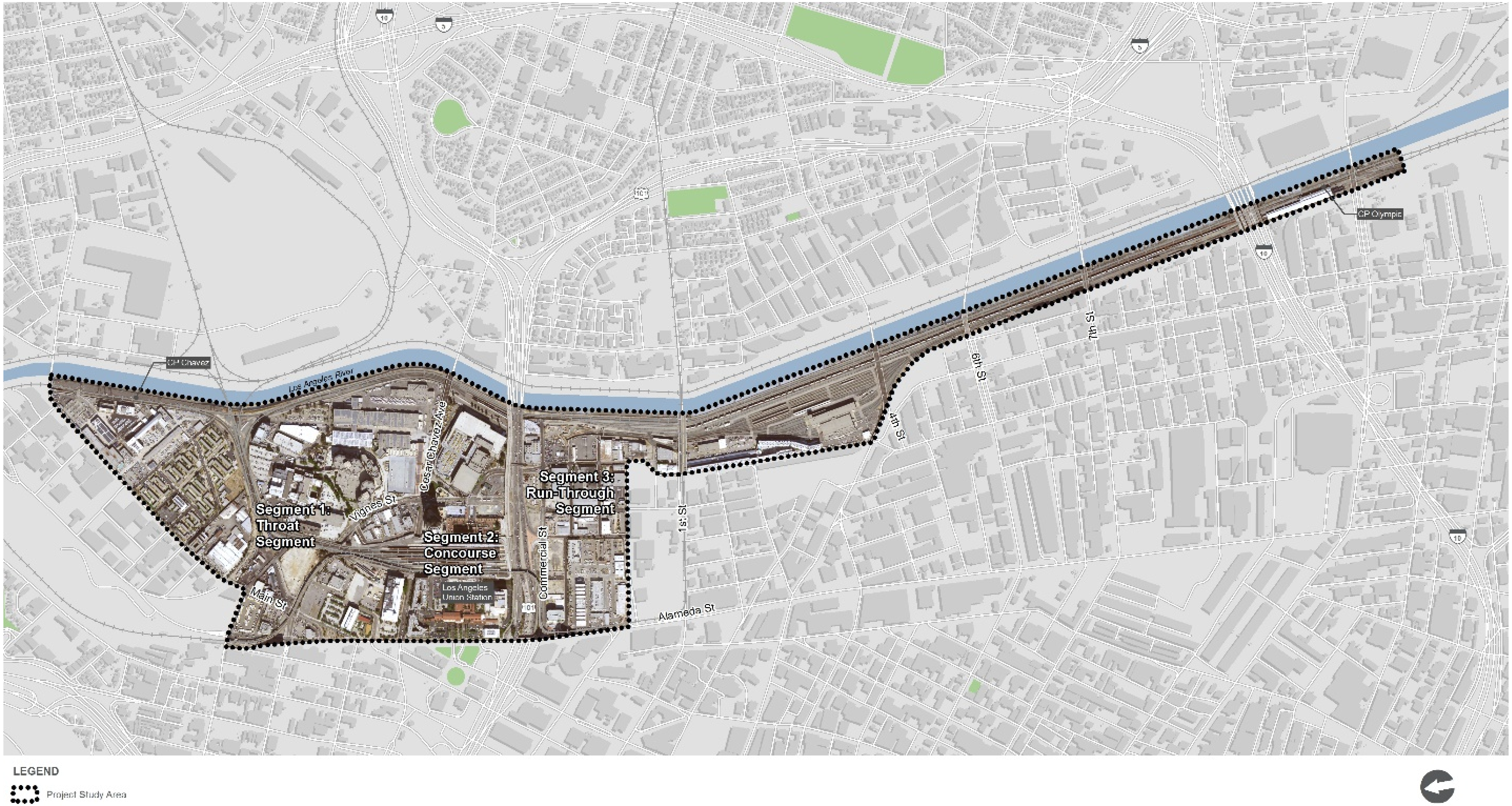

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Figure 1-2. Existing Los Angeles Union Station Track and Platform Layout

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1.3 Project Components

The project includes the following major components, as depicted on Figure 1-3 and summarized below, from north to south.

- Throat and Elevated Rail Yard – The project includes subgrade, signal, and structural improvements in the throat segment (Segment 1) to increase the elevation of the tracks leading to the rail yard in the concourse segment (Segment 2). The throat would be reconstructed with up to seven lead tracks north of LAUS to facilitate enhanced operations for regional/intercity rail service providers (Metrolink/Amtrak) and an entrance to LAUS for the planned HSR system. The project also includes new passenger platforms and canopies on the elevated rail yard.
- New Passenger Concourse – The project includes a new passenger concourse in Segment 2 that would include space dedicated for passenger circulation and waiting areas with ancillary support functions (back-of-house uses, baggage handling, etc.), transit-serving retail, office/commercial uses, and open spaces and terraces. The new passenger concourse would create an opportunity for an outdoor, community-oriented space and enhance Americans with Disabilities Act accessibility at LAUS with new vertical circulation elements, such as stairs, escalators, and elevators. The new passenger concourse would be constructed below or above the elevated rail yard.
- Run-Through Tracks – The project includes up to 10 new run-through tracks south of US-101 (including the possibility of a loop track) under US-101 to facilitate connections for regional/intercity rail trains and HSR trains to the main line tracks on the west bank of the Los Angeles River in Segment 3. As early as 2026, regional/intercity rail run-through track infrastructure would be constructed, including a "common" viaduct/deck over US-101 and embankment south of US-101 from Vignes Street to Center Street that would be built wide enough to support future run-through track infrastructure for the planned HSR system. The remaining run-through track infrastructure for the planned HSR system could be constructed as early as 2033.

The project would also require modifications to two existing bridges at Vignes Street and Cesar Chavez Avenue for new elevated tracks; modifications to US-101 and local streets (including potential street closures, geometric modifications, and parking improvements); railroad signal, positive train control, and communications-related improvements; modifications to the Gold Line light rail platforms and tracks; modifications to the Amtrak lead track between LAUS and Amtrak's Los Angeles Maintenance Facility; new access roadways to the railroad right-of-way; additional right-of-way; new utilities; utility relocations, replacements, and abandonments; and new drainage facilities/water quality improvements. The project will be constructed in phases to facilitate the continued operation of rail services at LAUS with minimal impacts on service.

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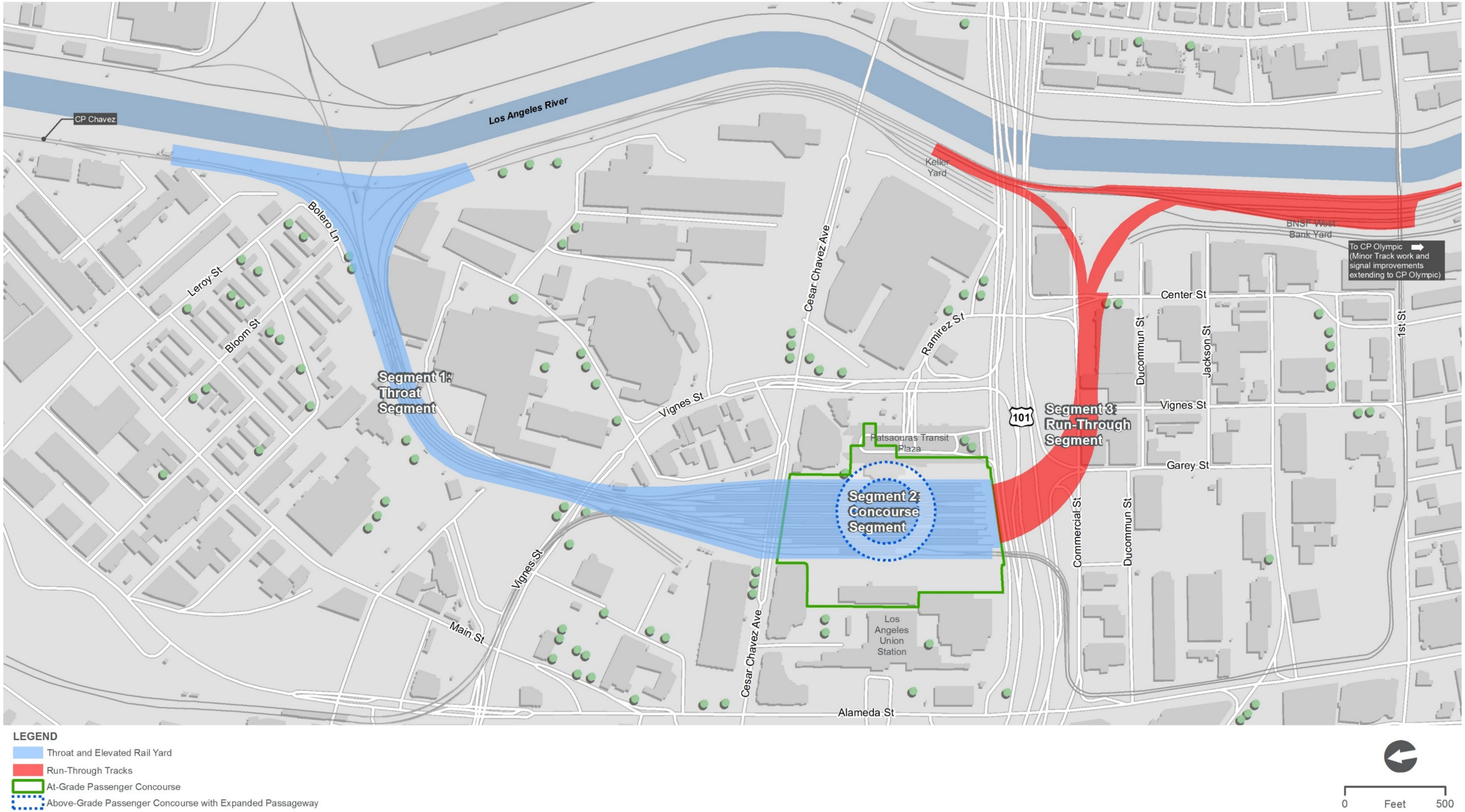
Figure 1-3. Major Project Components



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1.4 Build Alternatives and Design Options

Based on the results of the Alternatives Analysis Report, the Link US environmental documentation will include an evaluation of two track alignment Build Alternatives. Build Alternative 1 includes up to 10 new run-through tracks and accommodates future HSR trains on shared lead tracks in the throat segment (Segment 1). Build Alternative 2 includes up to 10 new run-through tracks and accommodates future HSR trains on dedicated lead tracks in the throat segment. Based on the results of the Concourse Study (appendix to the Alternatives Analysis Report), the Link US environmental documentation also includes an evaluation of two passenger concourse design options: Design Option A (At-Grade Passenger Concourse) and Design Option B (Above-Grade Passenger Concourse with New Expanded Passageway). Both track alignment alternatives and passenger concourse design options are being environmentally cleared because either concourse could be implemented with either Build Alternative.

The two Build Alternatives include the infrastructure associated with the maximum planned capacity of the rail yard, concourse, and run-through track infrastructure south of US-101 to serve future regional/intercity rail trains (Metrolink/Amtrak) and HSR trains at LAUS. The two Build Alternatives are summarized below to provide context for project-related capacity enhancements described in this memorandum.

- Alternative 1 (Up to 10 Run-Through Tracks – Shared Tracks) – Alternative 1 includes the addition of 1 new lead track for a total of 6 lead tracks in the throat north of LAUS (with regional/intercity and HSR trains sharing the 2 western lead tracks), multiple track and platform configuration options in the rail yard, and up to 10 run-through tracks that would extend south of LAUS over US-101, and connect to the main line tracks on the west bank of the Los Angeles River.
- Alternative 2 (Up to 10 Run-Through Tracks – Dedicated Tracks) – Alternative 2 includes the addition of 2 new lead tracks for a total of 7 lead tracks in the throat north of LAUS (with future HSR trains and some express/intercity services using the 2 western dedicated lead tracks and most regional/intercity trains using the 5 eastern lead tracks), multiple track and platform configuration options in the rail yard, and up to 10 run-through tracks that would extend south of LAUS over US-101 and connect to the main line tracks on the west bank of the Los Angeles River.

The new passenger concourse would facilitate enhanced passenger flow through LAUS while meeting Americans with Disabilities Act requirements and the forecasted increase in passengers. The two design options are described below.

- Design Option A (At-Grade Passenger Concourse) – This design option includes placement of the new passenger concourse below the elevated rail yard, with new plazas east and west of the elevated rail yard (East and West Plazas). Amtrak ticketing and baggage check-in services would occur at a centralized location at the concourse level. This design option also includes a grand canopy that would extend approximately up to 70 feet above the elevated rail yard and West Plaza.
- Design Option B (Above-Grade Passenger Concourse with New Expanded Passageway) – This design option includes placement of the new passenger concourse above the elevated rail yard, with new plazas east and west of the elevated rail yard (East and West Plazas). Amtrak ticketing and baggage check-in service would occur at two locations at the east and west ends of LAUS. This design option includes a canopy over the West Plaza up to 70 feet in height, with individual canopies over each platform. The new expanded passageway would be located below the rail yard to provide additional passenger travel-path convenience and options.

2.0 Objective of the Memorandum

The objective of this memorandum is to document the existing rail operating conditions and characteristics at LAUS (2016 baseline condition for National Environmental Policy Act Notice of Intent/California Environmental Quality Act Notice of Preparation) and estimate future train movements through LAUS for three horizon years (2026, 2031 and 2040) with appropriate service planning assumptions to facilitate the environmental evaluation of the project-related impacts of capacity enhancements in the Link US environmental documentation. The 2026 and 2031 years correspond to the two major phases of project implementation (interim condition and full build-out condition). 2040 corresponds to the horizon years and corresponding service goals and objectives of multiple statewide plans and mandates:

- 2026: Two new regional/intercity rail run-through tracks from Platform 4 at LAUS (interim condition)
- 2031: Construction of all regional/intercity rail improvements at LAUS including the reconstructed throat, elevated rail yard and new passenger concourse (full build-out condition)
- 2040: Full operation of HSR service at LAUS

Available estimates and projections from applicable agencies and stakeholders were used to estimate the future train movements. This memorandum will be utilized to prepare applicable environmental technical studies (i.e., traffic, air quality, noise, and vibration) in support of the Link US environmental documentation.

The service planning and operating characteristics considered in this memorandum include the following:

- Total number of train movements into and out of LAUS per day, revenue, and deadhead (2016, 2026, 2031, and 2040). Each inbound and outbound train movement counts as a separate movement. A run-though train, for example, would count as two train movements - one inbound and one outbound movement.
- Total number of train movements during the two 3-hour AM and PM peak operating periods (2016, 2026, 2031, and 2040)
- Train “consist” size, frequency of service, types of locomotives and dwell time for each carrier

The project-related capacity enhancements are required to enable Metrolink and Amtrak to meet regional/intercity rail growth projections and to facilitate CHSRA’s implementation of the planned HSR system at LAUS.

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3.0 Existing Rail Operating Conditions and Characteristics

LAUS is the focal point of passenger rail travel in Southern California, serving Metrolink commuter trains; Amtrak Pacific Surfliner intercity and long-distance trains; and Metro Red, Purple, and Gold Line trains[3]. In addition to revenue trains, there are numerous non-revenue train movements at the LAUS terminal to service passenger train equipment and position equipment at the station platforms for revenue service. For Metrolink, non-revenue train movements occur between LAUS and the Central Maintenance Facility. For Amtrak, through trains and non-revenue train movements occur for Pacific Surfliner and Amtrak Long-Distance trains (Southwest Chief, Sunset Limited/Texas Eagle, Coast Starlight) between LAUS and Amtrak's Los Angeles Maintenance Facility.

Consistent with the existing year used for the Link US environmental documentation, available 2016 schedules for Metrolink and Amtrak Pacific Surfliner and long-distance trains, existing rail operating characteristics at LAUS were determined by counting the total number of existing train movements per day and number of train movements at LAUS during the two 3-hour AM and PM peak operating periods (6:00 AM to 9:00 AM and 3:00 PM to 6:00 PM). For both Metrolink and Amtrak, a comparison between the 2016 and 2018 schedules showed no substantial addition to train movements at LAUS. The comparison revealed 1 additional round trip Pacific Surfliner train between LAUS and San Diego, as well as 1 additional Metrolink round trip between LAUS and Burbank Airport.

The following schedules were reviewed to determine the existing rail operating characteristics and are provided as Appendix A:

- Metrolink All Lines Timetable, dated June 6, 2016
- Amtrak Pacific Surfliner Schedules, effective June 6, 2016
- Amtrak Coast Starlight Schedule, effective June 6, 2016
- Amtrak Southwest Chief Schedule, effective June 9, 2014
- Amtrak Sunset Limited Schedule, effective June 9, 2014

3.1 Existing Metrolink Trains

LAUS is the hub for Metrolink operations and provides connections between the following Metrolink lines:

- 91/Perris Valley Line
- Antelope Valley Line
- Orange County Line
- Riverside Line

3 For the purpose of this memorandum, Metro trains are not considered because Metro's light rail and heavy rail operations are not anticipated to substantially affect other regional/intercity operations or operation of the planned HSR system.

- San Bernardino Line
- Ventura County Line

As of April 2016, Metrolink operates 139 revenue trains per weekday into and out of LAUS on several train lines, including the Ventura County Line (31 trains per weekday), Antelope Valley Line (30), San Bernardino Line (38), Riverside Line (12), 91/Perris Valley Line (9), and Orange County Line (19). Metrolink also operates 46 non-revenue trains between LAUS and the Central Maintenance Facility. During the two 3-hour AM and PM peak operating periods (AM and PM combined), 80 Metrolink trains (39 in the AM and 41 in the PM) pass through LAUS.

3.2 Existing Amtrak Trains

As of April 2016, Amtrak operates 28 revenue trains per weekday into and out of LAUS, which includes 14 Pacific Surfliner trains originating or terminating at LAUS; 9 Pacific Surfliner "through trains" that travel the entire extent of the Pacific Surfliner route (Los Angeles – San Diego – San Luis Obispo, or LOSSAN corridor) north and south of LAUS (counted as 18 total trains in Table 5-1 below); and an average of 5 long-distance trains including the Coast Starlight (2 trains daily), the Southwest Chief (2 trains daily), and the Texas Eagle/Sunset Limited, which is a combined train that operates 3 times per week. Amtrak / LOSSAN also operate 11 non-revenue trains between LAUS and Amtrak's Los Angeles Maintenance Facility (6 Pacific Surfliner and 5 Amtrak long-distance trains). During the two 3-hour AM and PM peak operating periods (AM and PM combined), 13 (6 in the AM and 7 in the PM) Amtrak / LOSSAN revenue and non-revenue train movements pass through LAUS.

4.0 Future Service Planning Assumptions and Data Sources

The project would accommodate a substantial increase in rail operational capacity for the region, reducing train idling (dwell) time and improving on-time performance for trains using LAUS. The estimate of train movements that could occur through LAUS aligns with the service goals, horizon years, and corresponding goals and objectives of multiple statewide plans and mandates as described below.

California Transportation Plan

The *California Transportation Plan 2040* Vision calls for a transportation system that is safe, sustainable, universally accessible, and globally competitive while meeting the State's greenhouse gas emission reduction goals. The project-related capacity enhancements would allow for future train operations to address this vision.

2018 California State Rail Plan (Caltrans 2018)

For the purpose of this memorandum, future train movements for Metrolink and Amtrak trains are based on the *2018 California State Rail Plan*.

- For Metrolink, in late 2017, future service plans were developed consistent with the *2018 California State Rail Plan* (see Section 4.1 below).
- For Amtrak, the *2018 California State Rail Plan* (Caltrans 2018) was referenced to determine future train counts for Pacific Surfliner trains (see Section 4.2 below).

The estimated train movements and resulting benefits correlate with the service goals and improvements for the Los Angeles Urban Mobility Corridor, and coincides with the 2027 mid-term plan statewide goals. The *2018 California State Rail Plan* calls for the following service enhancements for Metrolink:

- By 2028
  - Provide run-through service at LAUS as part of Link US
  - Half-hourly all-day service on the San Bernardino Line between Los Angeles and San Bernardino, and
  - Half-hourly peak-rail service on the 91/Perris Valley Line.
- By 2040
  - Very frequent service between LAUS and Burbank
  - On the Ventura County Line, half-hourly express service between LAUS and Oxnard, and half-hourly local service between LAUS and Chatsworth
  - Half-hourly local service between LAUS and Santa Clarita

- Very frequent service between LAUS and Fullerton
- Half-hourly express rail services connecting Riverside, San Bernardino, and Ontario with Los Angeles

2018 Business Plan (CHSRA 2018)

Future HSR train movements into and out of LAUS (revenue and non-revenue train movements) was provided by CHSRA for inclusion in this memorandum, and are consistent with the goals of the *2018 California State Rail Plan*, the service levels in the 2018 Business Plan (CHSRA 2018), and the ridership and revenue forecasting methodology[4] and technical supporting documents[5].

2016 Regional Transportation Plan/Sustainable Communities Strategy (SCAG 2016)

The *2016 Regional Transportation Plan/Sustainable Communities Strategy* was prepared pursuant to Senate Bill 375, to reduce GHG emissions from vehicles through better-integrated regional transportation, land use, and housing planning strategies to provide more access to jobs, services, public transit and active transportation options. The project would indirectly contribute to cumulative benefits for the region, including a regional reduction of greenhouse gas emissions and vehicle miles traveled, as demonstrated by the operational analysis provided in the *2016 Regional Transportation Plan/Sustainable Communities Strategy* (Program EIR Table 3.3.4-4) (Southern California Association of Governments 2016).

4.1 Metrolink

In October 2018, Metrolink provided daily train counts for the 2031 and 2040 horizon years (full Metrolink SCORE Program operations consistent with the *2018 California State Rail Plan*), but not for the 2026 horizon year. In the absence of 2026 service plans that correlate to the SCORE Program, Metrolink's Transit and Intercity Rail Capital Program Funding Application was used to estimate the number of trains anticipated to pass through LAUS, including non-revenue train movements for the 2026 horizon year. A breakdown of the 2026, 2031, and 2040 forecasts of Metrolink trains by train line is provided in Appendix B and information is summarized in Table 5-1.

4.1.1 Equipment Turn Time

An equipment turn is the act of changing the train's operating end and allowing the train to move in the reverse direction. Operational experience to date indicates that Metrolink crews can turn revenue trains at terminals, including changing of operating ends, checking the train consist for passengers and initialization of positive train control, within 15 minutes. Although it is possible that technology improvements may allow for a future reduction in equipment turn times, the rail operators agreed that for the purposes of this analysis a 15-minute turnaround is assumed for all Metrolink trains requiring a change of operating ends at LAUS.

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[4] http://www.hsr.ca.gov/docs/about/business_plans/2018_Business_Plan_Ridership_Revenue_Forecasting.pdf
[5] http://www.hsr.ca.gov/docs/about/business_plans/2018_Business_Plan_Service_Plan_Methodology.pdf

4.1.2 Dwell Time

Dwell time is defined as the amount of time a particular train is scheduled to be stationary at a station platform to accommodate passenger entraining and detraining, baggage handling, train servicing, crew changes, etc. For purposes of this analysis, the following dwell times are assumed:

- Year: 2026: 7 minutes
- Years 2031 and 2040: 5 minutes

4.1.3 Service Hours by Train Line

Scheduling details of the proposed service hours for each train line serving LAUS were not included in the Metrolink Transit and Intercity Rail Capital Program application. In the absence of this information, existing service hours were used in the development of future operational scenarios at 30-minute frequencies throughout the day with service extended during evening hours to at least 10:00 PM.

4.2 Pacific Surfliner and Amtrak

The *2018 California State Rail Plan* (Caltrans 2018) was referenced to determine future train counts for Pacific Surfliner trains. FRA, Caltrans, and the Riverside County Transportation Commission are analyzing the feasibility of operating regional rail service between LAUS and the Coachella Valley. The study is ongoing but includes a concept of two daily round trips between LAUS and Indio or Coachella. This potential new service was added to the 2026, 2031, and 2040 Pacific Surfliner train counts. A breakdown of the 2026, 2031, and 2040 forecasts of Amtrak trains is provided in Appendix B, and information is summarized in Table 5-1.

Amtrak has no current plans to alter existing long-distance trains currently serving LAUS.

4.2.1 Equipment Turn Time and Dwell Time

Currently, the operating practice for a Pacific Surfliner through train involves a crew change at LAUS as well as a change in train operating ends. The amount of time in the schedule varies from 15 to 33 minutes. In addition, trains often arrive before their scheduled arrival time, extending the amount of time the train dwells at a platform by as much as 15 minutes. With the construction of run-through tracks, it is anticipated that the time required to change operating ends will no longer be necessary, but that adequate time will still be needed for detraining and entraining passengers and baggage as well as the crew change. Based upon feedback from LOSSAN and participating agencies, a dwell time of 10 minutes will be used.

For Amtrak long-distance trains, entraining or detraining passengers, along with baggage handling, takes much longer than it does for a typical Pacific Surfliner train. In addition, Amtrak may keep the train at the station for as long as 3 hours, based more upon operational convenience (yard crew availability) than necessity. Amtrak recognizes that a significant reduction in long-distance station dwell time will be needed to facilitate platform capacity enhancements and service expansion at LAUS. For the purposes of this analysis, a dwell time of 30 minutes will be used.

4.3 California High-Speed Rail Authority

4.3.1 Service Hours

HSR service would operate at LAUS from 6:00 AM though midnight, 7 days per week.

4.3.2 Equipment Turn Time and Dwell Time

Per CHSRA, dwell time for trains operating through LAUS is estimated to be 5 minutes. For trainsets that are turning at LAUS, it is estimated that 20 minutes will be required for detraining, sweeping the train, changing operating ends, entraining, and departure. This time would be reduced to 5-minute dwells each upon arrival and departure if a proposed HSR turn facility south of LAUS is constructed.

4.4 Train Consists

Train consist (cars and locomotives) data was gathered from Metrolink and Amtrak and are presented in Table 4-1. A hypothetical HSR consist is also included in Table 4-1 but may be subject to change based upon final design of the planned HSR system.

Table 4-1. Train Consist by Operator

Operator	Number of Cars	Number of Locomotives	Locomotive Types Used Per Service (manufacturer)
Metrolink			
Metrolink 4-Car Set (18 in daily service)	4	1	F59 PH (EMD) F59 PHI (EMD) F40PH (EMD) MP36 PH-C (Motive Power Industries) All horizon year consists will use EMD F-125 Spirit locomotives, which started to enter service in 2018.
Metrolink 5-Car Set (9 in daily service)	5	1	
Metrolink 6-Car Set (6 in daily service)	6	1	
Amtrak - Pacific Surfliner			
6-Car Set (bi-level)	6	1	F59 PH (EMD) P42DC (General Electric) All horizon year consists will use Siemens Charger locomotives, which started entering service in 2017.
7-Car Set (single-level)	7	1	
Amtrak - Long Distance Trains			
Southwest Chief	10	2	P42DC (General Electric) P32-8BWH (General Electric) All horizon year consists will use Siemens Charger locomotives.
Sunset Limited	9	2	
Coast Starlight	11	2	
CHSRA - High Speed Train (2033)			
AGV High-Speed Trainset (France)*	6	2	Power cars in integrated trainset

Sources: Metrolink, Amtrak: SCRRA 2012

Notes:
****This is a hypothetical trainset. The actual trainsets used for CHSRA service have not yet been procured.***

CHSRA=California High-Speed Rail Authority

4.4.1 Emerging Train Consist Technology

The 2040 Vision in the *2018 California State Rail Plan* calls for the use of "greener" technology for locomotives and train consists as the technology becomes commercially available, and includes a recommendation for electrifying/deploying zero-emission vehicle technologies on as much of the passenger rail network as possible, and specifically calls out electrified electric multiple unit (EMU) systems, diesel multiple units (DMUs), battery-hybrid multiple units, renewable diesel, and other alternative fuels (pgs. 10 and 110)

- Goal 6: Practice Environmental Stewardship, Policy 1: Integrate Environmental Considerations in All Stages of Planning indicates - The Rail Plan provides a program-level platform from which more detailed service and environmental analysis must be conducted by the State and rail operators as the 2040 Vision is implemented.
- Goal 6: Practice Environmental Stewardship, Policy 4: Transform to a Clean and Energy Efficient Transportation System indicates - The intent of the 2040 Vision is to accommodate additional demand for trips, and grow the rail network in a manner that incorporates substantial electrification of the state network, with improvements possible on additional corridors where there is support to do so… These include more stringent standards for remanufactured locomotives; and a Tier 5 standard for new locomotives that would require capability for zero-emission operation in designated areas, such as disadvantaged and high-traffic regions, to better protect the health of those residents.

Although these emerging technologies exist today, for the purposes of this analysis which is to document train counts/movements, this Rail Planning Technical Memorandum focuses on the use of existing equipment/technology and the most currently known and available information relating to future equipment/technology.

5.0 Future Daily Train Movements at Los Angeles Union Station

Based upon available data, as well as valuable input from the rail operators, Table 5-1 summarizes the estimated total daily train movements (revenue and non-revenue) through LAUS and the total trips during the two 3-hour AM and PM peak operating periods for 2016 and future horizon years 2026, 2031, and 2040. Revenue trains operating through LAUS, such as existing Pacific Surfliner and future Metrolink run-through trains, count as two movements - one inbound and one outbound.

Table 5-1. Existing (2016) and Future Daily Train Movements

Transit Operator	Frequency	2016	2026	2031	2040
Metrolink (Regional Rail)	**Total Daily**	**185**	**410**	**690**	**690**
	Revenue Trains	139	370	678	678
	Non-Revenue Trains[1]	46	40	12	12
	6-hour peak	80	144	250	250
Amtrak / LOSSAN	**Total Daily**[2]	**48**	**68**	**80**	**140**
	Pacific Surfliner	32	48	56	112
	Long-Distance Trains	5	5	5	5
	Non-Revenue Trains[3]	11	15	19	23
	6-hour peak	13	21	21	39
CHSRA	**Total Daily**	—	—	—	**272**
	Non-Revenue Trains[4]	—	—	—	50
	6-hour peak	—	—	—	132

Source: Appendix A (Existing Condition); Caltrans 2018 California State Rail Plan (Amtrak and Pacific Surfliner), Metrolink SCORE Application (Regional Rail) and CHSRA-provided data (HSR).

Notes:
[1] This includes all deadhead equipment movements between LAUS and the Central Maintenance Facility
[2] This includes through trains on the Los Angeles – San Diego – San Luis Obispo corridor as well as proposed Coachella Valley Service starting in 2026
[3] This includes deadhead equipment movements for Pacific Surfliner and Amtrak Long Distance-trains (Southwest Chief, Sunset Limited/Texas Eagle, Coast Starlight) between LAUS and Amtrak Los Angeles Maintenance Facility
[4] This includes deadhead equipment movements for HSR trains between LAUS and HSR Los Angeles Maintenance Facility

HSR = High-Speed Rail, LAUS=Los Angeles Union Station , LOSSAN= Los Angeles – San Diego – San Luis Obispo

While the project would provide the largest possible "operating envelope" to increase capacity within the existing station footprint, considering the environmental and constructability constraints, actual operational scenarios and service levels at LAUS are dependent on future service plans, negotiations between the service operators, and available operating funding.

A summary of the projected train movements for the 2026, 2031, and 2040 horizon years is provided below by rail operator:

Metrolink

For 2026, it is estimated that Metrolink would operate 410 train movements per day (inclusive of 40 non-revenue train movements) between LAUS and the Central Maintenance Facility. During the two 3-hour AM and PM peak operating periods, 144 total train movements (72 each in the AM and PM) are anticipated to operate within LAUS. As stated earlier, the ability of LAUS to accommodate the higher Metrolink service levels during phases of construction has not been tested or validated. For 2031, Metrolink estimates that 690 train movements would occur per day. It is assumed that Metrolink's 2031 SCORE service plan would represent a full build-out of Metrolink services for the foreseeable future, so the train counts remain the same for 2040.

Amtrak and LOSSAN

For 2026, it is estimated that Amtrak / LOSSAN would operate 68 train movements per day within LAUS. During the two 3-hour AM and PM peak operating periods, 21 total train movements are anticipated to operate within LAUS. For 2031 and 2040, daily train movements would increase to 80 and 140 movements, respectively. Non-revenue movements for 2026, 2031, and 2040 are rough estimates, as future equipment cycles to support LOSSAN growth plans have not yet been developed.

High-Speed Rail

CHSRA is anticipated to commence operation of the planned HSR system as early as 2033, and plan to operate 272 train movements per day at LAUS by 2040. Of these, 148 would originate from or terminate at LAUS, and 74 would operate through LAUS to-and-from Anaheim. There would also be 50 daily deadhead equipment movements. During the two 3-hour peak AM and PM operating periods, CHSRA would operate 132 train movements. Of these, 88 would originate from or terminate at LAUS, and 44 would operate through LAUS to-and-from Anaheim.

6.0 Conclusion

Metro estimates the project-related capacity enhancements would reduce dwell time at LAUS and contribute to other cumulative benefits for the region, including a regional reduction of greenhouse gas emissions and vehicle miles traveled. Future service scenarios will depend on ongoing negotiations between the railroad operators, available infrastructure (corridor, maintenance facility, etc.), and available operating funding. The project, by itself, does not enable regional/intercity rail providers to meet their service goals, primarily because other infrastructure improvements on the entire system are required to meet the forecasted service levels by 2040.

Based on the results of this memorandum, the Link US environmental documentation will be prepared to include an analysis of potential environmental impacts associated with implementation of the two Build Alternatives, in consideration of the existing and future train movements through LAUS that could occur as a result of the project-related capacity enhancements.

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7.0 References

California Department of Transportation (Caltrans). 2018. *2018 California State Rail Plan.* http://www.dot.ca.gov/californiarail/docs/CSRP_Final.pdf

Southern California Association of Governments. 2016. *2016 Regional Transportation Plan/Sustainable Communities Strategy*. http://scagrtpscs.net/Documents/2016/final/f2016RTPSCS.pdf.

Southern California Regional Rail Authority. 2012. *Metrolink Fleet Plan 2012-2017*. http://metrolink.granicus.com/DocumentViewer.php?file=metrolink_0e45aa65088f01bf84c11a7cb31dab4b.pdf&view=1

——— 2018a. Metrolink Transit and Intercity Rail Capital Program 2018 Funding Application.

——— 2018b. Email exchange with HDR. October 2018.

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Appendix A:
Existing Metrolink and Amtrak Train Schedules

ALL LINES

METROLINK®

TIMETABLE

EFFECTIVE JUNE 6 2016

VC AV SB RIV 91/PVL OC IEOC

metrolinktrains.com

METROLINK COMMUTER RAIL SYSTEM


PACIFIC OCEAN
LAX Airport
Redondo Beach
Long Beach
Commerce
Norwalk
Norwalk/Santa Fe Springs
Buena Park
Fullerton
Anaheim
Placentia
Future Station
Corona - West
Corona - North Main
Riverside-Downtown
Riverside-La Sierra
Riverside-Hunter Park/UCR
Moreno Valley/March Field
Perris - Downtown
Perris - South
Anaheim Canyon
Orange
Santa Ana
Tustin
Irvine
Laguna Niguel/Mission Viejo
RIVERSIDE CO.
ORANGE CO.
John Wayne Airport (SNA)
San Juan Capistrano
San Clemente
San Clemente Pier
Limited Service
Oceanside
Solana Beach
San Diego
Escondido
SAN DIEGO CO.
METROLINK
Antelope Valley Line
Inland Empire-Orange County Line
Orange County Line
Riverside Line
San Bernardino Line
Ventura County Line
91/Perris Valley Line
Future Station
Station Served by Multiple Lines
Amtrak Pacific Surfliner
Metro Rail/Metro Bus
LAX FlyAway Bus
Coaster
Oceanside to San Diego
Sprinter
Oceanside to Escondido
metrolinktrains.com
Effective June 6, 2016
N
MAP NOT TO SCALE
7

MONDAY THROUGH FRIDAY

Metrolink Service No.	100	900	102	104	106	902	108	MA A768	110	112	116	904	906	150	118	910
Ventura - East			5:25	6:03	6:42											
Oxnard ★			5:39	6:17	6:56			7:43								
Camarillo ★			5:49	6:27	7:06			7:54								
Moorpark ★	5:04		6:00	6:38	7:17			8:08	8:25		**2:18**				**4:57**	
Simi Valley ★	5:17		6:13	6:51	7:30			8:23	8:38		**2:31**				**5:10**	
Chatsworth ★	5:28		6:24	7:02	7:41		8:25	8:40	8:49	10:50	**2:42**			**4:40**	**5:27**	
Northridge	5:33		6:29	7:07	7:46		8:30	8:46	8:54	10:55	**2:47**			**4:45**	**5:32**	
Van Nuys ★	5:41		6:37	7:15	7:54		8:38	8:56	9:02	11:03	**2:55**			**4:53**	**5:45**	
Burbank/Bob Hope Airport ★	5:49	6:13	6:45	7:23	8:02	8:35	8:46	9:04	9:10	11:11	**3:03**	**3:37**	**4:15**	**5:05**	**5:53**	**8:30**
Burbank - Downtown	5:55	6:17	6:52	7:30	8:08	8:39	8:52	9:09	9:16	11:17	**3:09**	**3:41**	**4:19**	**5:10**	**5:59**	**8:35**
Glendale ★	6:02	6:23	6:59	7:37	8:15	8:45	8:59	9:16	9:23	11:26	**3:16**	**3:47**	**4:25**	**5:16**	**6:06**	**8:40**
L.A. Union Station ★	6:15	6:38	7:14	7:50	8:30	9:02	9:17	9:35	9:42	11:40	**3:33**	**4:00**	**4:40**	**5:30**	**6:20**	**8:55**

AM times **PM times**

NOTES: See page 3

MONDAY THROUGH FRIDAY

Metrolink Service No.	901	101	103	MA A761	903	905	907	107	109	909	155	115	117	119	121	123	911
L.A. Union Station ★	5:38	6:52	7:15	7:35	8:00	8:30	8:55	9:50	**12:43**	**2:50**	**3:15**	**3:35**	**4:33**	**5:10**	**5:55**	**6:40**	**7:45**
Glendale ★	5:48	7:01	7:25	7:48	8:10	8:40	9:05	10:00	**12:53**	**3:00**	**3:25**	**3:45**	**4:43**	**5:20**	**6:05**	**6:50**	**7:55**
Burbank - Downtown	5:54	7:07	7:31	↓	8:16	8:46	9:11	10:06	**12:59**	**3:06**	**3:31**	**3:51**	**4:49**	**5:26**	**6:11**	**6:56**	**8:01**
Burbank/Bob Hope Airport ★	6:01	7:12	7:36	8:00	8:25	8:55	9:20	10:11	**1:04**	**3:15**	**3:36**	**3:56**	**4:54**	**5:31**	**6:16**	**7:01**	**8:10**
Van Nuys ★		7:23	7:43	8:10				10:19	**1:11**		**3:43**	**4:03**	**5:01**	**5:38**	**6:23**	**7:08**	
Northridge		7:31	8:00	8:19				10:28	**1:19**		**3:51**	**4:11**	**5:09**	**5:46**	**6:31**	**7:16**	
Chatsworth ★		7:38	8:10	8:32				10:35	**1:26**		**4:05**	**4:18**	**5:16**	**5:53**	**6:38**	**7:23**	
Simi Valley ★		7:52		8:45					**1:38**			**4:30**	**5:28**	**6:05**	**6:50**	**7:35**	
Moorpark ★		8:10		8:57					**1:58**			**4:47**	**5:40**	**6:17**	**7:08**	**7:47**	
Camarillo ★				9:10									**5:51**	**6:28**		**7:58**	
Oxnard ★				9:21									**6:01**	**6:38**		**8:14**	
Ventura - East													**6:20**	**6:57**		**8:37**	

AM times **PM times**

NOTES: See page 3

VENTURA COUNTY LINE • AMTRAK SERVICE

All Metrolink ticket holders (including One-Way, Round-Trip, 7-Day or Monthly Pass) may, within the origin and destination of their ticket or pass, ride ANY Amtrak Pacific Surfliner train between Los Angeles and Burbank/Bob Hope Airport at no additional cost as part of the Rail 2 Rail® program. Holiday blackout dates may apply, and schedules subject to change. For details, please visit metrolinktrains.com/rail2rail

* A768 stops at Northridge and Burbank - Downtown Monday-Friday only.

AM times **PM times**

Oxnard to L.A.

DAILY

Amtrak Service No.	A768*	A774	A784	A790	A1790	A796
Ventura - East						
Oxnard ★	7:43	10:18	**2:57**	**5:07**	**5:35**	**7:51**
Camarillo ★	7:54	10:35	**3:08**	↓	↓	**8:02**
Moorpark ★	8:08	↓	**3:20**	**5:36**	**6:04**	↓
Simi Valley ★	8:23	11:02	**3:35**	**5:54**	**6:20**	**8:38**
Chatsworth ★	8:40	11:14	**3:52**	**6:12**	**6:33**	**8:50**
Northridge	8:46	↓	↓	↓	↓	↓
Van Nuys ★	8:56	11:28	**4:14**	**6:31**	**6:45**	**9:06**
Burbank/Bob Hope Airport ★	9:04	11:35	**4:22**	**6:39**	**6:53**	**9:13**
Burbank - Downtown	9:09	↓	↓	↓	↓	↓
Glendale ★	9:16	11:45	**4:32**	**6:50**	**7:04**	**9:23**
L.A. Union Station ★	9:35	**12:15**	**4:50**	**7:10**	**7:20**	**9:45**
				M-F	Sa-Su	

AMTRAK TRAINS FOR MONTHLY PASS HOLDERS ONLY

L.A. to Oxnard

DAILY

Amtrak Service No.	A761	A1761	A763	A769	A777	A785
L.A. Union Station ★	7:35	7:50	9:20	**12:30**	**3:05**	**7:15**
Glendale ★	7:48	8:02	9:32	**12:42**	**3:17**	**7:27**
Burbank - Downtown	↓	↓	↓	↓	↓	↓
Burbank/Bob Hope Airport ★	8:00	8:12	9:42	**12:52**	**3:27**	**7:37**
Van Nuys ★	8:10	8:21	9:52	**1:02**	**3:37**	**7:47**
Northridge	8:19	↓	↓	↓	↓	↓
Chatsworth ★	8:32	8:33	10:04	**1:14**	**3:49**	**7:59**
Simi Valley ★	8:45	8:45	10:16	**1:26**	**4:01**	**8:11**
Moorpark ★	8:57	8:57	↓	**1:39**	↓	↓
Camarillo ★	9:10	9:10	10:40	**1:54**	**4:27**	**8:35**
Oxnard ★	9:21	9:21	10:53	**2:05**	**4:38**	**8:46**
Ventura - East						
	M-F	Sa-Su				

AMTRAK TRAINS FOR MONTHLY PASS HOLDERS ONLY

NOTES: See page 3

MONDAY THROUGH FRIDAY

Metrolink Service No.	200	202	204	282	206	208	🚌	210	212	🚌	214	216	218	220	🚌	222	🚌	224	226
Lancaster	3:58	4:55	5:20		6:10	6:52			9:00			11:35		**1:40**					**6:05**
Palmdale	4:07	5:04	5:29	6:07	6:19	7:01	7:50		9:09	10:30		11:44		**1:49**	**2:00**		**4:00**		**6:15**
Vincent Grade/Acton	4:18	5:15	5:40	↓	6:30	7:12	↓		9:20	↓		11:55		**2:00**	↓		↓		↓
Via Princessa	4:50	5:49	6:14	↓	7:04	7:46	↓	9:03	9:54	↓	11:25	**12:29**	**1:45**	**2:34**	↓	**3:15**	↓		**7:12**
Santa Clarita	4:56	5:55	6:20	6:53	7:10	7:52	↓	9:09	10:00	↓	11:31	**12:35**	**1:51**	**2:40**	↓	**3:21**	↓	**5:05**	**7:18**
Newhall	5:03	6:02	6:27	↓	7:17	7:59	8:40 ➤	9:16	10:08	11:20 ➤	11:38	**12:42**	**1:57**	**2:47**	**2:50** ➤	**3:28**	**4:50** ➤	**5:13**	**7:25**
Sylmar/San Fernando	5:16	6:16	6:41	7:12	7:32	8:13		9:30	10:23		11:57	**12:57**	**2:11**	**3:02**		**3:42**		**5:27**	**7:39**
Sun Valley	5:23	6:23	6:57	↓	7:40	8:20		9:37	10:31		**12:04**	**1:10**	**2:21**	**3:14**		**3:49**		**5:34**	**7:46**
Burbank - Downtown	5:30	6:31	7:03	7:25	7:48	8:27		9:45	10:38		**12:11**	**1:17**	**2:28**	**3:22**		**3:56**		**5:41**	**7:54**
Glendale ★	5:37	6:38	7:09	↓	7:55	8:33		9:54	10:44		**12:17**	**1:24**	**2:34**	**3:29**		**4:02**		**5:48**	**8:00**
L.A. Union Station ★	5:53	6:55	7:26	7:42	8:15	8:55		10:11	11:05		**12:40**	**1:45**	**2:50**	**3:50**		**4:20**		**6:10**	**8:25**

🚌 North County TRANSporter bus service.

AM times **PM times**

NOTES: See page 3

MONDAY THROUGH FRIDAY

Metrolink Service No.	201	203	🚌	205	207	🚌	209	211	213	🚌	215	217	🚌	219	285	221	223	225	227
L.A. Union Station ★	6:30	7:30		8:25	9:40		11:15	**12:00**	**1:55**		**3:40**	**4:00**		**4:45**	**5:35**	**5:50**	**6:30**	**7:40**	**9:25**
Glendale ★	6:41	7:40		8:36	9:50		11:25	**12:11**	**2:05**		**3:50**	**4:10**		**4:55**	↓	**6:00**	**6:40**	**7:50**	**9:35**
Burbank - Downtown	6:47	7:46		8:42	9:56		11:31	**12:17**	**2:11**		**3:56**	**4:16**		**5:01**	**5:49**	**6:06**	**6:46**	**7:56**	**9:41**
Sun Valley	6:52	7:52		8:48	10:02		11:37	**12:23**	**2:17**		**4:02**	**4:22**		**5:07**	↓	**6:12**	**6:52**	**8:02**	**9:47**
Sylmar/San Fernando	6:59	8:00		8:56	10:10		11:45	**12:32**	**2:25**		**4:11**	**4:30**		**5:15**	**6:02**	**6:20**	**7:00**	**8:10**	**9:55**
Newhall	7:18	8:17 ➤	8:50	9:10	10:23 ➤	10:35	11:59	**12:45**	**2:38** ➤	**2:50**	**4:24**	**4:43** ➤	**5:00**	**5:34**	↓	**6:33**	**7:13**	**8:23**	**10:08**
Santa Clarita	7:25	8:24	↓	9:18	10:31	↓	**12:07**	**12:52**	**2:45**	↓	**4:31**	**4:55**	↓	**5:41**	**6:22**	**6:41**	**7:20**	**8:31**	**10:15**
Via Princessa	7:31	8:43	↓	9:24	10:50	↓	**12:14**	**1:06**	**3:00**	↓	**4:37**		↓	**5:48**	↓	**6:47**	**7:26**	**8:37**	**10:21**
Vincent Grade/Acton	8:10		↓	10:05		↓	**12:52**			↓	**5:14**		↓	**6:25**	↓	**7:21**	**8:03**	**9:12**	**10:58**
Palmdale	8:20		9:40	10:15		11:25	**1:02**			**3:40**	**5:25**		**5:50**	**6:35**	**7:08**	**7:32**	**8:13**	**9:21**	**11:08**
Lancaster	8:40			10:45			**1:20**				**5:50**			**6:55**		**8:00**	**8:32**	**9:40**	**11:25**

🚌 North County TRANSporter bus service.
Northbound TRANSporter bus stops at the Vincent Grade/Acton Metrolink station by request only.

AM times **PM times**

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ANTELOPE VALLEY LINE

Lancaster to L.A.

SATURDAY AND SUNDAY

Metrolink Service No.	260	262	264	266	268	270
Lancaster	6:25	8:55	11:10	**12:40**	**2:25**	**6:15**
Palmdale	6:34	9:05	11:19	**12:49**	**2:34**	**6:24**
Vincent Grade/Acton	6:45	9:16	11:30	**12:59**	**2:45**	**6:35**
Via Princessa	7:19	9:53	**12:04**	**1:32**	**3:19**	**7:12**
Santa Clarita	7:25	10:00	**12:10**	**1:38**	**3:25**	**7:18**
Newhall	7:32	10:07	**12:17**	**1:45**	**3:32**	**7:25**
Sylmar/San Fernando	7:46	10:21	**12:34**	**1:59**	**3:46**	**7:39**
Sun Valley	7:53	10:28	**12:41**	**2:06**	**3:53**	**7:46**
Burbank - Downtown	8:00	10:35	**12:48**	**2:13**	**3:59**	**7:53**
Glendale ★	8:07	10:42	**12:55**	**2:20**	**4:05**	**8:00**
L.A. Union Station ★	8:25	11:00	**1:15**	**2:40**	**4:30**	**8:20**

L.A. to Lancaster

SATURDAY AND SUNDAY

Metrolink Service No.	261	263	265	267	269	271
L.A. Union Station ★	8:45	11:40	**2:15**	**3:50**	**5:25**	**8:55**
Glendale ★	8:55	11:50	**2:25**	**4:00**	**5:35**	**9:05**
Burbank - Downtown	9:02	11:57	**2:32**	**4:07**	**5:42**	**9:12**
Sun Valley	9:08	**12:03**	**2:38**	**4:13**	**5:48**	**9:18**
Sylmar/San Fernando	9:16	**12:11**	**2:46**	**4:21**	**5:56**	**9:26**
Newhall	9:30	**12:25**	**3:00**	**4:35**	**6:10**	**9:40**
Santa Clarita	9:38	**12:33**	**3:08**	**4:43**	**6:18**	**9:48**
Via Princessa	9:44	**12:39**	**3:13**	**4:49**	**6:24**	**9:54**
Vincent Grade/Acton	10:25	**1:23**	**3:52**	**5:27**	**7:02**	**10:32**
Palmdale	10:36	**1:33**	**4:01**	**5:38**	**7:14**	**10:43**
Lancaster	10:55	**1:50**	**4:20**	**5:55**	**7:25**	**11:00**

AM times **PM times**

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MONDAY THROUGH FRIDAY

Metrolink Service No.	301	303	305	307	309	311	313	315	317	319	321	323	325	327	329	331	333	335	337
San Bernardino	3:48	4:21	4:40	5:12	5:38	6:00	6:28	6:53	7:59	8:49	9:59	11:33	**12:28**	**1:35**	**3:12**	**4:00**	**5:16**	**6:14**	**7:49**
Rialto	3:59	4:32	4:50	5:23	5:49	6:11	6:38	7:04	8:10	9:01	10:09	11:44	**12:38**	**1:45**	**3:22**	**4:10**	**5:27**	**6:25**	**8:00**
Fontana	4:06	4:38	4:57	5:30	5:56	6:17	6:45	7:11	8:17	9:06	10:16	11:53	**12:47**	**1:52**	**3:31**	**4:17**	**5:34**	**6:34**	**8:06**
Rancho Cucamonga	4:14	4:47	5:06	5:38	6:04	6:26	6:54	7:19	8:25	9:17	10:25	**12:02**	**12:56**	**2:01**	**3:40**	**4:26**	**5:43**	**6:54**	**8:15**
Upland	4:22	4:54	5:13	5:46	6:12	6:34	7:01	7:27	8:33	9:24	10:33	**12:09**	**1:03**	**2:09**	**3:47**	**4:33**	**5:51**	**7:02**	**8:23**
Montclair	4:28	5:00	5:19	5:52	6:18	6:39	7:07	7:33	8:39	9:30	10:39	**12:15**	**1:09**	**2:15**	**3:53**	**4:39**	**5:57**	**7:08**	**8:28**
Claremont	4:31	5:04	5:23	5:55	6:21	6:43	7:11	7:36	8:42	9:33	10:43	**12:18**	**1:13**	**2:19**	**3:56**	**4:42**	**6:01**	**7:11**	**8:32**
Pomona - North	4:36	5:09	5:28	6:00	6:26	6:48	7:15	7:41	8:47	9:38	10:47	**12:23**	**1:17**	**2:23**	**4:01**	**4:49**	**6:11**	**7:17**	**8:37**
Covina	4:47	5:20	5:39	6:11	6:37	6:59	7:27	7:52	8:58	9:49	10:58	**12:34**	**1:29**	**2:35**	**4:12**	**5:00**	**6:23**	**7:28**	**8:48**
Baldwin Park	4:54	5:27	5:46	6:18	6:44	7:06	7:34	7:59	9:05	9:56	11:05	**12:41**	**1:35**	**2:41**	**4:19**	**5:12**	**6:30**	**7:35**	**8:55**
El Monte	5:04	5:37	5:56	6:28	6:54	7:16	7:43	8:09	9:15	10:06	11:15	**12:51**	**1:45**	**2:51**	**4:32**	**5:22**	**6:48**	**7:52**	**9:05**
Cal State L.A.	5:15	5:48	6:08	6:39	7:05	7:27	7:56	8:20	9:28	10:17	11:28	**1:04**	**1:57**	**3:03**	**4:45**	**5:35**	**6:59**	**8:03**	**9:17**
L.A. Union Station ★	5:26	5:59	6:19	6:50	7:16	7:38	8:07	8:31	9:39	10:28	11:39	**1:15**	**2:07**	**3:13**	**4:55**	**5:47**	**7:10**	**8:14**	**9:27**

AM times **PM times**

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MONDAY THROUGH FRIDAY

Metrolink Service No.	300	302	304	306	308	310	312	314	316	318	320	322	324	326	328	330	332	334	336
L.A. Union Station ★	5:46	7:34	9:05	10:17	11:05	**12:41**	**1:55**	**3:01**	**3:33**	**3:55**	**4:22**	**4:58**	**5:12**	**5:35**	**6:05**	**6:24**	**7:28**	**8:39**	**9:46**
Cal State L.A.	5:59	7:48	9:18	10:30	11:19	**12:55**	**2:08**	**3:15**	**3:47**	**4:09**	**4:35**	**5:11**	**5:25**	**5:52**	**6:19**	**6:37**	**7:41**	**8:52**	**10:00**
El Monte	6:16	8:07	9:35	10:41	11:36	**1:11**	**2:20**	**3:26**	**3:58**	**4:20**	**4:52**	**5:22**	**5:42**	**6:03**	**6:30**	**6:48**	**7:52**	**9:04**	**10:11**
Baldwin Park	6:29	8:19	9:45	10:51	11:46	**1:22**	**2:30**	**3:36**	**4:08**	**4:30**	**5:02**	**5:32**	**5:52**	**6:13**	**6:40**	**6:58**	**8:02**	**9:14**	**10:21**
Covina	6:36	8:26	9:53	10:59	11:53	**1:29**	**2:37**	**3:43**	**4:15**	**4:37**	**5:10**	**5:40**	**6:00**	**6:22**	**6:48**	**7:06**	**8:10**	**9:21**	**10:28**
Pomona - North	6:50	8:40	10:06	11:12	**12:06**	**1:42**	**2:50**	**3:56**	**4:29**	**4:50**	**5:23**	**5:53**	**6:13**	**6:35**	**7:01**	**7:19**	**8:23**	**9:34**	**10:42**
Claremont	6:55	8:45	10:11	11:17	**12:11**	**1:47**	**2:55**	**4:01**	**4:34**	**4:56**	**5:28**	**5:58**	**6:18**	**6:40**	**7:06**	**7:24**	**8:28**	**9:39**	**10:47**
Montclair	7:06	8:49	10:15	11:21	**12:15**	**1:51**	**2:59**	**4:05**	**4:38**	**5:00**	**5:32**	**6:02**	**6:22**	**6:44**	**7:10**	**7:28**	**8:32**	**9:43**	**10:51**
Upland	7:12	8:54	10:21	11:27	**12:21**	**1:57**	**3:05**	**4:11**	**4:43**	**5:05**	**5:38**	**6:08**	**6:28**	**6:50**	**7:16**	**7:34**	**8:38**	**9:49**	**10:56**
Rancho Cucamonga	7:19	9:02	10:28	11:34	**12:28**	**2:04**	**3:12**	**4:25**	**4:51**	**5:12**	**5:45**	**6:15**	**6:35**	**6:57**	**7:23**	**7:41**	**8:45**	**9:56**	**11:04**
Fontana	7:31	9:17	10:39	11:45	**12:39**	**2:15**	**3:23**	**4:36**	**5:01**	**5:23**	**5:55**	**6:26**	**6:46**	**7:07**	**7:33**	**7:52**	**8:56**	**10:07**	**11:14**
Rialto	7:39	9:23	10:45	11:51	**12:45**	**2:21**	**3:29**	**4:42**	**5:07**	**5:34**	**6:02**	**6:32**	**6:52**	**7:14**	**7:40**	**8:05**	**9:02**	**10:13**	**11:21**
San Bernardino	7:48	9:32	10:54	**12:00**	**12:54**	**2:30**	**3:38**	**4:51**	**5:16**	**5:43**	**6:11**	**6:41**	**7:01**	**7:23**	**7:49**	**8:14**	**9:11**	**10:22**	**11:29**

AM times **PM times**

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SAN BERNARDINO LINE • 300 SERIES

San Bernardino to L.A.

SATURDAY

Metrolink Service No.	351	353	357	359	363	367	369	373	377	379
San Bernardino	7:00	8:25	9:50	11:30	**1:05**	**2:07**	**3:35**	**4:55**	**6:30**	**9:15**
Rialto	7:07	8:32	9:57	11:37	**1:12**	**2:14**	**3:42**	**5:02**	**6:37**	**9:22**
Fontana	7:12	8:37	10:02	11:42	**1:17**	**2:19**	**3:47**	**5:07**	**6:42**	**9:27**
Rancho Cucamonga	7:21	8:46	10:11	11:50	**1:26**	**2:28**	**3:56**	**5:16**	**6:51**	**9:36**
Upland	7:28	8:53	10:20	11:59	**1:35**	**2:36**	**4:04**	**5:25**	**7:00**	**9:45**
Montclair	7:34	8:59	10:26	**12:05**	**1:41**	**2:42**	**4:10**	**5:31**	**7:06**	**9:51**
Claremont	7:37	9:02	10:29	**12:08**	**1:44**	**2:45**	**4:13**	**5:34**	**7:09**	**9:56**
Pomona - North	7:41	9:06	10:34	**12:13**	**1:49**	**2:49**	**4:18**	**5:39**	**7:14**	**10:00**
Covina	7:51	9:16	10:44	**12:23**	**1:59**	**2:59**	**4:28**	**5:49**	**7:24**	**10:10**
Baldwin Park	7:57	9:21	10:50	**12:29**	**2:05**	**3:05**	**4:39**	**5:55**	**7:30**	**10:16**
El Monte	8:07	9:35	11:01	**12:43**	**2:19**	**3:14**	**4:49**	**6:09**	**7:44**	**10:30**
Cal State L.A.	8:19	9:48	11:14	**12:55**	**2:32**	**3:27**	**5:01**	**6:22**	**7:56**	**10:42**
L.A. Union Station ★	8:35	10:05	11:30	**1:15**	**2:50**	**3:40**	**5:15**	**6:40**	**8:15**	**10:55**

SUNDAY

Metrolink Service No.	351	357	359	361	367	369	377
San Bernardino	7:00	9:50	11:30	**12:30**	**2:07**	**3:35**	**6:30**
Rialto	7:07	9:57	11:37	**12:36**	**2:14**	**3:42**	**6:37**
Fontana	7:12	10:02	11:42	**12:41**	**2:19**	**3:47**	**6:42**
Rancho Cucamonga	7:21	10:11	11:50	**12:49**	**2:28**	**3:56**	**6:51**
Upland	7:28	10:20	11:59	**12:56**	**2:36**	**4:04**	**7:00**
Montclair	7:34	10:26	**12:05**	**1:01**	**2:42**	**4:10**	**7:06**
Claremont	7:37	10:29	**12:08**	**1:04**	**2:45**	**4:13**	**7:09**
Pomona - North	7:41	10:34	**12:13**	**1:08**	**2:49**	**4:18**	**7:14**
Covina	7:51	10:44	**12:23**	**1:17**	**2:59**	**4:28**	**7:24**
Baldwin Park	7:57	10:50	**12:29**	**1:23**	**3:05**	**4:39**	**7:30**
El Monte	8:07	11:01	**12:43**	**1:32**	**3:14**	**4:49**	**7:44**
Cal State L.A.	8:19	11:14	**12:55**	**1:43**	**3:27**	**5:01**	**7:56**
L.A. Union Station ★	8:35	11:30	**1:15**	**2:00**	**3:40**	**5:15**	**8:15**

AM times **PM times**

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SATURDAY

Metrolink Service No.	352	354	358	362	364	366	368	372	376	378
L.A. Union Station ★	6:15	9:00	10:35	**12:10**	**1:45**	**4:00**	**5:35**	**7:10**	**9:00**	**11:30**
Cal State L.A.	6:25	9:10	10:46	**12:21**	**1:56**	**4:11**	**5:46**	**7:21**	**9:10**	**11:40**
El Monte	6:35	9:20	10:57	**12:32**	**2:07**	**4:21**	**5:57**	**7:32**	**9:21**	**11:50**
Baldwin Park	6:43	9:30	11:07	**12:42**	**2:17**	**4:29**	**6:07**	**7:42**	**9:31**	**11:58**
Covina	6:51	9:38	11:15	**12:50**	**2:25**	**4:38**	**6:15**	**7:50**	**9:39**	12:05
Pomona - North	7:02	9:50	11:27	**1:02**	**2:36**	**4:49**	**6:27**	**8:02**	**9:50**	12:16
Claremont	7:06	9:54	11:31	**1:06**	**2:40**	**4:54**	**6:31**	**8:06**	**9:54**	12:20
Montclair	7:10	9:58	11:35	**1:10**	**2:44**	**4:58**	**6:35**	**8:10**	**9:58**	12:24
Upland	7:15	10:03	11:40	**1:15**	**2:50**	**5:04**	**6:40**	**8:16**	**10:04**	12:29
Rancho Cucamonga	7:24	10:14	11:51	**1:26**	**2:58**	**5:15**	**6:51**	**8:23**	**10:11**	12:36
Fontana	7:33	10:23	**12:00**	**1:35**	**3:07**	**5:24**	**7:00**	**8:32**	**10:20**	12:45
Rialto	7:39	10:29	**12:06**	**1:41**	**3:13**	**5:30**	**7:06**	**8:38**	**10:26**	12:51
San Bernardino	7:54	10:45	**12:22**	**2:00**	**3:30**	**5:45**	**7:22**	**8:54**	**10:40**	1:05

SUNDAY

Metrolink Service No.	354	356	362	364	366	368	376
L.A. Union Station ★	9:00	10:10	**12:10**	**1:45**	**4:00**	**5:35**	**9:00**
Cal State L.A.	9:10	10:21	**12:21**	**1:56**	**4:11**	**5:46**	**9:10**
El Monte	9:20	10:31	**12:32**	**2:07**	**4:21**	**5:57**	**9:21**
Baldwin Park	9:30	10:40	**12:42**	**2:17**	**4:29**	**6:07**	**9:31**
Covina	9:38	10:48	**12:50**	**2:25**	**4:38**	**6:15**	**9:39**
Pomona - North	9:50	10:59	**1:02**	**2:36**	**4:49**	**6:27**	**9:50**
Claremont	9:54	11:03	**1:06**	**2:40**	**4:54**	**6:31**	**9:54**
Montclair	9:58	11:07	**1:10**	**2:44**	**4:58**	**6:35**	**9:58**
Upland	10:03	11:12	**1:15**	**2:50**	**5:04**	**6:40**	**10:04**
Rancho Cucamonga	10:14	11:19	**1:26**	**2:58**	**5:15**	**6:51**	**10:11**
Fontana	10:23	11:28	**1:35**	**3:07**	**5:24**	**7:00**	**10:20**
Rialto	10:29	11:40	**1:41**	**3:13**	**5:30**	**7:06**	**10:26**
San Bernardino	10:45	11:52	**2:00**	**3:30**	**5:45**	**7:22**	**10:40**

AM times **PM times**

NOTES: See page 3

RIVERSIDE LINE

Riverside to L.A.

MONDAY THROUGH FRIDAY

Metrolink Service No.	401	403	405	407	409	411
Riverside - Downtown	4:47	5:42	6:15	6:50	8:10	**3:07**
Pedley	4:58	5:53	6:26	7:01	8:21	**3:18**
Ontario - East	5:08	6:03	6:36	7:11	8:31	**3:28**
Pomona - Downtown	5:20	6:15	6:48	7:23	8:43	**3:40**
Industry	5:29	6:24	6:57	7:32	8:52	**3:49**
Montebello/Commerce	5:47	6:42	7:15	7:50	9:10	**4:07**
L.A. Union Station ★	6:10	7:07	7:35	8:15	9:35	**4:35**

L.A. to Riverside

MONDAY THROUGH FRIDAY

Metrolink Service No.	402	404	406	408	410	412
L.A. Union Station ★	**1:20**	**4:15**	**5:00**	**5:30**	**6:00**	**6:30**
Montebello/Commerce	**1:37**	**4:32**	**5:17**	**5:47**	**6:17**	**6:47**
Industry	**1:55**	**4:50**	**5:35**	**6:05**	**6:35**	**7:05**
Pomona - Downtown	**2:04**	**4:59**	**5:44**	**6:14**	**6:44**	**7:14**
Ontario - East	**2:16**	**5:12**	**5:56**	**6:26**	**6:56**	**7:26**
Pedley	**2:28**	**5:24**	**6:08**	**6:38**	**7:08**	**7:38**
Riverside - Downtown	**2:48**	**5:42**	**6:27**	**6:58**	**7:25**	**7:57**

Check 91 Line schedule for additional trains to Riverside - Downtown via Fullerton.

AM times **PM times**

NOTES: See page 3

91/PERRIS VALLEY LINE

Perris to L.A.

MONDAY THROUGH FRIDAY

Metrolink Service No.	701	703	705	731	733	735	707
Perris - South	4:37	5:06	5:42	7:45	11:30	**2:45**	
Perris - Downtown	4:45	5:13	5:50	7:51	11:36	**2:51**	
Moreno Valley/March Field	4:58	5:25	6:03	8:08	11:53	**3:08**	
Riverside - Hunter Park/UCR	5:09	5:36	6:14	8:23	**12:08**	**3:23**	
Riverside - Downtown	5:27	5:56	6:32	8:35	**12:20**	**3:35**	**6:07**
Riverside - La Sierra	5:37	6:04	6:42				**6:17**
Corona - North Main	5:45	6:12	6:50				**6:25**
Corona - West	5:51	6:18	6:56				**6:31**
Fullerton ★	6:16	6:43	7:21				**6:54**
Buena Park	6:23	6:50	7:29				**7:00**
Norwalk/Santa Fe Springs	6:31	6:58	7:36				**7:06**
L.A. Union Station ★	7:05	7:32	8:10				**7:45**

L.A. to Perris

MONDAY THROUGH FRIDAY

Metrolink Service No.	700	732	734	736	702	704	706	708
L.A. Union Station ★	5:45				**3:35**	**4:20**	**5:30**	**6:50**
Norwalk/Santa Fe Springs	6:06				**3:56**	**4:41**	**5:51**	**7:11**
Buena Park	6:12				**4:03**	**4:47**	**5:57**	**7:17**
Fullerton ★	6:19				**4:09**	**4:54**	**6:04**	**7:24**
Corona - West	6:43				**4:35**	**5:18**	**6:28**	**7:48**
Corona - North Main	6:50				**4:41**	**5:25**	**6:35**	**7:55**
Riverside - La Sierra	6:59				**4:50**	**5:34**	**6:44**	**8:04**
Riverside - Downtown	7:15	9:10	**1:00**	**4:30**	**5:03**	**5:45**	**6:55**	**8:25**
Riverside - Hunter Park/UCR		9:23	**1:13**	**4:43**	**5:16**	**5:58**	**7:08**	
Moreno Valley/March Field		9:36	**1:26**	**4:57**	**5:29**	**6:11**	**7:16**	
Perris - Downtown		9:55	**1:45**	**5:16**	**5:48**	**6:30**	**7:35**	
Perris - South		10:05	**1:55**	**5:25**	**6:00**	**6:40**	**7:50**	

Check Orange County Line and Inland Empire-Orange County Line schedules for additional trains along this corridor.
Check Riverside Line schedule for additional trains to Riverside-Downtown.

AM times **PM times**

NOTES: See page 3

SATURDAY AND SUNDAY

Metrolink Service No.	751	753
Riverside - Downtown	7:50	9:00
Riverside - La Sierra	8:00	9:10
Corona - North Main	8:08	9:18
Corona - West	8:14	9:24
Fullerton ★	8:39	9:49
Buena Park	8:46	9:56
Norwalk/Santa Fe Springs	8:54	10:04
L.A. Union Station ★	9:30	10:40

SATURDAY AND SUNDAY

Metrolink Service No.	752	754
L.A. Union Station ★	**3:15**	**7:12**
Norwalk/Santa Fe Springs	**3:36**	**7:33**
Buena Park	**3:42**	**7:39**
Fullerton ★	**3:49**	**7:46**
Corona - West	**4:13**	**8:10**
Corona - North Main	**4:20**	**8:17**
Riverside - La Sierra	**4:29**	**8:26**
Riverside - Downtown	**4:52**	**8:52**

Check Orange County Line and Inland Empire-Orange County Line schedules for additional trains along this corridor.

AM times **PM times**

NOTES: See page 3

MONDAY THROUGH FRIDAY

Metrolink Service No.	681	601	603	605	683	607	685	687	633	635	641	609	689	643	707	645
Oceanside ★		4:43	5:16	5:42		6:34					**2:59**	**3:26**				
San Clemente Pier ★		↓	↓	↓		↓					↓	↓				
San Clemente		5:06	5:38	6:04		6:56					**3:21**	**3:48**				
San Juan Capistrano ★		5:15	5:47	6:13		7:05					**3:31**	**3:57**				
Laguna Niguel/Mission Viejo	4:05	5:22	5:53	6:19		7:11	8:03	8:43	8:58	11:30	**3:39**	**4:04**		**5:55**		**8:50**
Irvine ★	4:15	5:32	6:03	6:29	7:10	7:22	8:13	8:54	9:08	11:40	**3:50**	**4:15**	**5:17**	**6:05**		**9:00**
Tustin	4:21	5:38	6:09	6:36	7:16	7:28	8:19	9:00	9:14	11:46	**3:57**	**4:22**	**5:23**	**6:11**		**9:06**
Santa Ana ★	4:27	5:44	6:16	6:43	7:22	7:34	8:25	9:06	9:20	11:52	**4:04**	**4:29**	**5:29**	**6:17**		**9:12**
Orange	4:32	5:52	6:21	6:49	7:27	7:39	8:30	9:11	9:25	11:57	**4:09**	**4:34**	**5:34**	**6:22**		**9:17**
Anaheim ★	4:36	5:57	6:26	6:55	7:32	7:44	8:35	9:16	9:29	**12:01**	**4:14**	**4:39**	**5:39**	**6:27**		**9:22**
Fullerton ★	4:43	6:04	6:35	7:02	7:41	7:51	8:42	9:25	9:41	**12:15**	**4:24**	**4:46**	**5:46**	**6:40**➤	**6:54**	**9:35**
Buena Park	4:49	6:10	6:41	7:08	7:47	7:57	8:48	9:30				**4:52**	**5:52**		**7:00**	
Norwalk/Santa Fe Springs	4:57	6:18	6:49	7:16	7:55	8:05	8:56	9:37				**5:00**	**6:00**		**7:06**	
Commerce	↓	↓	7:00	7:26	↓	8:19	9:08	↓				↓	↓		↓	
L.A. Union Station ★	5:25	6:45	7:20	7:45	8:19	8:40	9:26	10:04				**5:26**	**6:27**		**7:45**	

Check 91 Line and Inland Empire-Orange County Line schedules for additional trains along this corridor.

AM times **PM times**

NOTES: See page 3

MONDAY THROUGH FRIDAY

Metrolink Service No.	682	600	632	634	684	602	686	640	604	688	606	608	708	642	644
L.A. Union Station ★	6:50	7:58			2:11	3:19	3:47		4:30	4:50	5:46	6:40	6:50		
Commerce	↓	↓			↓	3:33	4:01		4:44	↓	6:00	↓	↓		
Norwalk/Santa Fe Springs	7:12	8:20			2:33	3:43	4:12		4:55	5:12	6:10	7:03	7:11		
Buena Park	7:19	8:27			2:40	3:50	4:19		5:03	5:19	6:17	7:10	7:17		
Fullerton ★	7:25	8:33	10:00	1:40	2:46	3:56	4:25	4:55	5:10	5:25	6:23	7:16	7:24 ➤	7:35	10:10
Anaheim ★	7:32	8:40	10:07	1:47	2:54	4:03	4:33	5:02	5:17	5:33	6:31	7:23		7:43	10:18
Orange	7:38	8:45	10:12	1:52	2:59	4:08	4:38	5:07	5:22	5:39	6:37	7:28		7:47	10:23
Santa Ana ★	7:44	8:50	10:17	1:57	3:05	4:13	4:43	5:12	5:27	5:45	6:42	7:33		7:52	10:27
Tustin	7:51	8:56	10:23	2:03	3:12	4:19	4:49	5:18	5:33	5:52	6:48	7:39		7:58	10:33
Irvine ★	8:00	9:04	10:31	2:11	3:21	4:27	5:02	5:26	5:41	6:01	6:56	7:47		8:05	10:41
Laguna Niguel/Mission Viejo	8:15	9:14	10:44	2:25	3:36	4:40		5:40	5:51	6:15	7:06	7:58		8:20	10:51
San Juan Capistrano ★		9:20				4:46			5:57		7:12	8:04			10:58
San Clemente		9:30				4:59			6:06		7:22	8:17			11:07
San Clemente Pier ★		↓				↓			↓		↓	↓			↓
Oceanside ★		10:01				5:28			6:37		7:54	8:46			11:35

Train 644 may be held for special events in Anaheim. Please visit metrolinktrains.com for details.

Check 91 Line and Inland Empire-Orange County Line schedules for additional trains along this corridor.

AM times **PM times**

NOTES: See page 3

ORANGE COUNTY LINE

L.A. to Oceanside

SATURDAY AND SUNDAY

Metrolink Service No.	660	662	664	666
L.A. Union Station ★	8:40	10:50	**2:00**	**4:40**
Commerce	↓	↓	↓	↓
Norwalk/Santa Fe Springs	9:02	11:12	**2:22**	**5:02**
Buena Park	9:09	11:19	**2:29**	**5:09**
Fullerton ★	9:15	11:25	**2:35**	**5:15**
Anaheim ★	9:22	11:32	**2:42**	**5:22**
Orange	9:27	11:37	**2:47**	**5:27**
Santa Ana ★	9:32	11:42	**2:52**	**5:32**
Tustin	9:38	11:48	**2:58**	**5:38**
Irvine ★	9:46	11:56	**3:06**	**5:46**
Laguna Niguel/Mission Viejo	9:56	**12:06**	**3:16**	**5:56**
San Juan Capistrano ★	10:01	**12:13**	**3:21**	**6:01**
San Clemente	10:12	**12:25**	**3:34**	**6:15**
San Clemente Pier ★	10:15	**12:28**	**3:36**	**6:18**
Oceanside ★	10:52	**1:00**	**4:15**	**6:55**

AM times **PM times**

Oceanside to L.A.

SATURDAY AND SUNDAY

Metrolink Service No.	661	663	665	667
Oceanside ★	8:15	11:24	**1:24**	**5:36**
San Clemente Pier ★	8:35	11:48	**1:43**	**5:55**
San Clemente	8:38	11:50	**1:46**	**5:58**
San Juan Capistrano ★	8:50	**12:00**	**2:00**	**6:11**
Laguna Niguel/Mission Viejo	8:58	**12:08**	**2:07**	**6:19**
Irvine ★	9:08	**12:19**	**2:17**	**6:29**
Tustin	9:14	**12:25**	**2:23**	**6:35**
Santa Ana ★	9:20	**12:31**	**2:29**	**6:41**
Orange	9:25	**12:36**	**2:34**	**6:46**
Anaheim ★	9:30	**12:41**	**2:39**	**6:51**
Fullerton ★	9:37	**12:48**	**2:46**	**6:58**
Buena Park	9:43	**12:54**	**2:52**	**7:04**
Norwalk/Santa Fe Springs	9:51	**1:02**	**3:00**	**7:12**
Commerce	↓	↓	↓	↓
L.A. Union Station ★	10:30	**1:37**	**3:39**	**7:56**

NOTES: See page 3

AMTRAK SCHEDULE - 2014/2016

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PACIFIC SURFLINER-Southbound

Train Number ▸				5804	5818	562	564	1566	566	768	768
Normal Days of Operation ▸				Daily	Daily	Daily	Daily	SaSuHo	Mo-Fr	SaSu	Daily
Will Also Operate ▸								9/5,11/24, 12/26,1/2		*See Note	
Will Not Operate ▸									9/5,11/24, 12/26,1/2		*See Note
On Board Service ▸						[B] [Café] [Bag] [Wi-Fi] [Bike]	[B] [Café] [Bag] [Wi-Fi] [Bike]	[B] [Café] [Bag] [Wi-Fi] [Bike]	[B] [Café] [Bag] [Wi-Fi] [Bike]	[B] [Café] [Bag] [Wi-Fi] [Bike]	[B] [Café] [Bag] [Wi-Fi] [Bike]
	Mile	Symbol	▼								
SAN LUIS OBISPO, CA –Cal Poly	0	○	Dp							[Bus]2 30A	[Bus]3 40A
–Amtrak Station		●♿QT								[Bus]2 40A	[Bus]3 50A
Grover Beach, CA	12	○♿QT								[Bus]3 05A	[Bus]4 15A
Santa Maria, CA–IHOP	24	○♿								[Bus]3 30A	[Bus]4 40A
Guadalupe-Santa Maria, CA	25	○♿QT									
Lompoc-Surf Station, CA	51	○									
Lompoc, CA–Visitors Center	67	○♿									
Solvang, CA	68	○♿								[Bus]4 05A	[Bus]5 15A
Buellton, CA–Opposite Burger King	72	○								[Bus]4 10A	[Bus]5 20A
Goleta, CA	110	○[♿]QT								5 27A	6 35A
SANTA BARBARA, CA	119	●♿QT	Ar							[Bus][43]5 20A	[Bus][43]6 30A
			Dp							[Bag]5 41A	[Bag]6 49A
Carpinteria, CA	129	○♿QT								5 56A	7 04A
Ventura, CA	145	○♿QT								6 21A	7 29A
Oxnard, CA	155	●♿QT					[44]		[44]	[Bag]6 35A	[Bag]7 43A
Camarillo, CA	165	○♿					[44]		[44]	6 46A	7 54A
Moorpark, CA	175	○[♿]					[44]		[44]	7 00A	8 08A
Simi Valley, CA	186	○[♿]					[44]		[44]	7 15A	8 23A
Chatsworth, CA	194	○[♿]					[44]		[44]	7 27A	8 40A
Van Nuys, CA–Amtrak Station	203	●♿QT					[44]		[44]	[Bag]7 40A	[Bag]8 56A
Burbank-Bob Hope Airport, CA ✈	209	○♿QT					[44]		[44]	7 48A	9 04A
Glendale, CA	216	○♿					[44]		[44]	7 58A	9 16A
LOS ANGELES, CA ✈	222	●♿QT	Ar				[44]		[44]	[Bag]8 25A	[Bag]9 35A
			Dp	[Bus][90][R]12 55A	[Bus][90][R]2 30A	[Bag]6 08A	[Bag]7 25A	[Bag]8 19A	[Bag]8 41A	[Bag]8 54A	[Bag]9 55A
Fullerton, CA	248	●♿QT		[Bus]D1 30A	[Bus]D3 05A	6 39A	[Bag]7 56A	[Bag]8 50A	[Bag]9 12A	[Bag]9 25A	[Bag]10 26A
Anaheim, CA (Disneyland®)	253	●♿QT				6 48A	8 04A	[Bag]8 58A	[Bag]9 20A	[Bag]9 40A	[Bag]10 34A
Santa Ana, CA	258	●♿QT		[Bus]1 45A	[Bus]D3 20A	6 58A	8 13A	[Bag]9 07A	[Bag]9 29A	[Bag]9 54A	[Bag]10 43A
Irvine, CA	268	●♿QT			[Bus]D3 40A	7 11A	8 26A	9 18A	9 40A	10 15A	10 54A
San Juan Capistrano, CA	280	●♿QT			[Bus]D3 55A	7 26A	8 42A	9 31A	9 54A	10 35A	11 09A
San Clemente Pier, CA	288	○						9 48A	10 11A	10 54A	11 22A
Oceanside, CA (LEGOLAND) [55]	309	●♿QT			[Bus]D4 30A	8 05A	9 16A	[Bag]10 19A	[Bag]10 38A	[Bag]11 26A	[Bag]11 47A
Carlsbad (Village), CA	312	○									
Carlsbad (Poinsettia), CA	316	○									
Encinitas, CA	321	○									
Solana Beach, CA	325	●♿QT			[Bus]D4 50A	8 21A	9 34A	10 38A	10 56A	11 55A	**12 08P**
Sorrento Valley, CA	332	○									
San Diego (Old Town), CA	347	○[♿]QT					D10 08A	D11 10A	D11 27A	D12 31P	D12 41P
SAN DIEGO, CA ✈ (Tijuana)	350	●♿QT	Ar		[Bus]5 15A	[Bag]8 58A	[Bag]10 16A	[Bag]11 18A	[Bag]11 35A	[Bag]**12 39P**	[Bag]**12 49P**

768 (SaSu): * This train operates only on Saturdays and Sundays, July 16 through September 4, and September 5.

768 (Daily): * This train does NOT operate on Saturdays or Sundays, July 16 through September 4, nor September 5.

PACIFIC SURFLINER SCHEDULES EFFECTIVE 6/6/16

Service on Pacific Surfliner®

Coaches: Unreserved.

[R] Reserved.

[B] **Pacific Business class:** Reserved seat service with complimentary beverages, light snacks and newspaper. Amtrak Metropolitan Lounge is available in Los Angeles for Pacific Business class passengers.

[Café] **Café:** Sandwiches, snacks and beverages.

[Bag] Checked baggage at select stations; size restriction for carry on luggage is 28" x 22" x 11". Consult Amtrak.com for latest baggage policies.

[Wi-Fi] Wi-Fi available.

[37] Connection between Thruway bus and train at Los Angeles.

[43] Connection between Thruway bus and train at Santa Barbara.

[44] Metrolink commuter train connection available. Separate ticket required. Call Metrolink at (800) 371-LINK for exact departure times.

[55] LEGOLAND is located 8 miles from Oceanside station. Transfers may be made by taxi at passenger's expense.

[58] Checked baggage service at this location available on weekends only.

[65] Thruway bus connection at San Luis Obispo Amtrak Station arrives Atascadero at 9:05 p.m. and Paso Robles at 9:25 p.m.

[66] Connection between Thruway bus and train at San Luis Obispo Amtrak Station.

[76] Thruway bus connects to San Joaquin trains at Bakersfield.

[90] Travel on this bus is reserved and must be part of an itinerary involving a train trip in one direction or the other. Also, the Los Angeles ticket office is open 30 minutes ahead of departure for night buses 5804 and 5818.

[91] Travel on this bus is reserved and must be part of an itinerary involving a train trip in one direction or the other. Since most stations are unstaffed at the hours the buses operate, advance reservations can be made and tickets purchased online at Amtrak.com, at Metrolink Ticket Vending Machines or Amtrak Quik-Trak kiosks located at most stations. Reserved, ticketed customers have priority seating. Unreserved, ticketed passengers are carried on a space-available basis. The ticket office is open at Los Angeles, San Diego and Oceanside 30 minutes before the departure of the bus.

Smoking is prohibited on trains and only permitted in designated areas at stations.

[Bike] **Bicycles:** Most *Pacific Surfliner* trains have racks for seven bicycles located in the cab car, at the opposite end of the train from the locomotive. These slots are available by reservation only and are offered without charge. Passengers must properly secure their bicycles in the racks. For some train departures and on Thruway buses, reservations are not available and only a limited number of bicycles can be carried. When space is available, unboxed bicycles may be put in the baggage bin under connecting Thruway buses. Amtrak disclaims liability for loss or damage. Passengers connecting to Trains 2, 4 and 14 must send their bicycles as checked baggage. There is a $10 fee, and the bicycle must be boxed; if needed, a bicycle box can be purchased from Amtrak for $15.

SYMBOLS KEY

- **A** Time Symbol for A.M.
- **P** Time Symbol for P.M.
- **N** Time Symbol for Noon.
- **D** Stops only to discharge passengers; train may leave before time shown.
- **R** Stops only to receive passengers.
- **M** Meal stop
- [Bus] Thruway Bus stop
- ✈ Airport connection
- **QT** Quik-Trak self-serve ticketing kiosk
- ○ Unstaffed station
- ● Staffed Station with ticket office; may or may not be open for all train departures.
- ♿ Station wheelchair accessible; no barriers between station and train.
- [♿] Station wheelchair accessible; not all station facilities accessible.

Train Number				572	572	774	580	582	784	790	1790	796
Normal Days of Operation				SaSu	Daily	Daily	Daily	Daily	Daily	Mo-Fr	SaSuHol	Daily
Will Also Operate				*See Note							9/5,11/24, 12/26,1/2	
Will Not Operate					*See Note					9/5,11/24, 12/26,1/2		
On Board Service				B	B	B	B	B	B	B	B	B
	Mile	Symbol										
SAN LUIS OBISPO, CA –Cal Poly	0	○	Dp						10 10A	[66] 12 50P	[66] 1 10P	3 15P
–Amtrak Station		●♿QT				6 55A			10 30A	1 35P	2 00P	3 40P
Grover Beach, CA	12	○♿QT				7 15A			10 55A	1 55P	2 20P	4 10P
Santa Maria, CA–IHOP	24	○♿							R11 20A			4 35P
Guadalupe-Santa Maria, CA	25	○♿QT				7 31A				2 11P	2 36P	
Lompoc-Surf Station, CA	51	○				8 05A				2 51P	3 16P	
Lompoc, CA–Visitors Center	67	○♿							R12 05P			
Solvang, CA	68	○♿							R12 35P			5 10P
Buellton, CA–Opposite Burger King	72	○							R12 40P			5 15P
Goleta, CA	110	○♿QT				9 13A			1 50P	3 57P	4 22P	6 45P
SANTA BARBARA, CA	119	●♿QT	Ar			9 24A			[43] 1 45P	4 09P	4 37P	[43] 6 40P
			Dp			9 27A		[90] R12 55P	2 04P	4 12P	4 40P	6 59P
Carpinteria, CA	129	○♿QT				9 42A			2 19P	4 27P	4 55P	7 15P
Ventura, CA	145	○♿QT				10 04A		[90] R1 25P	2 41P	4 49P	5 21P	7 37P
Oxnard, CA	155	●♿QT				10 18A		[90] R1 50P	2 57P	5 07P	5 35P	7 51P
Camarillo, CA	165	○♿				10 35A			3 08P			8 02P
Moorpark, CA	175	○♿							3 20P	5 36P	6 04P	
Simi Valley, CA	186	○♿				11 02A			3 35P	5 54P	6 20P	8 38P
Chatsworth, CA	194	○♿				11 14A			3 52P	6 12P	6 33P	8 50P
Van Nuys, CA–Amtrak Station	203	●♿QT				11 28A			4 14P	6 31P	6 45P	9 06P
Burbank-Bob Hope Airport, CA ✈	209	○♿QT				11 35A			4 22P	6 39P	6 53P	9 13P
Glendale, CA	216	○♿				11 45A			4 32P	6 50P	7 04P	9 23P
LOS ANGELES, CA ✈	222	●♿QT	Ar			12 15P		[37] 3 35P	4 50P	7 10P	7 20P	9 45P
			Dp	11 03A	11 20A	12 33P	2 58P	4 08P	5 10P	7 31P	7 40P	10 10P
Fullerton, CA	248	●♿QT		11 36A	11 51A	1 04P	3 29P	4 39P	5 42P	8 02P	8 11P	10 41P
Anaheim, CA (Disneyland®)	253	●♿QT		11 50A	11 59A	1 12P	3 37P	4 47P	5 51P	8 10P	8 19P	10 49P
Santa Ana, CA	258	●♿QT		12 05P	12 08P	1 21P	3 46P	4 56P	6 00P	8 19P	8 28P	10 58P
Irvine, CA	268	●♿QT		12 23P	12 21P	1 34P	3 59P	5 09P	6 13P	8 32P	8 39P	11 09P
San Juan Capistrano, CA	280	●♿QT		12 46P	12 39P	1 49P	4 14P	5 24P	6 27P	8 47P	8 54P	11 24P
San Clemente Pier, CA	288	○										
Oceanside, CA (LEGOLAND) [55]	309	●♿QT		1 24P	1 13P	2 24P	4 52P	6 01P	7 03P	9 20P	9 27P	11 57P
Carlsbad (Village), CA	312	○							7 08P	9 25P	9 32P	12 03A
Carlsbad (Poinsettia), CA	316	○							7 14P	9 32P	9 39P	12 12A
Encinitas, CA	321	○							7 23P	9 40P	9 48P	12 19A
Solana Beach, CA	325	●♿QT		1 50P	1 29P	2 43P	5 13P	6 20P	7 29P	9 47P	9 55P	12 26A
Sorrento Valley, CA	332	○							7 39P	9 57P	10 06P	12 36A
San Diego (Old Town), CA	347	○♿QT		D2 29P	D2 03P	D3 17P	D5 42P	D6 54P	D8 01P	D10 19P	D10 27P	D12 58A
SAN DIEGO, CA ✈ (Tijuana)	350	●♿QT	Ar	2 37P	2 11P	3 25P	5 50P	7 02P	8 09P	10 30P	10 39P	1 06A

*This train operates only on Saturdays and Sundays, July 16 through September 4, and September 5.

*This train does NOT operate on Saturdays or Sundays, July 16 through September 4, nor September 5.

PACIFIC SURFLINER SCHEDULES EFFECTIVE 6/6/16

Pacific Surfliner Thruway Bus Connections

Fullerton • Palm Springs • Indio

768/572/769	784/785		Connecting Train Number		769/572	785/784
4968	4984		Thruway Number		4969	4985
Daily	Daily		Days of Operation		Daily	Daily
12 05P	6 25P	Dp	Fullerton, CA–Trans. Ctr.	Ar	11 15A	5 25P
D12 55P	D7 10P		Riverside, CA–Metrolink Station		R10 20A	R4 25P
D1 35P	D7 50P		Cabazon, CA–Morongo Casino		R9 30A	R3 35P
D2 00P	D8 20P		Palm Springs, CA –Downtown SunLine Transit		R9 00A	R3 10P
2 10P	D8 25P		Palm Springs, CA–Airport ✈		R8 55A	3 05P
	D8 55P		Palm Desert, CA–SunLine Transit		R8 25A	
	D9 05P		La Quinta, CA–SunLine Transit		R8 10A	
	9 15P	Ar	Indio, CA–Hwy. 111 at Monroe	Dp	8 00A	

NOTE—All *Pacific Surfliner* Thruway Bus Connections above require reservations.

SHADING KEY

Daytime train	Connecting train	Thruway and connecting services

See page 4 for Connecting Transit Services, page 5 for Airport Connections, and page 8 for Route Map.

See in San Diego

How to get there from San Diego's Santa Fe Depot & Old Town Transit Center

Balboa Park and **San Diego Zoo:** MTS Rapid Bus Route 215 from Kettner Blvd. adjacent to Santa Fe Depot

SeaWorld San Diego: From Old Town take MTS Route 9 (west side of station); From Santa Fe Depot take Green Line to Old Town and transfer to MTS Bus Route 9

International Border at San Ysidro (for Tijuana): From Santa Fe Depot cross Kettner Blvd. to America Plaza Station to MTS Blue Line Trolley

Petco Park: MTS Green Line Trolley from Santa Fe Depot (or Old Town) to Gaslamp Quarter (headsign will read "Imperial")

Qualcomm Stadium: MTS Green Line Trolley from Old Town (or Santa Fe Depot) to Qualcomm Stadium (headsign may read "Santee")

San Diego Cruise Terminal/International Airport: MTS Route 992 bus runs from the Santa Fe Depot to the airport every 15 minutes during the weekday and every 30 minutes on the weekend. Board on the corner of Broadway and Kettner (near Starbucks). The trip to the airport takes only 10 minutes. Exact change one-way fare is $2.25. The Cruise Terminal is also served by Route 992, but is only a three block walk from Santa Fe Depot.

This Service is financed primarily through funds made available by the LOSSAN Agency through the California Department of Transportation

PACIFIC SURFLINER-Northbound

Train Number ▸	Mile	Symbol		5801	5811	761	1761	763	565	1567	567	769	573
Normal Days of Operation ▸				Daily	Daily	Mo-Fr	SaSuHo	Daily	Daily	SaSuHo	Mo-Fr	Daily	Daily
Will Also Operate ▸							9/5,11/24, 12/26,1/2			9/5,11/24, 12/26,1/2			
Will Not Operate ▸						9/5,11/24, 12/26,1/2					9/5,11/24, 12/26,1/2		
On Board Service ▸				R	R	B ☕ 🛄 🚲	B ☕ 🛄 🚲	B ☕ 🛄 🚲	B ☕ 🛄 🚲	B ☕ 🛄 🚲	B ☕ 🛄 🚲	B ☕ 🛄 🚲	B ☕ 🛄 🚲
SAN DIEGO, CA ✈ (Tijuana)	0	●♿QT	Dp					🛄6 07A	🛄6 56A	🛄8 05A	🛄8 23A	🛄9 20A	🛄10 41A
San Diego (Old Town), CA	3	○♿QT						R6 14A	R7 03A	R8 12A	R8 30A	R9 27A	R10 48A
Sorrento Valley, CA	19	○								8 34A	8 54A		11 11A
Solana Beach, CA	26	●♿QT						6 45A	7 36A	8 43A	9 03A	9 58A	11 22A
Encinitas, CA	30	○								8 50A	9 09A		11 30A
Carlsbad (Poinsettia), CA	34	○								8 57A	9 15A		11 36A
Carlsbad (Village), CA	38	○								9 04A	9 23A		11 42A
Oceanside, CA (LEGOLAND) 55	41	●♿QT						🛄7 03A	🛄7 55A	9 11A	9 29A	🛄10 15A	11 50A
San Clemente Pier, CA	63	○											
San Juan Capistrano, CA	70	●♿QT						7 36A	8 27A	9 45A	10 07A	10 47A	**12 22P**
Irvine, CA	83	●♿QT						7 54A	8 42A	10 01A	10 22A	11 01A	**12 37P**
Santa Ana, CA	92	●♿QT		🚌91 1 45A	🚌91 3 45A	🚌91 R5 25A	🚌91 R5 25A	🛄8 05A	🛄8 54A	10 12A	10 33A	🛄11 12A	**12 48P**
Anaheim, CA (Disneyland®)	97	●♿QT						🛄8 14A	🛄9 03A	10 21A	10 42A	🛄11 22A	**12 57P**
Fullerton, CA	102	●♿QT		🚌91 2 05A	🚌91 4 05A	🚌91 R5 50A	🚌91 R5 50A	🛄8 22A	🛄9 11A	🛄10 29A	🛄10 50A	🛄11 30A	**🛄1 05P**
LOS ANGELES, CA ✈	128	●♿QT	Ar	🚌91 2 45A	🚌91 4 45A	🚌37 6 35A	🚌37 6 35A	🛄8 57A	🛄9 46A	🛄11 04A	🛄11 25A	**🛄12 05P**	**🛄1 40P**
			Dp	🚌91 2 55A	🚌91 4 55A	🛄7 35A	🛄7 50A	🛄9 20A				**🛄12 30P**	
Glendale, CA	134	○♿		🚌91 3 10A	🚌91 5 10A	7 48A	8 02A	9 32A				**12 42P**	
Burbank-Bob Hope Airport, CA ✈	142	○♿QT		🚌76 91 3 25A	🚌76 91 5 25A	8 00A	8 12A	9 42A				**12 52P**	
Van Nuys, CA–Amtrak Station	147	●♿QT				🛄8 10A	🛄8 21A	🛄9 52A				**🛄1 02P**	
Chatsworth, CA	157	○♿				8 32A	8 33A	10 04A				**1 14P**	
Simi Valley, CA	164	○♿				8 45A	8 45A	10 16A				**1 26P**	
Moorpark, CA	175	○♿				8 57A	8 57A					**1 39P**	
Camarillo, CA	186	○♿				9 10A	9 10A	10 40A				**1 54P**	
Oxnard, CA	195	●♿QT				🛄9 21A	🛄9 21A	🛄10 53A				**🛄2 05P**	
Ventura, CA	205	○♿QT				9 35A	9 35A	11 09A				**2 19P**	
Carpinteria, CA	221	○♿QT				10 06A	10 06A	11 31A				**2 47P**	
SANTA BARBARA, CA	232	●♿QT	Ar			🛄10 19A	🛄10 19A	🛄**D**11 55A				**🛄D3 05P**	
			Dp			🛄10 22A	🛄10 22A	**🚌🛄43 R12 05P**				**🚌🛄43 R3 10P**	
Goleta, CA	241	○♿QT				10 34A	10 34A	**12 08P**				**3 18P**	
Solvang, CA	267	○♿						**🚌12 45P**				**🚌D4 00P**	
Buellton, CA–Opposite Burger King	271	○						**🚌12 50P**				**🚌D4 05P**	
Lompoc, CA–Visitors Center	284	○♿										**🚌D4 30P**	
Lompoc-Surf Station, CA	300	○				11 40A	11 40A						
Guadalupe-Santa Maria, CA	326	○♿QT				**12 16P**	**12 16P**					**🚌D5 05P**	
Santa Maria, CA–IHOP	327	○♿						**🚌1 30P**				**🚌4 35P**	
Grover Beach, CA	338	○♿QT				**12 35P**	**12 35P**	**🚌1 55P**				**🚌D5 30P**	
SAN LUIS OBISPO, CA –Amtrak Station	350	●♿QT	Ar			**🛄1 00P**	**🛄1 00P**	**🚌🛄2 25P**				**🚌🛄5 15P**	
–Cal Poly		○	Ar			**🚌66 1 15P**	**🚌66 1 15P**	**🚌2 35P**				**🚌5 30P**	

PACIFIC SURFLINER SCHEDULES EFFECTIVE 6/6/16

Connecting Transit Services in Southern California

Metrolink provides commuter rail service radiating from Los Angeles Union Station to the Antelope Valley, downtown Burbank, Oxnard, Riverside, San Bernardino and Orange County. It supplements *Pacific Surfliner* service between Oxnard and Oceanside. (800) 371-5465; metrolinktrains.com. *Rail 2 Rail:* The Rail 2 Rail program offers *Pacific Surfliner* monthly pass holders access to Metrolink and COASTER commuter trains within the station limits of their pass.

Los Angeles County Metropolitan Transportation Authority provides bus, subway, and light rail services in the Los Angeles area; Metro's Red, Purple and Gold lines originate at Union Station and provide rail connections to Hollywood, Universal City and Pasadena. 323.GO.METRO; metro.net

North County Transit District operates the COASTER commuter rail service which supplements *Pacific Surfliner* service between San Diego and Oceanside including additional stops at Sorrento Valley, Solana Beach, Encinitas and Carlsbad. The Sprinter operates frequent rail service between Oceanside, Vista, San Marcos and Escondido. The Breeze also provides bus service at many *Pacific Surfliner* stations. (760) 966-6500; www.gonctd.com.

San Diego Metropolitan Transit System operates bus and the San Diego Trolley service. Direct service to San Diego's Santa Fe Depot and Old Town stations. (619) 233-3004; sdmts.com.

Orange County Transportation Authority provides bus transit service throughout Orange County including *Pacific Surfliner* stations in Fullerton, Anaheim, Santa Ana, Irvine, San Juan Capistrano and San Clemente. (714) 636-7433; www.octa.net.

Santa Barbara Metropolitan Transit District provides bus transit service in Santa Barbara County, including connections to the Downtown and Waterfront shuttles serving State Street, the Santa Barbara Zoo and Santa Barbara Harbor. (805) 963-3366; sbmtd.gov.

Anaheim Resort Transit provides convenient bus connections from the Anaheim station to the Disneyland Resort and Anaheim Convention Center. (888) 364-2787; www.rideart.org

For a complete list of connecting public transit providers, visit PacificSurfliner.com

NEW! Transit Transfer Program

The *Pacific Surfliner* Transit Transfer Program provides free transfers to connecting transit providers at most stations. Simply show your Amtrak *Pacific Surfliner* paper ticket or e-Ticket when you board the bus or shuttle. You can also purchase a discounted one-day transit pass for Metro (Los Angeles) and MTS (San Diego) in the Café car. Visit PacificSurfliner.com for details.

SHADING KEY

Daytime train	Connecting train
Thruway and connecting services	

See pages 2-3 for Services, Symbols and Reference Marks; and page 8 for Route Map.

Train Number ▸				777	579	583	583	785	591	591	595	5809
Normal Days of Operation ▸				Daily	Daily	Daily	SaSu	Daily	Daily	SaSu	Daily	Daily
Will Also Operate ▸							*See Note			*See Note		
Will Not Operate ▸						*See Note			*See Note			
On Board Service ▸				[B]	[B]	[B]	[B]	[B]	[B]	[B]	[B]	[76]
	Mile	Symbol				*This train does NOT operate on Saturdays or Sundays, July 16 through September 4, nor September 5.	*This train operates only on Saturdays and Sundays, July 16 through September 4, and September 5.		*This train does NOT operate on Saturdays or Sundays, July 16 through September 4, nor September 5.	*This train operates only on Saturdays and Sundays, July 16 through September 4, and September 5.		
SAN DIEGO, CA ✈ (Tijuana)	0	●♿QT	Dp	11 57A	1 36P	2 47P	3 05P	3 58P	6 50P	6 50P	8 59P	[91]9 45P
San Diego (Old Town), CA	3	○♿QT				R2 54P	R3 12P	R4 05P	R6 57P	R6 57P	R9 06P	
Sorrento Valley, CA	19	○									9 28P	
Solana Beach, CA	26	●♿QT		12 32P	2 11P	3 28P	3 50P	4 36P	7 28P	7 33P	9 39P	[91]10 15P
Encinitas, CA	30	○									9 45P	
Carlsbad (Poinsettia), CA	34	○									9 51P	
Carlsbad (Village), CA	38	○									9 57P	
Oceanside, CA (LEGOLAND) [55]	41	●♿QT		12 47P	2 27P	3 45P	4 06P	4 53P	7 44P	7 49P	10 03P	[91]10 45P
San Clemente Pier, CA	63	○				4 07P	4 30P	5 19P				
San Juan Capistrano, CA	70	●♿QT		1 19P	2 59P	4 22P	4 51P	5 34P	8 17P	8 22P	10 35P	[91]11 20P
Irvine, CA	83	●♿QT		1 33P	3 14P	4 38P	5 09P	5 49P	8 32P	8 43P	10 49P	[91]11 35P
Santa Ana, CA	92	●♿QT		1 44P	3 25P	4 51P	5 24P	6 00P	8 43P	8 54P	11 01P	[91]11 55P
Anaheim, CA (Disneyland®)	97	●♿QT		1 53P	3 34P	5 01P	5 36P	6 10P	8 52P	9 03P	11 10P	
Fullerton, CA	102	●♿QT		2 01P	3 42P	5 10P	5 48P	6 20P	9 00P	9 13P	11 18P	[91]12 15A
LOS ANGELES, CA ✈	128	●♿QT	Ar	2 40P	4 17P	5 45P	6 28P	6 55P	9 35P	9 54P	11 52P	[91]1 00A
			Dp	3 05P	[44]	[44]		7 15P	[37]R9 50P	[37]R10 10P		[91]1 15A
Glendale, CA	134	○♿		3 17P	[44]	[44]		7 27P	10 05P	10 25P		1 30A
Burbank-Bob Hope Airport, CA ✈	142	○♿QT		3 27P	[44]	[44]		7 37P				[76][91]1 45A
Van Nuys, CA–Amtrak Station	147	●♿QT		3 37P	[44]	[44]		7 47P	10 30P	10 50P		
Chatsworth, CA	157	○♿		3 49P	[44]	[44]		7 59P	D10 50P	D11 10P		
Simi Valley, CA	164	○♿		4 01P	[44]	[44]		8 11P	D11 10P	D11 30P		
Moorpark, CA	175	○♿			[44]	[44]			D11 25P	D11 45P		
Camarillo, CA	186	○♿		4 27P	[44]			8 35P	D11 35P	D11 55P		
Oxnard, CA	195	●♿QT		4 38P	[44]			8 46P	D11 45P	D12 05A		
Ventura, CA	205	○♿QT		4 57P				9 00P	D11 59P	D12 20A		
Carpinteria, CA	221	○♿QT		5 21P				9 22P	D12 15A	D12 35A		
SANTA BARBARA, CA	232	●♿QT	Ar	5 40P				D9 50P	D12 35A	D12 55A		
			Dp	5 43P				[43]R9 55P				
Goleta, CA	241	○♿QT		5 55P				10 03P	12 50A	1 10A		
Solvang, CA	267	○♿						D10 40P				
Buellton, CA–Opposite Burger King	271	○						D10 45P				
Lompoc, CA–Visitors Center	284	○♿										
Lompoc-Surf Station, CA	300	○		7 01P								
Guadalupe-Santa Maria, CA	326	○♿QT		7 37P								
Santa Maria, CA–IHOP	327	○♿						D11 25P				
Grover Beach, CA	338	○♿QT		7 54P				11 50P				
SAN LUIS OBISPO, CA –Amtrak Station	350	●♿QT	Ar	8 35P				12 15A				
–Cal Poly		○	Ar	[65]8 45P				12 30A				

PACIFIC SURFLINER SCHEDULES EFFECTIVE 6/6/16

Pacific Surfliner Thruway Bus Connections

Los Angeles • Long Beach • San Pedro

573/774	777	583/784	591/796/11		Connecting Train Number		566/761/1761	572/769	777	580/785
5702	5712	5714	5716		Thruway Number		5713	5715	5717	5703
Daily	Daily	Daily	Daily	▼	Days of Operation	▲	Daily	Daily	Daily	Daily
2 50P	4 35P	6 50P	10 00P	Dp	Los Angeles, CA–Union Station ✈	Ar	7 20A	10 25A	12 45P	2 45P
D3 45P	D5 30P	D7 45P	D10 55P	Ar	Long Beach, CA–Transit Gallery	Dp	R6 00A	R9 20A	R11 45A	R1 45P
D4 00P	D5 45P	D8 00P	D11 10P		San Pedro, CA–Catalina Terminal		R5 45A	R9 05A	R11 30A	R1 30P
4 15P	6 00P	8 15P	11 25P	Ar	–Library	Dp	5 35A	8 55A	11 20A	1 20P

NOTE—All *Pacific Surfliner* Thruway Bus Connections above require reservations.

Airport Connections

Los Angeles International Airport
FlyAway bus service operates directly from Los Angeles Union Station to all terminals of Los Angeles International Airport. Buses depart on the half-hour from 5:00 a.m.-1:00 a.m., then at 2:00 a.m., 3:00 a.m. and 4:00 a.m. Travel time is 40-45 minutes. Reservations are not required. Tickets are available on board buses departing throughout the day from berth 9 of the Patsaouras Transit Plaza on the east side of Union Station. Credit and debit cards only are accepted, no cash. For further information, including purchasing tickets online, limited service from Van Nuys and Westwood (UCLA), etc., go to lawa.org/flyaway or call (866) 435-9529.

Burbank-Bob Hope Airport
The Burbank-Bob Hope Airport train station/Thruway bus stop is one short block from the main air terminal. Shuttle service between the rail station and airport terminal is available on call from the courtesy telephone on the sidewalk by the Empire Avenue crosswalk. Rental car agencies are located between the rail station and airport.

Book Your Bike!

Bicycle reservations are required on all *Pacific Surfliner* trains. Reservations are complimentary and can be obtained on-line at Amtrak.com (click the "Add Bike to Trip" tab after selecting your departure and class of service), at Quik-Trak kiosks, from station ticket agents, or by calling 1-800-USA-RAIL. Bike reservations are required for each travel segment and must accompany a valid Amtrak ticket. Amtrak Multi-Ride Ticket holders (10-trip or Monthly Pass) may obtain bike reservations only through station ticket agents or by calling 1-800-USA-RAIL. Passengers are required to properly secure bicycles in bike racks. Book early, as bike space is limited and may not be available on all trains or departures.

CALIFORNIA COASTAL ROUTES-Southbound

Train Name ▸ [85] [86] [88]				Capitol Corridor / Pacific Surfliner	Capitol Corridor / Pacific Surfliner	Pacific Surfliner	Capitol Corridor / Pacific Surfliner	Capitol Corridor / Pacific Surfliner	Coast Starlight / Pacific Surfliner	Capitol Corridor / Pacific Surfliner	Capitol Corridor / Pacific Surfliner	Capitol Corridor
Train Number ▸				549/768	749/768	784	523/790	723/1790	11/796	527/796	727/796	537/737
Normal Days of Operation ▸				Mo-Fr[74]	SaSuHo[74]	Daily	Mo-Fr	SaSuHo	Daily	Mo-Fr	SaSuHo	Daily
On Board Service ▸				B	B	B	B	B	R	B	B	
	Mile	Symbol										
SACRAMENTO, CA	0	●♿QT	Dp	6 55P	7 35P		5 30A	6 10A	6 35A	7 00A	8 10A	12 10P
Davis, CA	13	●♿QT		7 10P	7 50P		5 45A	6 25A	6 50A	7 15A	8 25A	12 25P
Suisun-Fairfield, CA	40	○♿QT		7 34P	8 14P		6 09A	6 49A		7 39A	8 49A	12 49P
Martinez, CA	57	●♿QT		7 54P	8 34P		6 29A	7 09A	7 34A	7 59A	9 09A	1 09P
Richmond, CA	76	○♿QT		8 20P	9 00P		6 55A	7 35A		8 25A	9 35A	1 35P
Berkeley, CA	82	○♿QT		8 28P	9 08P		7 03A	7 43A		8 33A	9 43A	1 43P
Emeryville, CA	84	●♿QT		8 35P	9 15P	R6 05A	7 10A	7 50A	8 20A	8 40A	9 50A	1 50P
OAKLAND, CA –Jack London Square	89	●♿QT	Ar	D8 51P	9 33P		[89]7 21A	[89]8 01A	8 35A	[89]8 51A	[89]10 01A	2 01P
			Dp	10 00P	10 00P	R5 55A	7 10A	7 40A	8 50A	9 55A	9 55A	2 03P
Oakland Coliseum, CA.	94	○♿QT					7 32A	8 12A		9 02A	10 12A	2 12P
San Francisco, CA–Transbay Term.		●♿QT		10 45P	10 45P	R6 35A	R7 40A	R8 10A		R10 30A	R10 30A	
Hayward, CA	102	○♿QT					7 43A	8 23A		9 13A	10 23A	2 23P
Fremont-Centerville, CA	114	○♿QT					7 59A	8 39A		9 29A	10 39A	2 39P
Santa Clara, CA-Great America	125	○♿QT					8 16A	8 56A		9 46A	10 56A	2 56P
Santa Clara, CA-University Station	128	○					8 24A	9 04A		9 54A	11 04A	3 04P
SAN JOSE, CA	132	●♿QT	Ar	11 55P	11 55P	7 30A	8 38A	9 18A	9 55A	10 13A	11 18A	3 18P
			Dp	11 59P	11 59P	7 35A	9 05A	9 25A	10 07A	11 35A	11 35A	3 25P
Salinas, CA	203	●♿		1 15A	1 15A	8 45A	10 10A	10 30A	11 48A	12 40P	12 40P	4 40P
King City, CA–McDonald's		○♿		M2 10A	M2 10A	M9 40A	M11 15A	M11 35A		M1 40P	M1 40P	MD5 35P
Paso Robles, CA	300	○♿		3 10A	3 10A	[68]10 40A	12 15P	12 35P	1 38P	2 40P	2 40P	D6 20P
Atascadero, CA–Transit Center	310	○								2 55P	2 55P	
San Luis Obispo, CA–Cal Poly	334	○		3 40A	3 40A	R10 10A	12 50P	1 10P		3 15P	3 15P	D6 55P
SAN LUIS OBISPO, CA	335	●♿QT	Ar	3 50A	3 50A	10 25A	1 10P	1 30P	3 07P	3 30P	3 30P	7 00P
			Dp	3 50A	3 50A	10 30A	1 35P	2 00P	3 20P	3 40P	3 40P	7 10P
Grover Beach, CA	348	○♿QT		4 15A	4 15A	10 55A	1 55P	2 20P		4 10P	4 10P	D7 30P
Santa Maria, CA–IHOP	360	○♿		4 40A	4 40A	R11 20A				4 35P	4 35P	D7 55P
Guadalupe-Santa Maria, CA	361	○♿QT					2 11P	2 36P				
Lompoc-Surf Station, CA	388	○					2 51P	3 16P				
Lompoc, CA–Visitors Center	404	○♿				R12 05P						
Solvang, CA–Solvang Park	436	○♿		5 15A	5 15A	R12 35P				5 10P	5 10P	D8 30P
Buellton, CA–Opposite Burger King		○		5 20A	5 20A	R12 40P				5 15P	5 15P	D8 35P
Goleta, CA	447	○♿QT		6 35A	6 35A	1 50P	3 57P	4 22P		6 45P	6 45P	
SANTA BARBARA, CA	456	●♿QT	Ar	6 30A	6 30A	1 45P	4 09P	4 37P	5 55P	6 40P	6 40P	9 30P
			Dp	6 49A	6 49A	2 04P	4 12P	4 40P	6 02P	6 59P	6 59P	
Carpinteria, CA	466	○♿QT		7 04A	7 04A	2 19P	4 27P	4 55P		7 15P	7 15P	
Ventura, CA	482	○♿QT		7 29A	7 29A	2 41P	4 49P	5 21P		7 37P	7 37P	
Oxnard, CA	492	●♿QT		7 43A	7 43A	2 57P	5 07P	5 35P	D7 05P	7 51P	7 51P	
Camarillo, CA	502	○♿		7 54A	7 54A	3 08P				8 02P	8 02P	
Moorpark, CA	512	○♿		8 08A	8 08A	3 20P	5 36P	6 04P				
Simi Valley, CA	523	○♿		8 23A	8 23A	3 35P	5 54P	6 20P	D7 48P	8 38P	8 38P	
Chatsworth, CA	531	○♿		8 40A	8 40A	3 52P	6 12P	6 33P		8 50P	8 50P	
Van Nuys, CA–Amtrak Station	540	●♿QT		8 56A	8 56A	4 14P	6 31P	6 45P	D8 22P	9 06P	9 06P	
Burbank-Bob Hope Airport, CA ✈	546	○♿QT		9 04A	9 04A	4 22P	6 39P	6 53P	D8 31P	9 13P	9 13P	
Glendale, CA	553	○♿		9 16A	9 16A	4 32P	6 50P	7 04P		9 23P	9 23P	
LOS ANGELES, CA ✈	559	●♿QT	Ar	9 35A	9 35A	4 50P	7 10P	7 20P	9 00P	9 45P	9 45P	
			Dp	9 55A	9 55A	5 10P	7 31P	7 40P	10 10P	10 10P	10 10P	
Fullerton, CA	585	●♿QT		10 26A	10 26A	5 42P	8 02P	8 11P	10 41P	10 41P	10 41P	
Anaheim, CA (Disneyland®)	590	●♿		10 34A	10 34A	5 51P	8 10P	8 19P	10 49P	10 49P	10 49P	
Santa Ana, CA	595	●♿		10 43A	10 43A	6 00P	8 19P	8 28P	10 58P	10 58P	10 58P	
Irvine, CA	605	●♿		10 54A	10 54A	6 13P	8 32P	8 39P	11 09P	11 09P	11 09P	
San Juan Capistrano, CA	617	●♿		11 09A	11 09A	6 27P	8 47P	8 54P	11 24P	11 24P	11 24P	
San Clemente Pier, CA	625	○		11 22A	11 22A							
Oceanside, CA (LEGOLAND)	646	●♿QT		11 47A	11 47A	7 03P	9 20P	9 27P	11 57P	11 57P	11 57P	
Carlsbad (Village), CA	649	○				7 08P	9 25P	9 32P	12 03A	12 03A	12 03A	
Carlsbad (Poinsettia), CA	653	○				7 14P	9 32P	9 39P	12 12A	12 12A	12 12A	
Encinitas, CA	658	○				7 23P	9 40P	9 48P	12 19A	12 19A	12 19A	
Solana Beach, CA	662	●♿QT		12 08P	12 08P	7 29P	9 47P	9 55P	12 26A	12 26A	12 26A	
Sorrento Valley, CA	669	○				7 39P	9 57P	10 06P	12 36A	12 36A	12 36A	
San Diego (Old Town), CA	684	○♿QT		D12 41P	D12 41P	D8 01P	D10 19P	D10 27P	D12 58A	D12 58A	D12 58A	
SAN DIEGO, CA ✈	687	●♿QT	Ar	12 49P	12 49P	8 09P	10 30P	10 39P	1 06A	1 06A	1 06A	

CAPITOL CORRIDOR SCHEDULES EFFECTIVE 8/22/16. PACIFIC SURFLINER SCHEDULES EFFECTIVE 6/6/16.

[74] Modified Summer Weekend Schedule for Overnight Coastal Service

[74] The Amtrak Thruway buses for trains 749/768 and 549/768 operate 70 minutes earlier from Oakland to Santa Barbara on Friday and Saturday nights between July 15 and September 3, as well as Sunday night September 4. For Train 768 (*Pacific Surfliner*) schedule on those nights, see page 2. *Capitol Corridor* train schedule does not change.

See page 4 for Connecting Transit Services.
See page 5 for Airport Connections.
See page 8 for Route Map.

Train Name ▸ 85 86 88				Capitol Corridor	Capitol Corridor	Pacific Surfliner / Capitol Corridor	Pacific Surfliner / Capitol Corridor	Pacific Surfliner / Capitol Corridor	Pacific Surfliner / Coast Starlight	Pacific Surfliner / Capitol Corridor	Pacific Surfliner	Pacific Surfliner	Pacific Surfliner / Capitol Corridor	Pacific Surfliner / Capitol Corridor
Train Number ▸				732	538	761/546	1761/742	763/548	763/14	763/748	769	777	785/522	785/720
Normal Days of Operation ▸				SaSuHo	Mo-Fr	Mo-Fr	SaSuHo	Mo-Fr	Daily	SaSuHo	Daily	Daily	Mo-Fr	SaSuHo
On Board Service ▸						B	B	B	R	B	B	B	B	B
	Mile	Symbol												
SAN DIEGO, CA ✈	0	●♿QT	Dp					6 07A	6 07A	6 07A	9 20A	11 57A	3 58P	3 58P
San Diego (Old Town), CA	3	○♿QT						R6 14A	R6 14A	R6 14A	R9 27A		R4 05P	R4 05P
Solana Beach, CA	26	●♿QT						6 45A	6 45A	6 45A	9 58A	12 32P	4 36P	4 36P
Oceanside, CA (LEGOLAND)	41	●♿QT						7 03A	7 03A	7 03A	10 15A	12 47P	4 53P	4 53P
San Clemente Pier, CA	63	○											5 19P	5 19P
San Juan Capistrano, CA	70	●♿						7 36A	7 36A	7 36A	10 47A	1 19P	5 34P	5 34P
Irvine, CA	83	●♿						7 54A	7 54A	7 54A	11 01A	1 33P	5 49P	5 49P
Santa Ana, CA	92	●♿				5 25A	5 25A	8 05A	8 05A	8 05A	11 12A	1 44P	6 00P	6 00P
Anaheim, CA (Disneyland®)	97	●♿						8 14A	8 14A	8 14A	11 22A	1 53P	6 10P	6 10P
Fullerton, CA	102	●♿QT				5 50A	5 50A	8 22A	8 22A	8 22A	11 30A	2 01P	6 20P	6 20P
LOS ANGELES, CA ✈	128	●♿QT	Ar			6 35A	6 35A	8 57A	8 57A	8 57A	12 05P	2 40P	6 55P	6 55P
			Dp			7 35A	7 50A	9 20A	10 10A	9 20A	12 30P	3 05P	7 15P	7 15P
Glendale, CA	134	○♿				7 48A	8 02A	9 32A		9 32A	12 42P	3 17P	7 27P	7 27P
Burbank-Bob Hope Airport, CA ✈	142	○♿QT				8 00A	8 12A	9 42A	R10 29A	9 42A	12 52P	3 27P	7 37P	7 37P
Van Nuys, CA–Amtrak Station	147	●♿QT				8 10A	8 21A	9 52A	R10 40A	9 52A	1 02P	3 37P	7 47P	7 47P
Chatsworth, CA	157	○♿				8 32A	8 33A	10 04A		10 04A	1 14P	3 49P	7 59P	7 59P
Simi Valley, CA	164	○♿				8 45A	8 45A	10 16A	R11 11A	10 16A	1 26P	4 01P	8 11P	8 11P
Moorpark, CA	175	○♿				8 57A	8 57A				1 39P			
Camarillo, CA	186	○♿				9 10A	9 10A	10 40A		10 40A	1 54P	4 27P	8 35P	8 35P
Oxnard, CA	195	●♿QT				9 21A	9 21A	10 53A	11 44A	10 53A	2 05P	4 38P	8 46P	8 46P
Ventura, CA	205	○♿QT				9 35A	9 35A	11 09A		11 09A	2 19P	4 57P	9 00P	9 00P
Carpinteria, CA	221	○♿QT				10 06A	10 06A	11 31A		11 31A	2 47P	5 21P	9 22P	9 22P
SANTA BARBARA, CA	232	●♿QT	Ar			10 19A	10 19A	D11 55A	12 33P	D11 55A	D3 05P	5 40P	D9 50P	D9 50P
			Dp	6 15A	8 10A	10 22A	10 22A	12 05P	12 40P	12 05P	3 10P	5 43P	9 55P	9 55P
Goleta, CA	241	○♿QT				10 34A	10 34A	12 08P		12 08P	3 18P	5 55P	10 03P	10 03P
Solvang, CA–Solvang Park	279	○♿						12 45P		12 45P	D4 00P		D10 40P	D10 40P
Buellton, CA–Opp. Burger King		○						12 50P		12 50P	D4 05P		D10 45P	D10 45P
Lompoc, CA–Visitors Center	288	○♿									D4 30P			
Lompoc-Surf Station, CA	300	○				11 40A	11 40A					7 01P		
Guadalupe-Santa Maria, CA	326	○♿QT				12 16P	12 16P				D5 05P	7 37P		
Santa Maria, CA–IHOP	327	○♿		7 30A	9 25A			1 30P		1 30P	D4 35P		D11 25P	D11 25P
Grover Beach, CA	338	○♿QT		8 00A	9 55A	12 35P	12 35P	1 55P		1 55P	D5 30P	7 54P	11 50P	11 50P
SAN LUIS OBISPO, CA	350	●♿QT	Ar	8 20A	10 15A	1 00P	1 00P	2 20P	3 22P	2 20P	5 15P	8 35P	12 15A	12 15A
			Dp	8 25A	10 20A	1 05P	1 05P	2 25P	3 35P	2 25P	5 20P	8 36P	12 20A	12 20A
San Luis Obispo, CA–Cal Poly	351	○		8 30A	10 25A	1 15P	1 15P	2 35P		2 35P	5 30P	D8 45P	12 30A	12 30A
Atascadero, CA–Transit Center	375	○						2 50P		2 50P		D9 05P		
Paso Robles, CA	385	○♿		9 05A	11 00A	1 40P	1 40P	3 05P	4 37P	3 05P	5 55P	9 25P	12 55A	12 55A
King City, CA–McDonald's		○♿		M10 10A	M12 05P	M2 50P	M2 50P	M4 15P		M4 15P	M6 55P		M2 05A	M2 05A
Salinas, CA	483	●♿		11 15A	1 10P	3 50P	3 50P	5 15P	6 28P	5 15P	7 55P		3 05A	3 05A
SAN JOSE, CA	554	●♿QT	Ar	12 50P	2 45P	D5 05P	D5 05P	D6 30P	8 11P	D6 30P	D9 10P			
			Dp	1 05P	3 10P	5 50P	5 10P	7 15P	8 23P	9 10P			4 20A	4 20A
Santa Clara, CA-University Station	561	○		1 11P	3 16P	5 56P	5 16P	7 21P		9 16P				
Santa Clara, CA-Great America	564	○♿QT		1 19P	3 24P	6 04P	5 24P	7 29P		9 24P				
Fremont-Centerville, CA	573	○♿QT		1 36P	3 43P	6 21P	5 41P	7 46P		9 41P				
Hayward, CA	585	○♿QT		1 51P	3 59P	6 36P	5 56P	8 01P		9 56P				
San Francisco, CA–Transbay Term.		●♿QT				D6 20P	D6 20P	D7 40P	D10 00P	D7 40P	D10 25P		D5 35A	D5 35A
Oakland Coliseum, CA	593	○♿QT		2 01P	4 09P	6 46P	6 06P	8 11P		10 06P				
OAKLAND, CA –Jack London Square	598	●♿QT	Ar	2 08P	4 18P	6 45P	6 45P	D8 10P	9 24P	D8 10P	D10 45P		6 05A	6 05A
			Dp	2 10P	4 20P	6 55P	6 20P	8 20P	9 39P	10 15P			6 25A	8 15A
Emeryville, CA	603	●♿QT		2 20P	4 30P	7 05P	6 30P	8 30P	10 04P	10 25P	D10 55P		6 35A	8 23A
Berkeley, CA	604	○♿QT		2 24P	4 34P	7 09P	6 34P	8 34P		10 29P			6 39A	8 29A
Richmond, CA	610	○♿QT		2 32P	4 42P	7 17P	6 42P	8 42P		10 37P			6 47A	8 37A
Martinez, CA	630	●♿QT		2 59P	5 09P	7 44P	7 09P	9 09P	10 46P	11 04P			7 14A	9 04A
Suisun-Fairfield, CA	647	○♿QT		3 18P	5 28P	8 03P	7 28P	9 28P		11 23P			7 33A	9 23A
Davis, CA	674	●♿QT		3 42P	5 52P	8 27P	7 52P	9 52P	11 25P	11 47P			7 57A	9 47A
SACRAMENTO, CA	687	●♿QT	Ar	4 13P	6 23P	8 58P	8 12P	10 28P	11 59P	12 18A			8 23A	10 13A

CAPITOL CORRIDOR SCHEDULES EFFECTIVE 8/22/16. PACIFIC SURFLINER SCHEDULES EFFECTIVE 6/6/16.

Service on California Coastal Routes

M Meal stop.

68 Bus 4784 operates express service to Santa Barbara via San Luis Obispo.

85 For detailed service information for the *Capitol Corridor* between Reno and San Jose, please refer to our corresponding timetable folder (W34).

86 For detailed service information for the *Pacific Surfliner* between San Luis Obispo and San Diego, please refer to pages 2-5.

88 For detailed service information for the *Coast Starlight* between Seattle and Los Angeles, please refer to our corresponding timetable folder (P11).

89 Train departs Oakland two minutes after arrival and makes connection with southbound coastal bus at San Jose.

Smoking is prohibited on trains and only permitted in designated areas at stations.

See pages 2-3 for Services, Symbols and Reference Marks.

SHADING KEY	
Daytime train	Overnight train
Thruway and connecting services	

Effective JUNE 9, 2014

SOUTHWEST CHIEF®

CHICAGO
— and —
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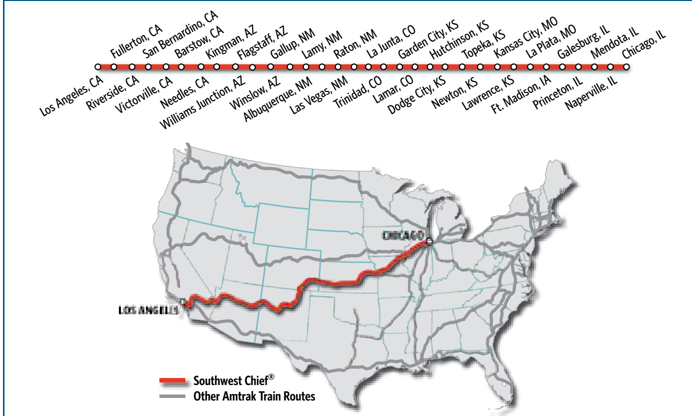
SOUTHWEST CHIEF

3	◂ Train Number ▸					4
Daily	◂ Normal Days of Operation ▸					Daily
R 🛏 🍴 ☕ 🧳	◂ On Board Service ▸					R 🛏 🍴 ☕ 🧳
Read Down	Mile	▼		Symbol	▲	Read Up
🧳3 00P	0	Dp	Chicago, IL–Union Station (CT) 🚌 Madison—see back	●♿QT	Ar	🧳3 15P
R3 35P	28		Naperville, IL	●[♿]QT		D2 42P
4 24P	83		Mendota, IL	○[♿]		1 19P
4 46P	104		Princeton, IL	○[♿]		12 58P
🧳5 38P	162		Galesburg, IL–S. Seminary St. [77]	●♿QT		🧳12 08P
🧳6 42P	220		Fort Madison, IA (Keokuk)	●[♿]QT		🧳11 09A
7 51P	298		La Plata, MO (Kirksville)	○[♿]		9 55A
🧳10 11P 🧳10 45P	437	Ar Dp	Kansas City, MO	●♿QT	Dp Ar	🧳7 43A 🧳7 24A
11 52P	477		Lawrence, KS	○[♿]		5 47A
🧳12 29A	503		Topeka, KS	●♿		🧳5 18A
🧳2 45A	638		Newton, KS (Wichita)	●[♿]		🧳2 59A
3 20A	671		Hutchinson, KS	○♿		2 19A
5 25A	791		Dodge City, KS	◐[♿]		12 27A
6 21A	841		Garden City, KS (CT)	●[♿]		11 17P
6 59A	941		Lamar, CO (MT)	○♿		8 40P
🧳8 15A 🧳8 30A	993	Ar Dp	La Junta, CO	●[♿]	Dp Ar	🧳7 41P 🧳7 31P
9 50A	1074		Trinidad, CO	○[♿]		5 49P
10 56A	1098		Raton, NM 🚌 Denver—see back	○[♿]		4 50P
12 38P	1209		Las Vegas, NM	○[♿]QT		3 03P
🧳2 24P	1274		Lamy, NM 🚌 Santa Fe—see back	●[♿]		🧳1 17P
🧳3 55P 🧳4 45P	1341	Ar Dp	Albuquerque, NM	●[♿]QT	Dp Ar	🧳12 10P 🧳11 42A
7 08P	1514		Gallup, NM (MT)	○[♿]		8 21A
[69]7 50P	1641		Winslow, AZ (MST)	○[♿]		[69]5 39A
[69]🧳8 51P [69]🧳8 57P	1699	Ar Dp	Flagstaff, AZ 🚌 Grand Canyon, Phoenix—see back	●♿QT	Dp Ar	[69]🧳4 41A [69]🧳4 36A
[53][69]9 33P	1730		Williams Jct., AZ (Grand Can. Ry.)	○♿[53]		[53][69]3 50A
[69]11 46P	1873		Kingman, AZ (MST) 🚌 Laughlin, Las Vegas—see back	○[♿]		[69]1 33A
12 49A	1940		Needles, CA (PT)	○♿		12 23A
3 39A	2109		Barstow, CA	○[♿]		9 56P
4 18A	2146		Victorville, CA	○♿		9 10P
5 32A	2193		San Bernardino, CA	○[♿]		7 59P
5 53A	2203		Riverside, CA	○♿		7 33P
🧳D6 34A	2239		Fullerton, CA	●♿QT		🧳R6 50P
🧳8 15A	2265	Ar	Los Angeles, CA ✈ (PT) 🚌 Las Vegas—see back, below	●♿QT	Dp	🧳6 15P

[77] Executive Transportation operates Thruway van service from Springfield, IL for connections from Train 22 to Trains 3 and 5 at Galesburg, IL and from Galesburg, IL for connections from Trains 4 and 6 to Train 21 at Springfield, IL. Passengers with disabilities must provide advance notification of needs. For additional information call (217) 523-5466.

SOUTHWEST CHIEF ROUTE MAP and SYMBOLS



- **A** Time Symbol for A.M.
- **P** Time Symbol for P.M.
- **D** Stops only to discharge passengers; train may leave before time shown.
- **R** Stops only to receive passengers.
- **CT** Central time
- **MT** Mountain time
- **MST** Mountain Standard time
- **PT** Pacific time
- 🚌 Bus stop
- ✈ Airport connection
- **QT** Quik-Trak self-serve ticketing kiosk
- ○ Unstaffed station
- ◐ Attended station
- ● Staffed ticket office; may or may not be open for all train departures
- ♿ Station wheelchair accessible; no barriers between station and train
- [♿] Station wheelchair accessible; not all stations facilities accessible

Service on the Southwest Chief®

- R **Coaches: Reservations required.**
- 🛏 **Sleeping cars:** Superliner sleeping accommodations.
  - Amtrak Metropolitan Lounge available in Chicago and Los Angeles for Sleeping car passengers.
- 🍴 **Dining:** Full meal service.
- ☕ **Sightseer Lounge:** Sandwiches, snacks and beverages.
- 🧳 Checked baggage at select stations.
- [53] Free shuttle service between Williams Grand Canyon Railway station and Williams Junction Amtrak station. Reservations required.
- [69] This location does not observe Daylight Saving Time. Schedule times at this station will be ONE HOUR LATER beginning with the Fall time change on November 2, 2014.

Smoking is prohibited.

Trails and Rails Program: In cooperation with the National Park Service, volunteer rangers from Bent's Old Fort National Historic Site provide narrative between La Junta and Albuquerque on Train 3 Friday and Sunday and on Train 4 Saturday and Monday, May 4 through September 1; volunteers from Texas A&M University provide narrative between Chicago and La Plata on Train 3 Tuesday and Thursday and Train 4 Wednesday and Friday, May 13 through September 15 and November 11 through January 1. Seasonal programs are subject to change. Visit nps.gov/trailsandrails and amtraktoparks.com.

Thruway Bus Connections

Flagstaff • Phoenix *(Arizona Shuttle)*

NOTE—In addition to the same-day train connections at Flagstaff shown on the next page, this service offers overnight connections for travel between Phoenix and the Grand Canyon or points east of Flagstaff.

8561	8563	8553	8557	8559	8565	8567	8581	8569	Thruway Number					8560	8554	8562	8576	8556	8558	8564	8566	8568
Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Mile	▼	Days of Operation	Symbol	▲	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily
5 00A	7 00A	8 00A	9 00A	11 00A	1 00P	3 00P	5 00P	7 00P	0	Dp	Flagstaff, AZ (MST) –Amtrak Station	●	Ar	10 20A	12 20P	2 20P	3 20P	4 20P	6 20P	8 20P	10 20P	12 20A
6 00A	8 00A	9 00A	10 00A	12 00N	2 00P	4 00P	6 00P	8 00P	50	Dp	Camp Verde, AZ	○	Dp	9 00A	11 00A	1 00P	2 00P	3 00P	5 00P	7 00P	9 00P	11 00P
7 50A	9 50A	10 50A	11 50A	1 50P	3 50P	5 50P	7 50P	9 50P	143	Ar	Phoenix, AZ –Metro Center Transportation Ctr.	○	Dp	7 30A	9 30A	11 30A	12 30P	1 30P	3 30P	5 45P	7 30P	9 30P
8 10A	10 10A	11 10A	12 10P	2 10P	4 10P	6 10P	8 10P	10 00P	145	Ar	–Sky Harbor (MST) Airport	○	Dp	7 00A	9 00A	11 00A	12 00N	1 00P	3 00P	5 00P	7 00P	9 00P

NOTE—Additional service: Bus 8579 departs Flagstaff 2:00 p.m., arriving Camp Verde 3:00 p.m., Phoenix Metro Center 4:50 p.m. and Sky Harbor Airport 5:10 p.m. Bus 8580 departs Sky Harbor Airport 6:00 p.m., Metro Center 6:30 p.m. and Camp Verde 8:00 p.m., arriving Flagstaff 9:20 p.m.

Los Angeles • Las Vegas *(Greyhound Lines)* NOTE—Greyhound schedules subject to change.

8534	8536	Thruway Number					8535
Daily	Daily	Mile	▼	Days of Operation	Symbol	▲	Daily
10 45A	3 10P	0	Dp	Los Angeles, CA ✈ –Union Station (PT)	●♿QT	Ar	3 15P
4 55P	8 20P	271	Ar	Las Vegas, NV–Greyhound Station (PT)	○	Dp	9 05A

Shading Key

Shading Key
Long-distance train
Thruway and connecting services

Thruway Bus Connections

Madison • Rockford • Chicago

(Van Galder–en route transfers may be necessary)

8964	Mile	▼	Thruway Number	Symbol	▲	8965
			Madison, WI (CT)			
10 00A	0	Dp	–Univ. of Wisconsin/Chazen Museum	○	Ar	**8 35P**
10 15A	6		–Dutchmill Park & Ride	○		**8 20P**
11 00A	35		Janesville, WI	○		**7 30P**
11 25A	48		South Beloit, IL	○		**7 10P**
11 50A	65	Dp	Rockford, IL	○	Ar	**6 50P**
1 45P	140	Ar	Chicago, IL–Union Station (CT)	●	Dp	**5 00P**

Denver • Colorado Springs • Pueblo • Raton

(Greyhound Lines)

3			Connecting Train Number			4
8603	**Mile**	▼	**Thruway Number**	**Symbol**	▲	**8604**
5 30A		Dp	Denver, CO–Amtrak Station (MT)	●♿	Ar	**9 10P**
7 10A		Ar	Colorado Springs, CO	○	Dp	**7 40P**
8 10A		Ar	Pueblo, CO	○	Dp	**6 45P**
10 20A		Ar	Raton, NM –Amtrak Station (MT)	○	Dp	**5 05P**

Lamy • Santa Fe *(Lamy Shuttle)*

Lamy Shuttle Service van meets Trains 3 and 4 daily. From Lamy to Santa Fe, advance reservations required; call 1-800-USA-RAIL. From Santa Fe to Lamy, shuttle will pick up at your hotel; call (505) 982-8829 the day prior to departure to arrange pickup.

Grand Canyon • Williams *(Grand Canyon Railway)*

7903			Grand Canyon Railway Train Number			7904
Daily	Mile	▼	**Days of Operation**	**Symbol**	▲	**Daily**
3 30P	0	Dp	Grand Canyon, AZ (MST) –Grand Canyon Railway Station	○♿	Ar	11 45A
5 45P	64	Ar	Williams, AZ (MST) –Grand Canyon Railway Station	○♿	Dp	9 30A

NOTE—The Grand Canyon Railway station at the Grand Canyon is located near the Canyon rim, across the road from the El Tovar Hotel. Please visit www.thetrain.com/schedule for any updates to 2014 train schedule.

Williams • Williams Junction 53

(Shuttle service provided by Grand Canyon Railway)

3			Connecting Train Number			4
6903			**Thruway Number**			**6904**
Daily	Mile	▼	**Days of Operation**	**Symbol**	▲	**Daily**
69 **9 10P**	0	Dp	Williams, AZ (MST) –Grand Canyon Railway Station	○♿	Ar	69 4 10A
69 **9 20P**	3	Ar	Williams Junction, AZ (MST) –Amtrak Station	○♿	Dp	69 4 00A
6803		▼	**Thruway Number**		▲	**6804**
69 **9 40P**	0	Dp	Williams Junction, AZ (MST) –Amtrak Station	○♿	Ar	69 3 40A
69 **9 50P**	3	Ar	Williams, AZ (MST) –Grand Canyon Railway Station	○♿	Dp	69 3 30A

Kingman • Laughlin • Las Vegas *(Commuter Services)*

8003	Mile	▼	Thruway Number	Symbol	▲	8004
69 **11 50P**	0	Dp	Kingman, AZ–Amtrak Station (MST)	○	Ar	69 1 00A
12 50A	33	Ar	Laughlin, NV–Tropicana Express (PT)	○	Dp	12 01A
3 10A	128	Ar	Las Vegas, NV (PT) –McCarran International Airport	○	Dp	**9 30P**

Flagstaff • Phoenix *(Greyhound Lines)*

3			Connecting Train Number			4
8703			**Thruway Number**			**8704**
Daily	Mile	▼	**Days of Operation**	**Symbol**	▲	**Daily**
69 **10 10P**	0	Dp	Flagstaff, AZ–KP Transport. (MST)	○	Ar	69 2 20A
69 12 40A	145	Ar	Phoenix, AZ–Greyhound Sta. (MST)	○	Dp	69 **11 40P**

Rail Runner Commuter Rail Service

Belen–Albuquerque–Santa Fe

For information call (866) 795-7245 or visit www.nmrailrunner.com.

See other side for Shading Key, Route Map and Symbols.

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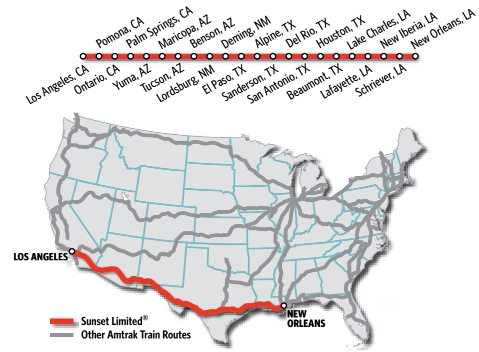
SUNSET LIMITED

1 [20]	Train Number					2 [20]
As indicated in column	Normal Days of Operation					As indicated in column
R	On Board Service					R
Read Down	Mile	▼		Symbol	▲	Read Up
9 00A MoWeSa	0	Dp	**New Orleans, LA** (CT) Baton Rouge—see below	● ♿ QT	Ar	**9 40P** TuFrSu
10 30A MoWeSa	56		**Schriever, LA** (Houma/Thibodaux)	○ ♿		**7 03P** TuFrSu
11 56A MoWeSa	127		**New Iberia, LA**	○ ♿		**5 41P** TuFrSu
12 24P MoWeSa	145		**Lafayette, LA**	○ ♿		**5 15P** TuFrSu
1 55P MoWeSa	219		**Lake Charles, LA**	○ ♿		**3 29P** TuFrSu
3 48P MoWeSa	281		**Beaumont, TX** (Port Arthur)	○ ♿		**2 05P** TuFrSu
6 18P MoWeSa **6 55P** MoWeSa	363	Ar Dp	**Houston, TX** Galveston—see below	● ♿	Dp Ar	**12 10P** TuFrSu 11 10A TuFrSu
12 05A TuThSu 2 45A TuThSu	573	Ar Dp	**San Antonio, TX**	● ♿ QT	Dp Ar	6 25A TuFrSu 4 50A TuFrSu
5 49A TuThSu	742		**Del Rio, TX**	○ ♿		1 02A TuFrSu
8 24A TuThSu	868		**Sanderson, TX**	○		**10 36P** MoThSa
10 38A TuThSu	959		**Alpine, TX** (Big Bend Nat'l Park) (CT)	○ ♿		**8 45P** MoThSa
1 22P TuThSu **1 47P** TuThSu	1178	Ar Dp	**El Paso, TX** (MT) (Ciudad Juarez, Mexico)	● ♿ QT	Dp Ar	**3 35P** MoThSa **3 10P** MoThSa
3 18P TuThSu	1264		**Deming, NM**	○ ♿		**1 10P** MoThSa
4 13P TuThSu	1325		**Lordsburg, NM** (MT)	○ ♿		**12 15P** MoThSa
[69] **5 18P** TuThSu	1443		**Benson, AZ** (MST)	○ ♿		[69] 9 15A MoThSa
[69] **6 45P** TuThSu [69] **7 35P** TuThSu	1493	Ar Dp	**Tucson, AZ**	● ♿ QT	Dp Ar	[69] 8 15A MoThSa [69] 7 28A MoThSa
[69] **8 52P** TuThSu [69] **9 02P** TuThSu	1579	Ar Dp	**Maricopa, AZ** (Phoenix)	● ♿	Dp Ar	[69] 5 40A MoThSa [69] 5 30A MoThSa
[69] **11 49P** TuThSu	1744		**Yuma, AZ** (MST)	○ ♿		[69] 2 47A MoThSa
2 02A WeFrMo	1890		**Palm Springs, CA** (PT)	○ ♿		12 36A MoThSa
D3 54A WeFrMo	1957		**Ontario, CA**	○ ♿		**10 54P** SuWeFr
D4 04A WeFrMo	1964		**Pomona, CA**	○ ♿		**10 41P** SuWeFr
5 35A WeFrMo	1995	Ar	**Los Angeles, CA** ✈ (PT)	● ♿ QT	Dp	**10 00P** SuWeFr

SUNSET LIMITED
ROUTE MAP and SYMBOLS



- **A** Time Symbol for A.M.
- **P** Time Symbol for P.M.
- **D** Stops only to discharge passengers; train may leave before time shown.
- **CT** Central time
- **ET** Eastern time
- **MT** Mountain time
- **MST** Mountain Standard time
- **PT** Pacific time
- Bus stop
- Flag stop
- ✈ Airport connection
- **QT** Quik-Trak self-serve ticketing kiosk
- ○ Unstaffed station
- ● Staffed ticket office; may or may not be open for all train departures
- ♿ Station wheelchair accessible; no barriers between station and train
- Station wheelchair accessible; not all stations facilities accessible

Service on the Sunset Limited®

- R **Coaches: Reservations required.**
- **Sleeping cars:** Superliner sleeping accommodations.
  - Magnolia Room is available in New Orleans and Amtrak Metropolitan Lounge in Los Angeles for Sleeping car passengers.
  - Sleeping car passengers arriving at Los Angeles are welcome to occupy their accommodations until 6:30 a.m.
- **Dining:** Full meal service.
- **Sightseer Lounge:** Sandwiches, snacks and beverages.
- Checked baggage at select stations.
- Train stops only when passengers are present, either on the train or station platform, and ticketed to and/or from this station. Reservations are required. Boarding passengers must reserve as far in advance as possible.
- [69] This location does not observe Daylight Saving Time. Schedule times at this station will be ONE HOUR LATER beginning with the Fall time change on November 2, 2014.

Smoking is prohibited.

Trails and Rails Program: In cooperation with the National Park Service, volunteer rangers from the New Orleans Jazz National Historical Park provide a narrative on Train 1, Monday and Saturday, and Train 2, Tuesday and Sunday, between New Orleans and Beaumont, May 22 through September 2. Seasonal programs are subject to change. Visit nps.gov/trailsandrails and amtraktoparks.com.

Scenic Highlights

- Gulf Coast
- Bayou Country
- Mexican border
- Southwestern desert

Modified Amtrak Service for the *Sunset Limited*

[20] The *Sunset Limited* service between Orlando and New Orleans has been suspended. Future service has not been determined.

Shading Key

Long-distance train	Thruway and connecting services

Thruway Bus Connections

Galveston • Houston *(Lone Star Coach)*

6022	Thruway Number					6021
Daily	Mile	▼	Days of Operation	Symbol	▲	Daily
11 30A	0	Dp	**Galveston, TX** (CT) –123 Rosenberg	○	Ar	**2 45P**
1 05P	47	Ar	**Houston, TX**–Amtrak Station (CT)	● ♿	Dp	**1 15P**

New Orleans • Baton Rouge *(Greyhound Lines)*

8059	Thruway Number					8058
Daily	Mile	▼	Days of Operation	Symbol	▲	Daily
6 10P	0	Dp	**New Orleans, LA** (CT) –Union Passenger Terminal	●	Ar	7 00A
7 55P	80	Ar	**Baton Rouge, LA** (CT)	○	Dp	5 15A

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SUNSET LIMITED

1 [20]			Número de tren			2 [20]
Como se indica en la columna			Días de operación			Como se indica en la columna
R 🛏 ✕ ☕ 🧳			Servicio a bordo			R 🛏 ✕ ☕ 🧳
Leer hacia abajo	Milla	↓		Símbolo	↑	Leer hacia arriba
🧳9 00A LMiS	0	Dp	New Orleans, LA (CT) 🚌 Baton Rouge—ver la derecha	●♿QT	Ar	🧳**9 40P** MVD
✱10 30A LMiS	56		Schriever, LA (Houma/Thibodaux)	○[♿]		✱**7 03P** MVD
✱11 56A LMiS	127		New Iberia, LA	○[♿]		✱**5 41P** MVD
12 24P LMiS	145		Lafayette, LA	○[♿]		**5 15P** MVD
1 55P LMiS	219		Lake Charles, LA	○[♿]		**3 29P** MVD
3 48P LMiS	281		Beaumont, TX (Port Arthur)	○[♿]		**2 05P** MVD
🧳**6 18P** LMiS 🧳**6 55P** LMiS	363	Ar Dp	Houston, TX 🚌 Galveston—ver la derecha	●[♿]	Dp Ar	🧳**12 10P** MVD 🧳11 10A MVD
🧳12 05A MJD 🧳2 45A MJD	573	Ar Dp	San Antonio, TX	●♿QT	Dp Ar	🧳6 25A MVD 🧳4 50A MVD
5 49A MJD	742		Del Rio, TX	○[♿]		1 02A MVD
✱8 24A MJD	868		Sanderson, TX	○		✱**10 36P** LJS
10 38A MJD	959		Alpine, TX (Big Bend Nat'l Park) (CT)	○[♿]		**8 45P** LJS
🧳**1 22P** MJD 🧳**1 47P** MJD	1178	Ar Dp	El Paso, TX (MT) (Ciudad Juarez, Mexico)	●♿QT	Dp Ar	🧳**3 35P** LJS 🧳**3 10P** LJS
✱**3 18P** MJD	1264		Deming, NM	○[♿]		✱**1 10P** LJS
✱**4 13P** MJD	1325		Lordsburg, NM (MT)	○[♿]		✱**12 15P** LJS
[69]✱**5 18P** MJD	1443		Benson, AZ (MST)	○[♿]		[69]✱9 15A LJS
[69]🧳**6 45P** MJD [69]🧳**7 35P** MJD	1493	Ar Dp	Tucson, AZ	●[♿]QT	Dp Ar	[69]🧳8 15A LJS [69]🧳7 28A LJS
[69]🧳**8 52P** MJD [69]🧳**9 02P** MJD	1579	Ar Dp	Maricopa, AZ (Phoenix)	●[♿]	Dp Ar	[69]🧳5 40A LJS [69]🧳5 30A LJS
[69]**11 49P** MJD	1744		Yuma, AZ (MST)	○♿		[69]2 47A LJS
2 02A MiVL	1890		Palm Springs, CA (PT)	○♿		12 36A LJS
D3 54A MiVL	1957		Ontario, CA	○♿		**10 54P** DMiV
D4 04A MiVL	1964		Pomona, CA	○[♿]		**10 41P** DMiV
🧳5 35A MiVL	1995	Ar	Los Angeles, CA ✈ (PT)	●♿QT	Dp	🧳**10 00P** DMiV

Servicio en el Sunset Limited®

- R **Clase económica: se requiere reservación.**
- 🛏 **Cabinas dormitorio:** Dormitorios en Superliner.
  - El Salón Magnolia está disponible en Nueva Orleans y el Salón Metropolitan en Los Ángeles para los pasajeros con servicio de coche-cama.
  - Los pasajeros con servicio de coche-cama que lleguen a Los Ángeles pueden ocupar sus lugares hasta las 6:30 a.m.
- ✕ **Comedor:** servicio de comida completo.
- ☕ **Lounge Sightseer:** sándwiches, refrigerios y bebidas.
- 🧳 Equipaje facturado en estaciones selectas.
- ✱ El tren se detiene en una estación sólo cuando hay pasajeros en el tren con boleto hasta dicha estación o en la plataforma de la misma con boleto para salir desde allí. Es necesario hacer reservaciones. Los pasajeros que se van a embarcar deben reservar con la mayor anticipación posible.
- [69] Esta ubicación no respeta el horario de verano. Los horarios programados para esta estación se RETRASARÁN UNA HORA a partir del cambio de horario de otoño que comenzará a regir el 2 de noviembre de 2014.

Está prohibido fumar.

Programa Trails and Rails: en cooperación con el Servicio de Parques Nacionales, los guardaparques voluntarios del Parque Histórico Nacional de Jazz de Nueva Orleans realizarán una narración en el tren 1, los lunes y los sábados, y en el tren 2, los martes y los domingos, entre Nueva Orleans y Beaumont, desde el 22 de mayo hasta el 2 de septiembre. Los programas de temporada están sujetos a modificación. Visite nps.gov/trailsandrails y amtraktoparks.com.

Conexión de Thruway Bus

Galveston • Houston *(Lone Star Coach)*

6022			Número de Thruway			6021
Diariamente	Milla	↓	Días de operación	Símbolo	↑	Diariamente
11 30A	0	Dp	Galveston, TX (CT) –123 Rosenberg	○	Ar	**2 45P**
🧳**1 05P**	47	Ar	Houston, TX–Estación de Amtrak (CT)	●[♿]	Dp	**1 15P**

New Orleans • Baton Rouge *(Greyhound Lines)*

8059			Número de Thruway			8058
Diariamente	Milla	↓	Días de operación	Símbolo	↑	Diariamente
6 10P	0	Dp	New Orleans, LA (CT) –Union Passenger Terminal	●	Ar	7 00A
7 55P	80	Ar	Baton Rouge, LA (CT)	○	Dp	5 15A

Convenciones del sombreado

Tren de larga distancia	Thruway y servicios de conexión

Servicio Amtrak modificado para *Sunset Limited*

[20] El servicio de *Sunset Limited* entre Orlando y New Orleans ha sido suspendido. No se ha determinado cuándo iniciará el servicio futuro.

SUNSET LIMITED MAPA DE LA RUTA y SÍMBOLOS

- **A** Símbolo de tiempo para A.M.
- **N** Símbolo de tiempo para mediodía.
- **P** Símbolo de tiempo para P.M.
- **D** Sólo se detiene para bajar pasajeros; el tren puede partir antes de la hora que se muestra.
- **CT** Hora del Centro
- **ET** Hora del Este
- **MT** Hora de la Montaña
- **MST** Hora estándar de la Montaña
- **PT** Símbolo de tiempo para P.M.
- 🚌 Parada de autobús
- ✱ Parada a petición del pasajero
- ✈ Conexión al aeropuerto
- **QT** Quiosco Quik-Trak, venta de boletos autoservicio
- ○ Estación no provista de personal
- ● Oficina de boletos provista de personal; puede no estar abierta en todos los horarios de salida
- ♿ Estación con acceso para silla de ruedas; no hay obstáculos entre la estación y el tren.
- [♿] Estación con acceso para silla de ruedas; no todas las instalaciones de la estación son accesibles

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Appendix B: Metrolink and Amtrak Forecast – Daily and for 6-Hour AM/PM Peak for 2026, 2031, and 2040

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Table B-1. 2026 Metrolink Projection by Line

Breakdown by Metrolink Line		
Ventura County Line	Total Daily[a]	70
	6-hour peak[b]	24
	LAUS-CMF	0
Orange County Line	Total Daily[a]	74
	6-hour peak[b]	26
	LAUS-CMF	0
Antelope Valley Line	Total Daily[a]	81
	6-hour peak[b]	32
	LAUS-CM	10
San Bernardino Line	Total Daily[a]	62
	6-hour peak[b]	28
	LAUS-CMF	10
Riverside Line	Total Daily[a]	12
	6-hour peak[b]	9
	LAUS-CMF	10
91/Perris Valley Line	Total Daily[a]	71
	6-hour peak[b]	25
	LAUS-CMF	10
	Total Daily	410
	# of Rev Trains	370
	*# of dead head equipment moves**	40
	Total 6-hour Peak (AM and PM combined)	144

Source: Source: SCRRA 2018a

Notes:

*[a] **Includes deadhead moves between LAUS and CMF***

*[b] **Inbound/Outbound 6:00-9:00 AM; 3:00-6:00 PM***

Service frequencies assumed at 30-minutes based on direction from Metrolink

2026 15 Minute Peak:

AM: 6:00 – 6:15; 7:00 – 7:15; 7:30 – 7:45;

PM: 4:30 – 4:45; 5:00 – 5:15; 5:30 – 5:45;

Table B-2. 15-min peak breakdown – AM

Line	Time												TOTAL
	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	
VCL	2	0	2	0	2	0	2	0	2	0	2	0	**12**
OCL	1	1	1	1	1	1	1	1	1	1	1	2	**13**
AVL	2	1	2	0	2	1	2	0	2	1	2	1	**16**
SBL	2	0	2	1	2	0	2	1	2	0	2	1	**15**
Riv	1	—	—	—	1	—	1	—	—	1	—	—	**4**
91/Perris	1	0	1	1	1	1	1	1	1	1	1	2	**12**
TOTAL	**9**	**2**	**8**	**3**	**9**	**3**	**9**	**3**	**8**	**4**	**8**	**6**	**72**

Table B-3. 15-min peak breakdown – PM

Line	Time												TOTAL
	15:00	15:15	15:30	15:45	16:00	16:15	16:30	16:45	17:00	17:15	17:30	17:45	
VCL	2	0	2	0	2	0	2	0	2	0	2	0	**12**
OCL	1	1	1	1	1	1	1	1	1	1	1	2	**13**
AVL	2	1	2	0	2	1	2	0	2	1	2	1	**16**
SBL	1	0	2	1	1	0	2	1	2	0	2	1	**13**
Riv	—	—	—	—	—	1	1	—	1	—	1	1	**5**
91/Perris	1	1	1	1	1	1	1	1	1	1	1	2	**13**
TOTAL	**7**	**3**	**8**	**3**	**7**	**5**	**9**	**3**	**9**	**4**	**8**	**6**	**72**

Source: SCRRA 2018a

Table B-4. 2031/2040 Metrolink Projection by Line

Breakdown by Metrolink Line		
Ventura – Orange County Line	Total Daily [a]	*304*
	VC-OC High Frequency Local[c]	*288*
	Ventura County Express	*16*
	6-hour peak [b]	*112*
	LAUS-CMF	*0*
Antelope Valley Line - Perris Valley Line	Total Daily [a]	*276*
	Antelope Valley/91-Perris Valley Regional [c]	*132*
	Santa Clarita High-Frequency Local	*144*
	6-hour peak [b]	*92*
	LAUS-CMF	*0*
San Bernardino Line	Total Daily [a]	*86*
	San Bernardino Regional	*78*
	San Bernardino Express	*8*
	6-hour peak [b]	*34*
	LAUS-CMF	*0*
Riverside Line	Total Daily [a]	*24*
	6-hour peak [b]	*12*
	LAUS-CMF	*12*
	Total Daily	**690**
	# of Rev Trains	*678*
	*# of dead head equipment moves **	*12*
	Total 6-hour Peak (AM and PM combined)	**250**

Source: SCRRA 2018b

Notes:
[a] ***Includes deadhead moves between LAUS and CMF***
[b] ***Inbound/Outbound 6:00-9:00 AM; 3:00-6:00 PM***
[c] ***Run-through trains are counted as separate moves and hence doubled***
Calculations based off 2028 Service Levels – 2018 TIRCP Application Assumptions

2031/2040 15 Minute Peak:

AM: 7:00 – 6:15; 7:30 – 7:45; 8:00 – 8:15; 8:30 – 8:45

PM: 4:00 – 4:15; 4:30 – 4:45; 5:00 – 5:15; 5:30 – 5:45

Table B-5. 15-min peak breakdown – AM

Line	Time												TOTAL
	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	
VCL/OCL	4	4	4	5	5	5	5	5	5	5	5	4	**56**
AVL/PVL	3	3	4	4	4	4	4	4	4	4	4	4	**46**
SBL	2	1	1	1	2	1	2	1	2	1	2	1	**17**
Riv	1	0	1	0	1	0	1	0	1	0	1	0	**6**
TOTAL	**10**	**8**	**10**	**10**	**12**	**10**	**12**	**10**	**12**	**10**	**12**	**9**	**125**

Table B-6. 15-min peak breakdown – PM

Line	Time												TOTAL
	15:00	15:15	15:30	15:45	16:00	16:15	16:30	16:45	17:00	17:15	17:30	17:45	
VCL/OCL	4	4	4	5	5	5	5	5	5	5	5	4	**56**
AVL/PVL	3	3	4	4	4	4	4	4	4	4	4	4	**46**
SBL	2	1	1	1	2	1	2	1	2	1	2	1	**17**
Riv	1	0	1	0	1	0	1	0	1	0	1	0	**6**
TOTAL	**10**	**8**	**10**	**10**	**12**	**10**	**12**	**10**	**12**	**10**	**12**	**9**	**125**

Source: SCRRA 2018b

Table B-7. 2026 Amtrak Projection (Pacific Surfliner and Amtrak Long Distance)

	6 hour peak			Daily Total		
	LOSSAN	Long Distance	TOTAL	LOSSAN	Long Distance	TOTAL
Revenue Trains	19	1	20	48	5	53
Non-Revenue Trains	0	1	1	10	5	15
Total	**19**	**2**	**21**	**58**	**10**	**68**

Source: SCRRA 2018a

Notes:
Assumptions:
7 LAUS to north of LAUS Round Trips
15 LAUS to San Diego Round Trips
2 LAUS to Coachella/Indio Round Trips
Equipment in LAUS: 4 Pacific Surfliner (LOSSAN), 1 Coachella
No Future Growth on Amtrak Long Distance

Table B-8. 2031 Amtrak Projection (Pacific Surfliner and Amtrak Long Distance)

	6 hour peak			Daily Total		
	LOSSAN	Long Distance	TOTAL	LOSSAN	Long Distance	TOTAL
Revenue Trains	19	1	20	56	5	61
Non-Revenue Trains	0	1	1	14	5	19
Total	**19**	**2**	**21**	**70**	**10**	**80**

Source: SCRRA 2018b

Notes:
Assumptions:
18-hour Service Day
8 LAUS to north of LAUS Round Trips
Hourly service between LAUS and San Diego
2 LAUS to Coachella/Indio Round Trips
Equipment in LAUS: 6 Pacific Surfliner (LOSSAN), 1 Coachella
No Future Growth on Amtrak Long Distance

Table B-9. 2040 Amtrak Projection (Pacific Surfliner and Amtrak Long Distance)

	6 hour peak			Daily Total		
	LOSSAN	Long Distance	TOTAL	LOSSAN	Long Distance	TOTAL
Revenue Trains	37	1	38	112	5	117
Non-Revenue Trains	0	1	1	18	5	23
Total	**37**	**2**	**39**	**130**	**10**	**140**

Source: SCRRA 2018b

Notes:
Assumptions:
18-hour Service Day
Hourly service between LAUS and north of LAUS
30-minutes service between LAUS and San Diego
2 LAUS to Coachella/Indio Round Trips
Equipment in LAUS: 8 Pacific Surfliner (LOSSAN), 1 Coachella
No Future Growth on Amtrak Long Distance

Appendix B:
Construction and Operational Assumptions

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EQUIPMENT USE BY EQUIPMENT - Build Alternative

Biditem/ Category	Activity/ Resource	Description	Quantity	Unit	Pcs	Rnt %	EOE %	Inside Equipment	Outside Equipment	EOE	Other	Total
8APPV020		Asphalt Paver, CAT 1055D										
*** 8APPV020		Asphalt Paver, CAT 1055D	82.53					12,468		9,118		21,586
8APPV200B		Asphalt Paver, CAT 200B										
*** 8APPV200B		Asphalt Paver, CAT 200B	156.00					11,982				11,982
8BH		***Backhoe***										
*** 8BH		***Backhoe***	41.20						5,601			5,601
8BH336		Crawler Hoe 40T (Cat 336)										
*** 8BH336		Crawler Hoe 40T (Cat 336)	12.27					589		352		941
8BH416		Tractor Backhoe, CAT 416										
*** 8BH416		Tractor Backhoe, CAT 416	2,674.67					39,572		46,641		86,213
8BH430		Tractor Backhoe, CAT 430										
*** 8BH430		Tractor Backhoe, CAT 430	3,253.82					59,825		73,146		132,971
8BHAHAM1500		Attach, Hammer, 1500 flb										
*** 8BHAHAM1500		Attach, Hammer, 1500 flb	75.62					840		495		1,336
8CA2CL		Exc Clam Shall 1.5CY										
*** 8CA2CL		Exc Clam Shall 1.5CY	1,334.08					26,148				26,148
8CC150		Crane 4000 175T										
*** 8CC150		Crane 4000 175T	41.20					2,636		1,912		4,548
8CMP0185D		Air Compressor, 185 cfm, Ds										
*** 8CMP0185D		Air Compressor, 185 cfm, Ds	1,311.64					4,769		14,192		18,961
8CMP0375D		Air Compressor, 375 cfm, Ds										
*** 8CMP0375D		Air Compressor, 375 cfm, Ds	5,523.14					38,413		91,353		129,766
8COECP01		Cellular Concrete Pump/Mixer										
*** 8COECP01		Cellular Concrete Pump/Mixer	5,710.49					1,142,098		285,525		1,427,623
8COEPU100		Conc.Pump Trlr Mtd.100 cy/Hr										
*** 8COEPU100		Conc.Pump Trlr Mtd.100 cy/Hr	5.47					178		255		433
8COEWB090		Work Bridge, 90 ft										
*** 8COEWB090		Work Bridge, 90 ft	1,217.99					9,190		9,459		18,649
8COPFIN80		Paving Roller/Finisher, 80'										
*** 8COPFIN80		Paving Roller/Finisher, 80'	1,217.99					17,716		18,708		36,424
8CRNCR100		Crane, 100 Ton Crawler(222)										
*** 8CRNCR100		Crane, 100 Ton Crawler(222)	2,907.43					297,945		252,481		550,426
8CRNCR200		Crane 200 Ton Crawler(777)										
*** 8CRNCR200		Crane 200 Ton Crawler(777)	77,136.15					13,411,200		10,853,829		24,265,028
8CRNRT35		R.T. Crane, 35 Ton										
*** 8CRNRT35		R.T. Crane, 35 Ton	1,242.61					61,876		65,377		127,253
8CRNRT50		R.T. Crane, 50 Ton										
*** 8CRNRT50		R.T. Crane, 50 Ton	169.26					9,078		11,305		20,383
8CRNTK140		Crane,Hy Trk, 140 Ton (238A)										
*** 8CRNTK140		Crane,Hy Trk, 140 Ton (238A)	300.00					37,534		36,008		73,542
8DSCMHD075		Bauer BG 18, 75'/5'										
*** 8DSCMHD075		Bauer BG 18, 75'/5'	1,789.66					192,469		169,898		362,367
8DSCMHD100		Bauer BG 28, 100'/7'										
*** 8DSCMHD100		Bauer BG 28, 100'/7'	8,020.50					1,433,119		1,259,820		2,692,939
8DSCMHD200		Bauer BG 36, 200'/10'										
*** 8DSCMHD200		Bauer BG 36, 200'/10'	33,295.43					7,447,588		6,208,765		13,656,354
8DSCMHD300		Bauer BG 40, 300'/12'										
*** 8DSCMHD300		Bauer BG 40, 300'/12'	17,575.80					4,019,269		3,498,428		7,517,697
8DSGRAB		Hartfuss Ball Grab										
*** 8DSGRAB		Hartfuss Ball Grab	60,647.39					609,203		1,516,185		2,125,388
8DZ06		CAT D6 T, 185 hp										
*** 8DZ06		CAT D6 T, 185 hp	627.44					30,459		31,910		62,369
8EL100		8 Ton Crane										
*** 8EL100		8 Ton Crane	1,837.99					148,510		27,570		176,079
8EL110		10 Ton Crane										
*** 8EL110		10 Ton Crane	8.00					819		120		939

EQUIPMENT USE BY EQUIPMENT - Build Alternative

Biditem/ Category	Activity/ Resource	Description	Quantity	Unit	Pcs	Rnt %	EOE %	Inside Equipment	Outside Equipment	EOE	Other	Total
8EL200		40' Telescopic Boom Lift w/										
*** 8EL200		40' Telescopic Boom Lift w/	444.78					37,691		6,672		44,362
8EX307		CAT 307 Exc - 0.43 cy										
*** 8EX307		CAT 307 Exc - 0.43 cy	12.82					277		256		533
8EX321		CAT 321D Exc,1.18 cy,21 tn										
*** 8EX321		CAT 321D Exc,1.18 cy,21 tn	5,253.53					207,278		222,645		429,923
8EX324		CAT 324E L Exc,1.74 cy,24 tn										
*** 8EX324		CAT 324E L Exc,1.74 cy,24 tn	132.77					5,824		6,883		12,707
8EX330		CAT 330 Exc - 2.0 cy										
*** 8EX330		CAT 330 Exc - 2.0 cy	1.33					180				180
8EX336		CAT 336D L Exc,1.56 cy,36 tn										
*** 8EX336		CAT 336D L Exc,1.56 cy,36 tn	14,529.38					812,657		960,683		1,773,340
8EX345		CAT 345 Exc,2.36 cy,45 tn										
*** 8EX345		CAT 345 Exc,2.36 cy,45 tn	1,959.74					143,463		175,260		318,722
8EXACMP24		Attach, Compact, 24"										
*** 8EXACMP24		Attach, Compact, 24"	10.85					36		23		59
8EXAHAM2500		Attach, Hammer, 2500 flb										
*** 8EXAHAM2500		Attach, Hammer, 2500 flb	489.24					6,504		4,971		11,475
8EXAHAM7500		Attach, Hammer, 7500 flb										
*** 8EXAHAM7500		Attach, Hammer, 7500 flb	913.86					31,964		21,028		52,992
8FLTELE10		RT Fork Lift, CAT TL-1055										
*** 8FLTELE10		RT Fork Lift, CAT TL-1055	25,210.29					690,409		679,115		1,369,524
8GEN005		Generator, 5Kw										
*** 8GEN005		Generator, 5Kw	51,081.19					39,486		210,863		250,349
8GENLPL		Light Tower, 6000 Watt										
*** 8GENLPL		Light Tower, 6000 Watt										
8GR14		Grader, CAT 14										
*** 8GR14		Grader, CAT 14	3,867.88					230,491		217,994		448,485
8LD210		Loader, Deere 210, 1.0 cy										
*** 8LD210		Loader, Deere 210, 1.0 cy	1,344.00					109		22,310		22,419
8LD950		Loader, Whl, CAT 950, 4.0 cy										
*** 8LD950		Loader, Whl, CAT 950, 4.0 cy	1,293.42					29,866		38,466		68,333
8LD966		Loader, Whl, CAT 966, 5.5 cy										
*** 8LD966		Loader, Whl, CAT 966, 5.5 cy	125,237.37					4,696,402		6,230,559		10,926,961
8LD980		Loader, Whl, CAT 980, 7.5 cy										
*** 8LD980		Loader, Whl, CAT 980, 7.5 cy	913.86					51,197		55,745		106,943
8LDIT62		Loader, IT, CAT IT62 w/Forks										
*** 8LDIT62		Loader, IT, CAT IT62 w/Forks	33,538.36					1,143,356		1,217,946		2,361,302
8LDT963		loader, Trk, CAT 963, 3.0 cy										
*** 8LDT963		loader, Trk, CAT 963, 3.0 cy	7,232.82					445,968		421,782		867,750
8LRSTR		Skid Steer Loader Tracked										
*** 8LRSTR		Skid Steer Loader Tracked	487.91					5,988		2,644		8,633
8MIBROOM		Pavement Broom										
*** 8MIBROOM		Pavement Broom	12,480.00					761		208,042		208,803
8MISNDBL300		Sand Blaster - 300 lb, Air										
*** 8MISNDBL300		Sand Blaster - 300 lb, Air	1,302.04					1,746		755		2,501
8MISRT		Forktruck 10K Telehandler										
*** 8MISRT		Forktruck 10K Telehandler	2,377.16					42,682		25,602		68,284
8MITCMR		Mortar Mixer										
*** 8MITCMR		Mortar Mixer	2,377.16					23,772		11,886		35,657
8MITMK		Telescopic Man Lift, 40 Ft										
*** 8MITMK		Telescopic Man Lift, 40 Ft	13,434.25					177,399		147,253		324,652
8MITML		Telescopic Man Lift, 80 Ft										
*** 8MITML		Telescopic Man Lift, 80 Ft	1,124.70					33,613		23,399		57,012
8PEHV200		Vib Hammer,APD 200,200t/150t										
*** 8PEHV200		Vib Hammer,APD 200,200t/150t	2,104.50					107,138		221,221		328,359

EQUIPMENT USE BY EQUIPMENT - Build Alternative

Biditem/ Category	Activity/ Resource	Description	Quantity	Unit	Pcs	Rnt %	EOE %	Inside Equipment	Outside Equipment	EOE	Other	Total
8PUSUB03		Pump, 3" Sub Elect. 3.0Hp										
*** 8PUSUB03		Pump, 3" Sub Elect. 3.0Hp	12,938.47					22,060		20,184		42,244
8R02		TRUCK - PICKUP										
*** 8R02		TRUCK - PICKUP	4,148.13					22,392		43,887		66,279
8R06		TRUCK - MATERIAL HANDLER										
*** 8R06		TRUCK - MATERIAL HANDLER	1,416.48					58,792		92,680		151,473
8RCDDS67		Compact,DD Smooth, CAT CB54										
*** 8RCDDS67		Compact,DD Smooth, CAT CB54	156.00					5,705		4,207		9,912
8RCDDS84		Compact,DD Smooth, CAT CB64										
*** 8RCDDS84		Compact,DD Smooth, CAT CB64	165.03					8,454		5,413		13,867
8RCPAD66		Compact,SD Padfoot, CAT 433										
*** 8RCPAD66		Compact,SD Padfoot, CAT 433	3.74					63		83		147
8RCPAD84		Compact,SD Padfoot, CAT CP56										
*** 8RCPAD84		Compact,SD Padfoot, CAT CP56	971.42					27,001		33,490		60,490
8RCPNU90		Compact, Pnumatic, CAT PS360										
*** 8RCPNU90		Compact, Pnumatic, CAT PS360	238.53					10,902		5,614		16,516
8RCSDS66		Compact,SD Smooth, CAT CS423										
*** 8RCSDS66		Compact,SD Smooth, CAT CS423	4,481.74					75,679		98,733		174,411
8RCVIBE		Hand Tamp,Vibro Plate/Wacker										
*** 8RCVIBE		Hand Tamp,Vibro Plate/Wacker	9,461.68					32,898		33,305		66,203
8RCWALK		Walk Behind Roller										
*** 8RCWALK		Walk Behind Roller	5,094.56					22,926		23,888		46,814
8SCR615C		Scraper, CAT 615 EL,14 cy										
*** 8SCR615C		Scraper, CAT 615 EL,14 cy	50.00					27		4,796		4,822
8SLD226		CAT Skid Steer 226										
*** 8SLD226		CAT Skid Steer 226	60,650.59					720,893		836,250		1,557,143
8SLD246		CAT Skid Steer 246										
*** 8SLD246		CAT Skid Steer 246	12,958.31					168,160		204,392		372,551
8TK14		Dump Truck, 14 Cy										
*** 8TK14		Dump Truck, 14 Cy	82.40					1,391		1,496		2,886
8TK600		Rack Truck 11000 GVW										
*** 8TK600		Rack Truck 11000 GVW	12,480.00					86,149		81,744		167,893
8TKDMP10		Trk, End Dump, 10 cy										
*** 8TKDMP10		Trk, End Dump, 10 cy	35,096.45					583,092		1,542,489		2,125,581
8TKDMP15		Trk, End Dump, 15 cy										
*** 8TKDMP15		Trk, End Dump, 15 cy	130,928.66					3,169,128		6,885,538		10,054,667
8TKFB10		Trk, Flatbed/Dump 10 Ton										
*** 8TKFB10		Trk, Flatbed/Dump 10 Ton	86,337.30					529,766		1,357,222		1,886,988
8TKFB2		Flatbed/Dump 2 Ton										
*** 8TKFB2		Flatbed/Dump 2 Ton	156.00					2,785				2,785
8TKFB20		Trk, Flatbed/Dump 20 Ton										
*** 8TKFB20		Trk, Flatbed/Dump 20 Ton	25,145.44					257,163		590,163		847,326
8TKMCH		Mechanics Truck, 1Ton										
*** 8TKMCH		Mechanics Truck, 1Ton	3,120.00					42,544		34,320		76,864
8TKOIL		Oil Distributer Truck										
*** 8TKOIL		Oil Distributer Truck	213.53					2,912		2,349		5,261
8TKPU2		Pickup, 1/2 Ton, 2X4										
*** 8TKPU2		Pickup, 1/2 Ton, 2X4	327,237.00					1,085,772		2,424,826		3,510,599
8TKPU4		Pickup, 3/4 Ton, 4X4										
*** 8TKPU4		Pickup, 3/4 Ton, 4X4	343,772.09					1,484,408		2,677,985		4,162,393
8TKTRA		Trk, Tractor, 6 X 4, 45K										
*** 8TKTRA		Trk, Tractor, 6 X 4, 45K	6,280.00					97,196		233,333		330,529
8TKWAT04		Trk, Water,4000 G										
*** 8TKWAT04		Trk, Water,4000 G	51,441.90					879,193		1,555,346		2,434,540
8TLFLT40		Trailer, Float, 40 ft										
*** 8TLFLT40		Trailer, Float, 40 ft	6,280.00					32,399		34,854		67,253

EQUIPMENT USE BY EQUIPMENT - Build Alternative

Biditem/ Category	Activity/ Resource	Description	Quantity	Unit	Pcs	Rnt %	EOE %	Inside Equipment	Outside Equipment	EOE	Other	Total
8WM350		Welding Machine, 350 Amp										
*** 8WM350		Welding Machine, 350 Amp	5,106.97					8,590		21,679		30,269
8WM8PE		Weld Machine,8 Pack 200 Amp										
*** 8WM8PE		Weld Machine,8 Pack 200 Amp	7,118.69					4,855		40,349		45,204
		*****REPORT TOTALS*****						47,475,042	5,601	54,507,470		101,988,113

"*" indicates non-additive item

EQUIPMENT USE BY EQUIPMENT - Proposed Project

Biditem/ Category	Activity/ Resource	Description	Quantity	Unit	Pcs	Rnt %	EOE %	Inside Equipment	Outside Equipment	EOE	Other	Total
8APPV020		Asphalt Paver, CAT 1055D										
*** 8APPV020		Asphalt Paver, CAT 1055D	25.00					3,777		2,762		6,539
8APPV200B		Asphalt Paver, CAT 200B										
*** 8APPV200B		Asphalt Paver, CAT 200B	156.00					11,982				11,982
8BH		***Backhoe***										
*** 8BH		***Backhoe***	41.20						5,601			5,601
8BH416		Tractor Backhoe, CAT 416										
*** 8BH416		Tractor Backhoe, CAT 416	1,958.37					28,974		34,150		63,124
8BH430		Tractor Backhoe, CAT 430										
*** 8BH430		Tractor Backhoe, CAT 430	3,178.20					58,434		71,446		129,880
8CA2CL		Exc Clam Shall 1.5CY										
*** 8CA2CL		Exc Clam Shall 1.5CY	1,334.08					26,148				26,148
8CC150		Crane 4000 175T										
*** 8CC150		Crane 4000 175T	41.20					2,636		1,912		4,548
8CMP0185D		Air Compressor, 185 cfm, Ds										
*** 8CMP0185D		Air Compressor, 185 cfm, Ds	779.66					2,835		8,436		11,271
8CMP0375D		Air Compressor, 375 cfm, Ds										
*** 8CMP0375D		Air Compressor, 375 cfm, Ds	5,292.83					36,812		87,544		124,355
8COECP01		Cellular Concrete Pump/Mixer										
*** 8COECP01		Cellular Concrete Pump/Mixer	5,091.71					1,018,342		254,586		1,272,928
8COEWB090		Work Bridge, 90 ft										
*** 8COEWB090		Work Bridge, 90 ft	878.22					6,626		6,820		13,446
8COPFIN80		Paving Roller/Finisher, 80'										
*** 8COPFIN80		Paving Roller/Finisher, 80'	878.22					12,774		13,490		26,263
8CRNCR100		Crane, 100 Ton Crawler(222)										
*** 8CRNCR100		Crane, 100 Ton Crawler(222)	2,196.23					225,063		190,721		415,784
8CRNCR200		Crane 200 Ton Crawler(777)										
*** 8CRNCR200		Crane 200 Ton Crawler(777)	40,200.93					6,989,495		5,656,674		12,646,168
8CRNRT35		R.T. Crane, 35 Ton										
*** 8CRNRT35		R.T. Crane, 35 Ton	1,242.61					61,876		65,377		127,253
8CRNRT50		R.T. Crane, 50 Ton										
*** 8CRNRT50		R.T. Crane, 50 Ton	148.19					7,948		9,898		17,846
8CRNTK140		Crane,Hy Trk, 140 Ton (238A)										
*** 8CRNTK140		Crane,Hy Trk, 140 Ton (238A)	3,810.05					476,691		457,301		933,992
8DSCMHD075		Bauer BG 18, 75'/5'										
*** 8DSCMHD075		Bauer BG 18, 75'/5'	2,965.33					318,906		281,508		600,414
8DSCMHD100		Bauer BG 28, 100'/7'										
*** 8DSCMHD100		Bauer BG 28, 100'/7'	4,875.27					871,123		765,783		1,636,906
8DSCMHD200		Bauer BG 36, 200'/10'										
*** 8DSCMHD200		Bauer BG 36, 200'/10'	2,575.06					575,995		480,184		1,056,179
8DSCMHD300		Bauer BG 40, 300'/12'										
*** 8DSCMHD300		Bauer BG 40, 300'/12'	14,878.60					3,402,468		2,961,556		6,364,024
8DSGRAB		Hartfuss Ball Grab										
*** 8DSGRAB		Hartfuss Ball Grab	25,294.26					254,081		632,357		886,437
8DZ06		CAT D6 T, 185 hp										
*** 8DZ06		CAT D6 T, 185 hp	307.44					14,925		15,636		30,560
8EL100		8 Ton Crane										
*** 8EL100		8 Ton Crane	99.50					8,040		1,493		9,532
8EL110		10 Ton Crane										
*** 8EL110		10 Ton Crane	8.00					819		120		939
8EL200		40' Telescopic Boom Lift w/										
*** 8EL200		40' Telescopic Boom Lift w/	48.44					4,105		727		4,831
8EX307		CAT 307 Exc - 0.43 cy										
*** 8EX307		CAT 307 Exc - 0.43 cy	12.82					277		256		533
8EX321		CAT 321D Exc,1.18 cy,21 tn										
*** 8EX321		CAT 321D Exc,1.18 cy,21 tn	3,294.05					129,967		139,602		269,569

EQUIPMENT USE BY EQUIPMENT - Proposed Project

Biditem/ Category	Activity/ Resource	Description	Quantity	Unit	Pcs	Rnt %	EOE %	Inside Equipment	Outside Equipment	EOE	Other	Total
8EX324		CAT 324E L Exc,1.74 cy,24 tn										
*** 8EX324		CAT 324E L Exc,1.74 cy,24 tn	132.77					5,824		6,883		12,707
8EX330		CAT 330 Exc - 2.0 cy										
*** 8EX330		CAT 330 Exc - 2.0 cy	1.33					180				180
8EX336		CAT 336D L Exc,1.56 cy,36 tn										
*** 8EX336		CAT 336D L Exc,1.56 cy,36 tn	6,068.81					339,441		401,270		740,710
8EX345		CAT 345 Exc,2.36 cy,45 tn										
*** 8EX345		CAT 345 Exc,2.36 cy,45 tn	1,229.10					89,976		109,918		199,895
8EXACMP24		Attach, Compact, 24"										
*** 8EXACMP24		Attach, Compact, 24"	10.85					36		23		59
8EXAHAM2500		Attach, Hammer, 2500 flb										
*** 8EXAHAM2500		Attach, Hammer, 2500 flb	1.33					18		14		31
8EXAHAM7500		Attach, Hammer, 7500 flb										
*** 8EXAHAM7500		Attach, Hammer, 7500 flb	671.13					23,474		15,443		38,917
8FLTELE10		RT Fork Lift, CAT TL-1055										
*** 8FLTELE10		RT Fork Lift, CAT TL-1055	21,394.17					585,901		576,317		1,162,217
8GEN005		Generator, 5Kw										
*** 8GEN005		Generator, 5Kw	24,535.00					18,965		101,280		120,246
8GENLPL		Light Tower, 6000 Watt										
*** 8GENLPL		Light Tower, 6000 Watt										
8GR14		Grader, CAT 14										
*** 8GR14		Grader, CAT 14	2,741.02					163,340		154,484		317,824
8LD210		Loader, Deere 210, 1.0 cy										
*** 8LD210		Loader, Deere 210, 1.0 cy	1,344.00					109		22,310		22,419
8LD950		Loader, Whl, CAT 950, 4.0 cy										
*** 8LD950		Loader, Whl, CAT 950, 4.0 cy	1,244.77					28,743		37,019		65,762
8LD966		Loader, Whl, CAT 966, 5.5 cy										
*** 8LD966		Loader, Whl, CAT 966, 5.5 cy	97,888.04					3,670,802		4,869,930		8,540,732
8LD980		Loader, Whl, CAT 980, 7.5 cy										
*** 8LD980		Loader, Whl, CAT 980, 7.5 cy	671.13					37,599		40,939		78,538
8LDIT62		Loader, IT, CAT IT62 w/Forks										
*** 8LDIT62		Loader, IT, CAT IT62 w/Forks	27,284.59					930,159		990,840		1,920,999
8LDT963		loader, Trk, CAT 963, 3.0 cy										
*** 8LDT963		loader, Trk, CAT 963, 3.0 cy	1,259.78					77,677		73,464		151,141
8MIBROOM		Pavement Broom										
*** 8MIBROOM		Pavement Broom	12,480.00					761		208,042		208,803
8MISNDBL300		Sand Blaster - 300 lb, Air										
*** 8MISNDBL300		Sand Blaster - 300 lb, Air	770.06					1,033		447		1,479
8MITMK		Telescopic Man Lift, 40 Ft										
*** 8MITMK		Telescopic Man Lift, 40 Ft	9,109.04					120,285		99,844		220,129
8MITML		Telescopic Man Lift, 80 Ft										
*** 8MITML		Telescopic Man Lift, 80 Ft	4,695.76					140,337		97,695		238,033
8PEHV200		Vib Hammer,APD 200,200t/150t										
*** 8PEHV200		Vib Hammer,APD 200,200t/150t	3,810.05					193,966		400,505		594,471
8PUSUB03		Pump, 3" Sub Elect. 3.0Hp										
*** 8PUSUB03		Pump, 3" Sub Elect. 3.0Hp	6,008.51					10,245		9,373		19,618
8R02		TRUCK - PICKUP										
*** 8R02		TRUCK - PICKUP	3,602.74					19,448		38,117		57,565
8R06		TRUCK - MATERIAL HANDLER										
*** 8R06		TRUCK - MATERIAL HANDLER	1,416.48					58,792		92,680		151,473
8RCDDS67		Compact,DD Smooth, CAT CB54										
*** 8RCDDS67		Compact,DD Smooth, CAT CB54	156.00					5,705		4,207		9,912
8RCDDS84		Compact,DD Smooth, CAT CB64										
*** 8RCDDS84		Compact,DD Smooth, CAT CB64	50.00					2,561		1,640		4,201
8RCPAD66		Compact,SD Padfoot, CAT 433										
*** 8RCPAD66		Compact,SD Padfoot, CAT 433	3.74					63		83		147

EQUIPMENT USE BY EQUIPMENT - Proposed Project

Biditem/ Category	Activity/ Resource	Description	Quantity	Unit	Pcs	Rnt %	EOE %	Inside Equipment	Outside Equipment	EOE	Other	Total
8RCPAD84		Compact,SD Padfoot, CAT CP56										
*** 8RCPAD84		Compact,SD Padfoot, CAT CP56	971.42					27,001		33,490		60,490
8RCPNU90		Compact, Pnumatic, CAT PS360										
*** 8RCPNU90		Compact, Pnumatic, CAT PS360	181.00					8,273		4,260		12,532
8RCSDS66		Compact,SD Smooth, CAT CS423										
*** 8RCSDS66		Compact,SD Smooth, CAT CS423	3,206.39					54,143		70,637		124,780
8RCVIBE		Hand Tamp,Vibro Plate/Wacker										
*** 8RCVIBE		Hand Tamp,Vibro Plate/Wacker	7,817.39					27,181		27,517		54,698
8RCWALK		Walk Behind Roller										
*** 8RCWALK		Walk Behind Roller	3,498.93					15,745		16,407		32,152
8SCR615C		Scraper, CAT 615 EL,14 cy										
*** 8SCR615C		Scraper, CAT 615 EL,14 cy	50.00					27		4,796		4,822
8SLD226		CAT Skid Steer 226										
*** 8SLD226		CAT Skid Steer 226	25,297.46					300,686		348,801		649,487
8SLD246		CAT Skid Steer 246										
*** 8SLD246		CAT Skid Steer 246	6,028.35					78,230		95,085		173,315
8TK14		Dump Truck, 14 Cy										
*** 8TK14		Dump Truck, 14 Cy	82.40					1,391		1,496		2,886
8TK600		Rack Truck 11000 GVW										
*** 8TK600		Rack Truck 11000 GVW	12,480.00					86,149		81,744		167,893
8TKDMP10		Trk, End Dump, 10 cy										
*** 8TKDMP10		Trk, End Dump, 10 cy	12,417.92					206,311		545,768		752,079
8TKDMP15		Trk, End Dump, 15 cy										
*** 8TKDMP15		Trk, End Dump, 15 cy	117,949.40					2,854,965		6,202,959		9,057,924
8TKFB10		Trk, Flatbed/Dump 10 Ton										
*** 8TKFB10		Trk, Flatbed/Dump 10 Ton	50,338.98					308,880		791,329		1,100,209
8TKFB2		Flatbed/Dump 2 Ton										
*** 8TKFB2		Flatbed/Dump 2 Ton	156.00					2,785				2,785
8TKFB20		Trk, Flatbed/Dump 20 Ton										
*** 8TKFB20		Trk, Flatbed/Dump 20 Ton	21,109.43					215,886		495,438		711,325
8TKMCH		Mechanics Truck, 1Ton										
*** 8TKMCH		Mechanics Truck, 1Ton	3,120.00					42,544		34,320		76,864
8TKOIL		Oil Distributer Truck										
*** 8TKOIL		Oil Distributer Truck	156.00					2,127		1,716		3,843
8TKPU2		Pickup, 1/2 Ton, 2X4										
*** 8TKPU2		Pickup, 1/2 Ton, 2X4	320,041.01					1,061,896		2,371,504		3,433,400
8TKPU4		Pickup, 3/4 Ton, 4X4										
*** 8TKPU4		Pickup, 3/4 Ton, 4X4	251,424.11					1,085,649		1,958,594		3,044,244
8TKTRA		Trk, Tractor, 6 X 4, 45K										
*** 8TKTRA		Trk, Tractor, 6 X 4, 45K	6,280.00					97,196		233,333		330,529
8TKWAT04		Trk, Water,4000 G										
*** 8TKWAT04		Trk, Water,4000 G	37,473.62					640,462		1,133,015		1,773,477
8TLFLT40		Trailer, Float, 40 ft										
*** 8TLFLT40		Trailer, Float, 40 ft	6,280.00					32,399		34,854		67,253
8WM350		Welding Machine, 350 Amp										
*** 8WM350		Welding Machine, 350 Amp	2,739.55					4,608		11,629		16,237
8WM8PE		Weld Machine,8 Pack 200 Amp										
*** 8WM8PE		Weld Machine,8 Pack 200 Amp	3,263.66					2,226		18,498		20,724
		REPORT TOTALS						28,233,313	5,601	35,010,293		63,249,206

"*" indicates non-additive item

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Appendix C:
Construction Emission Calculations

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Unmitigated Emissions - Above Grade

Off-Road			(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	Emissions (lbs)								
Equipment	**HP Rating**	**Hours**	**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Asphalt Paver	224	25	0.096219	0.306812	0.823589	0.001376	0.029997	0.029098	122.2913	0.008682	2.4	7.7	20.6	0.0	0.7	0.7	3057.3	0.2	3061.8
Asphalt Paver	35	156	0.082099	0.269557	0.216492	0.000309	0.018532	0.017976	23.92655	0.007408	12.8	42.1	33.8	0.0	2.9	2.8	3732.5	1.2	3756.8
Backhoe	50	41	0.051274	0.364663	0.333077	0.000775	0.018901	0.018334	66.79721	0.004626	2.1	15.0	13.7	0.0	0.8	0.8	2738.7	0.2	2742.7
Tractor Backhoe	62	1958	0.049709	0.283857	0.234245	0.000392	0.012081	0.011719	30.3471	0.004485	97.3	555.8	458.7	0.8	23.7	22.9	59419.6	8.8	59604.0
Tractor Backhoe	98	3178	0.043487	0.342622	0.29366	0.000607	0.018357	0.017807	51.72802	0.003924	138.2	1088.9	933.3	1.9	58.3	56.6	164391.7	12.5	164653.5
Excavator	120	1334	0.069294	0.501744	0.442525	0.000864	0.028931	0.028063	73.62307	0.006252	92.4	669.3	590.3	1.2	38.6	37.4	98213.2	8.3	98388.3
8T Crane	50	100	0.064589	0.252711	0.201938	0.0003	0.01513	0.014676	23.1867	0.005828	6.5	25.3	20.2	0.0	1.5	1.5	2318.7	0.6	2330.9
10T Crane	120	8	0.063871	0.34863	0.38575	0.000588	0.030642	0.029722	50.14797	0.005763	0.5	2.8	3.1	0.0	0.2	0.2	401.2	0.0	402.2
35T Crane	175	1242	0.075221	0.476621	0.502915	0.000904	0.028272	0.027424	80.3446	0.006787	93.4	592.0	624.6	1.1	35.1	34.1	99788.0	8.4	99965.0
50T Crane	250	148	0.07866	0.252136	0.616831	0.001262	0.021189	0.020553	112.1589	0.007097	11.6	37.3	91.3	0.2	3.1	3.0	16599.5	1.1	16621.6
100T Crane	500	2196	0.120161	0.408545	0.874849	0.001768	0.031732	0.03078	180.1013	0.010842	263.9	897.2	1921.2	3.9	69.7	67.6	395502.4	23.8	396002.4
140T Crane	550	3810	0.140979	0.478129	1.037114	0.002088	0.037402	0.03628	210.8371	0.01272	537.1	1821.7	3951.4	8.0	142.5	138.2	803289.4	48.5	804307.2
175T Crane	600	41	0.161797	0.547713	1.199378	0.002407	0.043072	0.04178	241.573	0.014599	6.6	22.5	49.2	0.1	1.8	1.7	9904.5	0.6	9917.1
200T Crane	750	40200	0.203433	0.686882	1.523907	0.003047	0.054413	0.052781	303.0447	0.018355	8178.0	27612.7	61261.1	122.5	2187.4	2121.8	12182395.8	737.9	12197891.4
Air Compressor	49	780	0.051782	0.214174	0.184788	0.000288	0.013056	0.012664	22.27126	0.004672	40.4	167.1	144.1	0.2	10.2	9.9	17371.6	3.6	17448.1
Air Compressor	120	5293	0.058164	0.313021	0.393537	0.000711	0.024634	0.023895	63.60731	0.005248	307.9	1656.8	2083.0	3.8	130.4	126.5	336673.5	27.8	337256.8
Concrete Mixer	20	5092	0.008662	0.041629	0.053759	0.000109	0.002193	0.002127	7.248148	0.000782	44.1	212.0	273.7	0.6	11.2	10.8	36907.6	4.0	36991.1
Roller	120	878	0.068263	0.388482	0.448478	0.00077	0.029074	0.028202	67.04405	0.006159	59.9	341.1	393.8	0.7	25.5	24.8	58864.7	5.4	58978.2
Drill Rig	249	2965	0.053756	0.342582	0.249932	0.002116	0.006828	0.006624	188.1019	0.00485	159.4	1015.8	741.0	6.3	20.2	19.6	557722.1	14.4	558024.1
Drill Rig	474	4875	0.088668	0.551156	0.403468	0.003056	0.011209	0.010873	311.3086	0.008	432.3	2686.9	1966.9	14.9	54.6	53.0	1517629.6	39.0	1518448.7
Drill Rig	580	2575	0.132064	0.820109	0.602858	0.00462	0.016706	0.016205	463.2009	0.011916	340.1	2111.8	1552.4	11.9	43.0	41.7	1192742.2	30.7	1193386.6
Drill Rig	580	14878	0.132064	0.820109	0.602858	0.00462	0.016706	0.016205	463.2009	0.011916	1964.9	12201.6	8969.3	68.7	248.5	241.1	6891502.4	177.3	6895225.4
D6 Tractor	215	307	0.133304	0.417938	1.043014	0.001869	0.03855	0.037393	166.1315	0.012028	40.9	128.3	320.2	0.6	11.8	11.5	51002.4	3.7	51079.9
Boom Lift	65	48	0.064589	0.252711	0.201938	0.0003	0.01513	0.014676	23.1867	0.005828	3.1	12.1	9.7	0.0	0.7	0.7	1113.0	0.3	1118.8
Excavator CAT307	54	13	0.046808	0.252087	0.200215	0.000323	0.011054	0.010722	25.01754	0.004223	0.6	3.3	2.6	0.0	0.1	0.1	325.2	0.1	326.4
Excavator CAT321	148	3294	0.069294	0.501744	0.442525	0.000864	0.028931	0.028063	73.62307	0.006252	228.3	1652.7	1457.7	2.8	95.3	92.4	242514.4	20.6	242946.9
Excavator CAT324	190	133	0.082387	0.664068	0.506902	0.001263	0.02643	0.025637	112.2216	0.007434	11.0	88.3	67.4	0.2	3.5	3.4	14925.5	1.0	14946.2
Excavator CAT330	235	2	0.09333	0.33234	0.598381	0.001785	0.020201	0.019595	158.6828	0.008421	0.2	0.7	1.2	0.0	0.0	0.0	317.4	0.0	317.7
Excavator CAT336	266	6069	0.09333	0.33234	0.598381	0.001785	0.020201	0.019595	158.6828	0.008421	566.4	2017.0	3631.6	10.8	122.6	118.9	963045.8	51.1	964119.1
Excavator CAT345	345	1230	0.113598	0.400618	0.693245	0.00204	0.024313	0.023584	196.2091	0.01025	139.7	492.8	852.7	2.5	29.9	29.0	241337.2	12.6	241601.9
Forklift CAT TL-1055	125	21395	0.026472	0.211761	0.174533	0.000366	0.010802	0.010478	31.22492	0.002389	566.4	4530.6	3734.1	7.8	231.1	224.2	668057.1	51.1	669130.2
Generator 5kW	15	24535	0.012261	0.064385	0.085235	0.000159	0.00429	0.004162	10.20766	0.001106	300.8	1579.7	2091.2	3.9	105.3	102.1	250444.9	27.1	251015.0
Grader CAT14	180	2741	0.105909	0.729413	0.700188	0.001394	0.038491	0.037336	123.9215	0.009556	290.3	1999.3	1919.2	3.8	105.5	102.3	339668.9	26.2	340219.0
Loader Deere 210	78	1344	0.074242	0.319812	0.259094	0.000403	0.017448	0.016925	31.14967	0.006699	99.8	429.8	348.2	0.5	23.5	22.7	41865.2	9.0	42054.2
Loader CAT950	130	1245	0.065966	0.401558	0.412143	0.000691	0.030685	0.029765	58.91351	0.005952	82.1	499.9	513.1	0.9	38.2	37.1	73347.3	7.4	73502.9
Loader CAT963	150	1260	0.065966	0.401558	0.412143	0.000691	0.030685	0.029765	58.91351	0.005952	83.1	506.0	519.3	0.9	38.7	37.5	74231.0	7.5	74388.5
Loader CAT966	170	97888	0.088786	0.622687	0.590182	0.001196	0.032334	0.031364	106.3152	0.008011	8691.1	60953.6	57771.7	117.1	3165.1	3070.1	10406982.2	784.2	10423450.1
Loader CAT IT62	207	27285	0.091694	0.473199	0.652182	0.001436	0.028343	0.027492	127.646	0.008273	2501.9	12911.2	17794.8	39.2	773.3	750.1	3482819.8	225.7	3487560.3
Loader CAT980	355	672	0.094601	0.323711	0.714183	0.001676	0.024351	0.023621	148.9767	0.008536	63.6	217.5	479.9	1.1	16.4	15.9	100112.3	5.7	100232.8
Pavement Broom	74	12480	0.082099	0.269557	0.216492	0.000309	0.018532	0.017976	23.92655	0.007408	1024.6	3364.1	2701.8	3.9	231.3	224.3	298603.4	92.4	300544.8
Manlift 40ft	50	9110	0.033638	0.150605	0.152478	0.000254	0.009254	0.008976	19.61275	0.003035	306.4	1372.0	1389.1	2.3	84.3	81.8	178672.2	27.7	179252.8
Manlift 80ft	74	4696	0.033162	0.191258	0.204503	0.00035	0.013102	0.012709	28.84229	0.002992	155.7	898.1	960.3	1.6	61.5	59.7	135443.4	14.1	135738.5
Compactor CAT CB54	130	156	0.080548	0.380873	0.486882	0.000639	0.040033	0.038832	54.49936	0.007268	12.6	59.4	76.0	0.1	6.2	6.1	8501.9	1.1	8525.7
Compactor CAT CB64	130	50	0.080548	0.380873	0.486882	0.000639	0.040033	0.038832	54.49936	0.007268	4.0	19.0	24.3	0.0	2.0	1.9	2725.0	0.4	2732.6
Compactor CAT 433	100	4	0.080548	0.380873	0.486882	0.000639	0.040033	0.038832	54.49936	0.007268	0.3	1.5	1.9	0.0	0.2	0.2	218.0	0.0	218.6
Compactor CAT CP56	145	972	0.080548	0.380873	0.486882	0.000639	0.040033	0.038832	54.49936	0.007268	78.3	370.2	473.2	0.6	38.9	37.7	52973.4	7.1	53121.7
Compactor CAT PS360	130	181	0.080548	0.380873	0.486882	0.000639	0.040033	0.038832	54.49936	0.007268	14.6	68.9	88.1	0.1	7.2	7.0	9864.4	1.3	9892.0
Compactor CAT CS423	80	3207	0.082099	0.269557	0.216492	0.000309	0.018532	0.017976	23.92655	0.007408	263.3	864.5	694.3	1.0	59.4	57.7	76732.5	23.8	77231.3
Scraper CAT 615	250	50	0.170437	0.532359	1.355816	0.002357	0.05014	0.048636	209.4703	0.015378	8.5	26.6	67.8	0.1	2.5	2.4	10473.5	0.8	10489.7
Skid Steer CAT 226	58	25298	0.026321	0.203471	0.17869	0.00033	0.006505	0.00631	25.51916	0.002375	665.9	5147.4	4520.5	8.3	164.6	159.6	645583.8	60.1	646845.5
Skid Steer CAT 246	80	6029	0.012398	0.133999	0.098489	0.000251	0.004746	0.004604	21.38091	0.001119	74.7	807.9	593.8	1.5	28.6	27.8	128905.5	6.7	129047.2
Rack Truck		12480	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261	69.5	461.9	3489.9	12.6	284.6	115.4	1359892.1	40.7	1360746.7
Mechanics Truck		3120	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034	3.8	234.1	23.1	0.7	32.7	13.1	70256.6	1.1	70278.9

Oil dist Truck	156	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034		0.2	11.7	1.2	0.0	1.6	0.7	3512.8	0.1	3513.9
Pickup 1/2T	320041	0.002048	0.106169	0.010292	0.000211	0.010524	0.004261	20.93382	0.000522		655.5	33978.6	3293.9	67.4	3368.0	1363.6	6699681.4	166.9	6703187.1
Pickup 3/4T	251424	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034		302.8	18868.0	1859.0	56.8	2633.4	1059.7	5661599.2	85.5	5663394.2
Tractor 6x4	6280	0.013788	0.05546	0.419738	0.001278	0.023416	0.009838	133.9301	0.00064		86.6	348.3	2636.0	8.0	147.1	61.8	841081.3	4.0	841165.8
Water truck	37474	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034		45.1	2812.2	277.1	8.5	392.5	157.9	843844.5	12.7	844112.1
										total	30,234	211,520	200,783	613	15,418	11,073	58,431,840	2,934	58,493,453

On-Road		**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**		**Emissions (lbs)**								
Equipment	**Hours**	**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**		**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Dump Truck	82	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		0.5	3.0	22.9	0.1	1.9	0.8	8935.2	0.3	8940.8
End Dump 10CY	12418	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		69.2	459.6	3472.6	12.5	283.2	114.9	1353136.2	40.5	1353986.6
End Dump 15CY	117949	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		657.0	4365.2	32983.4	118.9	2689.5	1091.1	12852397.1	384.6	12860473.8
Flatbed 10T	50340	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		280.4	1863.1	14077.2	50.7	1147.9	465.7	5485334.1	164.1	5488781.2
Flatbed 2T	156	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		0.9	5.8	43.6	0.2	3.6	1.4	16998.7	0.5	17009.3
Flatbed 20T	21110	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		117.6	781.3	5903.2	21.3	481.4	195.3	2300266.2	68.8	2301711.8
Employee Commutes	147062.1	0.000689	0.052913	0.003519	0.000178	0.010467	0.004209	17.80674	0.000209		101.4	7781.5	517.5	26.2	1539.3	618.9	2618697.6	30.8	2619343.5
										total	1,227	15,259	57,020	230	6,147	2,488	24,635,765	690	24,650,247

	Daily Acres	**lb/acre PM**	**Daily Emissions (lbs) PM10**	**Daily Emissions (lbs) PM2.5**	**Total Emissions (lbs) PM10**	**Total Emissions (lbs) PM2.5**
Fugitive Dust	15	20	300.0	63.0	450000	94500

	ROG	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Total (lb)	31,460	226,780	257,803	842	471,564	108,061	83,067,605	3,624	83,143,700
Daily (lb)	21.0	151.2	171.9	0.6	314.4	72.0	55,378.4	2.4	55,429.1
Annual (T)	2.6	18.9	21.5	0.1	39.3	9.0	6,922.3	0.3	6,928.6

On-site Emissions

	ROG	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Total (lb)	30294.9	212283.3	203633.6	624.1	465725.1	105697.8	59663628.7	2968.4	59725965.2
Daily (lb)	20.19657	141.5222	135.7557	0.416071	310.4834	70.46518	39775.75244	1.978939	39817.31015
Annual (T)	2.524572	17.69027	16.96947	0.052009	38.81042	8.808148	4971.969055	0.247367	4977.163768

Total Emissions (tons)	**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Off-road	15.1	105.8	100.4	0.3	7.7	5.5	29,215.9	1.5	29,246.7
On-Road	0.6	7.6	28.5	0.1	3.1	1.2	12,317.9	0.3	12,325.1
Fugitive Dust					225.0	47.3			
Total	15.7	113.4	128.9	0.4	235.8	54.0	41,533.8	1.8	41,571.8
Annual	2.6	18.9	21.5	0.1	39.3	9.0	6,922.3	0.3	6,928.6

Mitigated Emissions - Above Grade

											RD reduction	0.95	0.9	0.9	1	0.7	0.7	0.8		
Off-Road			**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**					**Emissions (lbs)**					
Equipment	**HP Rating**	**Hours**	**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**		**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Asphalt Paver	224	25	0.040774	0.028648	0.084842	0.00153	0.003483	0.003378	120.8164	0.008682		1.0	0.6	1.9	0.0	0.1	0.1	2416.3	0.2	2420.9
Asphalt Paver	35	156	0.006189	0.004348	0.012878	0.000232	0.000529	0.000513	18.3382	0.007408		0.9	0.6	1.8	0.0	0.1	0.1	2288.6	1.2	2312.9
Backhoe	50	41	0.006826	0.004796	0.014203	0.000256	0.000583	0.000566	20.22595	0.004626		0.3	0.2	0.5	0.0	0.0	0.0	663.4	0.2	667.4
Tractor Backhoe	62	1958	0.008464	0.005947	0.017612	0.000318	0.000723	0.000701	25.08018	0.004485		15.7	10.5	31.0	0.6	1.0	1.0	39285.6	8.8	39470.0
Tractor Backhoe	98	3178	0.013379	0.0094	0.027839	0.000502	0.001143	0.001109	39.64287	0.003924		40.4	26.9	79.6	1.6	2.5	2.5	100788.0	12.5	101049.9
Excavator	120	1334	0.020434	0.012377	0.042519	0.000767	0.001745	0.001693	60.54737	0.006252		25.9	14.9	51.0	1.0	1.6	1.6	64616.2	8.3	64791.3
8T Crane	50	100	0.006312	0.004282	0.013134	0.000237	0.000539	0.000523	18.70357	0.005828		0.6	0.4	1.2	0.0	0.0	0.0	1496.3	0.6	1508.5
10T Crane	120	8	0.015149	0.010277	0.031522	0.000569	0.001294	0.001255	44.88857	0.005763		0.1	0.1	0.2	0.0	0.0	0.0	287.3	0.0	288.3
35T Crane	175	1242	0.022093	0.014987	0.04597	0.000829	0.001887	0.001831	65.46249	0.006787		26.1	16.8	51.4	1.0	1.6	1.6	65043.5	8.4	65220.6
50T Crane	250	148	0.031561	0.02141	0.065672	0.001184	0.002696	0.002615	93.51784	0.007097		4.4	2.9	8.7	0.2	0.3	0.3	11072.5	1.1	11094.6
100T Crane	500	2196	0.063123	0.042821	0.131343	0.002369	0.005392	0.00523	187.0357	0.010842		131.7	84.6	259.6	5.2	8.3	8.0	328584.3	23.8	329084.3
140T Crane	550	3810	0.069435	0.047103	0.144478	0.002606	0.005931	0.005753	205.7393	0.01272		251.3	161.5	495.4	9.9	15.8	15.3	627093.3	48.5	628111.0
175T Crane	600	41	0.075747	0.051385	0.157612	0.002843	0.00647	0.006276	224.4428	0.014599		3.0	1.9	5.8	0.1	0.2	0.2	7361.7	0.6	7374.3
200T Crane	750	40200	0.094684	0.064231	0.197015	0.003553	0.008088	0.007845	280.5535	0.018355		3616.0	2323.9	7128.0	142.8	227.6	220.8	9022601.6	737.9	9038097.3
Air Compressor	49	780	0.006905	0.004852	0.014368	0.000259	0.00059	0.000572	20.46083	0.004672		5.1	3.4	10.1	0.2	0.3	0.3	12767.6	3.6	12844.1
Air Compressor	120	5293	0.001691	0.001188	0.003519	6.35E-05	0.000144	0.00014	5.010817	0.005248		8.5	5.7	16.8	0.3	0.5	0.5	21217.8	27.8	21801.1
Concrete Mixer	20	5092	0.002818	0.00198	0.005865	0.000106	0.000241	0.000234	8.351361	0.000782		13.6	9.1	26.9	0.5	0.9	0.8	34020.1	4.0	34103.7
Roller	120	878	0.020258	0.014233	0.042152	0.00076	0.00173	0.001679	60.02541	0.006159		16.9	11.2	33.3	0.7	1.1	1.0	42161.8	5.4	42275.4
Drill Rig	249	2965	0.031435	0.01904	0.065409	0.00118	0.002685	0.002605	93.14377	0.00485		88.5	50.8	174.5	3.5	5.6	5.4	220937.0	14.4	221239.0
Drill Rig	474	4875	0.05984	0.036245	0.124514	0.002246	0.005112	0.004958	177.3098	0.008		277.1	159.0	546.3	10.9	17.4	16.9	691508.3	39.0	692327.4
Drill Rig	580	2575	0.073222	0.04435	0.152358	0.002748	0.006255	0.006067	216.9614	0.011916		179.1	102.8	353.1	7.1	11.3	10.9	446940.5	30.7	447584.8
Drill Rig	580	14878	0.073222	0.04435	0.152358	0.002748	0.006255	0.006067	216.9614	0.011916		1034.9	593.9	2040.1	40.9	65.1	63.2	2582361.4	177.3	2586084.4
D6 Tractor	215	307	0.037242	0.025264	0.077493	0.001398	0.003181	0.003086	110.3511	0.012028		10.9	7.0	21.4	0.4	0.7	0.7	27102.2	3.7	27179.8
Boom Lift	65	48	0.009065	0.006369	0.018862	0.00034	0.000774	0.000751	26.85919	0.005828		0.4	0.3	0.8	0.0	0.0	0.0	1031.4	0.3	1037.3
Excavator CAT307	54	13	0.009195	0.00557	0.019133	0.000345	0.000785	0.000762	27.24632	0.004223		0.1	0.1	0.2	0.0	0.0	0.0	283.4	0.1	284.5
Excavator CAT321	148	3294	0.025202	0.015265	0.05244	0.000946	0.002153	0.002088	74.67509	0.006252		78.9	45.3	155.5	3.1	5.0	4.8	196783.8	20.6	197216.3
Excavator CAT324	190	133	0.032354	0.019597	0.067321	0.001214	0.002764	0.002681	95.86666	0.007434		4.1	2.3	8.1	0.2	0.3	0.2	10200.2	1.0	10221.0
Excavator CAT330	235	2	0.040017	0.024238	0.083266	0.001502	0.003418	0.003316	158.6828	0.008421		0.1	0.0	0.1	0.0	0.0	0.0	253.9	0.0	254.2
Excavator CAT336	266	6069	0.045296	0.027435	0.09425	0.0017	0.003869	0.003753	134.2133	0.008421		261.2	149.9	514.8	10.3	16.4	15.9	651632.6	51.1	652705.8
Excavator CAT345	345	1230	0.058748	0.035583	0.122241	0.002205	0.005018	0.004868	174.0737	0.01025		68.6	39.4	135.3	2.7	4.3	4.2	171288.5	12.6	171553.3
Forklift CAT TL-1055	125	21395	0.017432	0.012248	0.036272	0.000654	0.001489	0.001444	51.6523	0.002389		354.3	235.8	698.4	14.0	22.3	21.6	884080.7	51.1	885153.9
Generator 5kW	15	24535	0.003259	0.004027	0.073706	0.000122	0.000557	0.00054	9.656261	0.001106		76.0	88.9	1627.5	3.0	9.6	9.3	189533.1	27.1	190103.1
Grader CAT14	180	2741	0.030387	0.018405	0.063228	0.00114	0.002596	0.002518	90.03811	0.009556		79.1	45.4	156.0	3.1	5.0	4.8	197435.6	26.2	197985.6
Loader Deere 210	78	1344	0.010649	0.007482	0.022157	0.0004	0.00091	0.000882	31.55249	0.006699		13.6	9.0	26.8	0.5	0.9	0.8	33925.2	9.0	34114.3
Loader CAT950	130	1245	0.017748	0.01247	0.036929	0.000666	0.001516	0.001471	52.58748	0.005952		21.0	14.0	41.4	0.8	1.3	1.3	52377.1	7.4	52532.7
Loader CAT963	150	1260	0.020478	0.014388	0.04261	0.000768	0.001749	0.001697	60.67786	0.005952		24.5	16.3	48.3	1.0	1.5	1.5	61163.3	7.5	61320.8
Loader CAT966	170	97888	0.023209	0.016306	0.048292	0.000871	0.001982	0.001923	68.76824	0.008011		2158.2	1436.6	4254.5	85.3	135.8	131.8	5385268.2	784.2	5401736.1
Loader CAT IT62	207	27285	0.02826	0.019855	0.058802	0.001061	0.002414	0.002342	83.73544	0.008273		732.5	487.6	1444.0	28.9	46.1	44.7	1827777.3	225.7	1832517.8
Loader CAT980	355	672	0.048465	0.034052	0.100844	0.001819	0.00414	0.004016	143.6043	0.008536		30.9	20.6	61.0	1.2	1.9	1.9	77201.7	5.7	77322.1
Pavement Broom	74	12480	0.01032	0.007251	0.021473	0.000387	0.000882	0.000855	30.57816	0.007408		122.4	81.4	241.2	4.8	7.7	7.5	305292.4	92.4	307233.8
Manlift 40ft	50	9110	0.006973	0.004899	0.014509	0.000262	0.000596	0.000578	20.66092	0.003035		60.3	40.2	119.0	2.4	3.8	3.7	150576.8	27.7	151157.4
Manlift 80ft	74	4696	0.01032	0.007251	0.021473	0.000387	0.000882	0.000855	30.57816	0.002992		46.0	30.6	90.8	1.8	2.9	2.8	114876.0	14.1	115171.1
Compactor CAT CB54	130	156	0.021946	0.015419	0.045665	0.000824	0.001875	0.001818	65.02752	0.007268		3.3	2.2	6.4	0.1	0.2	0.2	8115.4	1.1	8139.2
Compactor CAT CB64	130	50	0.021946	0.015419	0.045665	0.000824	0.001875	0.001818	65.02752	0.007268		1.0	0.7	2.1	0.0	0.1	0.1	2601.1	0.4	2608.7
Compactor CAT 433	100	4	0.016882	0.011861	0.035127	0.000634	0.001442	0.001399	50.02117	0.007268		0.1	0.0	0.1	0.0	0.0	0.0	160.1	0.0	160.7
Compactor CAT CP56	145	972	0.024478	0.017199	0.050934	0.000919	0.002091	0.002028	72.5307	0.007268		22.6	15.0	44.6	0.9	1.4	1.4	56399.9	7.1	56548.2
Compactor CAT PS360	130	181	0.021946	0.015419	0.045665	0.000824	0.001875	0.001818	65.02752	0.007268		3.8	2.5	7.4	0.1	0.2	0.2	9416.0	1.3	9443.6
Compactor CAT CS423	80	3207	0.013505	0.009489	0.028101	0.000507	0.001154	0.001119	40.01694	0.007408		41.1	27.4	81.1	1.6	2.6	2.5	102667.5	23.8	103166.3
Scraper CAT 615	250	50	0.042204	0.025563	0.087817	0.001584	0.003605	0.003497	125.0529	0.015378		2.0	1.2	4.0	0.1	0.1	0.1	5002.1	0.8	5018.3
Skid Steer CAT 226	58	25298	0.007918	0.005563	0.016476	0.000297	0.000676	0.000656	23.4621	0.002375		190.3	126.7	375.1	7.5	12.0	11.6	474835.5	60.1	476097.2
Skid Steer CAT 246	80	6029	0.010922	0.007674	0.022725	0.00041	0.000933	0.000905	32.36152	0.001119		62.6	41.6	123.3	2.5	3.9	3.8	156086.1	6.7	156227.7
Rack Truck		12480	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		66.0	415.7	3140.9	12.6	199.2	80.8	1087913.7	40.7	1088768.3
Mechanics Truck		3120	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034		3.6	210.7	20.8	0.7	22.9	9.2	56205.3	1.1	56227.5
Oil dist Truck		156	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034		0.2	10.5	1.0	0.0	1.1	0.5	2810.3	0.1	2811.4
Pickup 1/2T		320041	0.002048	0.106169	0.010292	0.000211	0.010524	0.004261	20.93382	0.000522		622.8	30580.7	2964.5	67.4	2357.6	954.5	5359745.1	166.9	5363250.8

Pickup 3/4T	251424	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034		287.6	16981.2	1673.1	56.8	1843.4	741.8	4529279.4	85.5	4531074.3
Tractor 6x4	6280	0.013788	0.05546	0.419738	0.001278	0.023416	0.009838	133.9301	0.00064		82.3	313.5	2372.4	8.0	102.9	43.2	672865.0	4.0	672949.5
Water truck	37474	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034		42.9	2531.0	249.4	8.5	274.7	110.6	675075.6	12.7	675343.2
										total	11,316	57,593	32,029	557	5,449	2,569	37,862,774	2,934	37,924,387
															0.6				

On-Road Equipment	**Hours**	**(lb/hr) ROG**	**(lb/hr) CO**	**(lb/hr) NOX**	**(lb/hr) SOX**	**(lb/hr) PM10**	**(lb/hr) PM2.5**	**(lb/hr) CO2**	**(lb/hr) CH4**		**Emissions (lbs) ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Dump Truck	82	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		0.5	3.0	22.9	0.1	1.9	0.8	8935.2	0.3	8940.8
End Dump 10CY	12418	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		69.2	459.6	3472.6	12.5	283.2	114.9	1353136.2	40.5	1353986.6
End Dump 15CY	117949	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		657.0	4365.2	32983.4	118.9	2689.5	1091.1	12852397.1	384.6	12860473.8
Flatbed 10T	50340	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		280.4	1863.1	14077.2	50.7	1147.9	465.7	5485334.1	164.1	5488781.2
Flatbed 2T	156	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		0.9	5.8	43.6	0.2	3.6	1.4	16998.7	0.5	17009.3
Flatbed 20T	21110	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		117.6	781.3	5903.2	21.3	481.4	195.3	2300266.2	68.8	2301711.8
Employee Commutes	147062.1	0.000689	0.052913	0.003519	0.000178	0.010467	0.004209	17.80674	0.000209		101.4	7781.5	517.5	26.2	1539.3	618.9	2618697.6	30.8	2619343.5
										total	1,227	15,259	57,020	230	6,147	2,488	24,635,765	690	24,650,247

	Daily Acres	**lb/acre PM**	**Daily Emissions (lbs) PM10**	**Daily Emissions (lbs) PM2.5**	**Total Emissions (lbs) PM10**	**Total Emissions (lbs) PM2.5**
Fugitive Dust	15	10	150.0	31.5	225000	47250

	ROG	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Total (lb)	12,543	72,852	89,049	787	236,596	52,307	62,498,539	3,624	62,574,634
Daily (lb)	8.4	48.6	59.4	0.5	157.7	34.9	41,665.7	2.4	41,716.4
Annual (T)	1.0	6.1	7.4	0.1	19.7	4.4	5,208.2	0.3	5,214.6

On-site Emissions

	ROG	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Total (lb)	11377.7	58355.8	34879.6	568.9	230756.7	49943.0	39094562.7	2968.4	39156899.2
Daily (lb)	7.6	38.9	23.3	0.4	153.8	33.3	26063.0	2.0	26104.6
Annual (T)	0.9	4.9	2.9	0.0	19.2	4.2	3257.9	0.2	3263.1

Total Emissions (tons)	**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Off-road	5.7	28.8	16.0	0.3	2.7	1.3	18,931.4	1.5	18,962.2
On-Road	0.6	7.6	28.5	0.1	3.1	1.2	12,317.9	0.3	12,325.1
Fugitive Dust					112.5	23.6			
Total	6.3	36.4	44.5	0.4	118.3	26.2	31,249.3	1.8	31,287.3
Annual	1.0	6.1	7.4	0.1	19.7	4.4	5,208.2	0.3	5,214.6

SCAB Fleet Average Emission Factors (Diesel)

Road Emission Rates

Air Basin	SC

Equipment	MaxHP	ROG (lb/hr)	CO (lb/hr)	NOX (lb/hr)	SOX (lb/hr)	PM (lb/hr)	CO2 (lb/hr)	CH4 (lb/hr)
Aerial Lifts	15	0.0101	0.0528	0.0631	0.0001	0.0025	8.7	0.0009
	25	0.0143	0.0468	0.0865	0.0001	0.0039	11.0	0.0013
	50	0.0336	0.1506	0.1525	0.0003	0.0093	19.6	0.0030
	120	0.0327	0.2319	0.2565	0.0004	0.0170	38.1	0.0029
	500	0.0840	0.3899	0.8852	0.0021	0.0270	213	0.0076
	750	0.1545	0.7049	1.6423	0.0039	0.0494	385	0.0139
Aerial Lifts Composite		0.0322	0.1740	0.2152	0.0004	0.0119	34.7	0.0029
Air Compressors	15	0.0098	0.0456	0.0608	0.0001	0.0033	7.2	0.0009
	25	0.0207	0.0645	0.1187	0.0002	0.0060	14.4	0.0019
	50	0.0518	0.2142	0.1848	0.0003	0.0131	22.3	0.0047
	120	0.0504	0.3097	0.3370	0.0006	0.0255	47.0	0.0045
	175	0.0685	0.4994	0.5069	0.0010	0.0268	88.5	0.0062
	250	0.0747	0.2653	0.6529	0.0015	0.0206	131	0.0067
	500	0.1262	0.4504	1.0161	0.0023	0.0345	232	0.0114
	750	0.1960	0.6961	1.6134	0.0036	0.0540	358	0.0177
	1000	0.2958	1.0416	3.7257	0.0049	0.0965	486	0.0267
Air Compressors Composite		0.0582	0.3130	0.3935	0.0007	0.0246	63.6	0.0052
Bore/Drill Rigs	15	0.0120	0.0632	0.0754	0.0002	0.0029	10.3	0.0011
	25	0.0193	0.0658	0.1219	0.0002	0.0046	16.0	0.0017
	50	0.0204	0.2211	0.1897	0.0004	0.0034	31.0	0.0018
	120	0.0308	0.4665	0.2710	0.0009	0.0072	77.1	0.0028
	175	0.0475	0.7542	0.2910	0.0016	0.0092	141	0.0043
	250	0.0538	0.3426	0.2499	0.0021	0.0068	188	0.0049
	500	0.0887	0.5512	0.4035	0.0031	0.0112	311	0.0080
	750	0.1755	1.0891	0.8022	0.0062	0.0222	615	0.0158
	1000	0.2789	1.6441	4.2095	0.0093	0.0723	928	0.0252
Bore/Drill Rigs Composite		0.0539	0.5011	0.4175	0.0017	0.0099	165	0.0049
Cement and Mortar	15	0.0074	0.0386	0.0461	0.0001	0.0018	6.3	0.0007
	25	0.0232	0.0754	0.1391	0.0002	0.0064	17.6	0.0021
Cement and Mortar Mixers Compo		0.0087	0.0416	0.0538	0.0001	0.0022	7.2	0.0008
Concrete/Industrial	25	0.0199	0.0678	0.1256	0.0002	0.0047	16.5	0.0018
	50	0.0549	0.2534	0.2388	0.0004	0.0148	30.2	0.0050
	120	0.0650	0.4661	0.4898	0.0009	0.0335	74.1	0.0059
	175	0.1012	0.8661	0.8304	0.0018	0.0410	160	0.0091
Concrete/Industrial Saws Compos		0.0605	0.3850	0.3959	0.0007	0.0261	58.5	0.0055
Cranes	50	0.0646	0.2527	0.2019	0.0003	0.0151	23.2	0.0058
	120	0.0639	0.3486	0.3857	0.0006	0.0306	50.1	0.0058
	175	0.0752	0.4766	0.5029	0.0009	0.0283	80.3	0.0068
	250	0.0787	0.2521	0.6168	0.0013	0.0212	112	0.0071
	500	0.1202	0.4085	0.8748	0.0018	0.0317	180	0.0108
	750	0.2034	0.6869	1.5239	0.0030	0.0544	303	0.0184
	9999	0.7422	2.3933	7.8338	0.0098	0.2146	971	0.0670
Cranes Composite		0.1012	0.4060	0.7908	0.0014	0.0318	129	0.0091
Crawler Tractors	50	0.0813	0.2884	0.2240	0.0003	0.0181	24.9	0.0073
	120	0.0945	0.4679	0.5589	0.0008	0.0448	65.8	0.0085
	175	0.1270	0.7327	0.8534	0.0014	0.0479	121	0.0115
	250	0.1333	0.4179	1.0430	0.0019	0.0385	166	0.0120
	500	0.1959	0.7202	1.4625	0.0025	0.0554	259	0.0177
	750	0.3529	1.2889	2.6916	0.0047	0.1006	465	0.0318
	1000	0.5380	2.0171	5.7362	0.0066	0.1663	658	0.0485
Crawler Tractors Composite		0.1185	0.5387	0.7960	0.0013	0.0457	114	0.0107
Crushing/Proc. Equ	50	0.0949	0.4230	0.3607	0.0006	0.0241	44.0	0.0086
	120	0.0849	0.5506	0.5679	0.0010	0.0416	83.1	0.0077
	175	0.1258	0.9520	0.8975	0.0019	0.0475	167	0.0113
	250	0.1386	0.4932	1.1284	0.0028	0.0359	245	0.0125
	500	0.2037	0.7231	1.5205	0.0037	0.0524	374	0.0184
	750	0.3193	1.1368	2.4441	0.0059	0.0824	589	0.0288
	9999	0.8312	2.7569	9.5902	0.0131	0.2467	1,308	0.0750

Crushing/Proc. Equipment Compo		0.1109	0.6328	0.7330	0.0015	0.0412	132	0.0100
Dumpers/Tenders	25	0.0092	0.0314	0.0584	0.0001	0.0023	7.6	0.0008
Dumpers/Tenders Composite		0.0092	0.0314	0.0584	0.0001	0.0023	7.6	0.0008
Excavators	25	0.0198	0.0677	0.1253	0.0002	0.0047	16.4	0.0018
	50	0.0468	0.2521	0.2002	0.0003	0.0111	25.0	0.0042
	120	0.0693	0.5017	0.4425	0.0009	0.0289	73.6	0.0063
	175	0.0824	0.6641	0.5069	0.0013	0.0264	112	0.0074
	250	0.0933	0.3323	0.5984	0.0018	0.0202	159	0.0084
	500	0.1339	0.4689	0.7881	0.0023	0.0284	234	0.0121
	750	0.2224	0.7769	1.3381	0.0039	0.0476	387	0.0201
Excavators Composite		0.0848	0.5160	0.5181	0.0013	0.0249	120	0.0077
Forklifts	50	0.0229	0.1440	0.1180	0.0002	0.0058	14.7	0.0021
	120	0.0265	0.2118	0.1745	0.0004	0.0108	31.2	0.0024
	175	0.0394	0.3322	0.2328	0.0006	0.0125	56.1	0.0036
	250	0.0440	0.1559	0.2594	0.0009	0.0089	77.1	0.0040
	500	0.0623	0.2131	0.3432	0.0011	0.0125	111	0.0056
Forklifts Composite		0.0372	0.2173	0.2186	0.0006	0.0101	54.4	0.0034
Generator Sets	15	0.0123	0.0644	0.0852	0.0002	0.0043	10.2	0.0011
	25	0.0231	0.0788	0.1449	0.0002	0.0070	17.6	0.0021
	50	0.0491	0.2265	0.2357	0.0004	0.0138	30.6	0.0044
	120	0.0642	0.4694	0.5181	0.0009	0.0333	77.9	0.0058
	175	0.0808	0.7324	0.7528	0.0016	0.0337	142	0.0073
	250	0.0857	0.3931	0.9756	0.0024	0.0274	213	0.0077
	500	0.1264	0.6113	1.3836	0.0033	0.0415	337	0.0114
	750	0.2080	0.9868	2.2918	0.0055	0.0679	544	0.0188
	9999	0.5230	2.0948	7.5356	0.0105	0.1778	1,049	0.0472
Generator Sets Composite		0.0477	0.2786	0.3759	0.0007	0.0192	61.0	0.0043
Graders	50	0.0676	0.2868	0.2305	0.0004	0.0157	27.5	0.0061
	120	0.0860	0.5138	0.5323	0.0009	0.0398	75.0	0.0078
	175	0.1059	0.7294	0.7002	0.0014	0.0385	124	0.0096
	250	0.1115	0.3778	0.8409	0.0019	0.0287	172	0.0101
	500	0.1420	0.5194	0.9989	0.0023	0.0359	229	0.0128
	750	0.3024	1.0988	2.1820	0.0049	0.0774	486	0.0273
Graders Composite		0.1049	0.5812	0.7217	0.0015	0.0355	133	0.0095
Off-Highway Tracto	120	0.1622	0.6879	0.9427	0.0011	0.0779	93.7	0.0146
	175	0.1614	0.8085	1.1191	0.0015	0.0632	130	0.0146
	250	0.1275	0.3861	1.0244	0.0015	0.0411	130	0.0115
	750	0.5173	2.0914	4.1264	0.0057	0.1633	568	0.0467
	1000	0.7842	3.2770	8.0820	0.0082	0.2526	814	0.0708
Off-Highway Tractors Composite		0.1631	0.6762	1.2293	0.0017	0.0579	151	0.0147
Off-Highway Trucks	175	0.0983	0.7542	0.5947	0.0014	0.0314	125	0.0089
	250	0.1042	0.3572	0.6660	0.0019	0.0225	167	0.0094
	500	0.1656	0.5578	0.9706	0.0027	0.0351	272	0.0149
	750	0.2693	0.9044	1.6152	0.0044	0.0577	442	0.0243
	1000	0.4058	1.3339	4.3394	0.0063	0.1110	625	0.0366
Off-Highway Trucks Composite		0.1613	0.5634	1.0525	0.0027	0.0360	260	0.0146
Other Construction	15	0.0118	0.0617	0.0737	0.0002	0.0029	10.1	0.0011
	25	0.0159	0.0544	0.1008	0.0002	0.0038	13.2	0.0014
	50	0.0412	0.2342	0.2102	0.0004	0.0108	28.0	0.0037
	120	0.0604	0.5116	0.4573	0.0009	0.0279	80.9	0.0054
	175	0.0608	0.5859	0.4478	0.0012	0.0218	107	0.0055
	500	0.1122	0.4743	0.8004	0.0025	0.0275	254	0.0101
Other Construction Equipment Co		0.0633	0.3542	0.4478	0.0013	0.0181	123	0.0057
Other General Indu	15	0.0066	0.0391	0.0466	0.0001	0.0018	6.4	0.0006
	25	0.0185	0.0632	0.1170	0.0002	0.0044	15.3	0.0017
	50	0.0548	0.2314	0.1869	0.0003	0.0134	21.7	0.0049
	120	0.0732	0.4277	0.4544	0.0007	0.0350	62.0	0.0066
	175	0.0835	0.5664	0.5608	0.0011	0.0307	95.9	0.0075
	250	0.0884	0.2862	0.6866	0.0015	0.0221	136	0.0080
	500	0.1664	0.5336	1.1846	0.0026	0.0412	265	0.0150
	750	0.2755	0.8795	2.0057	0.0044	0.0689	437	0.0249
	1000	0.3866	1.2370	4.3716	0.0056	0.1169	560	0.0349
Other General Industrial Equipme		0.1113	0.4591	0.8242	0.0016	0.0336	152	0.0100
Other Material Han	50	0.0758	0.3192	0.2598	0.0004	0.0186	30.3	0.0068
	120	0.0709	0.4162	0.4437	0.0007	0.0341	60.7	0.0064
	175	0.1050	0.7171	0.7125	0.0014	0.0389	122	0.0095
	250	0.0934	0.3046	0.7336	0.0016	0.0237	145	0.0084

	500	0.1186	0.3838	0.8543	0.0019	0.0297	192	0.0107
	9999	0.5386	1.6331	5.7822	0.0073	0.1543	741	0.0486
Other Material Handling Equipme		0.1050	0.4495	0.8053	0.0015	0.0324	141	0.0095
Pavers	25	0.0226	0.0769	0.1434	0.0002	0.0057	18.7	0.0020
	50	0.0968	0.3188	0.2539	0.0004	0.0217	28.0	0.0087
	120	0.1030	0.4862	0.6205	0.0008	0.0506	69.2	0.0093
	175	0.1365	0.7632	0.9644	0.0014	0.0539	128	0.0123
	250	0.1574	0.5000	1.3162	0.0022	0.0490	194	0.0142
	500	0.1765	0.6885	1.4189	0.0023	0.0539	233	0.0159
Pavers Composite		0.1121	0.5017	0.6241	0.0009	0.0419	77.9	0.0101
Paving Equipment	25	0.0152	0.0520	0.0963	0.0002	0.0036	12.6	0.0014
	50	0.0821	0.2696	0.2165	0.0003	0.0185	23.9	0.0074
	120	0.0805	0.3809	0.4869	0.0006	0.0400	54.5	0.0073
	175	0.1062	0.5971	0.7567	0.0011	0.0424	101	0.0096
	250	0.0962	0.3068	0.8236	0.0014	0.0300	122	0.0087
Paving Equipment Composite		0.0857	0.4136	0.5558	0.0008	0.0374	68.9	0.0077
Plate Compactors	15	0.0050	0.0263	0.0314	0.0001	0.0012	4.3	0.0005
Plate Compactors Composite		0.0050	0.0263	0.0314	0.0001	0.0012	4.3	0.0005
Pressure Washers	15	0.0059	0.0308	0.0408	0.0001	0.0021	4.9	0.0005
	25	0.0094	0.0319	0.0587	0.0001	0.0028	7.1	0.0008
	50	0.0170	0.0895	0.1059	0.0002	0.0054	14.3	0.0015
	120	0.0167	0.1383	0.1528	0.0003	0.0087	24.1	0.0015
Pressure Washers Composite		0.0101	0.0562	0.0703	0.0001	0.0036	9.4	0.0009
Pumps	15	0.0101	0.0468	0.0625	0.0001	0.0034	7.4	0.0009
	25	0.0279	0.0871	0.1601	0.0002	0.0080	19.5	0.0025
	50	0.0599	0.2670	0.2677	0.0004	0.0164	34.3	0.0054
	120	0.0676	0.4767	0.5260	0.0009	0.0350	77.9	0.0061
	175	0.0845	0.7338	0.7548	0.0016	0.0350	140	0.0076
	250	0.0866	0.3786	0.9399	0.0023	0.0271	201	0.0078
	500	0.1387	0.6343	1.4367	0.0034	0.0442	345	0.0125
	750	0.2330	1.0487	2.4376	0.0057	0.0741	571	0.0210
	9999	0.7050	2.7434	9.8509	0.0136	0.2358	1,355	0.0636
Pumps Composite		0.0458	0.2722	0.3306	0.0006	0.0189	49.6	0.0041
Rollers	15	0.0074	0.0386	0.0461	0.0001	0.0018	6.3	0.0007
	25	0.0161	0.0549	0.1017	0.0002	0.0038	13.3	0.0015
	50	0.0662	0.2547	0.2171	0.0003	0.0158	26.0	0.0060
	120	0.0680	0.3919	0.4411	0.0007	0.0341	59.0	0.0061
	175	0.0897	0.6130	0.6569	0.0012	0.0356	108	0.0081
	250	0.0934	0.3306	0.8164	0.0017	0.0274	153	0.0084
	500	0.1262	0.4902	1.0345	0.0022	0.0365	219	0.0114
Rollers Composite		0.0683	0.3885	0.4485	0.0008	0.0291	67.0	0.0062
Rough Terrain Fork	50	0.0655	0.3294	0.2744	0.0004	0.0166	33.9	0.0059
	120	0.0596	0.4179	0.3967	0.0007	0.0273	62.4	0.0054
	175	0.0911	0.7231	0.6072	0.0014	0.0322	125	0.0082
	250	0.0988	0.3504	0.7075	0.0019	0.0237	171	0.0089
	500	0.1441	0.5029	0.9468	0.0025	0.0341	257	0.0130
Rough Terrain Forklifts Composite		0.0638	0.4499	0.4219	0.0008	0.0277	70.3	0.0058
Rubber Tired Doze	175	0.1676	0.8191	1.1443	0.0015	0.0646	129	0.0151
	250	0.1890	0.5640	1.4879	0.0021	0.0605	183	0.0171
	500	0.2531	1.0338	1.9476	0.0026	0.0787	265	0.0228
	750	0.3821	1.5520	2.9917	0.0040	0.1195	399	0.0345
	1000	0.5986	2.5082	6.0072	0.0060	0.1906	592	0.0540
Rubber Tired Dozers Composite		0.2343	0.8819	1.8194	0.0025	0.0737	239	0.0211
Rubber Tired Loade	25	0.0204	0.0697	0.1291	0.0002	0.0048	16.9	0.0018
	50	0.0742	0.3198	0.2591	0.0004	0.0174	31.1	0.0067
	120	0.0660	0.4016	0.4121	0.0007	0.0307	58.9	0.0060
	175	0.0888	0.6227	0.5902	0.0012	0.0323	106	0.0080
	250	0.0946	0.3237	0.7142	0.0017	0.0244	149	0.0085
	500	0.1440	0.5256	1.0103	0.0023	0.0363	237	0.0130
	750	0.2966	1.0762	2.1374	0.0049	0.0758	486	0.0268
	1000	0.3912	1.4170	4.4558	0.0060	0.1188	594	0.0353
Rubber Tired Loaders Composite		0.0861	0.4470	0.5831	0.0012	0.0300	109	0.0078
Scrapers	120	0.1382	0.6686	0.8165	0.0011	0.0661	93.9	0.0125
	175	0.1579	0.8954	1.0712	0.0017	0.0603	148	0.0142
	250	0.1704	0.5324	1.3558	0.0024	0.0501	209	0.0154
	500	0.2458	0.9165	1.8678	0.0032	0.0707	321	0.0222
	750	0.4267	1.5807	3.3123	0.0056	0.1238	555	0.0385

Scrapers Composite		0.2135	0.8418	1.6042	0.0027	0.0653	262	0.0193
Signal Boards	15	0.0072	0.0377	0.0450	0.0001	0.0018	6.2	0.0006
	50	0.0649	0.2966	0.2820	0.0005	0.0172	36.2	0.0059
	120	0.0695	0.4999	0.5256	0.0009	0.0356	80.2	0.0063
	175	0.0955	0.8276	0.7968	0.0017	0.0385	155	0.0086
	250	0.1151	0.4857	1.1305	0.0029	0.0337	255	0.0104
Signal Boards Composite		0.0143	0.0916	0.1029	0.0002	0.0050	16.7	0.0013
Skid Steer Loaders	25	0.0176	0.0582	0.1081	0.0002	0.0048	13.8	0.0016
	50	0.0263	0.2035	0.1787	0.0003	0.0065	25.5	0.0024
	120	0.0248	0.2680	0.1970	0.0005	0.0095	42.8	0.0022
Skid Steer Loaders Composite		0.0253	0.2146	0.1799	0.0004	0.0074	30.3	0.0023
Surfacing Equipme	50	0.0317	0.1242	0.1139	0.0002	0.0077	14.1	0.0029
	120	0.0668	0.4072	0.4651	0.0007	0.0334	63.8	0.0060
	175	0.0637	0.4677	0.5082	0.0010	0.0257	85.8	0.0058
	250	0.0733	0.2858	0.7013	0.0015	0.0230	135	0.0066
	500	0.1120	0.5047	1.0316	0.0022	0.0350	221	0.0101
	750	0.1782	0.7911	1.6685	0.0035	0.0558	347	0.0161
Surfacing Equipment Composite		0.0923	0.4187	0.8043	0.0017	0.0291	166	0.0083
Sweepers/Scrubbe	15	0.0124	0.0729	0.0870	0.0002	0.0034	11.9	0.0011
	25	0.0237	0.0808	0.1495	0.0002	0.0056	19.6	0.0021
	50	0.0522	0.2974	0.2539	0.0004	0.0137	31.6	0.0047
	120	0.0647	0.4983	0.4442	0.0009	0.0291	75.0	0.0058
	175	0.0966	0.8030	0.6280	0.0016	0.0337	139	0.0087
	250	0.0894	0.3218	0.6073	0.0018	0.0204	162	0.0081
Sweepers/Scrubbers Composite		0.0681	0.4946	0.4308	0.0009	0.0251	78.5	0.0061
Tractors/Loaders/B	25	0.0191	0.0653	0.1211	0.0002	0.0046	15.9	0.0017
	50	0.0497	0.2839	0.2342	0.0004	0.0121	30.3	0.0045
	120	0.0435	0.3426	0.2937	0.0006	0.0184	51.7	0.0039
	175	0.0669	0.5845	0.4264	0.0011	0.0218	101	0.0060
	250	0.0914	0.3483	0.5964	0.0019	0.0200	172	0.0082
	500	0.1788	0.6771	1.0736	0.0039	0.0385	345	0.0161
	750	0.2691	1.0154	1.6525	0.0058	0.0585	517	0.0243
Tractors/Loaders/Backhoes Comp		0.0513	0.3647	0.3331	0.0008	0.0189	66.8	0.0046
Trenchers	15	0.0099	0.0517	0.0617	0.0001	0.0024	8.5	0.0009
	25	0.0397	0.1355	0.2509	0.0004	0.0094	32.9	0.0036
	50	0.1142	0.3647	0.2965	0.0004	0.0255	32.9	0.0103
	120	0.0959	0.4498	0.5899	0.0008	0.0477	64.9	0.0087
	175	0.1505	0.8436	1.1021	0.0016	0.0607	144	0.0136
	250	0.1783	0.5823	1.5446	0.0025	0.0582	223	0.0161
	500	0.2312	0.9564	1.9434	0.0031	0.0740	311	0.0209
	750	0.4382	1.7994	3.7533	0.0059	0.1413	587	0.0395
Trenchers Composite		0.1061	0.4368	0.5117	0.0007	0.0393	58.7	0.0096
Welders	15	0.0084	0.0392	0.0522	0.0001	0.0028	6.2	0.0008
	25	0.0161	0.0504	0.0927	0.0001	0.0047	11.3	0.0015
	50	0.0563	0.2339	0.2108	0.0003	0.0144	26.0	0.0051
	120	0.0398	0.2540	0.2787	0.0005	0.0205	39.5	0.0036
	175	0.0703	0.5400	0.5536	0.0011	0.0283	98.2	0.0063
	250	0.0617	0.2348	0.5828	0.0013	0.0179	119	0.0056
	500	0.0825	0.3196	0.7244	0.0016	0.0239	168	0.0074
Welders Composite		0.0388	0.1876	0.1941	0.0003	0.0133	25.6	0.0035

Tier 4 Final Emission Rates

Adjusted EF = Steady State EF x TAF x DF

Where:

EF = Emission Factor
TAF = Transient Adjustment Factor
DF = Deterioration Factor

Note: TAF = 1.0 for Tier 4 equipment

Deterioration "A"

ROG	0.027
CO	0.151
NOx	0.008
PM10	0.473

DF

ROG	1.0135
CO	1.0755
NOx	1.004
PM10	1.2365

			Steady State Emission Factors (g/bhphr)							Adjusted Emission Factors (g/bhphr)							Adjusted Emission Factors (lb/hr)						
Equipment	**HP Rating**	**Load Factor**	**ROG**	**CO**	**NOX**	**SOX**	**PM**	**CO2**	**CH4**	**ROG**	**CO**	**NOX**	**SOX**	**PM**	**CO2**	**CH4**	**ROG**	**CO**	**NOX**	**SOX**	**PM**	**CO2**	**CH4**
Drill Rig	250	0.43	0.1314	0.075	0.276	0.004998	0.0092	394.6		0.133174	0.080663	0.277104	0.004998	0.011376	394.6		0.031561	0.019116	0.065672	0.001184	0.002696	93.51784	
Wheel Loader	150	0.465	0.1314	0.087	0.276	0.004998	0.0092	394.6		0.133174	0.093569	0.277104	0.004998	0.011376	394.6		0.020478	0.014388	0.04261	0.000768	0.001749	60.67786	
Excavator	200	0.58	0.1314	0.075	0.276	0.004998	0.0092	394.6		0.133174	0.080663	0.277104	0.004998	0.011376	394.6		0.034057	0.020628	0.070864	0.001278	0.002909	100.9123	
Pump Truck	175	0.74	0.1314	0.075	0.276	0.004998	0.0092	394.6		0.133174	0.080663	0.277104	0.004998	0.011376	394.6		0.03802	0.023029	0.079111	0.001427	0.003248	112.6564	
Crane	375	0.43	0.1314	0.084	0.276	0.004998	0.0092	394.6		0.133174	0.090342	0.277104	0.004998	0.011376	394.6		0.047342	0.032116	0.098508	0.001777	0.004044	140.2768	
Forklift	150	0.475	0.1314	0.087	0.276	0.004998	0.0092	394.6		0.133174	0.093569	0.277104	0.004998	0.011376	394.6		0.020919	0.014697	0.043527	0.000785	0.001787	61.98276	
Pile Driving Machine	180	0.43	0.1314	0.075	0.276	0.004998	0.0092	394.6		0.133174	0.080663	0.277104	0.004998	0.011376	394.6		0.022724	0.013764	0.047284	0.000853	0.001941	67.33285	
Dozer	400	0.59	0.1314	0.084	0.276	0.004998	0.0092	394.6		0.133174	0.090342	0.277104	0.004998	0.011376	394.6		0.069288	0.047003	0.144172	0.0026	0.005919	205.3043	
Backhoe	150	0.465	0.1314	0.087	0.276	0.004998	0.0092	394.6		0.133174	0.093569	0.277104	0.004998	0.011376	394.6		0.020478	0.014388	0.04261	0.000768	0.001749	60.67786	
Grader	175	0.575	0.1314	0.075	0.276	0.004998	0.0092	394.6		0.133174	0.080663	0.277104	0.004998	0.011376	394.6		0.029543	0.017894	0.061472	0.001109	0.002524	87.53705	
Paver	34	0.62	0.1314	0.087	0.276	0.004998	0.0092	394.6		0.133174	0.093569	0.277104	0.004998	0.011376	394.6		0.006189	0.004348	0.012878	0.000232	0.000529	18.3382	
Roller	125	0.575	0.1314	0.087	0.276	0.004998	0.0092	394.6		0.133174	0.093569	0.277104	0.004998	0.011376	394.6		0.021102	0.014826	0.043908	0.000792	0.001803	62.52647	
Ballast Compressor	175	0.62	0.1314	0.075	0.276	0.004998	0.0092	394.6		0.133174	0.080663	0.277104	0.004998	0.011376	394.6		0.031855	0.019294	0.066283	0.001195	0.002721	94.38778	
Ballast Regulator	175	0.62	0.1314	0.075	0.276	0.004998	0.0092	394.6		0.133174	0.080663	0.277104	0.004998	0.011376	394.6		0.031855	0.019294	0.066283	0.001195	0.002721	94.38778	
Generator	49	0.74	0.1314	0.153	3	0.004998	0.0184	394.6		0.133174	0.164552	3.012	0.004998	0.022752	394.6		0.010646	0.013154	0.240774	0.0004	0.001819	31.54379	
Air Compressor	150	0.48	0.1314	0.087	0.276	0.004998	0.0092	394.6		0.133174	0.093569	0.277104	0.004998	0.011376	394.6		0.021139	0.014852	0.043985	0.000793	0.001806	62.63521	

EMFAC2017 2022 Emission Rates (g/mile)

Heavy Trucks

	CH4	CO	CO2	HC	NOx	PM	PM10	PM2_5	ROG	SOx	TOG
35 MPH	0.04226	0.479642	1412.196	0.096002	3.624155	0.018407	0.018296	0.017505	0.07219	0.013061	0.121438
Brake Wear						0.189	0.18522	0.07938			
Tire Wear						0.092	0.092	0.023			
Total	**0.04226**	**0.479642**	**1412.196**	**0.096002**	**3.624155**	**0.299407**	**0.295516**	**0.119885**	**0.07219**	**0.013061**	**0.121438**
lb/hr	**0.003261**	**0.037009**	**108.9657**	**0.007408**	**0.279642**	**0.023102**	**0.022802**	**0.00925**	**0.00557**	**0.001008**	**0.00937**

ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4
0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261

LDA

	CH4	CO	CO2	HC	NOx	PM	PM10	PM2_5	ROG	SOx	TOG
35 MPH	0.00271	0.685749	230.7754	0.011957	0.045605	0.001561	0.001403	0.001293	0.008933	0.002313	0.012984
Brake Wear						0.1125	0.11025	0.04725			
Tire Wear						0.024	0.024	0.006			
Total	**0.00271**	**0.685749**	**230.7754**	**0.011957**	**0.045605**	**0.138061**	**0.135653**	**0.054543**	**0.008933**	**0.002313**	**0.012984**
lb/hr	**0.000209**	**0.052913**	**17.80674**	**0.000923**	**0.003519**	**0.010653**	**0.010467**	**0.004209**	**0.000689**	**0.000178**	**0.001002**

ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4
0.000689	0.052913	0.003519	0.000178	0.010467	0.004209	17.80674	0.000209

LDT (gas)

	CH4	CO	CO2	HC	NOx	PM	PM10	PM2_5	ROG	SOx	TOG
35 MPH	0.00676	1.375955	271.3023	0.035713	0.133387	0.002385	0.002137	0.001967	0.026546	0.00273	0.038684
Brake Wear						0.1125	0.11025	0.04725			
Tire Wear						0.024	0.024	0.006			
Total	**0.00676**	**1.375955**	**271.3023**	**0.035713**	**0.133387**	**0.138885**	**0.136387**	**0.055217**	**0.026546**	**0.00273**	**0.038684**
lb/hr	**0.000522**	**0.106169**	**20.93382**	**0.002756**	**0.010292**	**0.010716**	**0.010524**	**0.004261**	**0.002048**	**0.000211**	**0.002985**

ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4
0.002048	0.106169	0.010292	0.000211	0.010524	0.004261	20.93382	0.000522

LDT (diesel)

	CH4	CO	CO2	HC	NOx	PM	PM10	PM2_5	ROG	SOx	TOG
35 MPH	0.004406	0.972576	291.835	0.020959	0.095824	0.001662	0.00149	0.001372	0.015606	0.002927	0.022723
Brake Wear						0.1125	0.11025	0.04725			
Tire Wear						0.024	0.024	0.006			
Total	**0.004406**	**0.972576**	**291.835**	**0.020959**	**0.095824**	**0.138162**	**0.13574**	**0.054622**	**0.015606**	**0.002927**	**0.022723**
lb/hr	**0.00034**	**0.075044**	**22.51813**	**0.001617**	**0.007394**	**0.010661**	**0.010474**	**0.004215**	**0.001204**	**0.000226**	**0.001753**

ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4
0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034

Unmitigated At-Grade

Off-Road Equipment	HP Rating	Hours	(lb/hr) ROG	(lb/hr) CO	(lb/hr) NOX	(lb/hr) SOX	(lb/hr) PM10	(lb/hr) PM2.5	(lb/hr) CO2	(lb/hr) CH4	Emissions (lbs) ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	CO2e
Asphalt Paver	224	83	0.096219	0.306812	0.823589	0.001376	0.029997	0.029098	122.2913	0.008682	8.0	25.5	68.4	0.1	2.5	2.4	10150.2	0.7	10165.3
Asphalt Paver	35	156	0.082099	0.269557	0.216492	0.000309	0.018532	0.017976	23.92655	0.007408	12.8	42.1	33.8	0.0	2.9	2.8	3732.5	1.2	3756.8
Backhoe	50	41	0.051274	0.364663	0.333077	0.000775	0.018901	0.018334	66.79721	0.004626	2.1	15.0	13.7	0.0	0.8	0.8	2738.7	0.2	2742.7
Crawler Backhoe	266	12	0.09137	0.348282	0.596387	0.001932	0.020044	0.019442	171.737	0.008244	1.1	4.2	7.2	0.0	0.2	0.2	2060.8	0.1	2062.9
Tractor Backhoe	62	2675	0.049709	0.283857	0.234245	0.000392	0.012081	0.011719	30.3471	0.004485	133.0	759.3	626.6	1.0	32.3	31.3	81178.5	12.0	81430.4
Tractor Backhoe	98	3253	0.043487	0.342622	0.29366	0.000607	0.018357	0.017807	51.72802	0.003924	141.5	1114.6	955.3	2.0	59.7	57.9	168271.3	12.8	168539.3
Excavator	120	1334	0.069294	0.501744	0.442525	0.000864	0.028931	0.028063	73.62307	0.006252	92.4	669.3	590.3	1.2	38.6	37.4	98213.2	8.3	98388.3
8T Crane	50	1838	0.064589	0.252711	0.201938	0.0003	0.01513	0.014676	23.1867	0.005828	118.7	464.5	371.2	0.6	27.8	27.0	42617.1	10.7	42842.1
10T Crane	120	8	0.063871	0.34863	0.38575	0.000588	0.030642	0.029722	50.14797	0.005763	0.5	2.8	3.1	0.0	0.2	0.2	401.2	0.0	402.2
35T Crane	175	1242	0.075221	0.476621	0.502915	0.000904	0.028272	0.027424	80.3446	0.006787	93.4	592.0	624.6	1.1	35.1	34.1	99788.0	8.4	99965.0
50T Crane	250	170	0.07866	0.252136	0.616831	0.001262	0.021189	0.020553	112.1589	0.007097	13.4	42.9	104.9	0.2	3.6	3.5	19067.0	1.2	19092.4
100T Crane	500	2908	0.120161	0.408545	0.874849	0.001768	0.031732	0.03078	180.1013	0.010842	349.4	1188.0	2544.1	5.1	92.3	89.5	523734.5	31.5	524396.6
140T Crane	550	300	0.140979	0.478129	1.037114	0.002088	0.037402	0.03628	210.8371	0.01272	42.3	143.4	311.1	0.6	11.2	10.9	63251.1	3.8	63331.3
175T Crane	600	41	0.161797	0.547713	1.199378	0.002407	0.043072	0.04178	241.573	0.014599	6.6	22.5	49.2	0.1	1.8	1.7	9904.5	0.6	9917.1
200T Crane	750	77136	0.203433	0.686882	1.523907	0.003047	0.054413	0.052781	303.0447	0.018355	15692.0	52983.4	117548.1	235.0	4197.2	4071.3	23375653.8	1415.9	23405386.9
Air Compressor	49	1312	0.051782	0.214174	0.184788	0.000288	0.013056	0.012664	22.27126	0.004672	67.9	281.0	242.4	0.4	17.1	16.6	29219.9	6.1	29348.6
Air Compressor	120	5523	0.058164	0.313021	0.393537	0.000711	0.024634	0.023895	63.60731	0.005248	321.2	1728.8	2173.5	3.9	136.1	132.0	351303.2	29.0	351911.9
Concrete Mixer	20	5710	0.008662	0.041629	0.053759	0.000109	0.002193	0.002127	7.248148	0.000782	49.5	237.7	307.0	0.6	12.5	12.1	41386.9	4.5	41480.6
Concrete Pump	30	6	0.045793	0.272172	0.330641	0.00059	0.018942	0.018374	49.60666	0.004132	0.3	1.6	2.0	0.0	0.1	0.1	297.6	0.0	298.2
Roller	120	1218	0.068263	0.388482	0.448478	0.00077	0.029074	0.028202	67.04405	0.006159	83.1	473.2	546.2	0.9	35.4	34.4	81659.7	7.5	81817.2
Drill Rig	249	1790	0.053756	0.342582	0.249932	0.002116	0.006828	0.006624	188.1019	0.00485	96.2	613.2	447.4	3.8	12.2	11.9	336702.4	8.7	336884.7
Drill Rig	474	8020	0.088668	0.551156	0.403468	0.003056	0.011209	0.010873	311.3086	0.008	711.1	4420.3	3235.8	24.5	89.9	87.2	2496695.3	64.2	2498042.7
Drill Rig	580	33295	0.132064	0.820109	0.602858	0.00462	0.016706	0.016205	463.2009	0.011916	4397.1	27305.5	20072.2	153.8	556.2	539.5	15422272.6	396.7	15430604.2
Drill Rig	580	17575	0.132064	0.820109	0.602858	0.00462	0.016706	0.016205	463.2009	0.011916	2321.0	14413.4	10595.2	81.2	293.6	284.8	8140755.1	209.4	8145153.0
D6 Tractor	215	627	0.133304	0.417938	1.043014	0.001869	0.03855	0.037393	166.1315	0.012028	83.6	262.0	654.0	1.2	24.2	23.4	104164.5	7.5	104322.8
Boom Lift	65	445	0.064589	0.252711	0.201938	0.0003	0.01513	0.014676	23.1867	0.005828	28.7	112.5	89.9	0.1	6.7	6.5	10318.1	2.6	10372.5
Excavator CAT307	54	13	0.046808	0.252087	0.200215	0.000323	0.011054	0.010722	25.01754	0.004223	0.6	3.3	2.6	0.0	0.1	0.1	325.2	0.1	326.4
Excavator CAT321	148	5253	0.069294	0.501744	0.442525	0.000864	0.028931	0.028063	73.62307	0.006252	364.0	2635.7	2324.6	4.5	152.0	147.4	386742.0	32.8	387431.7
Excavator CAT324	190	133	0.082387	0.664068	0.506902	0.001263	0.02643	0.025637	112.2216	0.007434	11.0	88.3	67.4	0.2	3.5	3.4	14925.5	1.0	14946.2
Excavator CAT330	235	2	0.09333	0.33234	0.598381	0.001785	0.020201	0.019595	158.6828	0.008421	0.2	0.7	1.2	0.0	0.0	0.0	317.4	0.0	317.7
Excavator CAT336	266	14530	0.09333	0.33234	0.598381	0.001785	0.020201	0.019595	158.6828	0.008421	1356.1	4828.9	8694.5	25.9	293.5	284.7	2305660.9	122.4	2308230.4
Excavator CAT345	345	1960	0.113598	0.400618	0.693245	0.00204	0.024313	0.023584	196.2091	0.01025	222.7	785.2	1358.8	4.0	47.7	46.2	384569.8	20.1	384991.7
Forklift CAT TL-1055	125	25210	0.026472	0.211761	0.174533	0.000366	0.010802	0.010478	31.22492	0.002389	667.4	5338.5	4400.0	9.2	272.3	264.1	787180.2	60.2	788444.7
Generator 5kW	15	51082	0.012261	0.064385	0.085235	0.000159	0.00429	0.004162	10.20766	0.001106	626.3	3288.9	4354.0	8.1	219.2	212.6	521427.7	56.5	522614.5
Grader CAT14	180	3868	0.105909	0.729413	0.700188	0.001394	0.038491	0.037336	123.9215	0.009556	409.7	2821.4	2708.3	5.4	148.9	144.4	479328.5	37.0	480104.7
Loader Deere 210	78	1344	0.074242	0.319812	0.259094	0.000403	0.017448	0.016925	31.14967	0.006699	99.8	429.8	348.2	0.5	23.5	22.7	41865.2	9.0	42054.2
Loader CAT950	130	1293	0.065966	0.401558	0.412143	0.000691	0.030685	0.029765	58.91351	0.005952	85.3	519.2	532.9	0.9	39.7	38.5	76175.2	7.7	76336.8
Loader CAT963	150	7233	0.065966	0.401558	0.412143	0.000691	0.030685	0.029765	58.91351	0.005952	477.1	2904.5	2981.0	5.0	221.9	215.3	426121.4	43.1	427025.5
Loader CAT966	170	125237	0.088786	0.622687	0.590182	0.001196	0.032334	0.031364	106.3152	0.008011	11119.3	77983.5	73912.6	149.8	4049.4	3927.9	13314596.6	1003.3	13335665.5
Loader CAT IT62	207	33538	0.091694	0.473199	0.652182	0.001436	0.028343	0.027492	127.646	0.008273	3075.2	15870.1	21872.9	48.2	950.6	922.0	4280989.9	277.5	4286816.8
Loader CAT980	355	914	0.094601	0.323711	0.714183	0.001676	0.024351	0.023621	148.9767	0.008536	86.5	295.9	652.8	1.5	22.3	21.6	136164.7	7.8	136328.5
Skid Steer Loader	50	488	0.025253	0.214562	0.179886	0.000375	0.00735	0.00713	30.27763	0.002279	12.3	104.7	87.8	0.2	3.6	3.5	14775.5	1.1	14798.8
Pavement Broom	74	12480	0.082099	0.269557	0.216492	0.000309	0.018532	0.017976	23.92655	0.007408	1024.6	3364.1	2701.8	3.9	231.3	224.3	298603.4	92.4	300544.8
Forktruck	74	2377	0.082099	0.269557	0.216492	0.000309	0.018532	0.017976	23.92655	0.007408	195.1	640.7	514.6	0.7	44.1	42.7	56873.4	17.6	57243.2
Manlift 40ft	50	13434	0.033638	0.150605	0.152478	0.000254	0.009254	0.008976	19.61275	0.003035	451.9	2023.2	2048.4	3.4	124.3	120.6	263477.7	40.8	264334.0
Manlift 80ft	74	1125	0.033162	0.191258	0.204503	0.00035	0.013102	0.012709	28.84229	0.002992	37.3	215.2	230.1	0.4	14.7	14.3	32447.6	3.4	32518.3
Compactor CAT CB54	130	156	0.080548	0.380873	0.486882	0.000639	0.040033	0.038832	54.49936	0.007268	12.6	59.4	76.0	0.1	6.2	6.1	8501.9	1.1	8525.7
Compactor CAT CB64	130	165	0.080548	0.380873	0.486882	0.000639	0.040033	0.038832	54.49936	0.007268	13.3	62.8	80.3	0.1	6.6	6.4	8992.4	1.2	9017.6
Compactor CAT 433	100	4	0.080548	0.380873	0.486882	0.000639	0.040033	0.038832	54.49936	0.007268	0.3	1.5	1.9	0.0	0.2	0.2	218.0	0.0	218.6

Compactor CAT CP56	145	972	0.080548	0.380873	0.486882	0.000639	0.040033	0.038832	54.49936	0.007268		78.3	370.2	473.2	0.6	38.9	37.7	52973.4	7.1	53121.7
Compactor CAT PS360	130	239	0.080548	0.380873	0.486882	0.000639	0.040033	0.038832	54.49936	0.007268		19.3	91.0	116.4	0.2	9.6	9.3	13025.3	1.7	13061.8
Compactor CAT CS423	80	4482	0.082099	0.269557	0.216492	0.000309	0.018532	0.017976	23.92655	0.007408		368.0	1208.2	970.3	1.4	83.1	80.6	107238.8	33.2	107936.0
Scraper CAT 615	250	50	0.170437	0.532359	1.355816	0.002357	0.05014	0.048636	209.4703	0.015378		8.5	26.6	67.8	0.1	2.5	2.4	10473.5	0.8	10489.7
Skid Steer CAT 226	58	60651	0.026321	0.203471	0.17869	0.00033	0.006505	0.00631	25.51916	0.002375		1596.4	12340.7	10837.7	20.0	394.5	382.7	1547762.8	144.0	1550787.7
Skid Steer CAT 246	80	12958	0.012398	0.133999	0.098489	0.000251	0.004746	0.004604	21.38091	0.001119		160.7	1736.4	1276.2	3.2	61.5	59.7	277053.9	14.5	277358.3
Rack Truck		12480	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		69.5	461.9	3489.9	12.6	284.6	115.4	1359892.1	40.7	1360746.7
Mechanics Truck		3120	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034		3.8	234.1	23.1	0.7	32.7	13.1	70256.6	1.1	70278.9
Oil dist Truck		213	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034		0.3	16.0	1.6	0.0	2.2	0.9	4796.4	0.1	4797.9
Pickup 1/2T		327237	0.002048	0.106169	0.010292	0.000211	0.010524	0.004261	20.93382	0.000522		670.3	34742.5	3368.0	68.9	3443.7	1394.2	6850321.2	170.7	6853905.7
Pickup 3/4T		343772	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034		414.0	25798.2	2541.8	77.6	3600.6	1448.9	7741103.8	116.9	7743558.0
Tractor 6x4		6280	0.013788	0.05546	0.419738	0.001278	0.023416	0.009838	133.9301	0.00064		86.6	348.3	2636.0	8.0	147.1	61.8	841081.3	4.0	841165.8
Water truck		51442	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034		61.9	3860.4	380.4	11.6	538.8	216.8	1158377.8	17.5	1158745.1
											total	48,753	313,419	318,352	995	21,206	16,012	95,390,174	4,632	95,487,445

On-Road		**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**					**Emissions (lbs)**					
Equipment	**Hours**	**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**		**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Dump Truck	82	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		0.5	3.0	22.9	0.1	1.9	0.8	8935.2	0.3	8940.8
End Dump 10CY	33096	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		184.4	1224.9	9255.0	33.4	754.7	306.2	3606329.3	107.9	3608595.6
End Dump 15CY	130929	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		729.3	4845.6	36613.2	132.0	2985.5	1211.1	14266772.0	426.9	14275737.6
Flatbed 10T	86337	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		480.9	3195.3	24143.4	87.0	1968.7	798.6	9407772.9	281.5	9413685.0
Flatbed 2T	156	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		0.9	5.8	43.6	0.2	3.6	1.4	16998.7	0.5	17009.3
Flatbed 20T	25145	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		140.1	930.6	7031.6	25.3	573.4	232.6	2739942.9	82.0	2741664.7
Employee Commutes	196025	0.000689	0.052913	0.003519	0.000178	0.010467	0.004209	17.80674	0.000209		135.1	10372.2	689.8	35.0	2051.8	825.0	3490562.5	41.0	3491423.4
										total	1,671	20,577	77,800	313	8,339	3,376	33,537,313	940	33,557,056

	Daily Acres	**lb/acre PM**	**Daily Emissions (lbs) PM10**	**PM2.5**
Fugitive Dust	15	20	300.0	63.0

	ROG	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Total (lb)	50,424	333,996	396,151	1,308	479,545	113,888	128,927,488	5,572	129,044,501
Daily (lb)	33.6	222.7	264.1	0.9	319.7	75.9	85,951.7	3.7	86,029.7
Annual (T)	4.2	27.8	33.0	0.1	40.0	9.5	10,744.0	0.5	10,753.7

On-site Emissions

	ROG	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Total (lb)	48836.5	314447.4	322241.9	1010.5	471622.5	110681.2	97067040.0	4678.9	97165297.8
Daily (lb)	32.55769	209.6316	214.8279	0.673693	314.415	73.78744	64711.35997	3.119296	64776.9
Annual (T)	4.069711	26.20395	26.85349	0.084212	39.30188	9.223431	8088.919996	0.389912	8097.1

Total Emissions (tons)	**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Off-road	24.4	156.7	159.2	0.5	10.6	8.0	47,695.1	2.3	47,743.7
On-Road	0.8	10.3	38.9	0.2	4.2	1.7	16,768.7	0.5	16,778.5
Fugitive Dust					225.0	47.3			
Total	25.2	167.0	198.1	0.7	239.8	56.9	64,463.7	2.8	64,522.3
Annual	4.2	27.8	33.0	0.1	40.0	9.5	10,744.0	0.5	10,753.7

Mitigated At-Grade

											RD reduction	0.95	0.9	0.9	1	0.7	0.7	0.8		
Off-Road			**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**					**Emissions (lbs)**					
Equipment	**HP Rating**	**Hours**	**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**		**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Asphalt Paver	224	83	0.040774	0.028648	0.084842	0.00153	0.003483	0.003378	120.8164	0.008682		3.2	2.1	6.3	0.1	0.2	0.2	8,022.2	0.7	8037.3
Asphalt Paver	35	156	0.006189	0.004348	0.012878	0.000232	0.000529	0.000513	18.3382	0.007408		0.9	0.6	1.8	0.0	0.1	0.1	2,288.6	1.2	2312.9
Backhoe	50	41	0.006826	0.004796	0.014203	0.000256	0.000583	0.000566	20.22595	0.004626		0.3	0.2	0.5	0.0	0.0	0.0	663.4	0.2	667.4
Crawler Backhoe	266	12	0.036315	0.025515	0.075562	0.001363	0.003102	0.003009	107.6021	0.008244		0.4	0.3	0.8	0.0	0.0	0.0	1,033.0	0.1	1035.1
Tractor Backhoe	62	2675	0.008464	0.005947	0.017612	0.000318	0.000723	0.000701	25.08018	0.004485		21.5	14.3	42.4	0.8	1.4	1.3	53,671.6	12.0	53923.5
Tractor Backhoe	98	3253	0.013379	0.0094	0.027839	0.000502	0.001143	0.001109	39.64287	0.003924		41.3	27.5	81.5	1.6	2.6	2.5	103,166.6	12.8	103434.6
Excavator	120	1334	0.020434	0.012377	0.042519	0.000767	0.001745	0.001693	60.54737	0.006252		25.9	14.9	51.0	1.0	1.6	1.6	64,616.2	8.3	64791.3
8T Crane	50	1838	0.006312	0.004282	0.013134	0.000237	0.000539	0.000523	18.70357	0.005828		11.0	7.1	21.7	0.4	0.7	0.7	27,501.7	10.7	27726.7
10T Crane	120	8	0.015149	0.010277	0.031522	0.000569	0.001294	0.001255	44.88857	0.005763		0.1	0.1	0.2	0.0	0.0	0.0	287.3	0.0	288.3
35T Crane	175	1242	0.022093	0.014987	0.04597	0.000829	0.001887	0.001831	65.46249	0.006787		26.1	16.8	51.4	1.0	1.6	1.6	65,043.5	8.4	65220.6
50T Crane	250	170	0.031561	0.02141	0.065672	0.001184	0.002696	0.002615	93.51784	0.007097		5.1	3.3	10.0	0.2	0.3	0.3	12,718.4	1.2	12743.8
100T Crane	500	2908	0.063123	0.042821	0.131343	0.002369	0.005392	0.00523	187.0357	0.010842		174.4	112.1	343.8	6.9	11.0	10.6	435,119.8	31.5	435781.9
140T Crane	550	300	0.069435	0.047103	0.144478	0.002606	0.005931	0.005753	205.7393	0.01272		19.8	12.7	39.0	0.8	1.2	1.2	49,377.4	3.8	49457.6
175T Crane	600	41	0.075747	0.051385	0.157612	0.002843	0.00647	0.006276	224.4428	0.014599		3.0	1.9	5.8	0.1	0.2	0.2	7,361.7	0.6	7374.3
200T Crane	750	77136	0.094684	0.064231	0.197015	0.003553	0.008088	0.007845	280.5535	0.018355		6,938.4	4,459.1	13,677.3	274.1	436.7	423.6	17,312,621.9	1415.9	17342355.0
Air Compressor	49	1312	0.006905	0.004852	0.014368	0.000259	0.00059	0.000572	20.46083	0.004672		8.6	5.7	17.0	0.3	0.5	0.5	21,475.7	6.1	21604.4
Air Compressor	120	5523	0.001691	0.001188	0.003519	6.35E-05	0.000144	0.00014	5.010817	0.005248		8.9	5.9	17.5	0.4	0.6	0.5	22,139.8	29.0	22748.5
Concrete Mixer	20	5710	0.002818	0.00198	0.005865	0.000106	0.000241	0.000234	8.351361	0.000782		15.3	10.2	30.1	0.6	1.0	0.9	38,149.0	4.5	38242.7
Concrete Pump	30	6	0.004228	0.00297	0.008797	0.000159	0.000361	0.00035	12.52704	0.004132		0.0	0.0	0.0	0.0	0.0	0.0	60.1	0.0	60.7
Roller	120	1218	0.020258	0.014233	0.042152	0.00076	0.00173	0.001679	60.02541	0.006159		23.4	15.6	46.2	0.9	1.5	1.4	58,488.8	7.5	58646.3
Drill Rig	249	1790	0.031435	0.01904	0.065409	0.00118	0.002685	0.002605	93.14377	0.00485		53.5	30.7	105.4	2.1	3.4	3.3	133,381.9	8.7	133564.2
Drill Rig	474	8020	0.05984	0.036245	0.124514	0.002246	0.005112	0.004958	177.3098	0.008		455.9	261.6	898.7	18.0	28.7	27.8	1,137,619.9	64.2	1138967.3
Drill Rig	580	33295	0.073222	0.04435	0.152358	0.002748	0.006255	0.006067	216.9614	0.011916		2,316.0	1,329.0	4,565.5	91.5	145.8	141.4	5,778,983.8	396.7	5787315.4
Drill Rig	580	17575	0.073222	0.04435	0.152358	0.002748	0.006255	0.006067	216.9614	0.011916		1,222.5	701.5	2,409.9	48.3	76.9	74.6	3,050,477.3	209.4	3054875.2
D6 Tractor	215	627	0.037242	0.025264	0.077493	0.001398	0.003181	0.003086	110.3511	0.012028		22.2	14.3	43.7	0.9	1.4	1.4	55,352.1	7.5	55510.5
Boom Lift	65	445	0.009065	0.006369	0.018862	0.00034	0.000774	0.000751	26.85919	0.005828		3.8	2.6	7.6	0.2	0.2	0.2	9,561.9	2.6	9616.3
Excavator CAT307	54	13	0.009195	0.00557	0.019133	0.000345	0.000785	0.000762	27.24632	0.004223		0.1	0.1	0.2	0.0	0.0	0.0	283.4	0.1	284.5
Excavator CAT321	148	5253	0.025202	0.015265	0.05244	0.000946	0.002153	0.002088	74.67509	0.006252		125.8	72.2	247.9	5.0	7.9	7.7	313,814.6	32.8	314504.3
Excavator CAT324	190	133	0.032354	0.019597	0.067321	0.001214	0.002764	0.002681	95.86666	0.007434		4.1	2.3	8.1	0.2	0.3	0.2	10,200.2	1.0	10221.0
Excavator CAT330	235	2	0.040017	0.024238	0.083266	0.001502	0.003418	0.003316	158.6828	0.008421		0.1	0.0	0.1	0.0	0.0	0.0	253.9	0.0	254.2
Excavator CAT336	266	14530	0.045296	0.027435	0.09425	0.0017	0.003869	0.003753	134.2133	0.008421		625.2	358.8	1,232.5	24.7	39.4	38.2	1,560,095.8	122.4	1562665.2
Excavator CAT345	345	1960	0.058748	0.035583	0.122241	0.002205	0.005018	0.004868	174.0737	0.01025		109.4	62.8	215.6	4.3	6.9	6.7	272,947.5	20.1	273369.4
Forklift CAT TL-1055	125	25210	0.017432	0.012248	0.036272	0.000654	0.001489	0.001444	51.6523	0.002389		417.5	277.9	823.0	16.5	26.3	25.5	1,041,723.5	60.2	1042988.0
Generator 5kW	15	51082	0.003259	0.004027	0.073706	0.000122	0.000557	0.00054	9.656261	0.001106		158.1	185.1	3,388.6	6.2	19.9	19.3	394,608.9	56.5	395795.7
Grader CAT14	180	3868	0.030387	0.018405	0.063228	0.00114	0.002596	0.002518	90.03811	0.009556		111.7	64.1	220.1	4.4	7.0	6.8	278,613.9	37.0	279390.1
Loader Deere 210	78	1344	0.010649	0.007482	0.022157	0.0004	0.00091	0.000882	31.55249	0.006699		13.6	9.0	26.8	0.5	0.9	0.8	33,925.2	9.0	34114.3
Loader CAT950	130	1293	0.017748	0.01247	0.036929	0.000666	0.001516	0.001471	52.58748	0.005952		21.8	14.5	43.0	0.9	1.4	1.3	54,396.5	7.7	54558.1
Loader CAT963	150	7233	0.020478	0.014388	0.04261	0.000768	0.001749	0.001697	60.67786	0.005952		140.7	93.7	277.4	5.6	8.9	8.6	351,106.4	43.1	352010.4
Loader CAT966	170	125237	0.023209	0.016306	0.048292	0.000871	0.001982	0.001923	68.76824	0.008011		2,761.2	1,837.9	5,443.1	109.1	173.8	168.6	6,889,862.3	1003.3	6910931.2
Loader CAT IT62	207	33538	0.02826	0.019855	0.058802	0.001061	0.002414	0.002342	83.73544	0.008273		900.4	599.3	1,774.9	35.6	56.7	55.0	2,246,655.4	277.5	2252482.4
Loader CAT980	355	914	0.048465	0.034052	0.100844	0.001819	0.00414	0.004016	143.6043	0.008536		42.1	28.0	83.0	1.7	2.6	2.6	105,003.4	7.8	105167.3
Skid Steer Loader	50	488	0.006826	0.004796	0.014203	0.000256	0.000583	0.000566	20.22595	0.002279		3.2	2.1	6.2	0.1	0.2	0.2	7,896.2	1.1	7919.6
Pavement Broom	74	12480	0.01032	0.007251	0.021473	0.000387	0.000882	0.000855	30.57816	0.007408		122.4	81.4	241.2	4.8	7.7	7.5	305,292.4	92.4	307233.8
Forktruck	74	2377	0.01032	0.007251	0.021473	0.000387	0.000882	0.000855	30.57816	0.007408		23.3	15.5	45.9	0.9	1.5	1.4	58,147.4	17.6	58517.2
Manlift 40ft	50	13434	0.006973	0.004899	0.014509	0.000262	0.000596	0.000578	20.66092	0.003035		89.0	59.2	175.4	3.5	5.6	5.4	222,047.0	40.8	222903.3
Manlift 80ft	74	1125	0.01032	0.007251	0.021473	0.000387	0.000882	0.000855	30.57816	0.002992		11.0	7.3	21.7	0.4	0.7	0.7	27,520.3	3.4	27591.0
Compactor CAT CB54	130	156	0.021946	0.015419	0.045665	0.000824	0.001875	0.001818	65.02752	0.007268		3.3	2.2	6.4	0.1	0.2	0.2	8,115.4	1.1	8139.2
Compactor CAT CB64	130	165	0.021946	0.015419	0.045665	0.000824	0.001875	0.001818	65.02752	0.007268		3.4	2.3	6.8	0.1	0.2	0.2	8,583.6	1.2	8608.8
Compactor CAT 433	100	4	0.016882	0.011861	0.035127	0.000634	0.001442	0.001399	50.02117	0.007268		0.1	0.0	0.1	0.0	0.0	0.0	160.1	0.0	160.7

Compactor CAT CP56	145	972	0.024478	0.017199	0.050934	0.000919	0.002091	0.002028	72.5307	0.007268		22.6	15.0	44.6	0.9	1.4	1.4	56,399.9	7.1	56548.2
Compactor CAT PS360	130	239	0.021946	0.015419	0.045665	0.000824	0.001875	0.001818	65.02752	0.007268		5.0	3.3	9.8	0.2	0.3	0.3	12,433.3	1.7	12469.7
Compactor CAT CS423	80	4482	0.013505	0.009489	0.028101	0.000507	0.001154	0.001119	40.01694	0.007408		57.5	38.3	113.4	2.3	3.6	3.5	143,484.7	33.2	144182.0
Scraper CAT 615	250	50	0.042204	0.025563	0.087817	0.001584	0.003605	0.003497	125.0529	0.015378		2.0	1.2	4.0	0.1	0.1	0.1	5,002.1	0.8	5018.3
Skid Steer CAT 226	58	60651	0.007918	0.005563	0.016476	0.000297	0.000676	0.000656	23.4621	0.002375		456.2	303.7	899.4	18.0	28.7	27.9	1,138,400.1	144.0	1141425.0
Skid Steer CAT 246	80	12958	0.010922	0.007674	0.022725	0.00041	0.000933	0.000905	32.36152	0.001119		134.4	89.5	265.0	5.3	8.5	8.2	335,472.5	14.5	335776.9
Rack Truck		12480	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		66.0	415.7	3,140.9	12.6	199.2	80.8	1,087,913.7	40.7	1088768.3
Mechanics Truck		3120	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034		3.6	210.7	20.8	0.7	22.9	9.2	56,205.3	1.1	56227.5
Oil dist Truck		213	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034		0.2	14.4	1.4	0.0	1.6	0.6	3,837.1	0.1	3838.6
Pickup 1/2T		327237	0.002048	0.106169	0.010292	0.000211	0.010524	0.004261	20.93382	0.000522		636.8	31,268.3	3,031.2	68.9	2,410.6	975.9	5,480,256.9	170.7	5483841.5
Pickup 3/4T		343772	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034		393.3	23,218.4	2,287.6	77.6	2,520.4	1,014.2	6,192,883.0	116.9	6195337.3
Tractor 6x4		6280	0.013788	0.05546	0.419738	0.001278	0.023416	0.009838	133.9301	0.00064		82.3	313.5	2,372.4	8.0	102.9	43.2	672,865.0	4.0	672949.5
Water truck		51442	0.001204	0.075044	0.007394	0.000226	0.010474	0.004215	22.51813	0.00034		58.8	3,474.4	342.3	11.6	377.2	151.8	926,702.3	17.5	927069.5
											total	19,008	70,192	49,296	881	6,763	3,370	58,752,293	4,632	58,849,564

On-Road		**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**		**Emissions (lbs)**								
Equipment	**Hours**	**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**		**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Dump Truck	82	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		0.5	3.0	22.9	0.1	1.9	0.8	8935.2	0.3	8940.8
End Dump 10CY	33096	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		184.4	1224.9	9255.0	33.4	754.7	306.2	3606329.3	107.9	3608595.6
End Dump 15CY	130929	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		729.3	4845.6	36613.2	132.0	2985.5	1211.1	14266772.0	426.9	14275737.6
Flatbed 10T	86337	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		480.9	3195.3	24143.4	87.0	1968.7	798.6	9407772.9	281.5	9413685.0
Flatbed 2T	156	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		0.9	5.8	43.6	0.2	3.6	1.4	16998.7	0.5	17009.3
Flatbed 20T	25145	0.00557	0.037009	0.279642	0.001008	0.022802	0.00925	108.9657	0.003261		140.1	930.6	7031.6	25.3	573.4	232.6	2739942.9	82.0	2741664.7
Employee Commutes	196025	0.000689	0.052913	0.003519	0.000178	0.010467	0.004209	17.80674	0.000209		135.1	10372.2	689.8	35.0	2051.8	825.0	3490562.5	41.0	3491423.4
										total	1,671	20,577	77,800	313	8,339	3,376	33,537,313	940	33,557,056

		lb/acre	**Daily Emissions (lbs)**	
	Daily Acres	**PM**	**PM10**	**PM2.5**
Fugitive Dust	15	10	150.0	31.5

	ROG	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Total (lb)	20,679	90,769	127,096	1,194	240,102	53,996	92,289,606	5,572	92,406,620
Daily (lb)	13.8	60.5	84.7	0.8	160.1	36.0	61,526.4	3.7	61,604.4
Annual (T)	1.7	7.6	10.6	0.1	20.0	4.5	7,690.8	0.5	7,700.6

On-site Emissions

	ROG	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Total (lb)	19091.2	71220.9	53186.1	897.0	232179.9	50789.0	60429158.6	4678.9	60527416.4
Daily (lb)	12.72749	47.48059	35.45738	0.598016	154.7866	33.85932	40286.10574	3.119296	40351.6
Annual (T)	1.590936	5.935074	4.432172	0.074752	19.34833	4.232415	5035.763218	0.389912	5044.0

Total Emissions (tons)	**ROG**	**CO**	**NOX**	**SOX**	**PM10**	**PM2.5**	**CO2**	**CH4**	**CO2e**
Off-road	9.5	35.1	24.6	0.4	3.4	1.7	29,376.1	2.3	29,424.8
On-Road	0.8	10.3	38.9	0.2	4.2	1.7	16,768.7	0.5	16,778.5
Fugitive Dust					112.5	23.6			
Total	10.3	45.4	63.5	0.6	120.1	27.0	46,144.8	2.8	46,203.3
Annual	1.7	7.6	10.6	0.1	20.0	4.5	7,690.8	0.5	7,700.6

SCAB Fleet Average Emission Factors (Diesel)

Road Emission Rates

Air Basin	SC

Equipment	MaxHP	ROG (lb/hr)	CO (lb/hr)	NOX (lb/hr)	SOX (lb/hr)	PM (lb/hr)	CO2 (lb/hr)	CH4 (lb/hr)
Aerial Lifts	15	0.0101	0.0528	0.0631	0.0001	0.0025	8.7	0.0009
	25	0.0143	0.0468	0.0865	0.0001	0.0039	11.0	0.0013
	50	0.0336	0.1506	0.1525	0.0003	0.0093	19.6	0.0030
	120	0.0327	0.2319	0.2565	0.0004	0.0170	38.1	0.0029
	500	0.0840	0.3899	0.8852	0.0021	0.0270	213	0.0076
	750	0.1545	0.7049	1.6423	0.0039	0.0494	385	0.0139
Aerial Lifts Composite		0.0322	0.1740	0.2152	0.0004	0.0119	34.7	0.0029
Air Compressors	15	0.0098	0.0456	0.0608	0.0001	0.0033	7.2	0.0009
	25	0.0207	0.0645	0.1187	0.0002	0.0060	14.4	0.0019
	50	0.0518	0.2142	0.1848	0.0003	0.0131	22.3	0.0047
	120	0.0504	0.3097	0.3370	0.0006	0.0255	47.0	0.0045
	175	0.0685	0.4994	0.5069	0.0010	0.0268	88.5	0.0062
	250	0.0747	0.2653	0.6529	0.0015	0.0206	131	0.0067
	500	0.1262	0.4504	1.0161	0.0023	0.0345	232	0.0114
	750	0.1960	0.6961	1.6134	0.0036	0.0540	358	0.0177
	1000	0.2958	1.0416	3.7257	0.0049	0.0965	486	0.0267
Air Compressors Composite		0.0582	0.3130	0.3935	0.0007	0.0246	63.6	0.0052
Bore/Drill Rigs	15	0.0120	0.0632	0.0754	0.0002	0.0029	10.3	0.0011
	25	0.0193	0.0658	0.1219	0.0002	0.0046	16.0	0.0017
	50	0.0204	0.2211	0.1897	0.0004	0.0034	31.0	0.0018
	120	0.0308	0.4665	0.2710	0.0009	0.0072	77.1	0.0028
	175	0.0475	0.7542	0.2910	0.0016	0.0092	141	0.0043
	250	0.0538	0.3426	0.2499	0.0021	0.0068	188	0.0049
	500	0.0887	0.5512	0.4035	0.0031	0.0112	311	0.0080
	750	0.1755	1.0891	0.8022	0.0062	0.0222	615	0.0158
	1000	0.2789	1.6441	4.2095	0.0093	0.0723	928	0.0252
Bore/Drill Rigs Composite		0.0539	0.5011	0.4175	0.0017	0.0099	165	0.0049
Cement and Mortar	15	0.0074	0.0386	0.0461	0.0001	0.0018	6.3	0.0007
	25	0.0232	0.0754	0.1391	0.0002	0.0064	17.6	0.0021
Cement and Mortar Mixers Compo		0.0087	0.0416	0.0538	0.0001	0.0022	7.2	0.0008
Concrete/Industrial	25	0.0199	0.0678	0.1256	0.0002	0.0047	16.5	0.0018
	50	0.0549	0.2534	0.2388	0.0004	0.0148	30.2	0.0050
	120	0.0650	0.4661	0.4898	0.0009	0.0335	74.1	0.0059
	175	0.1012	0.8661	0.8304	0.0018	0.0410	160	0.0091
Concrete/Industrial Saws Compos		0.0605	0.3850	0.3959	0.0007	0.0261	58.5	0.0055
Cranes	50	0.0646	0.2527	0.2019	0.0003	0.0151	23.2	0.0058
	120	0.0639	0.3486	0.3857	0.0006	0.0306	50.1	0.0058
	175	0.0752	0.4766	0.5029	0.0009	0.0283	80.3	0.0068
	250	0.0787	0.2521	0.6168	0.0013	0.0212	112	0.0071
	500	0.1202	0.4085	0.8748	0.0018	0.0317	180	0.0108
	750	0.2034	0.6869	1.5239	0.0030	0.0544	303	0.0184
	9999	0.7422	2.3933	7.8338	0.0098	0.2146	971	0.0670
Cranes Composite		0.1012	0.4060	0.7908	0.0014	0.0318	129	0.0091
Crawler Tractors	50	0.0813	0.2884	0.2240	0.0003	0.0181	24.9	0.0073
	120	0.0945	0.4679	0.5589	0.0008	0.0448	65.8	0.0085
	175	0.1270	0.7327	0.8534	0.0014	0.0479	121	0.0115
	250	0.1333	0.4179	1.0430	0.0019	0.0385	166	0.0120
	500	0.1959	0.7202	1.4625	0.0025	0.0554	259	0.0177
	750	0.3529	1.2889	2.6916	0.0047	0.1006	465	0.0318
	1000	0.5380	2.0171	5.7362	0.0066	0.1663	658	0.0485
Crawler Tractors Composite		0.1185	0.5387	0.7960	0.0013	0.0457	114	0.0107
Crushing/Proc. Equ	50	0.0949	0.4230	0.3607	0.0006	0.0241	44.0	0.0086
	120	0.0849	0.5506	0.5679	0.0010	0.0416	83.1	0.0077
	175	0.1258	0.9520	0.8975	0.0019	0.0475	167	0.0113
	250	0.1386	0.4932	1.1284	0.0028	0.0359	245	0.0125
	500	0.2037	0.7231	1.5205	0.0037	0.0524	374	0.0184
	750	0.3193	1.1368	2.4441	0.0059	0.0824	589	0.0288
	9999	0.8312	2.7569	9.5902	0.0131	0.2467	1,308	0.0750

Crushing/Proc. Equipment Compo		0.1109	0.6328	0.7330	0.0015	0.0412	132	0.0100
Dumpers/Tenders	25	0.0092	0.0314	0.0584	0.0001	0.0023	7.6	0.0008
Dumpers/Tenders Composite		0.0092	0.0314	0.0584	0.0001	0.0023	7.6	0.0008
Excavators	25	0.0198	0.0677	0.1253	0.0002	0.0047	16.4	0.0018
	50	0.0468	0.2521	0.2002	0.0003	0.0111	25.0	0.0042
	120	0.0693	0.5017	0.4425	0.0009	0.0289	73.6	0.0063
	175	0.0824	0.6641	0.5069	0.0013	0.0264	112	0.0074
	250	0.0933	0.3323	0.5984	0.0018	0.0202	159	0.0084
	500	0.1339	0.4689	0.7881	0.0023	0.0284	234	0.0121
	750	0.2224	0.7769	1.3381	0.0039	0.0476	387	0.0201
Excavators Composite		0.0848	0.5160	0.5181	0.0013	0.0249	120	0.0077
Forklifts	50	0.0229	0.1440	0.1180	0.0002	0.0058	14.7	0.0021
	120	0.0265	0.2118	0.1745	0.0004	0.0108	31.2	0.0024
	175	0.0394	0.3322	0.2328	0.0006	0.0125	56.1	0.0036
	250	0.0440	0.1559	0.2594	0.0009	0.0089	77.1	0.0040
	500	0.0623	0.2131	0.3432	0.0011	0.0125	111	0.0056
Forklifts Composite		0.0372	0.2173	0.2186	0.0006	0.0101	54.4	0.0034
Generator Sets	15	0.0123	0.0644	0.0852	0.0002	0.0043	10.2	0.0011
	25	0.0231	0.0788	0.1449	0.0002	0.0070	17.6	0.0021
	50	0.0491	0.2265	0.2357	0.0004	0.0138	30.6	0.0044
	120	0.0642	0.4694	0.5181	0.0009	0.0333	77.9	0.0058
	175	0.0808	0.7324	0.7528	0.0016	0.0337	142	0.0073
	250	0.0857	0.3931	0.9756	0.0024	0.0274	213	0.0077
	500	0.1264	0.6113	1.3836	0.0033	0.0415	337	0.0114
	750	0.2080	0.9868	2.2918	0.0055	0.0679	544	0.0188
	9999	0.5230	2.0948	7.5356	0.0105	0.1778	1,049	0.0472
Generator Sets Composite		0.0477	0.2786	0.3759	0.0007	0.0192	61.0	0.0043
Graders	50	0.0676	0.2868	0.2305	0.0004	0.0157	27.5	0.0061
	120	0.0860	0.5138	0.5323	0.0009	0.0398	75.0	0.0078
	175	0.1059	0.7294	0.7002	0.0014	0.0385	124	0.0096
	250	0.1115	0.3778	0.8409	0.0019	0.0287	172	0.0101
	500	0.1420	0.5194	0.9989	0.0023	0.0359	229	0.0128
	750	0.3024	1.0988	2.1820	0.0049	0.0774	486	0.0273
Graders Composite		0.1049	0.5812	0.7217	0.0015	0.0355	133	0.0095
Off-Highway Tracto	120	0.1622	0.6879	0.9427	0.0011	0.0779	93.7	0.0146
	175	0.1614	0.8085	1.1191	0.0015	0.0632	130	0.0146
	250	0.1275	0.3861	1.0244	0.0015	0.0411	130	0.0115
	750	0.5173	2.0914	4.1264	0.0057	0.1633	568	0.0467
	1000	0.7842	3.2770	8.0820	0.0082	0.2526	814	0.0708
Off-Highway Tractors Composite		0.1631	0.6762	1.2293	0.0017	0.0579	151	0.0147
Off-Highway Trucks	175	0.0983	0.7542	0.5947	0.0014	0.0314	125	0.0089
	250	0.1042	0.3572	0.6660	0.0019	0.0225	167	0.0094
	500	0.1656	0.5578	0.9706	0.0027	0.0351	272	0.0149
	750	0.2693	0.9044	1.6152	0.0044	0.0577	442	0.0243
	1000	0.4058	1.3339	4.3394	0.0063	0.1110	625	0.0366
Off-Highway Trucks Composite		0.1613	0.5634	1.0525	0.0027	0.0360	260	0.0146
Other Construction	15	0.0118	0.0617	0.0737	0.0002	0.0029	10.1	0.0011
	25	0.0159	0.0544	0.1008	0.0002	0.0038	13.2	0.0014
	50	0.0412	0.2342	0.2102	0.0004	0.0108	28.0	0.0037
	120	0.0604	0.5116	0.4573	0.0009	0.0279	80.9	0.0054
	175	0.0608	0.5859	0.4478	0.0012	0.0218	107	0.0055
	500	0.1122	0.4743	0.8004	0.0025	0.0275	254	0.0101
Other Construction Equipment Co		0.0633	0.3542	0.4478	0.0013	0.0181	123	0.0057
Other General Indu	15	0.0066	0.0391	0.0466	0.0001	0.0018	6.4	0.0006
	25	0.0185	0.0632	0.1170	0.0002	0.0044	15.3	0.0017
	50	0.0548	0.2314	0.1869	0.0003	0.0134	21.7	0.0049
	120	0.0732	0.4277	0.4544	0.0007	0.0350	62.0	0.0066
	175	0.0835	0.5664	0.5608	0.0011	0.0307	95.9	0.0075
	250	0.0884	0.2862	0.6866	0.0015	0.0221	136	0.0080
	500	0.1664	0.5336	1.1846	0.0026	0.0412	265	0.0150
	750	0.2755	0.8795	2.0057	0.0044	0.0689	437	0.0249
	1000	0.3866	1.2370	4.3716	0.0056	0.1169	560	0.0349
Other General Industrial Equipme		0.1113	0.4591	0.8242	0.0016	0.0336	152	0.0100
Other Material Han	50	0.0758	0.3192	0.2598	0.0004	0.0186	30.3	0.0068
	120	0.0709	0.4162	0.4437	0.0007	0.0341	60.7	0.0064
	175	0.1050	0.7171	0.7125	0.0014	0.0389	122	0.0095
	250	0.0934	0.3046	0.7336	0.0016	0.0237	145	0.0084

	500	0.1186	0.3838	0.8543	0.0019	0.0297	192	0.0107
	9999	0.5386	1.6331	5.7822	0.0073	0.1543	741	0.0486
Other Material Handling Equipme		0.1050	0.4495	0.8053	0.0015	0.0324	141	0.0095
Pavers	25	0.0226	0.0769	0.1434	0.0002	0.0057	18.7	0.0020
	50	0.0968	0.3188	0.2539	0.0004	0.0217	28.0	0.0087
	120	0.1030	0.4862	0.6205	0.0008	0.0506	69.2	0.0093
	175	0.1365	0.7632	0.9644	0.0014	0.0539	128	0.0123
	250	0.1574	0.5000	1.3162	0.0022	0.0490	194	0.0142
	500	0.1765	0.6885	1.4189	0.0023	0.0539	233	0.0159
Pavers Composite		0.1121	0.5017	0.6241	0.0009	0.0419	77.9	0.0101
Paving Equipment	25	0.0152	0.0520	0.0963	0.0002	0.0036	12.6	0.0014
	50	0.0821	0.2696	0.2165	0.0003	0.0185	23.9	0.0074
	120	0.0805	0.3809	0.4869	0.0006	0.0400	54.5	0.0073
	175	0.1062	0.5971	0.7567	0.0011	0.0424	101	0.0096
	250	0.0962	0.3068	0.8236	0.0014	0.0300	122	0.0087
Paving Equipment Composite		0.0857	0.4136	0.5558	0.0008	0.0374	68.9	0.0077
Plate Compactors	15	0.0050	0.0263	0.0314	0.0001	0.0012	4.3	0.0005
Plate Compactors Composite		0.0050	0.0263	0.0314	0.0001	0.0012	4.3	0.0005
Pressure Washers	15	0.0059	0.0308	0.0408	0.0001	0.0021	4.9	0.0005
	25	0.0094	0.0319	0.0587	0.0001	0.0028	7.1	0.0008
	50	0.0170	0.0895	0.1059	0.0002	0.0054	14.3	0.0015
	120	0.0167	0.1383	0.1528	0.0003	0.0087	24.1	0.0015
Pressure Washers Composite		0.0101	0.0562	0.0703	0.0001	0.0036	9.4	0.0009
Pumps	15	0.0101	0.0468	0.0625	0.0001	0.0034	7.4	0.0009
	25	0.0279	0.0871	0.1601	0.0002	0.0080	19.5	0.0025
	50	0.0599	0.2670	0.2677	0.0004	0.0164	34.3	0.0054
	120	0.0676	0.4767	0.5260	0.0009	0.0350	77.9	0.0061
	175	0.0845	0.7338	0.7548	0.0016	0.0350	140	0.0076
	250	0.0866	0.3786	0.9399	0.0023	0.0271	201	0.0078
	500	0.1387	0.6343	1.4367	0.0034	0.0442	345	0.0125
	750	0.2330	1.0487	2.4376	0.0057	0.0741	571	0.0210
	9999	0.7050	2.7434	9.8509	0.0136	0.2358	1,355	0.0636
Pumps Composite		0.0458	0.2722	0.3306	0.0006	0.0189	49.6	0.0041
Rollers	15	0.0074	0.0386	0.0461	0.0001	0.0018	6.3	0.0007
	25	0.0161	0.0549	0.1017	0.0002	0.0038	13.3	0.0015
	50	0.0662	0.2547	0.2171	0.0003	0.0158	26.0	0.0060
	120	0.0680	0.3919	0.4411	0.0007	0.0341	59.0	0.0061
	175	0.0897	0.6130	0.6569	0.0012	0.0356	108	0.0081
	250	0.0934	0.3306	0.8164	0.0017	0.0274	153	0.0084
	500	0.1262	0.4902	1.0345	0.0022	0.0365	219	0.0114
Rollers Composite		0.0683	0.3885	0.4485	0.0008	0.0291	67.0	0.0062
Rough Terrain Fork	50	0.0655	0.3294	0.2744	0.0004	0.0166	33.9	0.0059
	120	0.0596	0.4179	0.3967	0.0007	0.0273	62.4	0.0054
	175	0.0911	0.7231	0.6072	0.0014	0.0322	125	0.0082
	250	0.0988	0.3504	0.7075	0.0019	0.0237	171	0.0089
	500	0.1441	0.5029	0.9468	0.0025	0.0341	257	0.0130
Rough Terrain Forklifts Composite		0.0638	0.4499	0.4219	0.0008	0.0277	70.3	0.0058
Rubber Tired Doze	175	0.1676	0.8191	1.1443	0.0015	0.0646	129	0.0151
	250	0.1890	0.5640	1.4879	0.0021	0.0605	183	0.0171
	500	0.2531	1.0338	1.9476	0.0026	0.0787	265	0.0228
	750	0.3821	1.5520	2.9917	0.0040	0.1195	399	0.0345
	1000	0.5986	2.5082	6.0072	0.0060	0.1906	592	0.0540
Rubber Tired Dozers Composite		0.2343	0.8819	1.8194	0.0025	0.0737	239	0.0211
Rubber Tired Loade	25	0.0204	0.0697	0.1291	0.0002	0.0048	16.9	0.0018
	50	0.0742	0.3198	0.2591	0.0004	0.0174	31.1	0.0067
	120	0.0660	0.4016	0.4121	0.0007	0.0307	58.9	0.0060
	175	0.0888	0.6227	0.5902	0.0012	0.0323	106	0.0080
	250	0.0946	0.3237	0.7142	0.0017	0.0244	149	0.0085
	500	0.1440	0.5256	1.0103	0.0023	0.0363	237	0.0130
	750	0.2966	1.0762	2.1374	0.0049	0.0758	486	0.0268
	1000	0.3912	1.4170	4.4558	0.0060	0.1188	594	0.0353
Rubber Tired Loaders Composite		0.0861	0.4470	0.5831	0.0012	0.0300	109	0.0078
Scrapers	120	0.1382	0.6686	0.8165	0.0011	0.0661	93.9	0.0125
	175	0.1579	0.8954	1.0712	0.0017	0.0603	148	0.0142
	250	0.1704	0.5324	1.3558	0.0024	0.0501	209	0.0154
	500	0.2458	0.9165	1.8678	0.0032	0.0707	321	0.0222
	750	0.4267	1.5807	3.3123	0.0056	0.1238	555	0.0385

Scrapers Composite		0.2135	0.8418	1.6042	0.0027	0.0653	262	0.0193
Signal Boards	15	0.0072	0.0377	0.0450	0.0001	0.0018	6.2	0.0006
	50	0.0649	0.2966	0.2820	0.0005	0.0172	36.2	0.0059
	120	0.0695	0.4999	0.5256	0.0009	0.0356	80.2	0.0063
	175	0.0955	0.8276	0.7968	0.0017	0.0385	155	0.0086
	250	0.1151	0.4857	1.1305	0.0029	0.0337	255	0.0104
Signal Boards Composite		0.0143	0.0916	0.1029	0.0002	0.0050	16.7	0.0013
Skid Steer Loaders	25	0.0176	0.0582	0.1081	0.0002	0.0048	13.8	0.0016
	50	0.0263	0.2035	0.1787	0.0003	0.0065	25.5	0.0024
	120	0.0248	0.2680	0.1970	0.0005	0.0095	42.8	0.0022
Skid Steer Loaders Composite		0.0253	0.2146	0.1799	0.0004	0.0074	30.3	0.0023
Surfacing Equipme	50	0.0317	0.1242	0.1139	0.0002	0.0077	14.1	0.0029
	120	0.0668	0.4072	0.4651	0.0007	0.0334	63.8	0.0060
	175	0.0637	0.4677	0.5082	0.0010	0.0257	85.8	0.0058
	250	0.0733	0.2858	0.7013	0.0015	0.0230	135	0.0066
	500	0.1120	0.5047	1.0316	0.0022	0.0350	221	0.0101
	750	0.1782	0.7911	1.6685	0.0035	0.0558	347	0.0161
Surfacing Equipment Composite		0.0923	0.4187	0.8043	0.0017	0.0291	166	0.0083
Sweepers/Scrubbe	15	0.0124	0.0729	0.0870	0.0002	0.0034	11.9	0.0011
	25	0.0237	0.0808	0.1495	0.0002	0.0056	19.6	0.0021
	50	0.0522	0.2974	0.2539	0.0004	0.0137	31.6	0.0047
	120	0.0647	0.4983	0.4442	0.0009	0.0291	75.0	0.0058
	175	0.0966	0.8030	0.6280	0.0016	0.0337	139	0.0087
	250	0.0894	0.3218	0.6073	0.0018	0.0204	162	0.0081
Sweepers/Scrubbers Composite		0.0681	0.4946	0.4308	0.0009	0.0251	78.5	0.0061
Tractors/Loaders/B	25	0.0191	0.0653	0.1211	0.0002	0.0046	15.9	0.0017
	50	0.0497	0.2839	0.2342	0.0004	0.0121	30.3	0.0045
	120	0.0435	0.3426	0.2937	0.0006	0.0184	51.7	0.0039
	175	0.0669	0.5845	0.4264	0.0011	0.0218	101	0.0060
	250	0.0914	0.3483	0.5964	0.0019	0.0200	172	0.0082
	500	0.1788	0.6771	1.0736	0.0039	0.0385	345	0.0161
	750	0.2691	1.0154	1.6525	0.0058	0.0585	517	0.0243
Tractors/Loaders/Backhoes Comp		0.0513	0.3647	0.3331	0.0008	0.0189	66.8	0.0046
Trenchers	15	0.0099	0.0517	0.0617	0.0001	0.0024	8.5	0.0009
	25	0.0397	0.1355	0.2509	0.0004	0.0094	32.9	0.0036
	50	0.1142	0.3647	0.2965	0.0004	0.0255	32.9	0.0103
	120	0.0959	0.4498	0.5899	0.0008	0.0477	64.9	0.0087
	175	0.1505	0.8436	1.1021	0.0016	0.0607	144	0.0136
	250	0.1783	0.5823	1.5446	0.0025	0.0582	223	0.0161
	500	0.2312	0.9564	1.9434	0.0031	0.0740	311	0.0209
	750	0.4382	1.7994	3.7533	0.0059	0.1413	587	0.0395
Trenchers Composite		0.1061	0.4368	0.5117	0.0007	0.0393	58.7	0.0096
Welders	15	0.0084	0.0392	0.0522	0.0001	0.0028	6.2	0.0008
	25	0.0161	0.0504	0.0927	0.0001	0.0047	11.3	0.0015
	50	0.0563	0.2339	0.2108	0.0003	0.0144	26.0	0.0051
	120	0.0398	0.2540	0.2787	0.0005	0.0205	39.5	0.0036
	175	0.0703	0.5400	0.5536	0.0011	0.0283	98.2	0.0063
	250	0.0617	0.2348	0.5828	0.0013	0.0179	119	0.0056
	500	0.0825	0.3196	0.7244	0.0016	0.0239	168	0.0074
Welders Composite		0.0388	0.1876	0.1941	0.0003	0.0133	25.6	0.0035

Tier 4 Final Emission Rates

Adjusted EF = Steady State EF x TAF x DF

Where:

EF = Emission Factor
TAF = Transient Adjustment Factor
DF = Deterioration Factor

Note: TAF = 1.0 for Tier 4 equipment

Deterioration "A"

ROG	0.027
CO	0.151
NOx	0.008
PM10	0.473

DF

ROG	1.0135
CO	1.0755
NOx	1.004
PM10	1.2365

			Steady State Emission Factors (g/bhphr)						Adjusted Emission Factors (g/bhphr)						Adjusted Emission Factors (lb/hr)					
Equipment	**HP Rating**	**Load Factor**	**ROG**	**CO**	**NOX**	**SOX**	**PM**	**CO2**	**ROG**	**CO**	**NOX**	**SOX**	**PM**	**CO2**	**ROG**	**CO**	**NOX**	**SOX**	**PM**	**CO2**
Drill Rig	250	0.43	0.1314	0.075	0.276	0.004998	0.0092	394.6	0.133174	0.080663	0.277104	0.004998	0.011376	394.6	0.031561	0.019116	0.065672	0.001184	0.002696	93.51784
Wheel Loader	150	0.465	0.1314	0.087	0.276	0.004998	0.0092	394.6	0.133174	0.093569	0.277104	0.004998	0.011376	394.6	0.020478	0.014388	0.04261	0.000768	0.001749	60.67786
Excavator	200	0.58	0.1314	0.075	0.276	0.004998	0.0092	394.6	0.133174	0.080663	0.277104	0.004998	0.011376	394.6	0.034057	0.020628	0.070864	0.001278	0.002909	100.9123
Pump Truck	175	0.74	0.1314	0.075	0.276	0.004998	0.0092	394.6	0.133174	0.080663	0.277104	0.004998	0.011376	394.6	0.03802	0.023029	0.079111	0.001427	0.003248	112.6564
Crane	375	0.43	0.1314	0.084	0.276	0.004998	0.0092	394.6	0.133174	0.090342	0.277104	0.004998	0.011376	394.6	0.047342	0.032116	0.098508	0.001777	0.004044	140.2768
Forklift	150	0.475	0.1314	0.087	0.276	0.004998	0.0092	394.6	0.133174	0.093569	0.277104	0.004998	0.011376	394.6	0.020919	0.014697	0.043527	0.000785	0.001787	61.98276
Pile Driving Machine	180	0.43	0.1314	0.075	0.276	0.004998	0.0092	394.6	0.133174	0.080663	0.277104	0.004998	0.011376	394.6	0.022724	0.013764	0.047284	0.000853	0.001941	67.33285
Dozer	400	0.59	0.1314	0.084	0.276	0.004998	0.0092	394.6	0.133174	0.090342	0.277104	0.004998	0.011376	394.6	0.069288	0.047003	0.144172	0.0026	0.005919	205.3043
Backhoe	150	0.465	0.1314	0.087	0.276	0.004998	0.0092	394.6	0.133174	0.093569	0.277104	0.004998	0.011376	394.6	0.020478	0.014388	0.04261	0.000768	0.001749	60.67786
Grader	175	0.575	0.1314	0.075	0.276	0.004998	0.0092	394.6	0.133174	0.080663	0.277104	0.004998	0.011376	394.6	0.029543	0.017894	0.061472	0.001109	0.002524	87.53705
Paver	34	0.62	0.1314	0.087	0.276	0.004998	0.0092	394.6	0.133174	0.093569	0.277104	0.004998	0.011376	394.6	0.006189	0.004348	0.012878	0.000232	0.000529	18.3382
Roller	125	0.575	0.1314	0.087	0.276	0.004998	0.0092	394.6	0.133174	0.093569	0.277104	0.004998	0.011376	394.6	0.021102	0.014826	0.043908	0.000792	0.001803	62.52647
Ballast Compressor	175	0.62	0.1314	0.075	0.276	0.004998	0.0092	394.6	0.133174	0.080663	0.277104	0.004998	0.011376	394.6	0.031855	0.019294	0.066283	0.001195	0.002721	94.38778
Ballast Regulator	175	0.62	0.1314	0.075	0.276	0.004998	0.0092	394.6	0.133174	0.080663	0.277104	0.004998	0.011376	394.6	0.031855	0.019294	0.066283	0.001195	0.002721	94.38778
Generator	49	0.74	0.1314	0.153	3	0.004998	0.0184	394.6	0.133174	0.164552	3.012	0.004998	0.022752	394.6	0.010646	0.013154	0.240774	0.0004	0.001819	31.54379
Air Compressor	150	0.48	0.1314	0.087	0.276	0.004998	0.0092	394.6	0.133174	0.093569	0.277104	0.004998	0.011376	394.6	0.021139	0.014852	0.043985	0.000793	0.001806	62.63521

EMFAC2017 2022 Emission Rates (g/mile)

Heavy Trucks

	CH4	CO	CO2	HC	NOx	PM	PM10	PM2_5	ROG	SOx	TOG
35 MPH	0.04226	0.479642	1412.196	0.096002	3.624155	0.018407	0.018296	0.017505	0.07219	0.013061	0.121438
Brake Wear						0.189	0.18522	0.07938			
Tire Wear						0.092	0.092	0.023			
Total	**0.04226**	**0.479642**	**1412.196**	**0.096002**	**3.624155**	**0.299407**	**0.295516**	**0.119885**	**0.07219**	**0.013061**	**0.121438**
lb/hr	**0.003261**	**0.037009**	**108.9657**	**0.007408**	**0.279642**	**0.023102**	**0.022802**	**0.00925**	**0.00557**	**0.001008**	**0.00937**

LDA

	CH4	CO	CO2	HC	NOx	PM	PM10	PM2_5	ROG	SOx	TOG
35 MPH	0.00271	0.685749	230.7754	0.011957	0.045605	0.001561	0.001403	0.001293	0.008933	0.002313	0.012984
Brake Wear						0.1125	0.11025	0.04725			
Tire Wear						0.024	0.024	0.006			
Total	**0.00271**	**0.685749**	**230.7754**	**0.011957**	**0.045605**	**0.138061**	**0.135653**	**0.054543**	**0.008933**	**0.002313**	**0.012984**
lb/hr	**0.000209**	**0.052913**	**17.80674**	**0.000923**	**0.003519**	**0.010653**	**0.010467**	**0.004209**	**0.000689**	**0.000178**	**0.001002**

LDT (gas)

	CH4	CO	CO2	HC	NOx	PM	PM10	PM2_5	ROG	SOx	TOG
35 MPH	0.00676	1.375955	271.3023	0.035713	0.133387	0.002385	0.002137	0.001967	0.026546	0.00273	0.038684
Brake Wear						0.1125	0.11025	0.04725			
Tire Wear						0.024	0.024	0.006			
Total	**0.00676**	**1.375955**	**271.3023**	**0.035713**	**0.133387**	**0.138885**	**0.136387**	**0.055217**	**0.026546**	**0.00273**	**0.038684**
lb/hr	**0.000522**	**0.106169**	**20.93382**	**0.002756**	**0.010292**	**0.010716**	**0.010524**	**0.004261**	**0.002048**	**0.000211**	**0.002985**

LDT (diesel)

	CH4	CO	CO2	HC	NOx	PM	PM10	PM2_5	ROG	SOx	TOG
35 MPH	0.004406	0.972576	291.835	0.020959	0.095824	0.001662	0.00149	0.001372	0.015606	0.002927	0.022723
Brake Wear						0.1125	0.11025	0.04725			
Tire Wear						0.024	0.024	0.006			
Total	**0.004406**	**0.972576**	**291.835**	**0.020959**	**0.095824**	**0.138162**	**0.13574**	**0.054622**	**0.015606**	**0.002927**	**0.022723**
lb/hr	**0.00034**	**0.075044**	**22.51813**	**0.001617**	**0.007394**	**0.010661**	**0.010474**	**0.004215**	**0.001204**	**0.000226**	**0.001753**

Appendix D:
Operational Emission Calculations

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Train VMT

Existing Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	331	1.7	572.6	12.0	58.4	261.4	0.2	6.81	6.6	22,442.6

2026 No Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	331	1.7	572.6	4.2	58.4	140.6	0.2	2.64	2.6	22,442.6

2026 Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	398	1.5	612.9	4.5	62.5	150.5	0.2	2.82	2.7	24,021.7

2031 No Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	331	1.7	572.6	2.5	58.4	101.0	0.2	1.54	1.5	22,442.6

2031 Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	770	1.5	1,185.8	5.3	121.0	209.2	0.4	3.18	3.1	46,474.1

2040 No Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	331	1.7	572.6	1.2	58.4	50.5	0.2	0.66	0.6	22,442.6

2040 Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	842	1.5	1,296.7	2.6	132.3	114.4	0.5	1.49	1.4	50,819.7

Train Idling

							pounds per day			
Conditions	**Trips**	**Idle time (hr)**	**Idle Hours**	**VOC**	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO2**
Existing	166	0.4	69.6	11.4	55.2	246.9	0.2	6.43	6.2	23122.7
2026 No Build	166	0.4	69.6	3.9	55.2	132.8	0.2	2.49	2.4	23122.7
2026 Build	199	0.3	54.2	3.1	42.9	103.3	0.2	1.94	1.9	17989.9
2031 No Build	166	0.4	69.6	2.4	55.2	95.4	0.2	1.45	1.4	23122.7
2031 Build	385	0.2	66.6	2.3	52.8	91.3	0.2	1.39	1.3	22126.0
2040 No Build	166	0.4	69.6	1.1	55.2	47.7	0.2	0.62	0.6	23122.7
2040 Build	421	0.2	72.7	1.1	57.6	49.8	0.2	0.65	0.6	24152.6

Summary (lb/day)

	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
Existing	23.4	113.6	508.3	0.4	13.2	12.8	45,565.3
2026 No Build	8.1	113.6	273.4	0.4	5.1	5.0	45,565.3
Increase from Existing	*-15.3*	*0.0*	*-234.9*	*0.0*	*-8.1*	*-7.9*	*0.0*
2026 Build	7.5	105.5	253.8	0.4	4.8	4.6	42,011.5
Increase from Existing	*-15.9*	*-8.1*	*-254.5*	*0.0*	*-8.5*	*-8.2*	*-3,553.8*
Increase from No Build	*-0.6*	*-8.1*	*-19.6*	*0.0*	*-0.4*	*-0.4*	*-3,553.8*
2031 No Build	5.0	113.6	196.5	0.4	3.0	2.9	45,565.3
Increase from Existing	*-18.5*	*0.0*	*-311.8*	*0.0*	*-10.3*	*-9.9*	*0.0*
2031 Build	7.6	173.8	300.6	0.6	4.6	4.4	68,600.1

Increase from Existing	*-15.8*	*60.2*	*-207.7*	*0.2*	*-8.7*	*-8.4*	*23,034.8*
Increase from No Build	*2.6*	*60.2*	*104.1*	*0.2*	*1.6*	*1.5*	*23,034.8*
2040 No Build	2.3	113.6	98.2	0.4	1.3	1.2	45,565.3
Increase from Existing	*-21.1*	*0.0*	*-410.0*	*0.0*	*-12.0*	*-11.6*	*0.0*
2040 Build	3.8	190.0	164.2	0.7	2.1	2.1	74,972.3
Increase from Existing	*-19.6*	*76.3*	*-344.0*	*0.3*	*-11.1*	*-10.8*	*29,407.0*
Increase from No Build	*1.5*	*76.3*	*66.0*	*0.3*	*0.9*	*0.8*	*29,407.0*

Summary (tons/year)

								Metric Tons
	VOC	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO2**	**CO2**
Existing	3.49	16.95	75.84	0.06	1.98	1.92	6,799.26	6,168.19
2026 No Build	1.21	16.95	40.79	0.06	0.76	0.74	6,799.3	6,168.2
Increase from Existing	*-2.28*	*0.00*	*-35.05*	*0.00*	*-1.21*	*-1.17*	*0.00*	*0.00*
2026 Build	1.12	15.74	37.87	0.06	0.71	0.69	6,269.0	5,687.1
Increase from Existing	*-2.37*	*-1.21*	*-37.98*	*0.00*	*-1.27*	*-1.23*	*-530.30*	*-481.08*
Increase from No Build	*-0.09*	*-1.21*	*-2.92*	*0.00*	*-0.05*	*-0.05*	*-530.30*	*-481.08*
2031 No Build	0.74	16.95	29.32	0.06	0.45	0.43	6,799.3	6,168.2
Increase from Existing	*-2.75*	*0.00*	*-46.53*	*0.00*	*-1.53*	*-1.48*	*0.0*	*0.0*
2031 Build	1.13	25.93	44.85	0.09	0.68	0.66	10,236.5	9,286.4
Increase from Existing	*-2.36*	*8.98*	*-30.99*	*0.03*	*-1.29*	*-1.25*	*3,437.3*	*3,118.2*
Increase from No Build	*0.39*	*8.98*	*15.53*	*0.03*	*0.24*	*0.23*	*3,437.3*	*3,118.2*
2040 No Build	0.34	16.95	14.66	0.06	0.19	0.19	6,799.3	6,168.2
Increase from Existing	*-3.15*	*0.00*	*-61.18*	*0.00*	*-1.78*	*-1.73*	*0.0*	*0.0*
2040 Build	0.56	28.34	24.51	0.10	0.32	0.31	11,187.4	10,149.0
Increase from Existing	*-2.93*	*11.39*	*-51.34*	*0.04*	*-1.66*	*-1.61*	*4,388.1*	*3,980.8*
Increase from No Build	*0.23*	*11.39*	*9.85*	*0.04*	*0.13*	*0.12*	*4,388.1*	*3,980.8*

Train VMT - Mitigated

Existing Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	331	1.7	572.6	12.0	58.4	261.4	0.2	6.81	6.6	22,442.6

2026 No Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	331	1.7	572.6	4.2	58.4	140.6	0.2	2.64	2.6	22,442.6

2026 Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	398	1.5	612.9	4.2	56.3	135.4	0.2	1.97	1.9	19,217.3

2031 No Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	331	1.7	572.6	2.5	58.4	101.0	0.2	1.54	1.5	22,442.6

2031 Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	770	1.5	1,185.8	5.0	108.9	188.3	0.4	2.23	2.2	37,179.3

2040 No Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	331	1.7	572.6	1.2	58.4	50.5	0.2	0.66	0.6	22,442.6

2040 Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	842	1.5	1,296.7	2.5	119.1	103.0	0.5	1.04	1.0	40,655.8

Train Idling - Mitigated

				pounds per day						
Conditions	**Trips**	**Idle time (hr)**	**Idle Hours**	**VOC**	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO2**
Existing	166	0.4	69.6	11.4	55.2	246.9	0.2	6.43	6.2	23122.7
2026 No Build	166	0.4	69.6	3.9	55.2	132.8	0.2	2.49	2.4	23122.7
2026 Build	199	0.3	54.2	2.9	38.6	93.0	0.2	1.36	1.3	14,391.9
2031 No Build	166	0.4	69.6	2.4	55.2	95.4	0.2	1.45	1.4	23122.7
2031 Build	385	0.2	66.6	2.2	47.5	82.2	0.2	0.97	0.9	17,700.8
2040 No Build	166	0.4	69.6	1.1	55.2	47.7	0.2	0.62	0.6	23122.7
2040 Build	421	0.2	72.7	1.1	51.9	44.9	0.2	0.46	0.4	19,322.1

Summary (lb/day) - Mitigated

	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
Existing	23.4	113.6	508.3	0.4	13.2	12.8	45,565.3
2026 No Build	8.1	113.6	273.4	0.4	5.1	5.0	45,565.3
Increase from Existing	*-15.3*	*0.0*	*-234.9*	*0.0*	*-8.1*	*-7.9*	*0.0*
2026 Build	7.2	94.9	228.4	0.4	3.3	3.2	33,609.2
Increase from Existing	*-16.2*	*-18.7*	*-279.9*	*0.0*	*-9.9*	*-9.6*	*-11,956.1*
Increase from No Build	*-1.0*	*-18.7*	*-45.0*	*0.0*	*-1.8*	*-1.7*	*-11,956.1*
2031 No Build	5.0	113.6	196.5	0.4	3.0	2.9	45,565.3
Increase from Existing	*-18.5*	*0.0*	*-311.8*	*0.0*	*-10.3*	*-9.9*	*0.0*
2031 Build	7.2	156.4	270.5	0.6	3.2	3.1	54,880.1
Increase from Existing	*-16.2*	*42.8*	*-237.8*	*0.2*	*-10.0*	*-9.7*	*9,314.8*
Increase from No Build	*2.2*	*42.8*	*74.0*	*0.2*	*0.2*	*0.2*	*9,314.8*
2040 No Build	2.3	113.6	98.2	0.4	1.3	1.2	45,565.3
Increase from Existing	*-21.1*	*0.0*	*-410.0*	*0.0*	*-12.0*	*-11.6*	*0.0*
2040 Build	3.6	171.0	147.8	0.7	1.5	1.5	59,977.9
Increase from Existing	*-19.8*	*57.3*	*-360.4*	*0.3*	*-11.7*	*-11.4*	*14,412.5*
Increase from No Build	*1.3*	*57.3*	*49.6*	*0.3*	*0.2*	*0.2*	*14,412.5*

Summary (tons/year) - Mitigated

								Metric Tons
	VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CO2
Existing	3.49	16.95	75.84	0.06	1.98	1.92	6,799.26	6,168.19
2026 No Build	1.21	16.95	40.79	0.06	0.76	0.74	6,799.3	6,168.2
Increase from Existing	*-2.28*	*0.00*	*-35.05*	*0.00*	*-1.21*	*-1.17*	*0.00*	*0.00*
2026 Build	1.07	14.16	34.08	0.06	0.50	0.48	5,015.2	4,549.7
Increase from Existing	*-2.42*	*-2.79*	*-41.76*	*0.00*	*-1.48*	*-1.43*	*-1,784.09*	*-1,618.50*
Increase from No Build	*-0.14*	*-2.79*	*-6.71*	*0.00*	*-0.27*	*-0.26*	*-1,784.09*	*-1,618.50*
2031 No Build	0.74	16.95	29.32	0.06	0.45	0.43	6,799.3	6,168.2
Increase from Existing	*-2.75*	*0.00*	*-46.53*	*0.00*	*-1.53*	*-1.48*	*0.0*	*0.0*
2031 Build	1.07	23.34	40.36	0.09	0.48	0.46	8,189.2	7,429.1
Increase from Existing	*-2.42*	*6.39*	*-35.48*	*0.03*	*-1.50*	*-1.45*	*1,390.0*	*1,260.9*
Increase from No Build	*0.34*	*6.39*	*11.05*	*0.03*	*0.03*	*0.03*	*1,390.0*	*1,260.9*
2040 No Build	0.34	16.95	14.66	0.06	0.19	0.19	6,799.3	6,168.2
Increase from Existing	*-3.15*	*0.00*	*-61.18*	*0.00*	*-1.78*	*-1.73*	*0.0*	*0.0*
2040 Build	0.54	25.51	22.06	0.10	0.22	0.22	8,949.9	8,119.2
Increase from Existing	*-2.96*	*8.56*	*-53.79*	*0.04*	*-1.75*	*-1.70*	*2,150.6*	*1,951.0*
Increase from No Build	*0.20*	*8.56*	*7.40*	*0.04*	*0.03*	*0.03*	*2,150.6*	*1,951.0*

Train VMT - Mitigated

0.7 0.63

Existing Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	331	1.7	572.6	12.0	58.4	261.4	0.2	6.81	6.6	22,442.6

2026 No Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	331	1.7	572.6	4.2	58.4	140.6	0.2	2.64	2.6	22,442.6

2026 Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	398	1.5	612.9	4.2	56.3	135.4	0.2	1.97	1.9	19,217.3

2031 No Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	331	1.7	572.6	2.5	58.4	101.0	0.2	1.54	1.5	22,442.6

2031 Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	770	1.5	1,185.8	3.5	76.2	131.8	0.3	1.56	1.5	26,025.5

2040 No Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	331	1.7	572.6	1.2	58.4	50.5	0.2	0.66	0.6	22,442.6

2040 Build Conditions	Trips	Avg Length	VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
	842	1.5	1,296.7	1.6	75.0	64.9	0.3	0.66	0.6	25,613.1

Train Idling - Mitigated

						pounds per day				
Conditions	**Trips**	**Idle time (hr)**	**Idle Hours**	**VOC**	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO2**
Existing	166	0.4	69.6	11.4	55.2	246.9	0.2	6.43	6.2	23122.7
2026 No Build	166	0.4	69.6	3.9	55.2	132.8	0.2	2.49	2.4	23122.7
2026 Build	199	0.3	54.2	2.9	38.6	93.0	0.2	1.36	1.3	14,391.9
2031 No Build	166	0.4	69.6	2.4	55.2	95.4	0.2	1.45	1.4	23122.7
2031 Build	385	0.2	66.6	2.2	47.5	82.2	0.2	0.97	0.9	17,700.8
2040 No Build	166	0.4	69.6	1.1	55.2	47.7	0.2	0.62	0.6	23122.7
2040 Build	421	0.2	72.7	1.1	51.9	44.9	0.2	0.46	0.4	19,322.1

Summary (lb/day) - Mitigated

	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
Existing	23.4	113.6	508.3	0.4	13.2	12.8	45,565.3
2026 No Build	8.1	113.6	273.4	0.4	5.1	5.0	45,565.3
Increase from Existing	*-15.3*	*0.0*	*-234.9*	*0.0*	*-8.1*	*-7.9*	*0.0*
2026 Build	7.2	94.9	228.4	0.4	3.3	3.2	33,609.2
Increase from Existing	*-16.2*	*-18.7*	*-279.9*	*0.0*	*-9.9*	*-9.6*	*-11,956.1*
Increase from No Build	*-1.0*	*-18.7*	*-45.0*	*0.0*	*-1.8*	*-1.7*	*-11,956.1*
2031 No Build	5.0	113.6	196.5	0.4	3.0	2.9	45,565.3
Increase from Existing	*-18.5*	*0.0*	*-311.8*	*0.0*	*-10.3*	*-9.9*	*0.0*
2031 Build	5.7	123.8	214.0	0.5	2.5	2.5	43,726.3
Increase from Existing	*-17.7*	*10.1*	*-294.3*	*0.1*	*-10.7*	*-10.4*	*-1,839.0*
Increase from No Build	*0.7*	*10.1*	*17.5*	*0.1*	*-0.5*	*-0.4*	*-1,839.0*
2040 No Build	2.3	113.6	98.2	0.4	1.3	1.2	45,565.3
Increase from Existing	*-21.1*	*0.0*	*-410.0*	*0.0*	*-12.0*	*-11.6*	*0.0*
2040 Build	2.7	126.9	109.7	0.5	1.1	1.1	44,935.2
Increase from Existing	*-20.7*	*13.3*	*-398.5*	*0.1*	*-12.1*	*-11.8*	*-630.1*
Increase from No Build	*0.4*	*13.3*	*11.5*	*0.1*	*-0.2*	*-0.2*	*-630.1*

Summary (tons/year) - Mitigated

	VOC	CO	NOx	SOx	PM10	PM2.5	CO2	Metric Tons CO2
Existing	3.49	16.95	75.84	0.06	1.98	1.92	6,799.26	6,168.19
2026 No Build	1.21	16.95	40.79	0.06	0.76	0.74	6,799.3	6,168.2
Increase from Existing	*-2.28*	*0.00*	*-35.05*	*0.00*	*-1.21*	*-1.17*	*0.00*	*0.00*
2026 Build	1.07	14.16	34.08	0.06	0.50	0.48	5,015.2	4,549.7
Increase from Existing	*-2.42*	*-2.79*	*-41.76*	*0.00*	*-1.48*	*-1.43*	*-1,784.09*	*-1,618.50*
Increase from No Build	*-0.14*	*-2.79*	*-6.71*	*0.00*	*-0.27*	*-0.26*	*-1,784.09*	*-1,618.50*
2031 No Build	0.74	16.95	29.32	0.06	0.45	0.43	6,799.3	6,168.2
Increase from Existing	*-2.75*	*0.00*	*-46.53*	*0.00*	*-1.53*	*-1.48*	*0.0*	*0.0*
2031 Build	0.85	18.47	31.93	0.07	0.38	0.37	6,524.8	5,919.2
Increase from Existing	*-2.64*	*1.51*	*-43.91*	*0.01*	*-1.60*	*-1.55*	*-274.4*	*-248.9*
Increase from No Build	*0.11*	*1.51*	*2.62*	*0.01*	*-0.07*	*-0.07*	*-274.4*	*-248.9*
2040 No Build	0.34	16.95	14.66	0.06	0.19	0.19	6,799.3	6,168.2
Increase from Existing	*-3.15*	*0.00*	*-61.18*	*0.00*	*-1.78*	*-1.73*	*0.0*	*0.0*
2040 Build	0.40	18.94	16.37	0.07	0.17	0.16	6,705.2	6,082.9
Increase from Existing	*-3.09*	*1.98*	*-59.47*	*0.01*	*-1.81*	*-1.76*	*-94.0*	*-85.3*
Increase from No Build	*0.06*	*1.98*	*1.71*	*0.01*	*-0.03*	*-0.02*	*-94.0*	*-85.3*

Rail Emission Rates - 2016

Pollutant	g/gal	g/mile
VOC	5.48	9.5352
CO	26.6	46.284
NOx	119	207.06
SOx	0.094	0.16356
PM10	3.1	5.394
PM2.5	3.007	5.23218
CO2	10217	17777.58

Rail Emission Rates - 2026

Pollutant	g/gal	g/mile
VOC	1.9	3.306
CO	26.6	46.284
NOx	64	111.36
SOx	0.094	0.16356
PM10	1.2	2.088
PM2.5	1.164	2.02536
CO2	10217	17777.58

Rail Emission Rates - 2031

Pollutant	g/gal	g/mile
VOC	1.16	2.0184
CO	26.6	46.284
NOx	46	80.04
SOx	0.094	0.16356
PM10	0.7	1.218
PM2.5	0.679	1.18146
CO2	10217	17777.58

Rail Emission Rates - 2040

Pollutant	g/gal	g/mile
VOC	0.53	0.9222
CO	26.6	46.284
NOx	23	40.02
SOx	0.094	0.16356
PM10	0.3	0.522
PM2.5	0.291	0.50634
CO2	10217	17777.58

2016 Locomotive Idling Emissions - Per Train Per Hour

Description	CO (lb/day)	VOC (lb/day)	NOx (lb/day)	SOx (lb/day)	PM10 (lb/day)	CO2 (lb/day)
Locomotive (idling)[a]	0.793	0.163	3.547	0.003	0.092	332.223

Locomotive Emission Factors[b]

Description	CO (g/hp-hr)	VOC (g/hp-hr)	NOx (g/hp-hr)	SOx (g/hp-hr)	PM10 (g/hp-hr)
2016 Fleet Average	1.28	0.2634615	5.7	0.00	0.1490385

Notes/Assumptions

g/hp-hr means grams per horsepower-hour

[a]Idling Emissions [lb/day] = (Emission Factor [g/hp-hr]) x (1/BSFC [hp-hr/lb]) x (Fuel Density [lb/gal]) x (Fuel Use [gal/hr]) x (Idling Time [hr/day]) x (1/453.6 [lb/g])

Locomotive rating:	3200	horsepower (hp)
Idling time:	1	hr/day
Fuel:	Diesel	
Fuel usage while idling:	15	gal/hr

[b] CO, VOC (HC), NOx, and PM10 (PM) emission factors from EPA's
Exhaust Emission Standards - 40CFR1033.101

SOx emission factor calculated based on sulfur content of diesel fuel:
SCAQMD Rule 431.2 (Sulfur Content of Liquid Fuels) limits the sulfur content of liquid fuels sold in the District to 500 ppmw.
Effective 1 Jan 2005, a refiner or importer shall not produce or supply any diesel fuel for any stationary or mobile source application in the District, unless the diesel fuel is low sulfur diesel for which the sulfur content shall not exceed 15 ppm by weight.

Diesel fuel sulfur content:	15	ppmw (as S)
Diesel fuel fuel density:	6.943	lb/gal
Higher Heating Value (HHV) of diesel fuel:	138000	Btu/gal
Brake Specific Fuel Consumption (BSFC):	0.37	lb/hp-hr
	7354	Btu/hp-hr

SOx as SO2 (lb/hp-hr) = (ppmw as S/1000000) x (Fuel Density [lb/gal]) x (1 gal/138000 Btu) x
(1 lb-mol S/32 lb S) x (1 lb-mole SO2/1 lb-mole S) x (64 lb SO2/1 lb-mole SO2) x (BSFC [Btu/hp-hr])

SOx EF:	1.11E-05	lb/hp-hr
	0.01	g/hp-hr

CO2 emission factor calculated based on carbon content of fuel

CO2 = (fuel desity [g/gal]) x (44 g of CO2/12 g C) x (carbon content of diesel fuel)

CO2 EF:	10046	g/gal
@ 15 gal/hr:	332	lb/hr

2026 Locomotive Idling Emissions - Per Train Per Hour

Description	CO (lb/day)	VOC (lb/day)	NOx (lb/day)	SOx (lb/day)	PM10 (lb/day)	CO2 (lb/day)
Locomotive (idling)[a]	0.793	0.057	1.908	0.003	0.036	332.223

Locomotive Emission Factors[b]

Description	CO (g/hp-hr)	VOC (g/hp-hr)	NOx (g/hp-hr)	SOx (g/hp-hr)	PM10 (g/hp-hr)
2026 Fleet Average	1.28	0.0913462	3.1	0.00	0.0576923

Notes/Assumptions

g/hp-hr means grams per horsepower-hour

[a]Idling Emissions [lb/day] = (Emission Factor [g/hp-hr]) x (1/BSFC [hp-hr/lb]) x (Fuel Density [lb/gal]) x (Fuel Use [gal/hr]) x (Idling Time [hr/day]) x (1/453.6 [lb/g])

Locomotive rating:	3200	horsepower (hp)
Idling time:	1	hr/day
Fuel:	Diesel	
Fuel usage while idling:	15	gal/hr

[b] CO, VOC (HC), NOx, and PM10 (PM) emission factors from EPA's
Exhaust Emission Standards - 40CFR1033.101

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Diesel fuel sulfur content:	15	ppmw (as S)
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Higher Heating Value (HHV) of diesel fuel:	138000	Btu/gal
Brake Specific Fuel Consumption (BSFC):	0.37	lb/hp-hr
	7354	Btu/hp-hr

SOx as SO2 (lb/hp-hr) = (ppmw as S/1000000) x (Fuel Density [lb/gal]) x (1 gal/138000 Btu) x
(1 lb-mol S/32 lb S) x (1 lb-mole SO2/1 lb-mole S) x (64 lb SO2/1 lb-mole SO2) x (BSFC [Btu/hp-hr])

SOx EF:	1.11E-05	lb/hp-hr
	0.01	g/hp-hr

CO2 emission factor calculated based on carbon content of fuel

CO2 = (fuel desity [g/gal]) x (44 g of CO2/12 g C) x (carbon content of diesel fuel)

CO2 EF:	10046	g/gal
@ 15 gal/hr:	332	lb/hr

2031 Locomotive Idling Emissions - Per Train Per Hour

Description	CO (lb/day)	VOC (lb/day)	NOx (lb/day)	SOx (lb/day)	PM10 (lb/day)	CO2 (lb/day)
Locomotive (idling)[a]	0.793	0.035	1.371	0.003	0.021	332.223

Locomotive Emission Factors[b]

Description	CO (g/hp-hr)	VOC (g/hp-hr)	NOx (g/hp-hr)	SOx (g/hp-hr)	PM10 (g/hp-hr)
2031 Fleet Average	1.28	0.0557692	2.2	0.00	0.0336538

Notes/Assumptions

g/hp-hr means grams per horsepower-hour

[a]Idling Emissions [lb/day] = (Emission Factor [g/hp-hr]) x (1/BSFC [hp-hr/lb]) x (Fuel Density [lb/gal]) x (Fuel Use [gal/hr]) x (Idling Time [hr/day]) x (1/453.6 [lb/g])

Locomotive rating:	3200	horsepower (hp)
Idling time:	1	hr/day
Fuel:	Diesel	
Fuel usage while idling:	15	gal/hr

[b] CO, VOC (HC), NOx, and PM10 (PM) emission factors from EPA's
Exhaust Emission Standards - 40CFR1033.101

SOx emission factor calculated based on sulfur content of diesel fuel:
SCAQMD Rule 431.2 (Sulfur Content of Liquid Fuels) limits the sulfur content of liquid fuels sold in the District to 500 ppmw.
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Higher Heating Value (HHV) of diesel fuel:	138000	Btu/gal
Brake Specific Fuel Consumption (BSFC):	0.37	lb/hp-hr
	7354	Btu/hp-hr

SOx as SO2 (lb/hp-hr) = (ppmw as S/1000000) x (Fuel Density [lb/gal]) x (1 gal/138000 Btu) x
(1 lb-mol S/32 lb S) x (1 lb-mole SO2/1 lb-mole S) x (64 lb SO2/1 lb-mole SO2) x (BSFC [Btu/hp-hr])

SOx EF:	1.11E-05	lb/hp-hr
	0.01	g/hp-hr

CO2 emission factor calculated based on carbon content of fuel

CO2 = (fuel desity [g/gal]) x (44 g of CO2/12 g C) x (carbon content of diesel fuel)

CO2 EF:	10046	g/gal
@ 15 gal/hr:	332	lb/hr

2040 Locomotive Idling Emissions - Per Train Per Hour

Description	CO (lb/day)	VOC (lb/day)	NOx (lb/day)	SOx (lb/day)	PM10 (lb/day)
Locomotive (idling)[a]	0.793	0.016	0.686	0.003	0.009

Locomotive Emission Factors[b]

Description	CO (g/hp-hr)	VOC (g/hp-hr)	NOx (g/hp-hr)	SOx (g/hp-hr)	PM10 (g/hp-hr)
2040 Fleet Average	1.28	0.0254808	1.1	0.00	0.0144231

Notes/Assumptions

g/hp-hr means grams per horsepower-hour

[a]Idling Emissions [lb/day] = (Emission Factor [g/hp-hr]) x (1/BSFC [hp-hr/lb]) x (Fuel Density [lb/gal]) x (Fuel Use [gal/hr]) x (Idling Time [hr/day]) x (1/453.6 [lb/g])

Locomotive rating:	3200	horsepower (hp)
Idling time:	1	hr/day
Fuel:	Diesel	
Fuel usage while idling:	15	gal/hr

[b] CO, VOC (HC), NOx, and PM10 (PM) emission factors from EPA's
Exhaust Emission Standards - 40CFR1033.101

SOx emission factor calculated based on sulfur content of diesel fuel:
SCAQMD Rule 431.2 (Sulfur Content of Liquid Fuels) limits the sulfur content of liquid fuels sold in the District to 500 ppmw.
Effective 1 Jan 2005, a refiner or importer shall not produce or supply any diesel fuel for any stationary or mobile source applic
in the District, unless the diesel fuel is low sulfur diesel for which the sulfur content shall not exceed 15 ppm by weight.

Diesel fuel sulfur content:	15	ppmw (as S)
Diesel fuel fuel density:	6.943	lb/gal
Higher Heating Value (HHV) of diesel fuel:	138000	Btu/gal
Brake Specific Fuel Consumption (BSFC):	0.37	lb/hp-hr
	7354	Btu/hp-hr

SOx as SO2 (lb/hp-hr) = (ppmw as S/1000000) x (Fuel Density [lb/gal]) x (1 gal/138000 Btu) x
(1 lb-mol S/32 lb S) x (1 lb-mole SO2/1 lb-mole S) x (64 lb SO2/1 lb-mole SO2) x (BSFC [Btu/hp-

SOx EF:	1.11E-05	lb/hp-hr
	0.01	g/hp-hr

CO2 emission factor calculated based on carbon content of fuel

CO2 = (fuel desity [g/gal]) x (44 g of CO2/12 g C) x (carbon content of diesel fuel)

CO2 EF:	10046	g/gal
@ 15 gal/hr:	332	lb/hr

CO2 (lb/day)
332.223

cation

hr])

Link US - 2031 Operational Emissions

South Coast Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	30.00	1000sqft	0.69	30,000.00	0
Regional Shopping Center	410.60	1000sqft	9.43	410,600.00	0
Strip Mall	159.40	1000sqft	3.66	159,400.00	0

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.2 **Precipitation Freq (Days)** 31

Climate Zone 12 **Operational Year** 2031

Utility Company Los Angeles Department of Water & Power

CO2 Intensity (lb/MWhr) 834 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Intensity factor from LADWP 2017 Power Strategic Long-Term Resource Plan

Land Use - Regional Shopping Center represents the new passenger concourse space not included in the retail or office uses

Construction Phase - Construction is calculated separately

Off-road Equipment - Construction is calculated separately

Trips and VMT - Construction is calculated separately

Architectural Coating - Construction is calculated separately

Vehicle Trips - Trip rates from traffic analysis

Energy Use - .

Energy Mitigation - CalEEMod includes 2013 Title 24. 2016 Title 24 is 5% more energy efficient for non-residential uses

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Nonresidential_Exterior	300,000.00	0.00
tblArchitecturalCoating	ConstArea_Nonresidential_Interior	900,000.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	1227.89	834
tblTripsAndVMT	WorkerTripNumber	38.00	0.00
tblVehicleTrips	ST_TR	2.46	0.49
tblVehicleTrips	ST_TR	49.97	0.00
tblVehicleTrips	ST_TR	42.04	8.10
tblVehicleTrips	SU_TR	1.05	0.21
tblVehicleTrips	SU_TR	25.24	0.00
tblVehicleTrips	SU_TR	20.43	3.94
tblVehicleTrips	WD_TR	11.03	2.21
tblVehicleTrips	WD_TR	42.70	0.00
tblVehicleTrips	WD_TR	44.32	8.54

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	2.4469	7.0000e-005	7.6200e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.0149	0.0149	4.0000e-005	0.0000	0.0159
Energy	6.7200e-003	0.0611	0.0514	3.7000e-004		4.6500e-003	4.6500e-003		4.6500e-003	4.6500e-003	0.0000	3,124.9600	3,124.9600	0.1076	0.0232	3,134.5710
Mobile	0.1920	1.0994	2.0832	9.5400e-003	0.9621	5.7800e-003	0.9678	0.2577	5.3700e-003	0.2630	0.0000	889.0200	889.0200	0.0377	0.0000	889.9630
Waste						0.0000	0.0000		0.0000	0.0000	127.1535	0.0000	127.1535	7.5146	0.0000	315.0175
Water						0.0000	0.0000		0.0000	0.0000	15.0865	356.7331	371.8196	1.5619	0.0392	422.5358
Total	**2.6456**	**1.1606**	**2.1422**	**9.9100e-003**	**0.9621**	**0.0105**	**0.9725**	**0.2577**	**0.0101**	**0.2677**	**142.2400**	**4,370.7279**	**4,512.9679**	**9.2219**	**0.0624**	**4,762.1031**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	2.4469	7.0000e-005	7.6200e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.0149	0.0149	4.0000e-005	0.0000	0.0159
Energy	6.4700e-003	0.0588	0.0494	3.5000e-004		4.4700e-003	4.4700e-003		4.4700e-003	4.4700e-003	0.0000	3,076.5651	3,076.5651	0.1060	0.0229	3,086.0229
Mobile	0.1920	1.0994	2.0832	9.5400e-003	0.9621	5.7800e-003	0.9678	0.2577	5.3700e-003	0.2630	0.0000	889.0200	889.0200	0.0377	0.0000	889.9630
Waste						0.0000	0.0000		0.0000	0.0000	127.1535	0.0000	127.1535	7.5146	0.0000	315.0175
Water						0.0000	0.0000		0.0000	0.0000	15.0865	356.7331	371.8196	1.5619	0.0392	422.5358
Total	**2.6454**	**1.1583**	**2.1402**	**9.8900e-003**	**0.9621**	**0.0103**	**0.9723**	**0.2577**	**9.8700e-003**	**0.2675**	**142.2400**	**4,322.3331**	**4,464.5731**	**9.2202**	**0.0620**	**4,713.5550**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.01**	**0.20**	**0.09**	**0.20**	**0.00**	**1.72**	**0.02**	**0.00**	**1.79**	**0.07**	**0.00**	**1.11**	**1.07**	**0.02**	**0.59**	**1.02**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Architectural Coating	Architectural Coating	1/4/2021	1/3/2021	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	0	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Architectural Coating - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Mitigated	0.1920	1.0994	2.0832	9.5400e-003	0.9621	5.7800e-003	0.9678	0.2577	5.3700e-003	0.2630	0.0000	889.0200	889.0200	0.0377	0.0000	889.9630
Unmitigated	0.1920	1.0994	2.0832	9.5400e-003	0.9621	5.7800e-003	0.9678	0.2577	5.3700e-003	0.2630	0.0000	889.0200	889.0200	0.0377	0.0000	889.9630

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	66.30	14.70	6.30	162,224	162,224
Regional Shopping Center	0.00	0.00	0.00		
Strip Mall	1,361.28	1,291.14	628.04	2,371,600	2,371,600
Total	1,427.58	1,305.84	634.34	2,533,824	2,533,824

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	16.60	8.40	6.90	33.00	48.00	19.00	77	19	4
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	54	35	11
Strip Mall	16.60	8.40	6.90	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.554622	0.041562	0.206751	0.111062	0.012660	0.005774	0.022378	0.035217	0.002175	0.001476	0.004853	0.000718	0.000752
Regional Shopping Center	0.554622	0.041562	0.206751	0.111062	0.012660	0.005774	0.022378	0.035217	0.002175	0.001476	0.004853	0.000718	0.000752
Strip Mall	0.554622	0.041562	0.206751	0.111062	0.012660	0.005774	0.022378	0.035217	0.002175	0.001476	0.004853	0.000718	0.000752

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	3,012.5662	3,012.5662	0.1048	0.0217	3,021.6436
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	3,058.4100	3,058.4100	0.1064	0.0220	3,067.6255
NaturalGas Mitigated	6.4700e-003	0.0588	0.0494	3.5000e-004		4.4700e-003	4.4700e-003		4.4700e-003	4.4700e-003	0.0000	63.9990	63.9990	1.2300e-003	1.1700e-003	64.3793
NaturalGas Unmitigated	6.7200e-003	0.0611	0.0514	3.7000e-004		4.6500e-003	4.6500e-003		4.6500e-003	4.6500e-003	0.0000	66.5500	66.5500	1.2800e-003	1.2200e-003	66.9455

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	312300	1.6800e-003	0.0153	0.0129	9.0000e-005		1.1600e-003	1.1600e-003		1.1600e-003	1.1600e-003	0.0000	16.6655	16.6655	3.2000e-004	3.1000e-004	16.7646
Regional Shopping Center	673384	3.6300e-003	0.0330	0.0277	2.0000e-004		2.5100e-003	2.5100e-003		2.5100e-003	2.5100e-003	0.0000	35.9343	35.9343	6.9000e-004	6.6000e-004	36.1479
Strip Mall	261416	1.4100e-003	0.0128	0.0108	8.0000e-005		9.7000e-004	9.7000e-004		9.7000e-004	9.7000e-004	0.0000	13.9502	13.9502	2.7000e-004	2.6000e-004	14.0331
Total		**6.7200e-003**	**0.0611**	**0.0514**	**3.7000e-004**		**4.6400e-003**	**4.6400e-003**		**4.6400e-003**	**4.6400e-003**	**0.0000**	**66.5500**	**66.5500**	**1.2800e-003**	**1.2300e-003**	**66.9455**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	297270	1.6000e-003	0.0146	0.0122	9.0000e-005		1.1100e-003	1.1100e-003		1.1100e-003	1.1100e-003	0.0000	15.8635	15.8635	3.0000e-004	2.9000e-004	15.9577
Regional Shopping Center	649774	3.5000e-003	0.0319	0.0268	1.9000e-004		2.4200e-003	2.4200e-003		2.4200e-003	2.4200e-003	0.0000	34.6744	34.6744	6.6000e-004	6.4000e-004	34.8805
Strip Mall	252250	1.3600e-003	0.0124	0.0104	7.0000e-005		9.4000e-004	9.4000e-004		9.4000e-004	9.4000e-004	0.0000	13.4611	13.4611	2.6000e-004	2.5000e-004	13.5410
Total		**6.4600e-003**	**0.0588**	**0.0494**	**3.5000e-004**		**4.4700e-003**	**4.4700e-003**		**4.4700e-003**	**4.4700e-003**	**0.0000**	**63.9990**	**63.9990**	**1.2200e-003**	**1.1800e-003**	**64.3793**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	389700	147.4220	5.1300e-003	1.0600e-003	147.8662
Regional Shopping Center	5.5431e+006	2,096.9328	0.0729	0.0151	2,103.2512
Strip Mall	2.1519e+006	814.0552	0.0283	5.8600e-003	816.5081
Total		**3,058.4100**	**0.1064**	**0.0220**	**3,067.6255**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	382800	144.8117	5.0400e-003	1.0400e-003	145.2481
Regional Shopping Center	5.46077e+006	2,065.7894	0.0718	0.0149	2,072.0140
Strip Mall	2.11994e+006	801.9650	0.0279	5.7700e-003	804.3815
Total		**3,012.5662**	**0.1048**	**0.0217**	**3,021.6436**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.4469	7.0000e-005	7.6200e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.0149	0.0149	4.0000e-005	0.0000	0.0159
Unmitigated	2.4469	7.0000e-005	7.6200e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.0149	0.0149	4.0000e-005	0.0000	0.0159

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.2781					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.1681					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	7.0000e-004	7.0000e-005	7.6200e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.0149	0.0149	4.0000e-005	0.0000	0.0159
Total	**2.4469**	**7.0000e-005**	**7.6200e-003**	**0.0000**		**3.0000e-005**	**3.0000e-005**		**3.0000e-005**	**3.0000e-005**	**0.0000**	**0.0149**	**0.0149**	**4.0000e-005**	**0.0000**	**0.0159**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.2781					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.1681					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	7.0000e-004	7.0000e-005	7.6200e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.0149	0.0149	4.0000e-005	0.0000	0.0159
Total	**2.4469**	**7.0000e-005**	**7.6200e-003**	**0.0000**		**3.0000e-005**	**3.0000e-005**		**3.0000e-005**	**3.0000e-005**	**0.0000**	**0.0149**	**0.0149**	**4.0000e-005**	**0.0000**	**0.0159**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	371.8196	1.5619	0.0392	422.5358
Unmitigated	371.8196	1.5619	0.0392	422.5358

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	5.33201 / 3.26801	41.6910	0.1751	4.3900e-003	47.3777
Regional Shopping Center	30.4142 / 18.6409	237.8084	0.9990	0.0250	270.2455
Strip Mall	11.8072 / 7.23665	92.3202	0.3878	9.7200e-003	104.9126
Total		**371.8196**	**1.5619**	**0.0392**	**422.5358**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	5.33201 / 3.26801	41.6910	0.1751	4.3900e-003	47.3777
Regional Shopping Center	30.4142 / 18.6409	237.8084	0.9990	0.0250	270.2455
Strip Mall	11.8072 / 7.23665	92.3202	0.3878	9.7200e-003	104.9126
Total		**371.8196**	**1.5619**	**0.0392**	**422.5358**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	127.1535	7.5146	0.0000	315.0175
Unmitigated	127.1535	7.5146	0.0000	315.0175

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	27.9	5.6635	0.3347	0.0000	14.0310
Regional Shopping Center	431.13	87.5155	5.1720	0.0000	216.8159
Strip Mall	167.37	33.9746	2.0078	0.0000	84.1706
Total		**127.1535**	**7.5146**	**0.0000**	**315.0175**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	27.9	5.6635	0.3347	0.0000	14.0310
Regional Shopping Center	431.13	87.5155	5.1720	0.0000	216.8159
Strip Mall	167.37	33.9746	2.0078	0.0000	84.1706
Total		**127.1535**	**7.5146**	**0.0000**	**315.0175**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Link US - 2031 Operational Emissions

South Coast Air Basin, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	30.00	1000sqft	0.69	30,000.00	0
Regional Shopping Center	410.60	1000sqft	9.43	410,600.00	0
Strip Mall	159.40	1000sqft	3.66	159,400.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	12			**Operational Year**	2031
Utility Company	Los Angeles Department of Water & Power				
CO2 Intensity (lb/MWhr)	834	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Intensity factor from LADWP 2017 Power Strategic Long-Term Resource Plan

Land Use - Regional Shopping Center represents the new passenger concourse space not included in the retail or office uses

Construction Phase - Construction is calculated separately

Off-road Equipment - Construction is calculated separately

Trips and VMT - Construction is calculated separately

Architectural Coating - Construction is calculated separately

Vehicle Trips - Trip rates from traffic analysis

Energy Use - .

Energy Mitigation - CalEEMod includes 2013 Title 24. 2016 Title 24 is 5% more energy efficient for non-residential uses

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Nonresidential_Exterior	300,000.00	0.00
tblArchitecturalCoating	ConstArea_Nonresidential_Interior	900,000.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	1227.89	834
tblTripsAndVMT	WorkerTripNumber	38.00	0.00
tblVehicleTrips	ST_TR	2.46	0.49
tblVehicleTrips	ST_TR	49.97	0.00
tblVehicleTrips	ST_TR	42.04	8.10
tblVehicleTrips	SU_TR	1.05	0.21
tblVehicleTrips	SU_TR	25.24	0.00
tblVehicleTrips	SU_TR	20.43	3.94
tblVehicleTrips	WD_TR	11.03	2.21
tblVehicleTrips	WD_TR	42.70	0.00
tblVehicleTrips	WD_TR	44.32	8.54

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	13.4094	5.5000e-004	0.0610	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Energy	0.0369	0.3350	0.2814	2.0100e-003		0.0255	0.0255		0.0255	0.0255		401.9662	401.9662	7.7000e-003	7.3700e-003	404.3548
Mobile	1.2634	6.5449	13.0640	0.0602	5.9568	0.0351	5.9919	1.5930	0.0326	1.6256		6,179.6997	6,179.6997	0.2513		6,185.9832
Total	**14.7096**	**6.8804**	**13.4064**	**0.0622**	**5.9568**	**0.0608**	**6.0176**	**1.5930**	**0.0583**	**1.6513**		**6,581.7971**	**6,581.7971**	**0.2594**	**7.3700e-003**	**6,590.4778**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	13.4094	5.5000e-004	0.0610	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Energy	0.0354	0.3221	0.2706	1.9300e-003		0.0245	0.0245		0.0245	0.0245		386.5576	386.5576	7.4100e-003	7.0900e-003	388.8547
Mobile	1.2634	6.5449	13.0640	0.0602	5.9568	0.0351	5.9919	1.5930	0.0326	1.6256		6,179.6997	6,179.6997	0.2513		6,185.9832
Total	**14.7082**	**6.8676**	**13.3956**	**0.0622**	**5.9568**	**0.0598**	**6.0166**	**1.5930**	**0.0573**	**1.6503**		**6,566.3886**	**6,566.3886**	**0.2591**	**7.0900e-003**	**6,574.9777**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.01**	**0.19**	**0.08**	**0.13**	**0.00**	**1.61**	**0.02**	**0.00**	**1.68**	**0.06**	**0.00**	**0.23**	**0.23**	**0.11**	**3.80**	**0.24**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Architectural Coating	Architectural Coating	1/4/2021	1/3/2021	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	0	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Architectural Coating - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.2634	6.5449	13.0640	0.0602	5.9568	0.0351	5.9919	1.5930	0.0326	1.6256		6,179.6997	6,179.6997	0.2513		6,185.9832
Unmitigated	1.2634	6.5449	13.0640	0.0602	5.9568	0.0351	5.9919	1.5930	0.0326	1.6256		6,179.6997	6,179.6997	0.2513		6,185.9832

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	66.30	14.70	6.30	162,224	162,224
Regional Shopping Center	0.00	0.00	0.00		
Strip Mall	1,361.28	1,291.14	628.04	2,371,600	2,371,600
Total	1,427.58	1,305.84	634.34	2,533,824	2,533,824

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	16.60	8.40	6.90	33.00	48.00	19.00	77	19	4
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	54	35	11
Strip Mall	16.60	8.40	6.90	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.554622	0.041562	0.206751	0.111062	0.012660	0.005774	0.022378	0.035217	0.002175	0.001476	0.004853	0.000718	0.000752
Regional Shopping Center	0.554622	0.041562	0.206751	0.111062	0.012660	0.005774	0.022378	0.035217	0.002175	0.001476	0.004853	0.000718	0.000752
Strip Mall	0.554622	0.041562	0.206751	0.111062	0.012660	0.005774	0.022378	0.035217	0.002175	0.001476	0.004853	0.000718	0.000752

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0354	0.3221	0.2706	1.9300e-003		0.0245	0.0245		0.0245	0.0245		386.5576	386.5576	7.4100e-003	7.0900e-003	388.8547
NaturalGas Unmitigated	0.0369	0.3350	0.2814	2.0100e-003		0.0255	0.0255		0.0255	0.0255		401.9662	401.9662	7.7000e-003	7.3700e-003	404.3548

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	855.616	9.2300e-003	0.0839	0.0705	5.0000e-004		6.3800e-003	6.3800e-003		6.3800e-003	6.3800e-003		100.6608	100.6608	1.9300e-003	1.8500e-003	101.2589
Regional Shopping Center	1844.89	0.0199	0.1809	0.1519	1.0900e-003		0.0138	0.0138		0.0138	0.0138		217.0456	217.0456	4.1600e-003	3.9800e-003	218.3354
Strip Mall	716.208	7.7200e-003	0.0702	0.0590	4.2000e-004		5.3400e-003	5.3400e-003		5.3400e-003	5.3400e-003		84.2598	84.2598	1.6100e-003	1.5400e-003	84.7605
Total		**0.0369**	**0.3350**	**0.2814**	**2.0100e-003**		**0.0255**	**0.0255**		**0.0255**	**0.0255**		**401.9662**	**401.9662**	**7.7000e-003**	**7.3700e-003**	**404.3548**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	0.814438	8.7800e-003	0.0799	0.0671	4.8000e-004		6.0700e-003	6.0700e-003		6.0700e-003	6.0700e-003		95.8163	95.8163	1.8400e-003	1.7600e-003	96.3857
Regional Shopping Center	1.7802	0.0192	0.1745	0.1466	1.0500e-003		0.0133	0.0133		0.0133	0.0133		209.4358	209.4358	4.0100e-003	3.8400e-003	210.6804
Strip Mall	0.691097	7.4500e-003	0.0678	0.0569	4.1000e-004		5.1500e-003	5.1500e-003		5.1500e-003	5.1500e-003		81.3056	81.3056	1.5600e-003	1.4900e-003	81.7887
Total		**0.0354**	**0.3221**	**0.2706**	**1.9400e-003**		**0.0245**	**0.0245**		**0.0245**	**0.0245**		**386.5576**	**386.5576**	**7.4100e-003**	**7.0900e-003**	**388.8547**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	13.4094	5.5000e-004	0.0610	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Unmitigated	13.4094	5.5000e-004	0.0610	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.5238					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	11.8800					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	5.5800e-003	5.5000e-004	0.0610	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Total	**13.4094**	**5.5000e-004**	**0.0610**	**0.0000**		**2.2000e-004**	**2.2000e-004**		**2.2000e-004**	**2.2000e-004**		**0.1313**	**0.1313**	**3.4000e-004**		**0.1398**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.5238					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	11.8800					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	5.5800e-003	5.5000e-004	0.0610	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Total	**13.4094**	**5.5000e-004**	**0.0610**	**0.0000**		**2.2000e-004**	**2.2000e-004**		**2.2000e-004**	**2.2000e-004**		**0.1313**	**0.1313**	**3.4000e-004**		**0.1398**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Link US - 2031 Operational Emissions

South Coast Air Basin, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	30.00	1000sqft	0.69	30,000.00	0
Regional Shopping Center	410.60	1000sqft	9.43	410,600.00	0
Strip Mall	159.40	1000sqft	3.66	159,400.00	0

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.2 **Precipitation Freq (Days)** 31

Climate Zone 12 **Operational Year** 2031

Utility Company Los Angeles Department of Water & Power

CO2 Intensity (lb/MWhr) 834 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Intensity factor from LADWP 2017 Power Strategic Long-Term Resource Plan

Land Use - Regional Shopping Center represents the new passenger concourse space not included in the retail or office uses

Construction Phase - Construction is calculated separately

Off-road Equipment - Construction is calculated separately

Trips and VMT - Construction is calculated separately

Architectural Coating - Construction is calculated separately

Vehicle Trips - Trip rates from traffic analysis

Energy Use - .

Energy Mitigation - CalEEMod includes 2013 Title 24. 2016 Title 24 is 5% more energy efficient for non-residential uses

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Nonresidential_Exterior	300,000.00	0.00
tblArchitecturalCoating	ConstArea_Nonresidential_Interior	900,000.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	1227.89	834
tblTripsAndVMT	WorkerTripNumber	38.00	0.00
tblVehicleTrips	ST_TR	2.46	0.49
tblVehicleTrips	ST_TR	49.97	0.00
tblVehicleTrips	ST_TR	42.04	8.10
tblVehicleTrips	SU_TR	1.05	0.21
tblVehicleTrips	SU_TR	25.24	0.00
tblVehicleTrips	SU_TR	20.43	3.94
tblVehicleTrips	WD_TR	11.03	2.21
tblVehicleTrips	WD_TR	42.70	0.00
tblVehicleTrips	WD_TR	44.32	8.54

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	13.4094	5.5000e-004	0.0610	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Energy	0.0369	0.3350	0.2814	2.0100e-003		0.0255	0.0255		0.0255	0.0255		401.9662	401.9662	7.7000e-003	7.3700e-003	404.3548
Mobile	1.2010	6.5632	12.5385	0.0571	5.9568	0.0353	5.9921	1.5930	0.0328	1.6258		5,865.1054	5,865.1054	0.2558		5,871.5007
Total	**14.6472**	**6.8987**	**12.8809**	**0.0591**	**5.9568**	**0.0610**	**6.0178**	**1.5930**	**0.0584**	**1.6514**		**6,267.2028**	**6,267.2028**	**0.2639**	**7.3700e-003**	**6,275.9953**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	13.4094	5.5000e-004	0.0610	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Energy	0.0354	0.3221	0.2706	1.9300e-003		0.0245	0.0245		0.0245	0.0245		386.5576	386.5576	7.4100e-003	7.0900e-003	388.8547
Mobile	1.2010	6.5632	12.5385	0.0571	5.9568	0.0353	5.9921	1.5930	0.0328	1.6258		5,865.1054	5,865.1054	0.2558		5,871.5007
Total	**14.6458**	**6.8859**	**12.8701**	**0.0591**	**5.9568**	**0.0600**	**6.0168**	**1.5930**	**0.0575**	**1.6505**		**6,251.7943**	**6,251.7943**	**0.2636**	**7.0900e-003**	**6,260.4952**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.01	0.19	0.08	0.14	0.00	1.61	0.02	0.00	1.68	0.06	0.00	0.25	0.25	0.11	3.80	0.25

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Architectural Coating	Architectural Coating	1/4/2021	1/3/2021	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	0	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Architectural Coating - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.2010	6.5632	12.5385	0.0571	5.9568	0.0353	5.9921	1.5930	0.0328	1.6258		5,865.1054	5,865.1054	0.2558		5,871.5007
Unmitigated	1.2010	6.5632	12.5385	0.0571	5.9568	0.0353	5.9921	1.5930	0.0328	1.6258		5,865.1054	5,865.1054	0.2558		5,871.5007

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	66.30	14.70	6.30	162,224	162,224
Regional Shopping Center	0.00	0.00	0.00		
Strip Mall	1,361.28	1,291.14	628.04	2,371,600	2,371,600
Total	1,427.58	1,305.84	634.34	2,533,824	2,533,824

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	16.60	8.40	6.90	33.00	48.00	19.00	77	19	4
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	54	35	11
Strip Mall	16.60	8.40	6.90	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.554622	0.041562	0.206751	0.111062	0.012660	0.005774	0.022378	0.035217	0.002175	0.001476	0.004853	0.000718	0.000752
Regional Shopping Center	0.554622	0.041562	0.206751	0.111062	0.012660	0.005774	0.022378	0.035217	0.002175	0.001476	0.004853	0.000718	0.000752
Strip Mall	0.554622	0.041562	0.206751	0.111062	0.012660	0.005774	0.022378	0.035217	0.002175	0.001476	0.004853	0.000718	0.000752

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0354	0.3221	0.2706	1.9300e-003		0.0245	0.0245		0.0245	0.0245		386.5576	386.5576	7.4100e-003	7.0900e-003	388.8547
NaturalGas Unmitigated	0.0369	0.3350	0.2814	2.0100e-003		0.0255	0.0255		0.0255	0.0255		401.9662	401.9662	7.7000e-003	7.3700e-003	404.3548

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	855.616	9.2300e-003	0.0839	0.0705	5.0000e-004		6.3800e-003	6.3800e-003		6.3800e-003	6.3800e-003		100.6608	100.6608	1.9300e-003	1.8500e-003	101.2589
Regional Shopping Center	1844.89	0.0199	0.1809	0.1519	1.0900e-003		0.0138	0.0138		0.0138	0.0138		217.0456	217.0456	4.1600e-003	3.9800e-003	218.3354
Strip Mall	716.208	7.7200e-003	0.0702	0.0590	4.2000e-004		5.3400e-003	5.3400e-003		5.3400e-003	5.3400e-003		84.2598	84.2598	1.6100e-003	1.5400e-003	84.7605
Total		**0.0369**	**0.3350**	**0.2814**	**2.0100e-003**		**0.0255**	**0.0255**		**0.0255**	**0.0255**		**401.9662**	**401.9662**	**7.7000e-003**	**7.3700e-003**	**404.3548**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	0.814438	8.7800e-003	0.0799	0.0671	4.8000e-004		6.0700e-003	6.0700e-003		6.0700e-003	6.0700e-003		95.8163	95.8163	1.8400e-003	1.7600e-003	96.3857
Regional Shopping Center	1.7802	0.0192	0.1745	0.1466	1.0500e-003		0.0133	0.0133		0.0133	0.0133		209.4358	209.4358	4.0100e-003	3.8400e-003	210.6804
Strip Mall	0.691097	7.4500e-003	0.0678	0.0569	4.1000e-004		5.1500e-003	5.1500e-003		5.1500e-003	5.1500e-003		81.3056	81.3056	1.5600e-003	1.4900e-003	81.7887
Total		**0.0354**	**0.3221**	**0.2706**	**1.9400e-003**		**0.0245**	**0.0245**		**0.0245**	**0.0245**		**386.5576**	**386.5576**	**7.4100e-003**	**7.0900e-003**	**388.8547**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	13.4094	5.5000e-004	0.0610	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Unmitigated	13.4094	5.5000e-004	0.0610	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.5238					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	11.8800					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	5.5800e-003	5.5000e-004	0.0610	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Total	**13.4094**	**5.5000e-004**	**0.0610**	**0.0000**		**2.2000e-004**	**2.2000e-004**		**2.2000e-004**	**2.2000e-004**		**0.1313**	**0.1313**	**3.4000e-004**		**0.1398**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.5238					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	11.8800					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	5.5800e-003	5.5000e-004	0.0610	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Total	**13.4094**	**5.5000e-004**	**0.0610**	**0.0000**		**2.2000e-004**	**2.2000e-004**		**2.2000e-004**	**2.2000e-004**		**0.1313**	**0.1313**	**3.4000e-004**		**0.1398**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Link US - 2040 Operational Emissions

South Coast, Summary Report

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	30.00	1000sqft	0.69	30,000.00	0
Regional Shopping Center	410.60	1000sqft	9.43	410,600.00	0
Strip Mall	159.40	1000sqft	3.66	159,400.00	0

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.2 **Precipitation Freq (Days)** 31

Climate Zone 12 **Operational Year** 2040

Utility Company Los Angeles Department of Water & Power

CO2 Intensity (lb/MWhr) 1135 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments

Only CalEEMod defaults were used.

Project Characteristics - Intensity factor from https://data.lacity.org/A-Livable-and-Sustainable-City/LADWP-CO2-Generation/e5ni-eqan/10

Land Use - Regional Shopping Center represents the new passenger concourse space not included in the retail or office uses

Construction Phase - Construction is calculated separately

Off-road Equipment -

Off-road Equipment - Construction is calculated separately

Trips and VMT - Construction is calculated separately

Grading - Construction is calculated separately

Vehicle Trips - Trip rates from traffic analysis

Vehicle Emission Factors -

Vehicle Emission Factors -

Vehicle Emission Factors -

Energy Use - .

Energy Mitigation - CalEEMod includes 2013 Title 24. 2016 Title 24 is 5% more energy efficient for non-residential uses

2.0 Peak Daily Emissions

Peak Daily Construction Emissions

Peak Daily Construction Emissions

		Unmitigated						Mitigated					
		ROG	NOX	CO	SO2	PM10	PM2.5	ROG	NOX	CO	SO2	PM10	PM2.5
Year	Phase	lb/day											
2017	Site Preparation	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S
	Peak Daily Total	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S	0.0000 S
	Air District Threshold												
	Exceed Significance?												

Peak Daily Operational Emissions

Peak Daily Operational Emissions

		Unmitigated						Mitigated					
		ROG	NOX	CO	SO2	PM10	PM2.5	ROG	NOX	CO	SO2	PM10	PM2.5
	Operational Activity	lb/day											
On-Site	Area	13.4094 S	5.5000e-004 S	0.0609 S	0.0000 S	2.2000e-004 S	2.2000e-004 S	13.4094 S	5.5000e-004 S	0.0609 S	0.0000 S	2.2000e-004 S	2.2000e-004 S
On-Site	Energy	0.0371 S	0.3369 S	0.2830 S	2.0200e-003 S	0.0256 S	0.0256 S	0.0356 S	0.3240 S	0.2721 S	1.9400e-003 S	0.0246 S	0.0246 S
Off-Site	Mobile	0.9412 S	6.4764 S	10.2667 S	0.0568 S	5.9825 W	1.6153 W	0.9412 S	6.4764 S	10.2667 S	0.0568 S	5.9825 W	1.6153 W
	Peak Daily Total	14.3877 S	6.8138 S	10.6106 S	0.0589 S	6.0084 W	1.6412 W	14.3862 S	6.8009 S	10.5997 S	0.0588 S	6.0074 W	1.6402 W
	Air District Threshold												

	Exceed Significance?												

3.0 Annual GHG Emissions

Annual GHG

Annual GHG

		Unmitigated				Mitigated			
		CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e
GHG Activity	Year	MT/yr							
Construction	2017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Operational	2040	5,810.7892	9.2203	0.0630	6,060.0606	5,742.8719	9.2186	0.0626	5,991.9841
	Total								
	Significance Threshold								
	Exceed Significance?								

Link US - 2040 Operational Emissions
South Coast Air Basin, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	30.00	1000sqft	0.69	30,000.00	0
Regional Shopping Center	410.60	1000sqft	9.43	410,600.00	0
Strip Mall	159.40	1000sqft	3.66	159,400.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	12			**Operational Year**	2040
Utility Company	Los Angeles Department of Water & Power				
CO2 Intensity (lb/MWhr)	1135	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Intensity factor from https://data.lacity.org/A-Livable-and-Sustainable-City/LADWP-CO2-Generation/e5ni-eqan/10

Land Use - Regional Shopping Center represents the new passenger concourse space not included in the retail or office uses

Construction Phase - Construction is calculated separately

Off-road Equipment -

Off-road Equipment - Construction is calculated separately

Trips and VMT - Construction is calculated separately

Grading - Construction is calculated separately

Vehicle Trips - Trip rates from traffic analysis

Vehicle Emission Factors -

Vehicle Emission Factors -

Vehicle Emission Factors -

Energy Use - .

Energy Mitigation - CalEEMod includes 2013 Title 24. 2016 Title 24 is 5% more energy efficient for non-residential uses

Table Name	Column Name	Default Value	New Value
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	1227.89	1135
tblProjectCharacteristics	OperationalYear	2018	2040
tblVehicleTrips	ST_TR	2.46	0.49
tblVehicleTrips	ST_TR	49.97	0.00
tblVehicleTrips	ST_TR	42.04	8.10
tblVehicleTrips	SU_TR	1.05	0.21
tblVehicleTrips	SU_TR	25.24	0.00
tblVehicleTrips	SU_TR	20.43	3.94
tblVehicleTrips	WD_TR	11.03	2.21
tblVehicleTrips	WD_TR	42.70	0.00
tblVehicleTrips	WD_TR	44.32	8.54

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	13.4094	5.5000e-004	0.0609	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Energy	0.0371	0.3369	0.2830	2.0200e-003		0.0256	0.0256		0.0256	0.0256		404.2869	404.2869	7.7500e-003	7.4100e-003	406.6893
Mobile	0.9412	6.4764	10.2667	0.0568	5.9594	0.0230	5.9825	1.5938	0.0214	1.6153		5,856.4839	5,856.4839	0.2210		5,862.0097
Total	**14.3877**	**6.8138**	**10.6106**	**0.0589**	**5.9594**	**0.0488**	**6.0083**	**1.5938**	**0.0472**	**1.6411**		**6,260.9021**	**6,260.9021**	**0.2291**	**7.4100e-003**	**6,268.8388**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	13.4094	5.5000e-004	0.0609	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Energy	0.0356	0.3240	0.2721	1.9400e-003		0.0246	0.0246		0.0246	0.0246		388.7623	388.7623	7.4500e-003	7.1300e-003	391.0725
Mobile	0.9412	6.4764	10.2667	0.0568	5.9594	0.0230	5.9825	1.5938	0.0214	1.6153		5,856.4839	5,856.4839	0.2210		5,862.0097
Total	**14.3862**	**6.8009**	**10.5997**	**0.0588**	**5.9594**	**0.0479**	**6.0073**	**1.5938**	**0.0463**	**1.6401**		**6,245.3775**	**6,245.3775**	**0.2288**	**7.1300e-003**	**6,253.2220**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.01**	**0.19**	**0.10**	**0.14**	**0.00**	**2.01**	**0.02**	**0.00**	**2.07**	**0.06**	**0.00**	**0.25**	**0.25**	**0.13**	**3.78**	**0.25**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	3/16/2017	3/15/2017	5	10	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40

Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Mitigated	0.9412	6.4764	10.2667	0.0568	5.9594	0.0230	5.9825	1.5938	0.0214	1.6153		5,856.4839	5,856.4839	0.2210		5,862.0097
Unmitigated	0.9412	6.4764	10.2667	0.0568	5.9594	0.0230	5.9825	1.5938	0.0214	1.6153		5,856.4839	5,856.4839	0.2210		5,862.0097

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	66.30	14.70	6.30	162,224	162,224
Regional Shopping Center	0.00	0.00	0.00		
Strip Mall	1,361.28	1,291.14	628.04	2,371,600	2,371,600
Total	1,427.58	1,305.84	634.34	2,533,824	2,533,824

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	16.60	8.40	6.90	33.00	48.00	19.00	77	19	4
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	54	35	11
Strip Mall	16.60	8.40	6.90	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.552848	0.041144	0.205921	0.110574	0.011987	0.005763	0.023182	0.038654	0.002242	0.001394	0.004854	0.000710	0.000727
Regional Shopping Center	0.552848	0.041144	0.205921	0.110574	0.011987	0.005763	0.023182	0.038654	0.002242	0.001394	0.004854	0.000710	0.000727
Strip Mall	0.552848	0.041144	0.205921	0.110574	0.011987	0.005763	0.023182	0.038654	0.002242	0.001394	0.004854	0.000710	0.000727

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
NaturalGas Mitigated	0.0356	0.3240	0.2721	1.9400e-003		0.0246	0.0246		0.0246	0.0246		388.7623	388.7623	7.4500e-003	7.1300e-003	391.0725
NaturalGas Unmitigated	0.0371	0.3369	0.2830	2.0200e-003		0.0256	0.0256		0.0256	0.0256		404.2869	404.2869	7.7500e-003	7.4100e-003	406.6893

5.2 Energy by Land Use - NaturalGas

Unmitigated

Land Use	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	kBTU/yr	lb/day										lb/day					
General Office Building	859.726	9.2700e-003	0.0843	0.0708	5.1000e-004		6.4100e-003	6.4100e-003		6.4100e-003	6.4100e-003		101.1442	101.1442	1.9400e-003	1.8500e-003	101.7453
Regional Shopping Center	1856.14	0.0200	0.1820	0.1529	1.0900e-003		0.0138	0.0138		0.0138	0.0138		218.3691	218.3691	4.1900e-003	4.0000e-003	219.6667
Strip Mall	720.575	7.7700e-003	0.0706	0.0593	4.2000e-004		5.3700e-003	5.3700e-003		5.3700e-003	5.3700e-003		84.7736	84.7736	1.6200e-003	1.5500e-003	85.2773
Total		**0.0371**	**0.3369**	**0.2830**	**2.0200e-003**		**0.0256**	**0.0256**		**0.0256**	**0.0256**		**404.2869**	**404.2869**	**7.7500e-003**	**7.4000e-003**	**406.6894**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	0.818342	8.8300e-003	0.0802	0.0674	4.8000e-004		6.1000e-003	6.1000e-003		6.1000e-003	6.1000e-003		96.2756	96.2756	1.8500e-003	1.7700e-003	96.8477
Regional Shopping Center	1.79089	0.0193	0.1756	0.1475	1.0500e-003		0.0133	0.0133		0.0133	0.0133		210.6931	210.6931	4.0400e-003	3.8600e-003	211.9451
Strip Mall	0.695246	7.5000e-003	0.0682	0.0573	4.1000e-004		5.1800e-003	5.1800e-003		5.1800e-003	5.1800e-003		81.7937	81.7937	1.5700e-003	1.5000e-003	82.2797
Total		**0.0356**	**0.3240**	**0.2721**	**1.9400e-003**		**0.0246**	**0.0246**		**0.0246**	**0.0246**		**388.7623**	**388.7623**	**7.4600e-003**	**7.1300e-003**	**391.0725**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	13.4094	5.5000e-004	0.0609	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Unmitigated	13.4094	5.5000e-004	0.0609	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.5238					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	11.8800					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	5.5700e-003	5.5000e-004	0.0609	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Total	**13.4094**	**5.5000e-004**	**0.0609**	**0.0000**		**2.2000e-004**	**2.2000e-004**		**2.2000e-004**	**2.2000e-004**		**0.1313**	**0.1313**	**3.4000e-004**		**0.1398**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.5238					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	11.8800					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	5.5700e-003	5.5000e-004	0.0609	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Total	**13.4094**	**5.5000e-004**	**0.0609**	**0.0000**		**2.2000e-004**	**2.2000e-004**		**2.2000e-004**	**2.2000e-004**		**0.1313**	**0.1313**	**3.4000e-004**		**0.1398**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Link US - 2040 Operational Emissions
South Coast Air Basin, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	30.00	1000sqft	0.69	30,000.00	0
Regional Shopping Center	410.60	1000sqft	9.43	410,600.00	0
Strip Mall	159.40	1000sqft	3.66	159,400.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	12			**Operational Year**	2040
Utility Company	Los Angeles Department of Water & Power				
CO2 Intensity (lb/MWhr)	1135	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Intensity factor from https://data.lacity.org/A-Livable-and-Sustainable-City/LADWP-CO2-Generation/e5ni-eqan/10

Land Use - Regional Shopping Center represents the new passenger concourse space not included in the retail or office uses

Construction Phase - Construction is calculated separately

Off-road Equipment -

Off-road Equipment - Construction is calculated separately

Trips and VMT - Construction is calculated separately

Grading - Construction is calculated separately

Vehicle Trips - Trip rates from traffic analysis

Vehicle Emission Factors -

Vehicle Emission Factors -

Vehicle Emission Factors -

Energy Use - .

Energy Mitigation - CalEEMod includes 2013 Title 24. 2016 Title 24 is 5% more energy efficient for non-residential uses

Table Name	Column Name	Default Value	New Value
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	1227.89	1135
tblProjectCharacteristics	OperationalYear	2018	2040
tblVehicleTrips	ST_TR	2.46	0.49
tblVehicleTrips	ST_TR	49.97	0.00
tblVehicleTrips	ST_TR	42.04	8.10
tblVehicleTrips	SU_TR	1.05	0.21
tblVehicleTrips	SU_TR	25.24	0.00
tblVehicleTrips	SU_TR	20.43	3.94
tblVehicleTrips	WD_TR	11.03	2.21
tblVehicleTrips	WD_TR	42.70	0.00
tblVehicleTrips	WD_TR	44.32	8.54

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	13.4094	5.5000e-004	0.0609	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Energy	0.0371	0.3369	0.2830	2.0200e-003		0.0256	0.0256		0.0256	0.0256		404.2869	404.2869	7.7500e-003	7.4100e-003	406.6893
Mobile	0.8992	6.4622	9.8572	0.0539	5.9594	0.0231	5.9825	1.5938	0.0215	1.6153		5,559.6273	5,559.6273	0.2264		5,565.2879
Total	**14.3457**	**6.7997**	**10.2010**	**0.0559**	**5.9594**	**0.0489**	**6.0084**	**1.5938**	**0.0473**	**1.6412**		**5,964.0455**	**5,964.0455**	**0.2345**	**7.4100e-003**	**5,972.1170**

Mitigated Operational

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Area	13.4094	5.5000e-004	0.0609	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Energy	0.0356	0.3240	0.2721	1.9400e-003		0.0246	0.0246		0.0246	0.0246		388.7623	388.7623	7.4500e-003	7.1300e-003	391.0725
Mobile	0.8992	6.4622	9.8572	0.0539	5.9594	0.0231	5.9825	1.5938	0.0215	1.6153		5,559.6273	5,559.6273	0.2264		5,565.2879
Total	**14.3443**	**6.7867**	**10.1902**	**0.0559**	**5.9594**	**0.0479**	**6.0074**	**1.5938**	**0.0463**	**1.6402**		**5,948.5209**	**5,948.5209**	**0.2342**	**7.1300e-003**	**5,956.5002**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.01**	**0.19**	**0.11**	**0.14**	**0.00**	**2.00**	**0.02**	**0.00**	**2.07**	**0.06**	**0.00**	**0.26**	**0.26**	**0.13**	**3.78**	**0.26**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	3/16/2017	3/15/2017	5	10	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40

Site Preparation	Tractors/Loaders/Backhoes		0	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.8992	6.4622	9.8572	0.0539	5.9594	0.0231	5.9825	1.5938	0.0215	1.6153		5,559.627 3	5,559.627 3	0.2264		5,565.287 9
Unmitigated	0.8992	6.4622	9.8572	0.0539	5.9594	0.0231	5.9825	1.5938	0.0215	1.6153		5,559.627 3	5,559.627 3	0.2264		5,565.287 9

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	66.30	14.70	6.30	162,224	162,224
Regional Shopping Center	0.00	0.00	0.00		
Strip Mall	1,361.28	1,291.14	628.04	2,371,600	2,371,600
Total	1,427.58	1,305.84	634.34	2,533,824	2,533,824

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	16.60	8.40	6.90	33.00	48.00	19.00	77	19	4
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	54	35	11
Strip Mall	16.60	8.40	6.90	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.552848	0.041144	0.205921	0.110574	0.011987	0.005763	0.023182	0.038654	0.002242	0.001394	0.004854	0.000710	0.000727
Regional Shopping Center	0.552848	0.041144	0.205921	0.110574	0.011987	0.005763	0.023182	0.038654	0.002242	0.001394	0.004854	0.000710	0.000727
Strip Mall	0.552848	0.041144	0.205921	0.110574	0.011987	0.005763	0.023182	0.038654	0.002242	0.001394	0.004854	0.000710	0.000727

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0356	0.3240	0.2721	1.9400e-003		0.0246	0.0246		0.0246	0.0246		388.7623	388.7623	7.4500e-003	7.1300e-003	391.0725
NaturalGas Unmitigated	0.0371	0.3369	0.2830	2.0200e-003		0.0256	0.0256		0.0256	0.0256		404.2869	404.2869	7.7500e-003	7.4100e-003	406.6893

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	859.726	9.2700e-003	0.0843	0.0708	5.1000e-004		6.4100e-003	6.4100e-003		6.4100e-003	6.4100e-003		101.1442	101.1442	1.9400e-003	1.8500e-003	101.7453
Regional Shopping Center	1856.14	0.0200	0.1820	0.1529	1.0900e-003		0.0138	0.0138		0.0138	0.0138		218.3691	218.3691	4.1900e-003	4.0000e-003	219.6667
Strip Mall	720.575	7.7700e-003	0.0706	0.0593	4.2000e-004		5.3700e-003	5.3700e-003		5.3700e-003	5.3700e-003		84.7736	84.7736	1.6200e-003	1.5500e-003	85.2773
Total		**0.0371**	**0.3369**	**0.2830**	**2.0200e-003**		**0.0256**	**0.0256**		**0.0256**	**0.0256**		**404.2869**	**404.2869**	**7.7500e-003**	**7.4000e-003**	**406.6894**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	0.818342	8.8300e-003	0.0802	0.0674	4.8000e-004		6.1000e-003	6.1000e-003		6.1000e-003	6.1000e-003		96.2756	96.2756	1.8500e-003	1.7700e-003	96.8477
Regional Shopping Center	1.79089	0.0193	0.1756	0.1475	1.0500e-003		0.0133	0.0133		0.0133	0.0133		210.6931	210.6931	4.0400e-003	3.8600e-003	211.9451
Strip Mall	0.695246	7.5000e-003	0.0682	0.0573	4.1000e-004		5.1800e-003	5.1800e-003		5.1800e-003	5.1800e-003		81.7937	81.7937	1.5700e-003	1.5000e-003	82.2797
Total		**0.0356**	**0.3240**	**0.2721**	**1.9400e-003**		**0.0246**	**0.0246**		**0.0246**	**0.0246**		**388.7623**	**388.7623**	**7.4600e-003**	**7.1300e-003**	**391.0725**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	13.4094	5.5000e-004	0.0609	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Unmitigated	13.4094	5.5000e-004	0.0609	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.5238					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	11.8800					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	5.5700e-003	5.5000e-004	0.0609	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Total	**13.4094**	**5.5000e-004**	**0.0609**	**0.0000**		**2.2000e-004**	**2.2000e-004**		**2.2000e-004**	**2.2000e-004**		**0.1313**	**0.1313**	**3.4000e-004**		**0.1398**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.5238					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	11.8800					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	5.5700e-003	5.5000e-004	0.0609	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1313	0.1313	3.4000e-004		0.1398
Total	**13.4094**	**5.5000e-004**	**0.0609**	**0.0000**		**2.2000e-004**	**2.2000e-004**		**2.2000e-004**	**2.2000e-004**		**0.1313**	**0.1313**	**3.4000e-004**		**0.1398**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Link US - 2040 Operational Emissions
South Coast Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	30.00	1000sqft	0.69	30,000.00	0
Regional Shopping Center	410.60	1000sqft	9.43	410,600.00	0
Strip Mall	159.40	1000sqft	3.66	159,400.00	0

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.2 **Precipitation Freq (Days)** 31

Climate Zone 12 **Operational Year** 2040

Utility Company Los Angeles Department of Water & Power

CO2 Intensity (lb/MWhr) 1135 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Intensity factor from https://data.lacity.org/A-Livable-and-Sustainable-City/LADWP-CO2-Generation/e5ni-eqan/10

Land Use - Regional Shopping Center represents the new passenger concourse space not included in the retail or office uses

Construction Phase - Construction is calculated separately

Off-road Equipment -

Off-road Equipment - Construction is calculated separately

Trips and VMT - Construction is calculated separately

Grading - Construction is calculated separately

Vehicle Trips - Trip rates from traffic analysis

Vehicle Emission Factors -

Vehicle Emission Factors -

Vehicle Emission Factors -

Energy Use - .

Energy Mitigation - CalEEMod includes 2013 Title 24. 2016 Title 24 is 5% more energy efficient for non-residential uses

Table Name	Column Name	Default Value	New Value
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	1227.89	1135
tblProjectCharacteristics	OperationalYear	2018	2040
tblVehicleTrips	ST_TR	2.46	0.49
tblVehicleTrips	ST_TR	49.97	0.00
tblVehicleTrips	ST_TR	42.04	8.10
tblVehicleTrips	SU_TR	1.05	0.21
tblVehicleTrips	SU_TR	25.24	0.00
tblVehicleTrips	SU_TR	20.43	3.94
tblVehicleTrips	WD_TR	11.03	2.21
tblVehicleTrips	WD_TR	42.70	0.00
tblVehicleTrips	WD_TR	44.32	8.54

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	**Start Date**	**End Date**	**Maximum Unmitigated ROG + NOX (tons/quarter)**	**Maximum Mitigated ROG + NOX (tons/quarter)**
		Highest		

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	2.4469	7.0000e-005	7.6100e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.0149	0.0149	4.0000e-005	0.0000	0.0159
Energy	6.7600e-003	0.0615	0.0517	3.7000e-004		4.6700e-003	4.6700e-003		4.6700e-003	4.6700e-003	0.0000	4,339.8982	4,339.8982	0.1105	0.0238	4,349.7567
Mobile	0.1440	1.0823	1.6347	9.0100e-003	0.9625	3.7900e-003	0.9663	0.2578	3.5300e-003	0.2613	0.0000	843.1540	843.1540	0.0333	0.0000	843.9866

Waste						0.0000	0.0000		0.0000	0.0000	127.1535	0.0000	127.1535	7.5146	0.0000	315.0175
Water						0.0000	0.0000		0.0000	0.0000	15.0865	485.4821	500.5686	1.5619	0.0392	551.2848
Total	**2.5976**	**1.1439**	**1.6939**	**9.3800e-003**	**0.9625**	**8.4900e-003**	**0.9710**	**0.2578**	**8.2300e-003**	**0.2660**	**142.2400**	**5,668.5491**	**5,810.7892**	**9.2203**	**0.0630**	**6,060.0614**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	2.4469	7.0000e-005	7.6100e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.0149	0.0149	4.0000e-005	0.0000	0.0159
Energy	6.5000e-003	0.0591	0.0497	3.5000e-004		4.4900e-003	4.4900e-003		4.4900e-003	4.4900e-003	0.0000	4,271.9809	4,271.9809	0.1087	0.0234	4,281.6794
Mobile	0.1440	1.0823	1.6347	9.0100e-003	0.9625	3.7900e-003	0.9663	0.2578	3.5300e-003	0.2613	0.0000	843.1540	843.1540	0.0333	0.0000	843.9866
Waste						0.0000	0.0000		0.0000	0.0000	127.1535	0.0000	127.1535	7.5146	0.0000	315.0175
Water						0.0000	0.0000		0.0000	0.0000	15.0865	485.4821	500.5686	1.5619	0.0392	551.2848
Total	**2.5974**	**1.1415**	**1.6920**	**9.3600e-003**	**0.9625**	**8.3100e-003**	**0.9708**	**0.2578**	**8.0500e-003**	**0.2659**	**142.2400**	**5,600.6318**	**5,742.8719**	**9.2186**	**0.0626**	**5,991.9841**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.01**	**0.21**	**0.12**	**0.21**	**0.00**	**2.12**	**0.02**	**0.00**	**2.19**	**0.07**	**0.00**	**1.20**	**1.17**	**0.02**	**0.64**	**1.12**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	3/16/2017	3/15/2017	5	10	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1440	1.0823	1.6347	9.0100e-003	0.9625	3.7900e-003	0.9663	0.2578	3.5300e-003	0.2613	0.0000	843.1540	843.1540	0.0333	0.0000	843.9866
Unmitigated	0.1440	1.0823	1.6347	9.0100e-003	0.9625	3.7900e-003	0.9663	0.2578	3.5300e-003	0.2613	0.0000	843.1540	843.1540	0.0333	0.0000	843.9866

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	66.30	14.70	6.30	162,224	162,224
Regional Shopping Center	0.00	0.00	0.00		
Strip Mall	1,361.28	1,291.14	628.04	2,371,600	2,371,600
Total	1,427.58	1,305.84	634.34	2,533,824	2,533,824

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	16.60	8.40	6.90	33.00	48.00	19.00	77	19	4

Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	54	35	11
Strip Mall	16.60	8.40	6.90	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.552848	0.041144	0.205921	0.110574	0.011987	0.005763	0.023182	0.038654	0.002242	0.001394	0.004854	0.000710	0.000727
Regional Shopping Center	0.552848	0.041144	0.205921	0.110574	0.011987	0.005763	0.023182	0.038654	0.002242	0.001394	0.004854	0.000710	0.000727
Strip Mall	0.552848	0.041144	0.205921	0.110574	0.011987	0.005763	0.023182	0.038654	0.002242	0.001394	0.004854	0.000710	0.000727

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	4,207.616 9	4,207.616 9	0.1075	0.0222	4,216.933 0
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	4,272.964 0	4,272.964 0	0.1092	0.0226	4,282.424 7
NaturalGas Mitigated	6.5000e-003	0.0591	0.0497	3.5000e-004		4.4900e-003	4.4900e-003		4.4900e-003	4.4900e-003	0.0000	64.3640	64.3640	1.2300e-003	1.1800e-003	64.7464
NaturalGas Unmitigated	6.7600e-003	0.0615	0.0517	3.7000e-004		4.6700e-003	4.6700e-003		4.6700e-003	4.6700e-003	0.0000	66.9342	66.9342	1.2800e-003	1.2300e-003	67.3320

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	313800	1.6900e-003	0.0154	0.0129	9.0000e-005		1.1700e-003	1.1700e-003		1.1700e-003	1.1700e-003	0.0000	16.7456	16.7456	3.2000e-004	3.1000e-004	16.8451
Regional Shopping Center	677490	3.6500e-003	0.0332	0.0279	2.0000e-004		2.5200e-003	2.5200e-003		2.5200e-003	2.5200e-003	0.0000	36.1535	36.1535	6.9000e-004	6.6000e-004	36.3683
Strip Mall	263010	1.4200e-003	0.0129	0.0108	8.0000e-005		9.8000e-004	9.8000e-004		9.8000e-004	9.8000e-004	0.0000	14.0352	14.0352	2.7000e-004	2.6000e-004	14.1186
Total		**6.7600e-003**	**0.0615**	**0.0517**	**3.7000e-004**		**4.6700e-003**	**4.6700e-003**		**4.6700e-003**	**4.6700e-003**	**0.0000**	**66.9342**	**66.9342**	**1.2800e-003**	**1.2300e-003**	**67.3320**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	298695	1.6100e-003	0.0146	0.0123	9.0000e-005		1.1100e-003	1.1100e-003		1.1100e-003	1.1100e-003	0.0000	15.9395	15.9395	3.1000e-004	2.9000e-004	16.0342
Regional Shopping Center	653675	3.5200e-003	0.0320	0.0269	1.9000e-004		2.4400e-003	2.4400e-003		2.4400e-003	2.4400e-003	0.0000	34.8826	34.8826	6.7000e-004	6.4000e-004	35.0899
Strip Mall	253765	1.3700e-003	0.0124	0.0105	7.0000e-005		9.5000e-004	9.5000e-004		9.5000e-004	9.5000e-004	0.0000	13.5419	13.5419	2.6000e-004	2.5000e-004	13.6223
Total		**6.5000e-003**	**0.0591**	**0.0497**	**3.5000e-004**		**4.5000e-003**	**4.5000e-003**		**4.5000e-003**	**4.5000e-003**	**0.0000**	**64.3640**	**64.3640**	**1.2400e-003**	**1.1800e-003**	**64.7464**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	399600	205.7250	5.2600e-003	1.0900e-003	206.1805

Regional Shopping Center	5.69092e+006	2,929.8392	0.0749	0.0155	2,936.3261
Strip Mall	2.20928e+006	1,137.3998	0.0291	6.0100e-003	1,139.9181
Total		**4,272.9640**	**0.1092**	**0.0226**	**4,282.4247**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	392370	202.0028	5.1600e-003	1.0700e-003	202.4501
Regional Shopping Center	5.60469e+006	2,885.4476	0.0737	0.0153	2,891.8363
Strip Mall	2.17581e+006	1,120.1665	0.0286	5.9200e-003	1,122.6466
Total		**4,207.6169**	**0.1075**	**0.0222**	**4,216.9330**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.4469	7.0000e-005	7.6100e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.0149	0.0149	4.0000e-005	0.0000	0.0159
Unmitigated	2.4469	7.0000e-005	7.6100e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.0149	0.0149	4.0000e-005	0.0000	0.0159

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.2781					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.1681					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	7.0000e-004	7.0000e-005	7.6100e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.0149	0.0149	4.0000e-005	0.0000	0.0159
Total	**2.4469**	**7.0000e-005**	**7.6100e-003**	**0.0000**		**3.0000e-005**	**3.0000e-005**		**3.0000e-005**	**3.0000e-005**	**0.0000**	**0.0149**	**0.0149**	**4.0000e-005**	**0.0000**	**0.0159**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.2781					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.1681					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	7.0000e-004	7.0000e-005	7.6100e-003	0.0000		3.0000e-005	3.0000e-005		3.0000e-005	3.0000e-005	0.0000	0.0149	0.0149	4.0000e-005	0.0000	0.0159
Total	**2.4469**	**7.0000e-005**	**7.6100e-003**	**0.0000**		**3.0000e-005**	**3.0000e-005**		**3.0000e-005**	**3.0000e-005**	**0.0000**	**0.0149**	**0.0149**	**4.0000e-005**	**0.0000**	**0.0159**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	500.5686	1.5619	0.0392	551.2848
Unmitigated	500.5686	1.5619	0.0392	551.2848

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	5.33201 / 3.26801	56.1272	0.1751	4.3900e-003	61.8139
Regional Shopping Center	30.4142 / 18.6409	320.1537	0.9990	0.0250	352.5908
Strip Mall	11.8072 / 7.23665	124.2876	0.3878	9.7200e-003	136.8801
Total		**500.5686**	**1.5619**	**0.0392**	**551.2848**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e

Land Use	Mgal	MT/yr			
General Office Building	5.33201 / 3.26801	56.1272	0.1751	4.3900e-003	61.8139
Regional Shopping Center	30.4142 / 18.6409	320.1537	0.9990	0.0250	352.5908
Strip Mall	11.8072 / 7.23665	124.2876	0.3878	9.7200e-003	136.8801
Total		**500.5686**	**1.5619**	**0.0392**	**551.2848**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	127.1535	7.5146	0.0000	315.0175
Unmitigated	127.1535	7.5146	0.0000	315.0175

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	27.9	5.6635	0.3347	0.0000	14.0310

Regional Shopping Center	431.13	87.5155	5.1720	0.0000	216.8159
Strip Mall	167.37	33.9746	2.0078	0.0000	84.1706
Total		**127.1535**	**7.5146**	**0.0000**	**315.0175**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	27.9	5.6635	0.3347	0.0000	14.0310
Regional Shopping Center	431.13	87.5155	5.1720	0.0000	216.8159
Strip Mall	167.37	33.9746	2.0078	0.0000	84.1706
Total		**127.1535**	**7.5146**	**0.0000**	**315.0175**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

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Appendix E:
Health Risk Assessment

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Link Us Dispersion Analysis Results

Operations - Unmitigated Concentrations

		Risk at	Existing		2026 NB		2026 B		2031 NB		2031 B		2040 NB		2040 B	
		1 ug/m3	Conc	Risk												
William Mead Homes	Residential	592.3	1.53693	910.3	0.59585	352.9	0.50693	300.3	0.34751	205.8	0.56323	333.6	0.14895	88.2	0.26391	156.3
William Mead Homes	Residential	592.3	1.17416	695.5	0.45521	269.6	0.38358	227.2	0.26548	157.2	0.42473	251.6	0.11379	67.4	0.19901	117.9
Mozaic Apartments	Residential	592.3	1.44599	856.5	0.56107	332.3	0.40627	240.6	0.3265	193.4	0.33017	195.6	0.13993	82.9	0.1546	91.6
Mission Road Residences	Residential	592.3	0.36014	213.3	0.13966	82.7	0.20373	120.7	0.0814	48.2	0.21959	130.1	0.03489	20.7	0.10289	60.9
Mission Road Residences	Residential	592.3	0.33853	200.5	0.13127	77.8	0.18602	110.2	0.07652	45.3	0.20146	119.3	0.0328	19.4	0.09439	55.9
One Santa Fe Apartments	Residential	592.3	0.15143	89.7	0.05872	34.8	0.05762	34.1	0.03423	20.3	0.06061	35.9	0.01467	8.7	0.0284	16.8
Utah Street Elementary School	School	22.5	0.32153	7.2	0.12467	2.8	0.14841	3.3	0.07268	1.6	0.1606	3.6	0.03115	0.7	0.07525	1.7
Mendez High School	School	22.5	0.32611	7.3	0.12645	2.8	0.16302	3.7	0.07372	1.7	0.1767	4.0	0.03159	0.7	0.08279	1.9
Ann Street Elementary School	School	22.5	1.48066	33.3	0.57403	12.9	0.53173	12.0	0.33479	7.5	0.59126	13.3	0.14349	3.2	0.27704	6.2
Twin Towers Correctional Facility	Commercial Worker	45.4	0.83813	38.1	0.3251	14.8	0.25175	11.4	0.18935	8.6	0.23683	10.8	0.08115	3.7	0.11093	5.0
Los Angeles Men's Central Jail	Commercial Worker	45.4	0.94566	42.9	0.3667	16.6	0.27113	12.3	0.21374	9.7	0.27933	12.7	0.09161	4.2	0.13086	5.9
Metro Offices	Commercial Worker	45.4	1.1194	50.8	0.43421	19.7	0.34901	15.8	0.25289	11.5	0.32944	15.0	0.10839	4.9	0.15431	7.0
Terminal Annex Alameda Street	Commercial Worker	45.4	1.05863	48.1	0.41072	18.6	0.29003	13.2	0.23908	10.9	0.24538	11.1	0.10247	4.7	0.11491	5.2

Link Us Dispersion Analysis Results

Construction - Unmitigated Concentrations

		Risk at	Above-Grade		At-Grade	
		1 ug/m3	Conc	Risk	Conc	Risk
William Mead Homes	Residential	368.2	0.0448	16.5	0.06843	25.2
William Mead Homes	Residential	368.2	0.04026	14.8	0.06149	22.6
Mozaic Apartments	Residential	368.2	0.23087	85.0	0.35259	129.8
Mission Road Residences	Residential	368.2	0.01593	5.9	0.02433	9.0
Mission Road Residences	Residential	368.2	0.0132	4.9	0.02016	7.4
One Santa Fe Apartments	Residential	368.2	0.00177	0.7	0.0027	1.0
Utah Street Elementary School	School	15.6	0.00909	0.1	0.01388	0.2
Mendez High School	School	15.6	0.01044	0.2	0.01594	0.2
Ann Street Elementary School	School	15.6	0.06071	0.9	0.09272	1.4
Twin Towers Correctional Facility	Commercial Worker	10.9	0.16149	1.8	0.24662	2.7
Los Angeles Men's Central Jail	Commercial Worker	10.9	0.10186	1.1	0.15557	1.7
Metro Offices	Commercial Worker	10.9	0.49109	5.4	0.75	8.2
Terminal Annex Alameda Street	Commercial Worker	10.9	0.17055	1.9	0.26047	2.8

Construction - Mitigated Concentrations

		Risk at	Above-Grade		At-Grade	
		1 ug/m3	Conc	Risk	Conc	Risk
William Mead Homes	Residential	368.2	0.00442	1.6	0.00716	2.6
William Mead Homes	Residential	368.2	0.00397	1.5	0.00644	2.4
Mozaic Apartments	Residential	368.2	0.02277	8.4	0.03691	13.6
Mission Road Residences	Residential	368.2	0.00157	0.6	0.00255	0.9
Mission Road Residences	Residential	368.2	0.0013	0.5	0.00211	0.8
One Santa Fe Apartments	Residential	368.2	0.00017	0.1	0.00028	0.1
Utah Street Elementary School	School	15.6	0.0009	0.0	0.00145	0.0
Mendez High School	School	15.6	0.00103	0.0	0.00167	0.0
Ann Street Elementary School	School	15.6	0.00599	0.1	0.00971	0.2
Twin Towers Correctional Facility	Commercial Worker	10.9	0.01593	0.2	0.02582	0.3
Los Angeles Men's Central Jail	Commercial Worker	10.9	0.01005	0.1	0.01628	0.2
Metro Offices	Commercial Worker	10.9	0.04844	0.5	0.07851	0.9
Terminal Annex Alameda Street	Commercial Worker	10.9	0.01682	0.2	0.02727	0.3

METRO LINKUS Construction Modeled DPM Concentrations [ug/m^3]

12/10/2018 Revised

	Discrete Receptor ID (Group Name)	Sensitive Receptor	Street Location (Los Angeles)	X	Y	Concentration (AVERAGE CONC) [ug/m^3]	Elevation (ZELEV)	Hill Heights (ZHILL)	Flagpole (ZFLAG)	Averagin Period (AVE)	Source Group (GRP)	Num Years (NUM YRS)
Revised 12/10/2018 Construction Above Grade Unmitigated	ARC1 (ARCREC)	William Mead Homes	Bolero Lane	386554.29	3769752.53	0.0448	89.05	89.05	0	ANNUAL	ALL	5
	ARC2 (ARCREC)	Mozaic Apartments	Union Station Driveway	386040.13	3769154.79	0.23087	90.06	90.06	0	ANNUAL	ALL	5
	ARC3 (ARCREC)	K-12 School	Park Paseo St	386891.05	3768359.8	0.00545	82.03	82.03	0	ANNUAL	ALL	5
	ARC4 (ARCREC)	Twin Towers Correctional Facility	Bauchet Street	386341.41	3769277.46	0.16149	86.94	86.94	0	ANNUAL	ALL	5
	ARC5 (ARCREC)	Los Angeles Men's Central Jail	Bauchet Street	386283.86	3769482.56	0.05454	88.03	88.03	0	ANNUAL	ALL	5
	ARC6 (ARCREC)	One Sante Fe Apartments	Santa Fe Avenue	386304.23	3767912	0.00177	81.1	81.1	0	ANNUAL	ALL	5
	ARC7 (ARCREC)	Metro Offices	N. Vignes Street	386214.89	3769095.39	0.49109	87.89	91.33	0	ANNUAL	ALL	5
	(ARCREC)-1	Residential	Mission Road	386788.16	3768599.79	0.01593	83.69	83.69	0	ANNUAL	ALL	5
	(ARCREC)-2	Residential	Mission Road	386771.84	3768542.02	0.0132	82.8	82.8	0	ANNUAL	ALL	5
	(ARCREC)-3	Residential	Mission Road	386747.98	3768474.21	0.01044	82.73	82.73	0	ANNUAL	ALL	5
	(ARCREC)-4	Residential	Mission Road	386735.42	3768434.02	0.00909	82.66	82.66	0	ANNUAL	ALL	5
	(ARCREC)-5	Northend Outside Union Station	Union Station Driveway	386020.88	3769115.91	0.17697	86.07	86.07	0	ANNUAL	ALL	5
	(ARCREC)-6	USPO Terminal Annex	Cesar E Chavez Ave.	386061.06	3769257.82	0.17055	86.48	86.48	0	ANNUAL	ALL	5
	(ARCREC)-7	Los Angeles Men's Central Jail	Vignes Street	386288.36	3769402.23	0.10186	88.72	88.72	0	ANNUAL	ALL	5
	(ARCREC)-8	Trimana Fresh Food Market	Union Station Driveway	386000.79	3769006.66	0.17525	86.17	86.17	0	ANNUAL	ALL	5
	(ARCREC)-9	William Mead Homes	Bolero Lane	386720.35	3769817.9	0.04026	86.86	86.86	0	ANNUAL	ALL	5
	(ARCREC)-10	William Mead Homes	Bolero Lane	386678.91	3769778.97	0.06071	87.27	87.27	0	ANNUAL	ALL	5
	(ARCREC)-11	William Mead Homes	Bolero Lane	386618.63	3769760.13	0.05582	88.18	88.18	0	ANNUAL	ALL	5
	(ARCREC)-12	Metropolitan Water	Union Station Driveway	385961.86	3768935.08	0.09734	86.28	86.28	0	ANNUAL	ALL	5

11/19/2018 Rerun Model

	Discrete Receptor ID (Group Name)	Sensitive Receptor	Street Location (Los Angeles)	X	Y	Concentration (AVERAGE CONC) [ug/m^3]	Elevation (ZELEV)	Hill Heights (ZHILL)	Flagpole (ZFLAG)	Averagin Period (AVE)	Source Group (GRP)	Num Years (NUM YRS)
Revised 12/10/2018 Construction Above Grade Mitigated	ARC1 (ARCREC)	William Mead Homes	Bolero Lane	386554.29	3769752.53	0.00442	89.05	89.05	0	ANNUAL	ALL	5
	ARC2 (ARCREC)	Mozaic Apartments	Union Station Driveway	386040.13	3769154.79	0.02277	90.06	90.06	0	ANNUAL	ALL	5
	ARC3 (ARCREC)	K-12 School	Park Paseo St	386891.05	3768359.8	0.00054	82.03	82.03	0	ANNUAL	ALL	5
	ARC4 (ARCREC)	Twin Towers Correctional Facility	Bauchet Street	386341.41	3769277.46	0.01593	86.94	86.94	0	ANNUAL	ALL	5
	ARC5 (ARCREC)	Los Angeles Men's Central Jail	Bauchet Street	386283.86	3769482.56	0.00538	88.03	88.03	0	ANNUAL	ALL	5
	ARC6 (ARCREC)	One Sante Fe Apartments	Santa Fe Avenue	386304.23	3767912	0.00017	81.1	81.1	0	ANNUAL	ALL	5
	ARC7 (ARCREC)	Metro Offices	N. Vignes Street	386214.89	3769095.39	0.04844	87.89	91.33	0	ANNUAL	ALL	5
	(ARCREC)-1	Residential	Mission Road	386788.16	3768599.79	0.00157	83.69	83.69	0	ANNUAL	ALL	5
	(ARCREC)-2	Residential	Mission Road	386771.84	3768542.02	0.00130	82.8	82.8	0	ANNUAL	ALL	5
	(ARCREC)-3	Residential	Mission Road	386747.98	3768474.21	0.00103	82.73	82.73	0	ANNUAL	ALL	5
	(ARCREC)-4	Residential	Mission Road	386735.42	3768434.02	0.00090	82.66	82.66	0	ANNUAL	ALL	5
	(ARCREC)-5	Northend Outside Union Station	Union Station Driveway	386020.88	3769115.91	0.01746	86.07	86.07	0	ANNUAL	ALL	5
	(ARCREC)-6	USPO Terminal Annex	Cesar E Chavez Ave.	386061.06	3769257.82	0.01682	86.48	86.48	0	ANNUAL	ALL	5
	(ARCREC)-7	Los Angeles Men's Central Jail	Vignes Street	386288.36	3769402.23	0.01005	88.72	88.72	0	ANNUAL	ALL	5
	(ARCREC)-8	Trimana Fresh Food Market	Union Station Driveway	386000.79	3769006.66	0.01729	86.17	86.17	0	ANNUAL	ALL	5
	(ARCREC)-9	William Mead Homes	Bolero Lane	386720.35	3769817.9	0.00397	86.86	86.86	0	ANNUAL	ALL	5
	(ARCREC)-10	William Mead Homes	Bolero Lane	386678.91	3769778.97	0.00599	87.27	87.27	0	ANNUAL	ALL	5
	(ARCREC)-11	William Mead Homes	Bolero Lane	386618.63	3769760.13	0.00551	88.18	88.18	0	ANNUAL	ALL	5
	(ARCREC)-12	Metropolitan Water	Union Station Driveway	385961.86	3768935.08	0.00960	86.28	86.28	0	ANNUAL	ALL	5

Revised 12/10/2018 Construction At-Grade Unmitigated

Discrete Receptor ID (Group Name)	Sensitive Receptor	Street Location (Los Angeles)	X	Y	Concentration (AVERAGE CONC) [ug/m^3]	Elevation (ZELEV)	Hill Heights (ZHILL)	Flagpole (ZFLAG)	Averagin Period (AVE)	Source Group (GRP)	Num Years (NUM YRS)
ARC1 (ARCREC)	William Mead Homes	Bolero Lane	386554.29	3769752.53	0.06843	89.05	89.05	0	ANNUAL	ALL	5
ARC2 (ARCREC)	Mozaic Apartments	Union Station Driveway	386040.13	3769154.79	0.35259	90.06	90.06	0	ANNUAL	ALL	5
ARC3 (ARCREC)	K-12 School	Park Paseo St	386891.05	3768359.8	0.00833	82.03	82.03	0	ANNUAL	ALL	5
ARC4 (ARCREC)	Twin Towers Correctional Facility	Bauchet Street	386341.41	3769277.46	0.24662	86.94	86.94	0	ANNUAL	ALL	5
ARC5 (ARCREC)	Los Angeles Men's Central Jail	Bauchet Street	386283.86	3769482.56	0.08330	88.03	88.03	0	ANNUAL	ALL	5
ARC6 (ARCREC)	One Sante Fe Apartments	Santa Fe Avenue	386304.23	3767912	0.00270	81.1	81.1	0	ANNUAL	ALL	5
ARC7 (ARCREC)	Metro Offices	N. Vignes Street	386214.89	3769095.39	0.75000	87.89	91.33	0	ANNUAL	ALL	5
(ARCREC)-1	Residential	Mission Road	386788.16	3768599.79	0.02433	83.69	83.69	0	ANNUAL	ALL	5
(ARCREC)-2	Residential	Mission Road	386771.84	3768542.02	0.02016	82.8	82.8	0	ANNUAL	ALL	5
(ARCREC)-3	Residential	Mission Road	386747.98	3768474.21	0.01594	82.73	82.73	0	ANNUAL	ALL	5
(ARCREC)-4	Residential	Mission Road	386735.42	3768434.02	0.01388	82.66	82.66	0	ANNUAL	ALL	5
(ARCREC)-5	Northend Outside Union Station	Union Station Driveway	386020.88	3769115.91	0.27028	86.07	86.07	0	ANNUAL	ALL	5
(ARCREC)-6	USPO Terminal Annex	Cesar E Chavez Ave.	386061.06	3769257.82	0.26047	86.48	86.48	0	ANNUAL	ALL	5
(ARCREC)-7	Los Angeles Men's Central Jail	Vignes Street	386288.36	3769402.23	0.15557	88.72	88.72	0	ANNUAL	ALL	5
(ARCREC)-8	Trimana Fresh Food Market	Union Station Driveway	386000.79	3769006.66	0.26764	86.17	86.17	0	ANNUAL	ALL	5
(ARCREC)-9	William Mead Homes	Bolero Lane	386720.35	3769817.9	0.06149	86.86	86.86	0	ANNUAL	ALL	5
(ARCREC)-10	William Mead Homes	Bolero Lane	386678.91	3769778.97	0.09272	87.27	87.27	0	ANNUAL	ALL	5
(ARCREC)-11	William Mead Homes	Bolero Lane	386618.63	3769760.13	0.08525	88.18	88.18	0	ANNUAL	ALL	5
(ARCREC)-12	Metropolitan Water	Union Station Driveway	385961.86	3768935.08	0.14866	86.28	86.28	0	ANNUAL	ALL	5

Revised 12/10/2018 Construction At-Grade Mitigated

Discrete Receptor ID (Group Name)	Sensitive Receptor	Street Location (Los Angeles)	X	Y	Concentration (AVERAGE CONC) [ug/m^3]	Elevation (ZELEV)	Hill Heights (ZHILL)	Flagpole (ZFLAG)	Averagin Period (AVE)	Source Group (GRP)	Num Years (NUM YRS)
ARC1 (ARCREC)	William Mead Homes	Bolero Lane	386554.29	3769752.53	0.00716	89.05	89.05	0	ANNUAL	ALL	5
ARC2 (ARCREC)	Mozaic Apartments	Union Station Driveway	386040.13	3769154.79	0.03691	90.06	90.06	0	ANNUAL	ALL	5
ARC3 (ARCREC)	K-12 School	Park Paseo St	386891.05	3768359.8	0.00087	82.03	82.03	0	ANNUAL	ALL	5
ARC4 (ARCREC)	Twin Towers Correctional Facility	Bauchet Street	386341.41	3769277.46	0.02582	86.94	86.94	0	ANNUAL	ALL	5
ARC5 (ARCREC)	Los Angeles Men's Central Jail	Bauchet Street	386283.86	3769482.56	0.00872	88.03	88.03	0	ANNUAL	ALL	5
ARC6 (ARCREC)	One Sante Fe Apartments	Santa Fe Avenue	386304.23	3767912	0.00028	81.1	81.1	0	ANNUAL	ALL	5
ARC7 (ARCREC)	Metro Offices	N. Vignes Street	386214.89	3769095.39	0.07851	87.89	91.33	0	ANNUAL	ALL	5
(ARCREC)-1	Residential	Mission Road	386788.16	3768599.79	0.00255	83.69	83.69	0	ANNUAL	ALL	5
(ARCREC)-2	Residential	Mission Road	386771.84	3768542.02	0.00211	82.8	82.8	0	ANNUAL	ALL	5
(ARCREC)-3	Residential	Mission Road	386747.98	3768474.21	0.00167	82.73	82.73	0	ANNUAL	ALL	5
(ARCREC)-4	Residential	Mission Road	386735.42	3768434.02	0.00145	82.66	82.66	0	ANNUAL	ALL	5
(ARCREC)-5	Northend Outside Union Station	Union Station Driveway	386020.88	3769115.91	0.02829	86.07	86.07	0	ANNUAL	ALL	5
(ARCREC)-6	USPO Terminal Annex	Cesar E Chavez Ave.	386061.06	3769257.82	0.02727	86.48	86.48	0	ANNUAL	ALL	5
(ARCREC)-7	Los Angeles Men's Central Jail	Vignes Street	386288.36	3769402.23	0.01628	88.72	88.72	0	ANNUAL	ALL	5
(ARCREC)-8	Trimana Fresh Food Market	Union Station Driveway	386000.79	3769006.66	0.02802	86.17	86.17	0	ANNUAL	ALL	5
(ARCREC)-9	William Mead Homes	Bolero Lane	386720.35	3769817.9	0.00644	86.86	86.86	0	ANNUAL	ALL	5
(ARCREC)-10	William Mead Homes	Bolero Lane	386678.91	3769778.97	0.00971	87.27	87.27	0	ANNUAL	ALL	5
(ARCREC)-11	William Mead Homes	Bolero Lane	386618.63	3769760.13	0.00892	88.18	88.18	0	ANNUAL	ALL	5
(ARCREC)-12	Metropolitan Water	Union Station Driveway	385961.86	3768935.08	0.01556	86.28	86.28	0	ANNUAL	ALL	5

METRO LINKUS Operation Modeled DPM Concentrations [ug/m^3]

Rev-2 Operation Emission - Unmitigated

	Discrete Receptor ID (Group Name)	Sensitive Receptor	Street Location (Los Angeles)	X	Y	Concentration (AVERAGE CONC) [ug/m^3]	Elevation (ZELEV)	Hill Heights (ZHILL)	Flagpole (ZFLAG)	Averagin Period (AVE)	Source Group (GRP)	Num Years (NUM YRS)
	ARC1 (ARCREC)	William Mead Homes	Bolero Lane	386554.29	3769752.53	1.53693	89.05	89.05	0	ANNUAL	ALL	5
	ARC2 (ARCREC)	Mozaic Apartments	Union Station Driveway	386040.13	3769154.79	1.44599	90.06	90.06	0	ANNUAL	ALL	5
	ARC3 (ARCREC)	K-12 School	Park Paseo St	386891.05	3768359.8	0.21438	82.03	82.03	0	ANNUAL	ALL	5
	ARC4 (ARCREC)	Twin Towers Correctional Facility	Bauchet Street	386341.41	3769277.46	0.83813	86.94	86.94	0	ANNUAL	ALL	5
	ARC5 (ARCREC)	Los Angeles Men's Central Jail	Bauchet Street	386283.86	3769482.56	1.13848	88.03	88.03	0	ANNUAL	ALL	5
	ARC6 (ARCREC)	One Sante Fe Apartments	Santa Fe Avenue	386304.23	3767912	0.15143	81.1	81.1	0	ANNUAL	ALL	5
	ARC7 (ARCREC)	Metro Offices	N. Vignes Street	386214.89	3769095.39	1.1194	87.89	91.33	0	ANNUAL	ALL	5
2016 Baseline	(ARCREC)-1	Residential	Mission Road	386788.16	3768599.79	0.36014	83.69	83.69	0	ANNUAL	ALL	5
	(ARCREC)-2	Residential	Mission Road	386771.84	3768542.02	0.33853	82.8	82.8	0	ANNUAL	ALL	5
	(ARCREC)-3	Residential	Mission Road	386747.98	3768474.21	0.32611	82.73	82.73	0	ANNUAL	ALL	5
	(ARCREC)-4	Residential	Mission Road	386735.42	3768434.02	0.32153	82.66	82.66	0	ANNUAL	ALL	5
	(ARCREC)-5	Northend Outside Union Station	Union Station Driveway	386020.88	3769115.91	1.07861	86.07	86.07	0	ANNUAL	ALL	5
	(ARCREC)-6	USPO Terminal Annex	Cesar E Chavez Ave.	386061.06	3769257.82	1.05863	86.48	86.48	0	ANNUAL	ALL	5
	(ARCREC)-7	Los Angeles Men's Central Jail	Vignes Street	386288.36	3769402.23	0.94566	88.72	88.72	0	ANNUAL	ALL	5
	(ARCREC)-8	Trimana Fresh Food Market	Union Station Driveway	386000.79	3769006.66	1.05032	86.17	86.17	0	ANNUAL	ALL	5
	(ARCREC)-9	William Mead Homes	Bolero Lane	386720.35	3769817.9	1.17416	86.86	86.86	0	ANNUAL	ALL	5
	(ARCREC)-10	William Mead Homes	Bolero Lane	386678.91	3769778.97	1.48066	87.27	87.27	0	ANNUAL	ALL	5
	(ARCREC)-11	William Mead Homes	Bolero Lane	386618.63	3769760.13	1.62149	88.18	88.18	0	ANNUAL	ALL	5
	(ARCREC)-12	Metropolitan Water	Union Station Driveway	385961.86	3768935.08	0.98665	86.28	86.28	0	ANNUAL	ALL	5

	Discrete Receptor ID (Group Name)	Sensitive Receptor	Street Location (Los Angeles)	X	Y	Concentration (AVERAGE CONC) [ug/m^3]	Elevation (ZELEV)	Hill Heights (ZHILL)	Flagpole (ZFLAG)	Averagin Period (AVE)	Source Group (GRP)	Num Years (NUM YRS)
	ARC1 (ARCREC)	William Mead Homes	Bolero Lane	386554.29	3769752.53	0.59585	89.05	89.05	0	ANNUAL	ALL	5
	ARC2 (ARCREC)	Mozaic Apartments	Union Station Driveway	386040.13	3769154.79	0.56107	90.06	90.06	0	ANNUAL	ALL	5
	ARC3 (ARCREC)	K-12 School	Park Paseo St	386891.05	3768359.8	0.08313	82.03	82.03	0	ANNUAL	ALL	5
	ARC4 (ARCREC)	Twin Towers Correctional Facility	Bauchet Street	386341.41	3769277.46	0.3251	86.94	86.94	0	ANNUAL	ALL	5
	ARC5 (ARCREC)	Los Angeles Men's Central Jail	Bauchet Street	386283.86	3769482.56	0.44142	88.03	88.03	0	ANNUAL	ALL	5
	ARC6 (ARCREC)	One Sante Fe Apartments	Santa Fe Avenue	386304.23	3767912	0.05872	81.1	81.1	0	ANNUAL	ALL	5
	ARC7 (ARCREC)	Metro Offices	N. Vignes Street	386214.89	3769095.39	0.43421	87.89	91.33	0	ANNUAL	ALL	5
2026 No-Build	(ARCREC)-1	Residential	Mission Road	386788.16	3768599.79	0.13966	83.69	83.69	0	ANNUAL	ALL	5
	(ARCREC)-2	Residential	Mission Road	386771.84	3768542.02	0.13127	82.8	82.8	0	ANNUAL	ALL	5
	(ARCREC)-3	Residential	Mission Road	386747.98	3768474.21	0.12645	82.73	82.73	0	ANNUAL	ALL	5
	(ARCREC)-4	Residential	Mission Road	386735.42	3768434.02	0.12467	82.66	82.66	0	ANNUAL	ALL	5
	(ARCREC)-5	Northend Outside Union Station	Union Station Driveway	386020.88	3769115.91	0.41849	86.07	86.07	0	ANNUAL	ALL	5
	(ARCREC)-6	USPO Terminal Annex	Cesar E Chavez Ave.	386061.06	3769257.82	0.41072	86.48	86.48	0	ANNUAL	ALL	5
	(ARCREC)-7	Los Angeles Men's Central Jail	Vignes Street	386288.36	3769402.23	0.3667	88.72	88.72	0	ANNUAL	ALL	5
	(ARCREC)-8	Trimana Fresh Food Market	Union Station Driveway	386000.79	3769006.66	0.40752	86.17	86.17	0	ANNUAL	ALL	5
	(ARCREC)-9	William Mead Homes	Bolero Lane	386720.35	3769817.9	0.45521	86.86	86.86	0	ANNUAL	ALL	5
	(ARCREC)-10	William Mead Homes	Bolero Lane	386678.91	3769778.97	0.57403	87.27	87.27	0	ANNUAL	ALL	5
	(ARCREC)-11	William Mead Homes	Bolero Lane	386618.63	3769760.13	0.62863	88.18	88.18	0	ANNUAL	ALL	5
	(ARCREC)-12	Metropolitan Water	Union Station Driveway	385961.86	3768935.08	0.38286	86.28	86.28	0	ANNUAL	ALL	5

	Discrete Receptor ID (Group Name)	Sensitive Receptor	Street Location (Los Angeles)	X	Y	Concentration (AVERAGE CONC) [ug/m^3]	Elevation (ZELEV)	Hill Heights (ZHILL)	Flagpole (ZFLAG)	Averagin Period (AVE)	Source Group (GRP)	Num Years (NUM YRS)
2026 Build	ARC1 (ARCREC)	William Mead Homes	Bolero Lane	386554.29	3769752.53	0.50693	89.05	89.05	0	ANNUAL	ALL	5
	ARC2 (ARCREC)	Mozaic Apartments	Union Station Driveway	386040.13	3769154.79	0.40627	90.06	90.06	0	ANNUAL	ALL	5
	ARC3 (ARCREC)	K-12 School	Park Paseo St	386891.05	3768359.8	0.09126	82.03	82.03	0	ANNUAL	ALL	5
	ARC4 (ARCREC)	Twin Towers Correctional Facility	Bauchet Street	386341.41	3769277.46	0.25175	86.94	86.94	0	ANNUAL	ALL	5
	ARC5 (ARCREC)	Los Angeles Men's Central Jail	Bauchet Street	386283.86	3769482.56	0.33692	88.03	88.03	0	ANNUAL	ALL	5
	ARC6 (ARCREC)	One Sante Fe Apartments	Santa Fe Avenue	386304.23	3767912	0.05762	81.1	81.1	0	ANNUAL	ALL	5
	ARC7 (ARCREC)	Metro Offices	N. Vignes Street	386214.89	3769095.39	0.34901	87.89	91.33	0	ANNUAL	ALL	5
	(ARCREC)-1	Residential	Mission Road	386788.16	3768599.79	0.20373	83.69	83.69	0	ANNUAL	ALL	5
	(ARCREC)-2	Residential	Mission Road	386771.84	3768542.02	0.18602	82.8	82.8	0	ANNUAL	ALL	5
	(ARCREC)-3	Residential	Mission Road	386747.98	3768474.21	0.16302	82.73	82.73	0	ANNUAL	ALL	5
	(ARCREC)-4	Residential	Mission Road	386735.42	3768434.02	0.14841	82.66	82.66	0	ANNUAL	ALL	5
	(ARCREC)-5	Northend Outside Union Station	Union Station Driveway	386020.88	3769115.91	0.30314	86.07	86.07	0	ANNUAL	ALL	5
	(ARCREC)-6	USPO Terminal Annex	Cesar E Chavez Ave.	386061.06	3769257.82	0.29003	86.48	86.48	0	ANNUAL	ALL	5
	(ARCREC)-7	Los Angeles Men's Central Jail	Vignes Street	386288.36	3769402.23	0.27113	88.72	88.72	0	ANNUAL	ALL	5
	(ARCREC)-8	Trimana Fresh Food Market	Union Station Driveway	386000.79	3769006.66	0.30166	86.17	86.17	0	ANNUAL	ALL	5
	(ARCREC)-9	William Mead Homes	Bolero Lane	386720.35	3769817.9	0.38358	86.86	86.86	0	ANNUAL	ALL	5
	(ARCREC)-10	William Mead Homes	Bolero Lane	386678.91	3769778.97	0.53173	87.27	87.27	0	ANNUAL	ALL	5
	(ARCREC)-11	William Mead Homes	Bolero Lane	386618.63	3769760.13	0.60292	88.18	88.18	0	ANNUAL	ALL	5
	(ARCREC)-12	Metropolitan Water	Union Station Driveway	385961.86	3768935.08	0.30103	86.28	86.28	0	ANNUAL	ALL	5

11/21/2018 rerun using revised emission numbers

	Discrete Receptor ID (Group Name)	Sensitive Receptor	Street Location (Los Angeles)	X	Y	Concentration (AVERAGE CONC) [ug/m^3]	Elevation (ZELEV)	Hill Heights (ZHILL)	Flagpole (ZFLAG)	Averagin Period (AVE)	Source Group (GRP)	Num Years (NUM YRS)
2031 No-Build	ARC1 (ARCREC)	William Mead Homes	Bolero Lane	386554.29	3769752.53	0.34751	89.05	89.05	0	ANNUAL	ALL	5
	ARC2 (ARCREC)	Mozaic Apartments	Union Station Driveway	386040.13	3769154.79	0.3265	90.06	90.06	0	ANNUAL	ALL	5
	ARC3 (ARCREC)	K-12 School	Park Paseo St	386891.05	3768359.8	0.04846	82.03	82.03	0	ANNUAL	ALL	5
	ARC4 (ARCREC)	Twin Towers Correctional Facility	Bauchet Street	386341.41	3769277.46	0.18935	86.94	86.94	0	ANNUAL	ALL	5
	ARC5 (ARCREC)	Los Angeles Men's Central Jail	Bauchet Street	386283.86	3769482.56	0.25738	88.03	88.03	0	ANNUAL	ALL	5
	ARC6 (ARCREC)	One Sante Fe Apartments	Santa Fe Avenue	386304.23	3767912	0.03423	81.1	81.1	0	ANNUAL	ALL	5
	ARC7 (ARCREC)	Metro Offices	N. Vignes Street	386214.89	3769095.39	0.25289	87.89	91.33	0	ANNUAL	ALL	5
	(ARCREC)-1	Residential	Mission Road	386788.16	3768599.79	0.0814	83.69	83.69	0	ANNUAL	ALL	5
	(ARCREC)-2	Residential	Mission Road	386771.84	3768542.02	0.07652	82.8	82.8	0	ANNUAL	ALL	5
	(ARCREC)-3	Residential	Mission Road	386747.98	3768474.21	0.07372	82.73	82.73	0	ANNUAL	ALL	5
	(ARCREC)-4	Residential	Mission Road	386735.42	3768434.02	0.07268	82.66	82.66	0	ANNUAL	ALL	5
	(ARCREC)-5	Northend Outside Union Station	Union Station Driveway	386020.88	3769115.91	0.24357	86.07	86.07	0	ANNUAL	ALL	5
	(ARCREC)-6	USPO Terminal Annex	Cesar E Chavez Ave.	386061.06	3769257.82	0.23908	86.48	86.48	0	ANNUAL	ALL	5
	(ARCREC)-7	Los Angeles Men's Central Jail	Vignes Street	386288.36	3769402.23	0.21374	88.72	88.72	0	ANNUAL	ALL	5
	(ARCREC)-8	Trimana Fresh Food Market	Union Station Driveway	386000.79	3769006.66	0.23718	86.17	86.17	0	ANNUAL	ALL	5
	(ARCREC)-9	William Mead Homes	Bolero Lane	386720.35	3769817.9	0.26548	86.86	86.86	0	ANNUAL	ALL	5
	(ARCREC)-10	William Mead Homes	Bolero Lane	386678.91	3769778.97	0.33479	87.27	87.27	0	ANNUAL	ALL	5
	(ARCREC)-11	William Mead Homes	Bolero Lane	386618.63	3769760.13	0.36664	88.18	88.18	0	ANNUAL	ALL	5
	(ARCREC)-12	Metropolitan Water	Union Station Driveway	385961.86	3768935.08	0.22276	86.28	86.28	0	ANNUAL	ALL	5

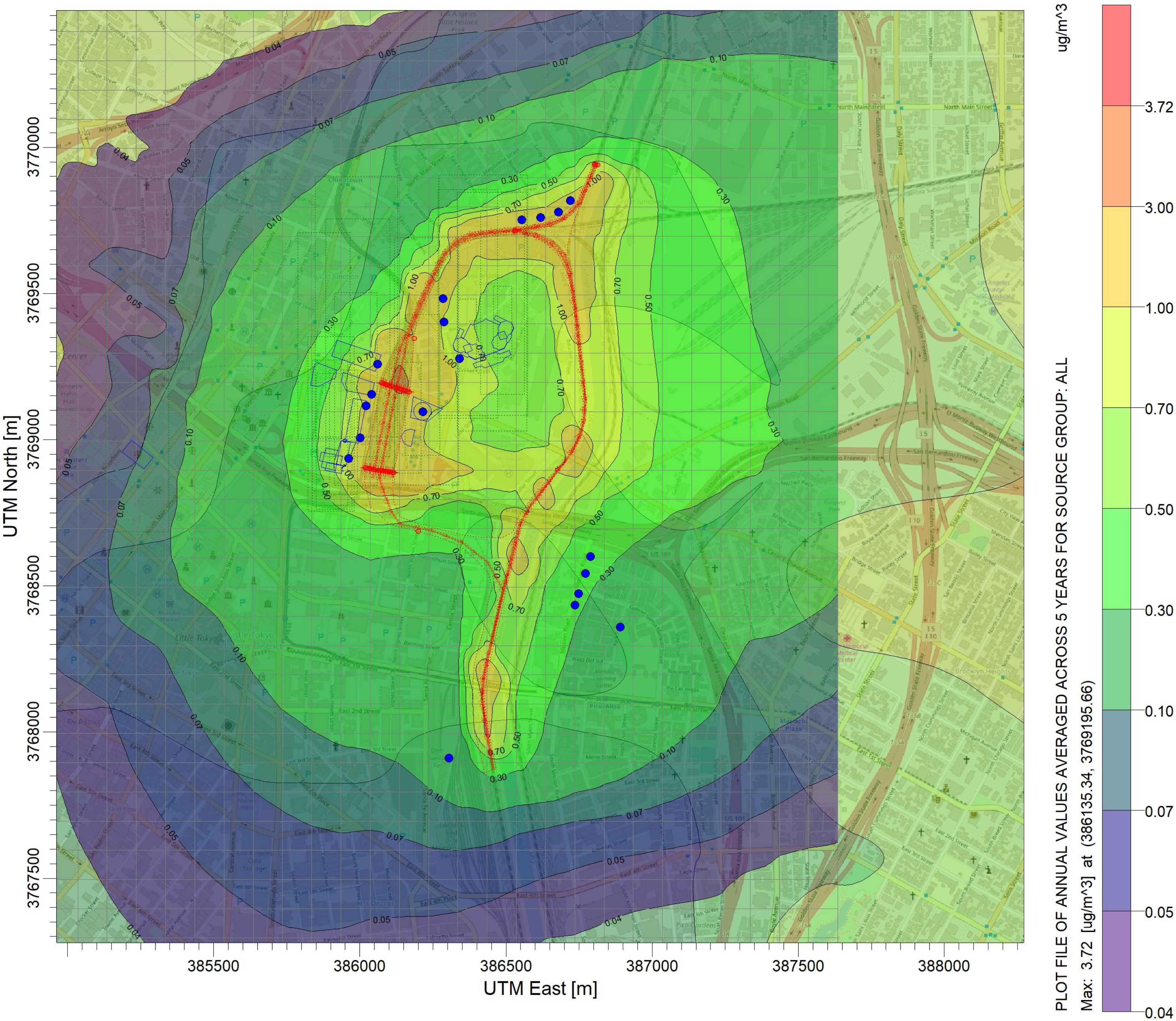
	Discrete Receptor ID (Group Name)	Sensitive Receptor	Street Location (Los Angeles)	X	Y	Concentration (AVERAGE CONC) [ug/m^3]	Elevation (ZELEV)	Hill Heights (ZHILL)	Flagpole (ZFLAG)	Averagin Period (AVE)	Source Group (GRP)	Num Years (NUM YRS)
2031 Build	ARC1 (ARCREC)	William Mead Homes	Bolero Lane	386554.29	3769752.53	0.56323	89.05	89.05	0	ANNUAL	ALL	5
	ARC2 (ARCREC)	Mozaic Apartments	Union Station Driveway	386040.13	3769154.79	0.33017	90.06	90.06	0	ANNUAL	ALL	5
	ARC3 (ARCREC)	K-12 School	Park Paseo St	386891.05	3768359.8	0.09771	82.03	82.03	0	ANNUAL	ALL	5
	ARC4 (ARCREC)	Twin Towers Correctional Facility	Bauchet Street	386341.41	3769277.46	0.23683	86.94	86.94	0	ANNUAL	ALL	5
	ARC5 (ARCREC)	Los Angeles Men's Central Jail	Bauchet Street	386283.86	3769482.56	0.36177	88.03	88.03	0	ANNUAL	ALL	5
	ARC6 (ARCREC)	One Sante Fe Apartments	Santa Fe Avenue	386304.23	3767912	0.06061	81.1	81.1	0	ANNUAL	ALL	5
	ARC7 (ARCREC)	Metro Offices	N. Vignes Street	386214.89	3769095.39	0.32944	87.89	91.33	0	ANNUAL	ALL	5
	(ARCREC)-1	Residential	Mission Road	386788.16	3768599.79	0.21959	83.69	83.69	0	ANNUAL	ALL	5
	(ARCREC)-2	Residential	Mission Road	386771.84	3768542.02	0.20146	82.8	82.8	0	ANNUAL	ALL	5
	(ARCREC)-3	Residential	Mission Road	386747.98	3768474.21	0.1767	82.73	82.73	0	ANNUAL	ALL	5
	(ARCREC)-4	Residential	Mission Road	386735.42	3768434.02	0.1606	82.66	82.66	0	ANNUAL	ALL	5
	(ARCREC)-5	Northend Outside Union Station	Union Station Driveway	386020.88	3769115.91	0.25291	86.07	86.07	0	ANNUAL	ALL	5
	(ARCREC)-6	USPO Terminal Annex	Cesar E Chavez Ave.	386061.06	3769257.82	0.24538	86.48	86.48	0	ANNUAL	ALL	5
	(ARCREC)-7	Los Angeles Men's Central Jail	Vignes Street	386288.36	3769402.23	0.27933	88.72	88.72	0	ANNUAL	ALL	5
	(ARCREC)-8	Trimana Fresh Food Market	Union Station Driveway	386000.79	3769006.66	0.25286	86.17	86.17	0	ANNUAL	ALL	5
	(ARCREC)-9	William Mead Homes	Bolero Lane	386720.35	3769817.9	0.42473	86.86	86.86	0	ANNUAL	ALL	5
	(ARCREC)-10	William Mead Homes	Bolero Lane	386678.91	3769778.97	0.59126	87.27	87.27	0	ANNUAL	ALL	5
	(ARCREC)-11	William Mead Homes	Bolero Lane	386618.63	3769760.13	0.67144	88.18	88.18	0	ANNUAL	ALL	5
	(ARCREC)-12	Metropolitan Water	Union Station Driveway	385961.86	3768935.08	0.24629	86.28	86.28	0	ANNUAL	ALL	5

	Discrete Receptor ID (Group Name)	Sensitive Receptor	Street Location (Los Angeles)	X	Y	Concentration (AVERAGE CONC) [ug/m^3]	Elevation (ZELEV)	Hill Heights (ZHILL)	Flagpole (ZFLAG)	Averagin Period (AVE)	Source Group (GRP)	Num Years (NUM YRS)
2040 No-Build	ARC1 (ARCREC)	William Mead Homes	Bolero Lane	386554.29	3769752.53	0.14895	89.05	89.05	0	ANNUAL	ALL	5
	ARC2 (ARCREC)	Mozaic Apartments	Union Station Driveway	386040.13	3769154.79	0.13993	90.06	90.06	0	ANNUAL	ALL	5
	ARC3 (ARCREC)	K-12 School	Park Paseo St	386891.05	3768359.8	0.02077	82.03	82.03	0	ANNUAL	ALL	5
	ARC4 (ARCREC)	Twin Towers Correctional Facility	Bauchet Street	386341.41	3769277.46	0.08115	86.94	86.94	0	ANNUAL	ALL	5
	ARC5 (ARCREC)	Los Angeles Men's Central Jail	Bauchet Street	386283.86	3769482.56	0.11031	88.03	88.03	0	ANNUAL	ALL	5
	ARC6 (ARCREC)	One Sante Fe Apartments	Santa Fe Avenue	386304.23	3767912	0.01467	81.1	81.1	0	ANNUAL	ALL	5
	ARC7 (ARCREC)	Metro Offices	N. Vignes Street	386214.89	3769095.39	0.10839	87.89	91.33	0	ANNUAL	ALL	5
	(ARCREC)-1	Residential	Mission Road	386788.16	3768599.79	0.03489	83.69	83.69	0	ANNUAL	ALL	5
	(ARCREC)-2	Residential	Mission Road	386771.84	3768542.02	0.0328	82.8	82.8	0	ANNUAL	ALL	5
	(ARCREC)-3	Residential	Mission Road	386747.98	3768474.21	0.03159	82.73	82.73	0	ANNUAL	ALL	5
	(ARCREC)-4	Residential	Mission Road	386735.42	3768434.02	0.03115	82.66	82.66	0	ANNUAL	ALL	5
	(ARCREC)-5	Northend Outside Union Station	Union Station Driveway	386020.88	3769115.91	0.10439	86.07	86.07	0	ANNUAL	ALL	5
	(ARCREC)-6	USPO Terminal Annex	Cesar E Chavez Ave.	386061.06	3769257.82	0.10247	86.48	86.48	0	ANNUAL	ALL	5
	(ARCREC)-7	Los Angeles Men's Central Jail	Vignes Street	386288.36	3769402.23	0.09161	88.72	88.72	0	ANNUAL	ALL	5
	(ARCREC)-8	Trimana Fresh Food Market	Union Station Driveway	386000.79	3769006.66	0.10165	86.17	86.17	0	ANNUAL	ALL	5
	(ARCREC)-9	William Mead Homes	Bolero Lane	386720.35	3769817.9	0.11379	86.86	86.86	0	ANNUAL	ALL	5
	(ARCREC)-10	William Mead Homes	Bolero Lane	386678.91	3769778.97	0.14349	87.27	87.27	0	ANNUAL	ALL	5
	(ARCREC)-11	William Mead Homes	Bolero Lane	386618.63	3769760.13	0.15714	88.18	88.18	0	ANNUAL	ALL	5
	(ARCREC)-12	Metropolitan Water	Union Station Driveway	385961.86	3768935.08	0.09547	86.28	86.28	0	ANNUAL	ALL	5

	Discrete Receptor ID (Group Name)	Sensitive Receptor	Street Location (Los Angeles)	X	Y	Concentration (AVERAGE CONC) [ug/m^3]	Elevation (ZELEV)	Hill Heights (ZHILL)	Flagpole (ZFLAG)	Averagin Period (AVE)	Source Group (GRP)	Num Years (NUM YRS)
2040 Build	ARC1 (ARCREC)	William Mead Homes	Bolero Lane	386554.29	3769752.53	0.26391	89.05	89.05	0	ANNUAL	ALL	5
	ARC2 (ARCREC)	Mozaic Apartments	Union Station Driveway	386040.13	3769154.79	0.1546	90.06	90.06	0	ANNUAL	ALL	5
	ARC3 (ARCREC)	K-12 School	Park Paseo St	386891.05	3768359.8	0.04578	82.03	82.03	0	ANNUAL	ALL	5
	ARC4 (ARCREC)	Twin Towers Correctional Facility	Bauchet Street	386341.41	3769277.46	0.11093	86.94	86.94	0	ANNUAL	ALL	5
	ARC5 (ARCREC)	Los Angeles Men's Central Jail	Bauchet Street	386283.86	3769482.56	0.1695	88.03	88.03	0	ANNUAL	ALL	5
	ARC6 (ARCREC)	One Sante Fe Apartments	Santa Fe Avenue	386304.23	3767912	0.0284	81.1	81.1	0	ANNUAL	ALL	5
	ARC7 (ARCREC)	Metro Offices	N. Vignes Street	386214.89	3769095.39	0.15431	87.89	91.33	0	ANNUAL	ALL	5
	(ARCREC)-1	Residential	Mission Road	386788.16	3768599.79	0.10289	83.69	83.69	0	ANNUAL	ALL	5
	(ARCREC)-2	Residential	Mission Road	386771.84	3768542.02	0.09439	82.8	82.8	0	ANNUAL	ALL	5
	(ARCREC)-3	Residential	Mission Road	386747.98	3768474.21	0.08279	82.73	82.73	0	ANNUAL	ALL	5
	(ARCREC)-4	Residential	Mission Road	386735.42	3768434.02	0.07525	82.66	82.66	0	ANNUAL	ALL	5
	(ARCREC)-5	Northend Outside Union Station	Union Station Driveway	386020.88	3769115.91	0.11843	86.07	86.07	0	ANNUAL	ALL	5
	(ARCREC)-6	USPO Terminal Annex	Cesar E Chavez Ave.	386061.06	3769257.82	0.11491	86.48	86.48	0	ANNUAL	ALL	5
	(ARCREC)-7	Los Angeles Men's Central Jail	Vignes Street	386288.36	3769402.23	0.13086	88.72	88.72	0	ANNUAL	ALL	5
	(ARCREC)-8	Trimana Fresh Food Market	Union Station Driveway	386000.79	3769006.66	0.11841	86.17	86.17	0	ANNUAL	ALL	5
	(ARCREC)-9	William Mead Homes	Bolero Lane	386720.35	3769817.9	0.19901	86.86	86.86	0	ANNUAL	ALL	5
	(ARCREC)-10	William Mead Homes	Bolero Lane	386678.91	3769778.97	0.27704	87.27	87.27	0	ANNUAL	ALL	5
	(ARCREC)-11	William Mead Homes	Bolero Lane	386618.63	3769760.13	0.31461	88.18	88.18	0	ANNUAL	ALL	5
	(ARCREC)-12	Metropolitan Water	Union Station Driveway	385961.86	3768935.08	0.11533	86.28	86.28	0	ANNUAL	ALL	5

PROJECT TITLE:

METRO LINKUS DPM Isopleth Concentrations
PM10 (Assume DPM) in ug/L



COMMENTS:

Operations
2016 Baseline
Un-Mitigated
Annual Averages

SOURCES:

35

RECEPTORS:

1519

OUTPUT TYPE:

Concentration

MAX:

3.72 ug/m^3

COMPANY NAME:

MODELER:

DATE:

12/7/2018

SCALE: 1:18,495

0 — 0.5 km

PROJECT NO.:

HDR-LINKUSrev2

AERMOD View - Lakes Environmental Software

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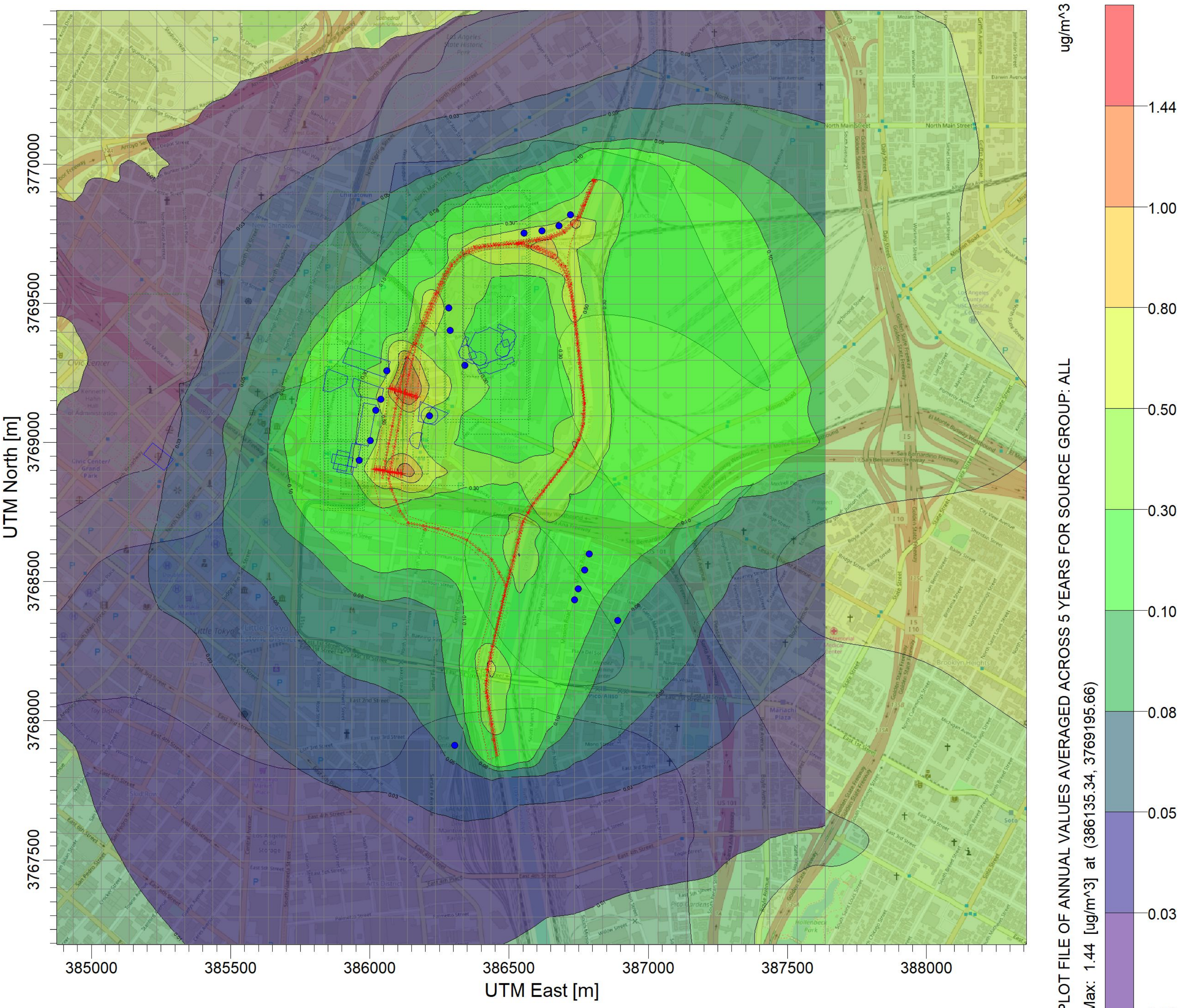
PROJECT TITLE:

METRO LINKUS DPM Isopleth Concentrations
PM10 (Assume DPM) in ug/L



COMMENTS:

Operations Unmitigated
2026 No-Build
Annual Averages

SOURCES:

35

RECEPTORS:

1519

OUTPUT TYPE:

Concentration

MAX:

1.44 ug/m^3

COMPANY NAME:

ZMassociates Environmental Corp.

MODELER:

Thomas Miller

DATE:

12/7/2018

SCALE: 1:19,470

0 0.5 km

PROJECT NO.:

HDR-LINKUS

AERMOD View - Lakes Environmental Software

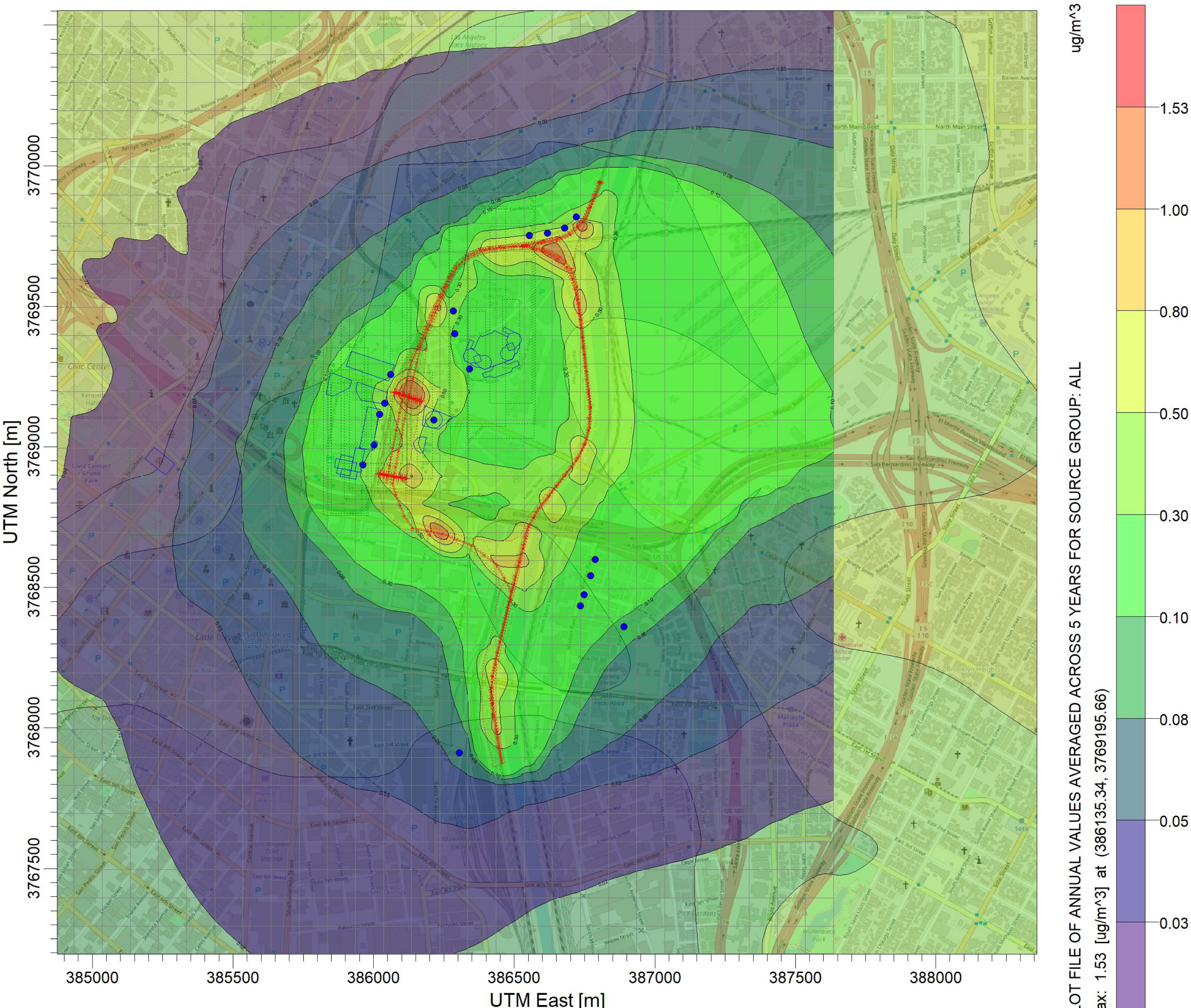
C:\Lakes\LINKUSrev2_Operations_Unmit_2026nobuild\LINKUSrev2_Operations_Unmit_2026nobuild.isc

PROJECT TITLE:

METRO LINKUS DPM Isopleth Concentrations
PM10 (Assume DPM) in ug/L

COMMENTS:

Operations Unmitigated
2026 Build
Annual Averages



SOURCES:

35

RECEPTORS:

1519

OUTPUT TYPE:

Concentration

MAX:

1.53 ug/m^3

COMPANY NAME:

ZMassociates Environmental Corp.

MODELER:

Thomas Miller

DATE:

12/7/2018

SCALE: 1:19,470

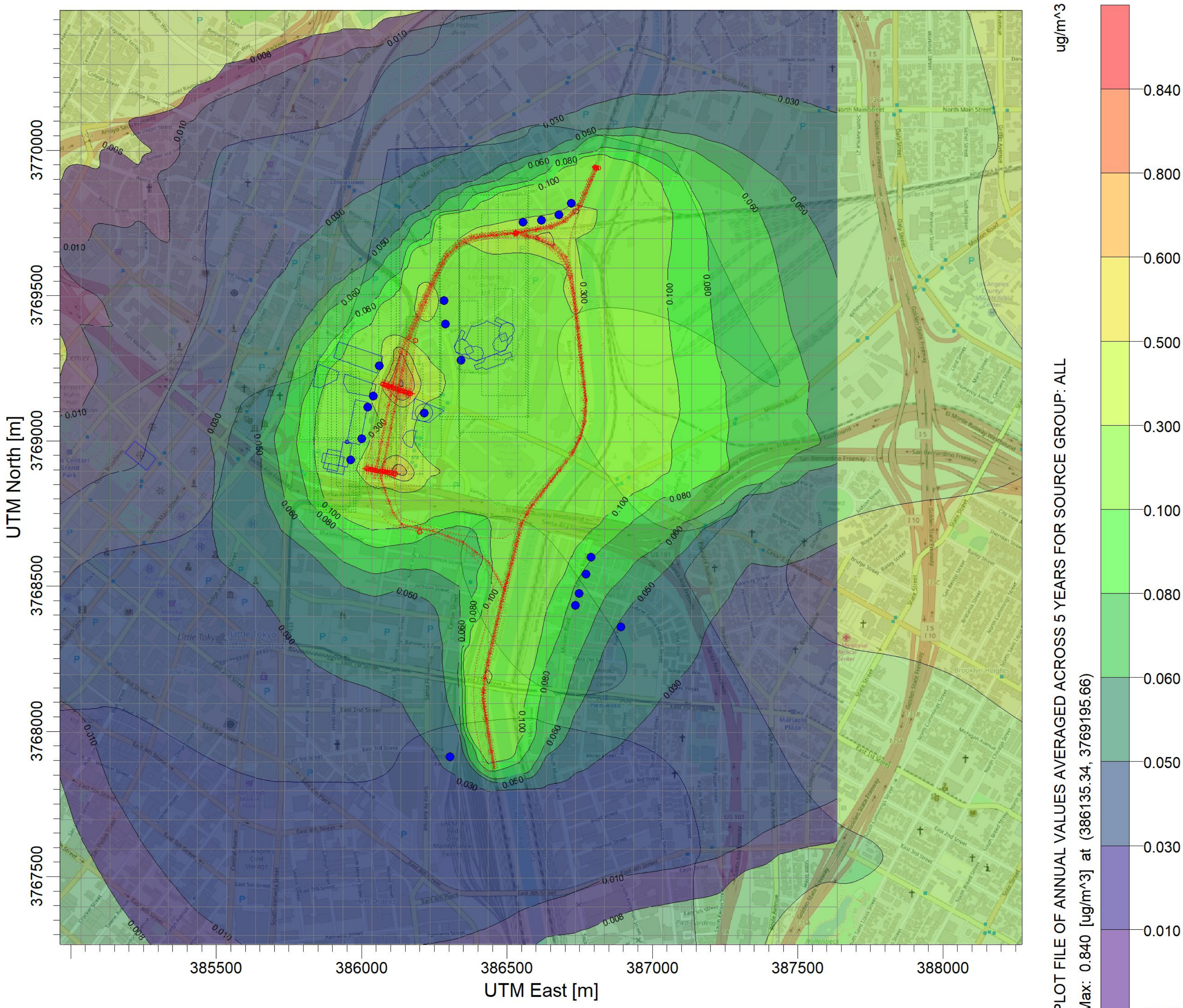
0 0.5 km

PROJECT NO.:

HDR-LINKUS

PROJECT TITLE:

METRO LINKUS DPM Isopleth Concentrations
PM10 (Assume DPM) in ug/L



COMMENTS:

Operations
2031 No Build
Un-Mitigated
Annual Averages

SOURCES:

35

RECEPTORS:

1519

OUTPUT TYPE:

Concentration

MAX:

0.840 ug/m^3

COMPANY NAME:

MODELER:

DATE:

12/7/2018

SCALE: 1:18,653

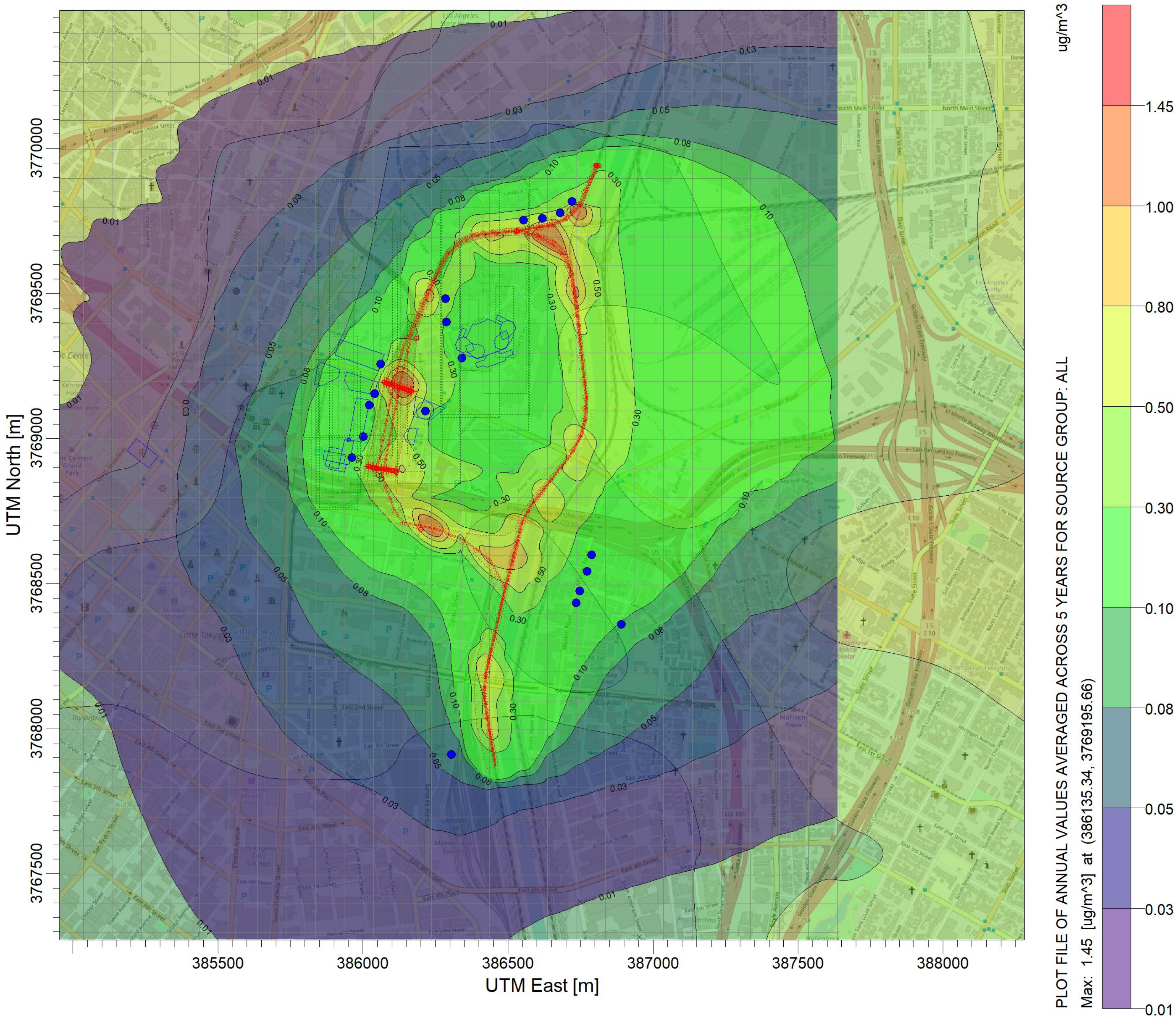
0 0.5 km

PROJECT NO.:

HDR-LINKUSrev2

PROJECT TITLE:

METRO LINKUS DPM Isopleth Concentrations
PM10 (Assume DPM) in ug/L



COMMENTS:

Operations
2031 Build
Un-Mitigated
Annual Averages

SOURCES:

35

RECEPTORS:

1519

OUTPUT TYPE:

Concentration

MAX:

1.45 ug/m^3

COMPANY NAME:

MODELER:

DATE:

12/8/2018

SCALE: 1:18,587

0 0.5 km

PROJECT NO.:

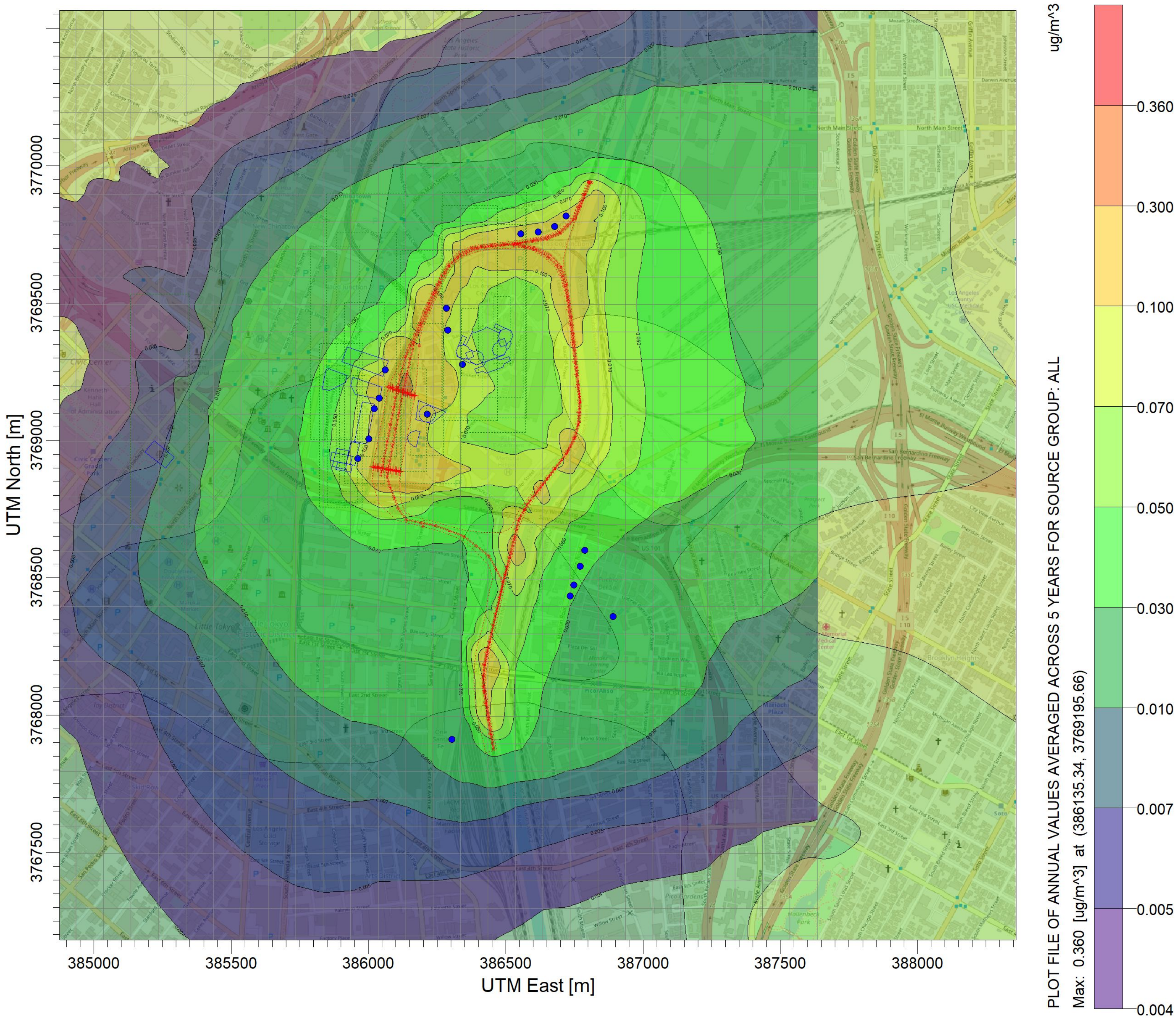
HDR-LINKUSrev2

AERMOD View - Lakes Environmental Software

C:\Lakes\LINKUSrev2_Operations_Unmit_2031Build\LINKUSrev2_Operations_Unmit_2031Build.isc

PROJECT TITLE:

METRO LINKUS DPM Isopleth Concentrations
PM10 (Assume DPM) in ug/L



COMMENTS:

Operations Unmitigated
2040 No Build
Annual Averages

SOURCES:

35

RECEPTORS:

1519

OUTPUT TYPE:

Concentration

MAX:

0.360 ug/m^3

COMPANY NAME:

ZMassociates Environmental Corp.

MODELER:

Thomas Miller

DATE:

12/8/2018

SCALE: 1:19,636

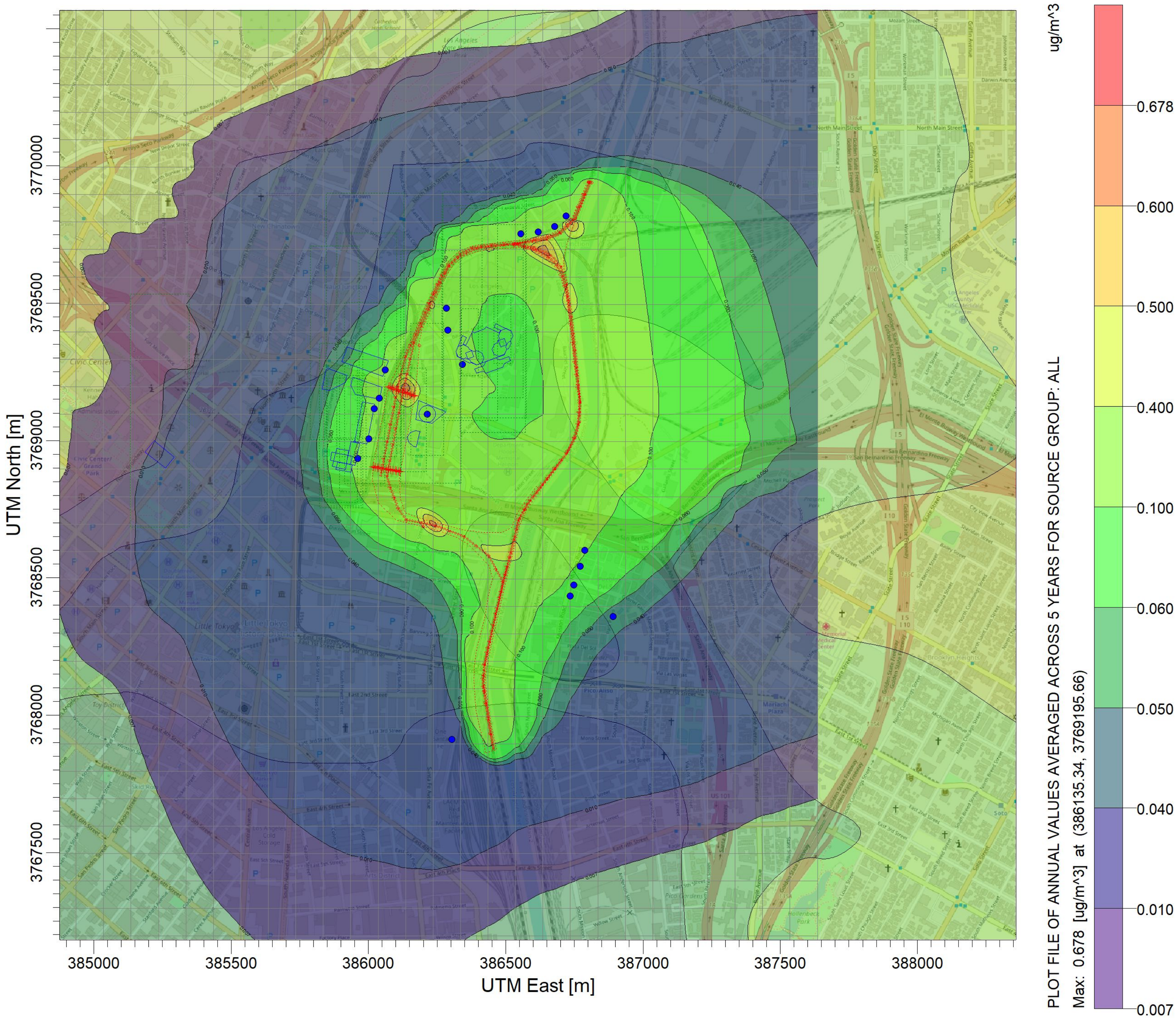
0 — 0.5 km

PROJECT NO.:

HDR-LINKUS

PROJECT TITLE:

METRO LINKUS DPM Isopleth Concentrations
PM10 (Assume DPM) in ug/L



COMMENTS:

Operations Unmitigated
2040 Build
Annual Averages

SOURCES:

35

RECEPTORS:

1519

OUTPUT TYPE:

Concentration

MAX:

0.678 ug/m^3

COMPANY NAME:

ZMassociates Environmental Corp.

MODELER:

Thomas Miller

DATE:

12/8/2018

SCALE: 1:19,636

0 0.5 km

PROJECT NO.:

HDR-LINKUS

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Appendix F:
Carbon Monoxide Hot-Spot Analysis

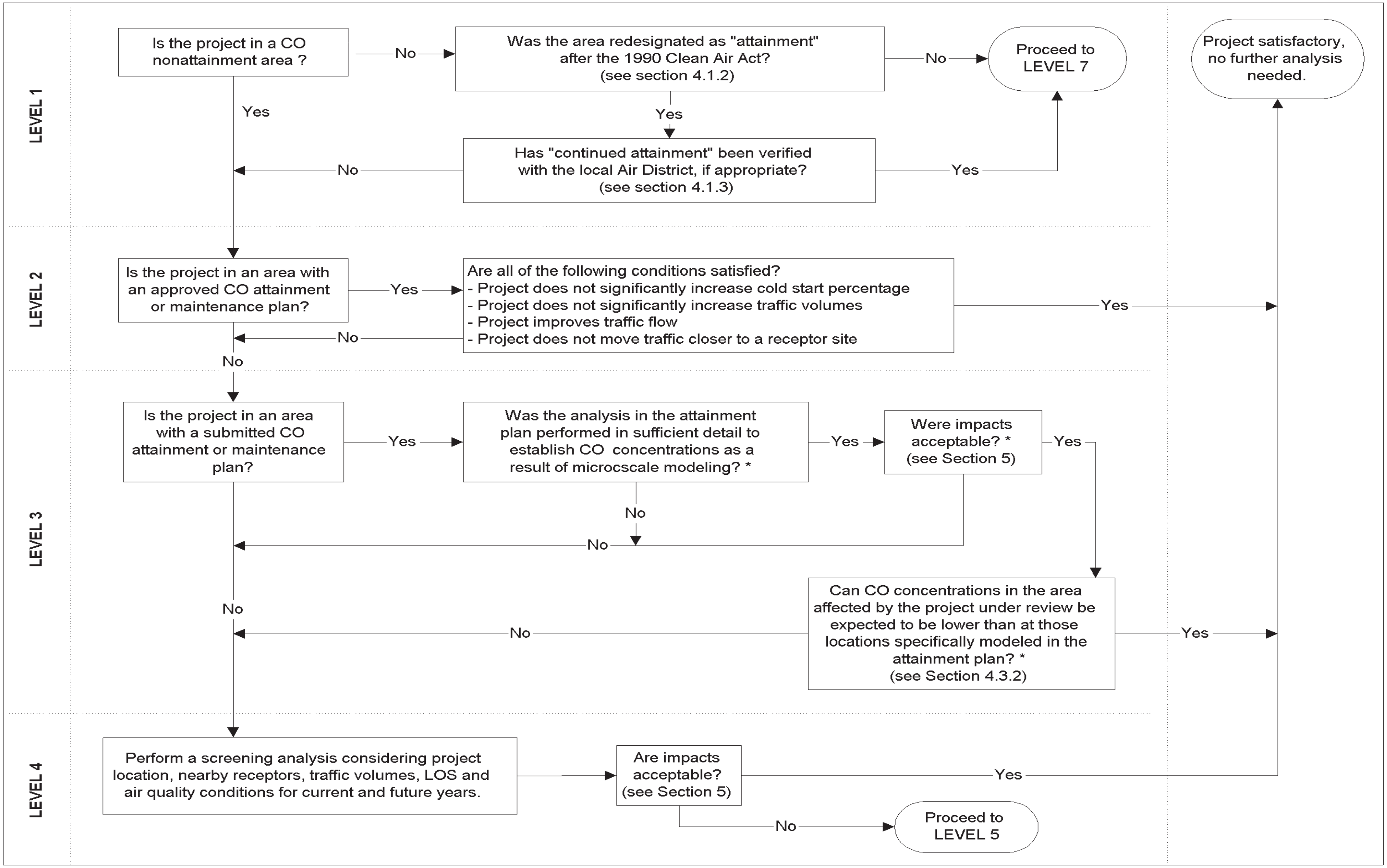

Figure 3. Local CO Analysis

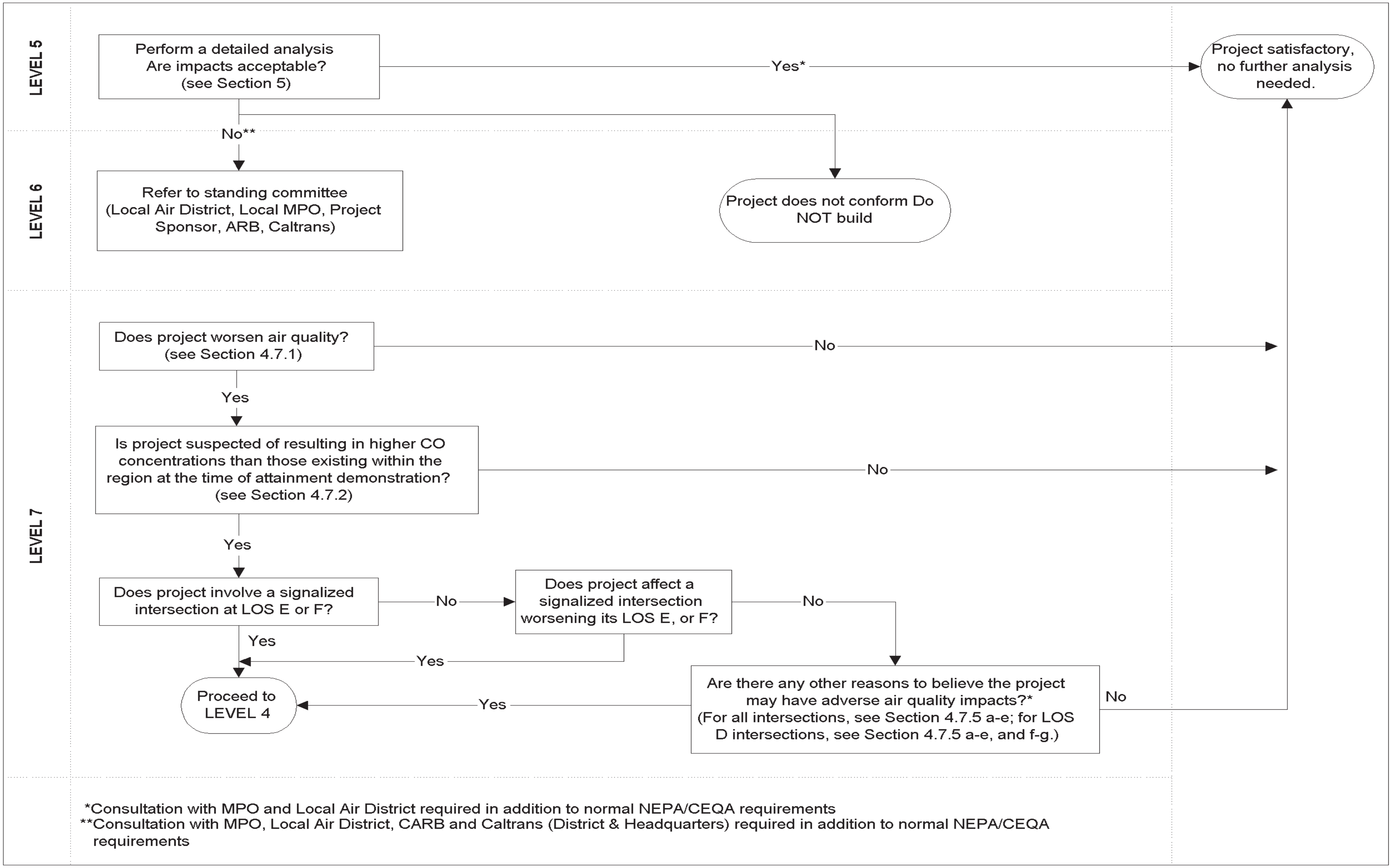

Figure 3 (cont.). Local CO Analysis

Figure 7-2. Year 2031 No Build Peak Hour Traffic Volumes

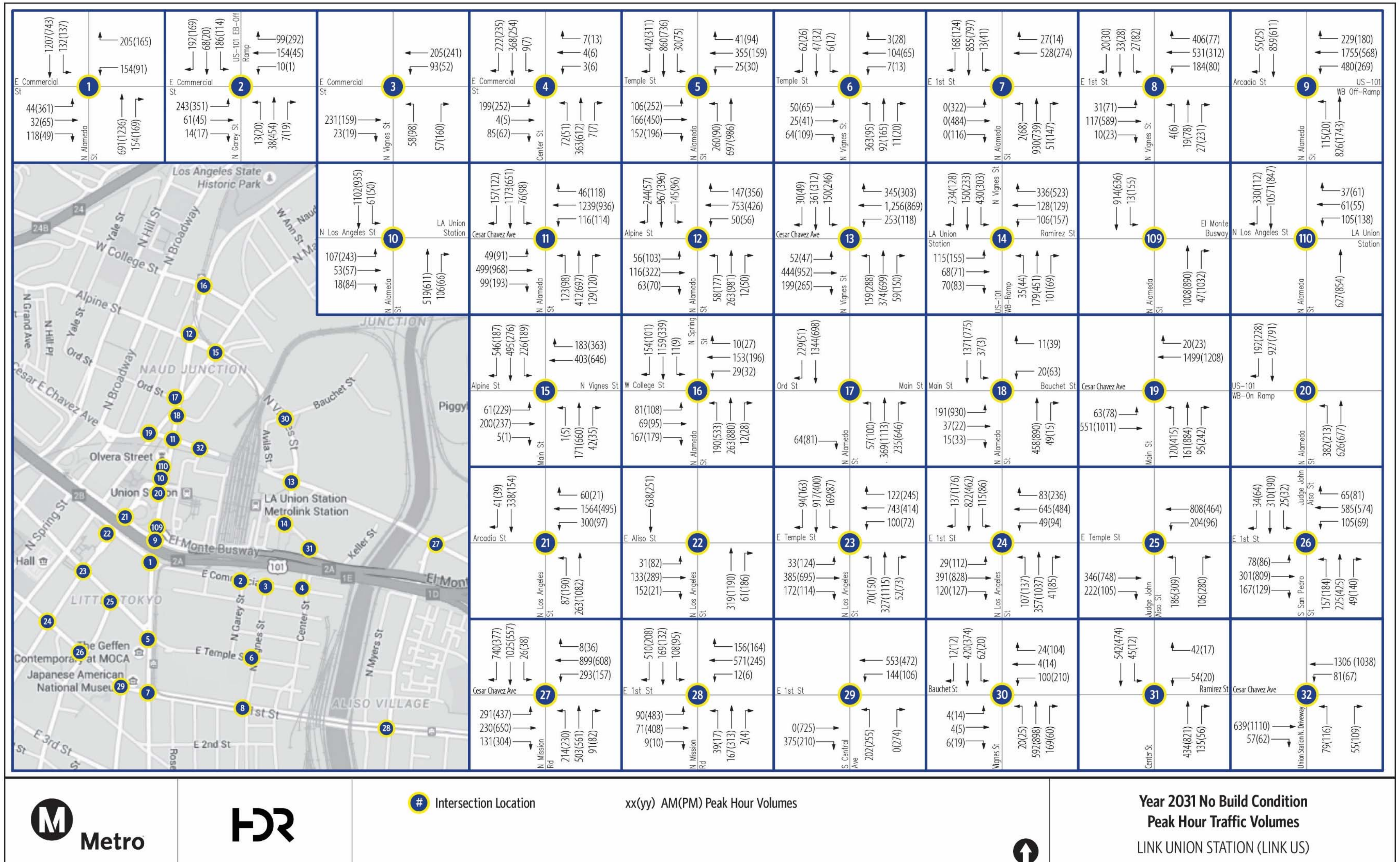

Figure 7-3. Year 2040 No Build Peak Hour Traffic Volumes

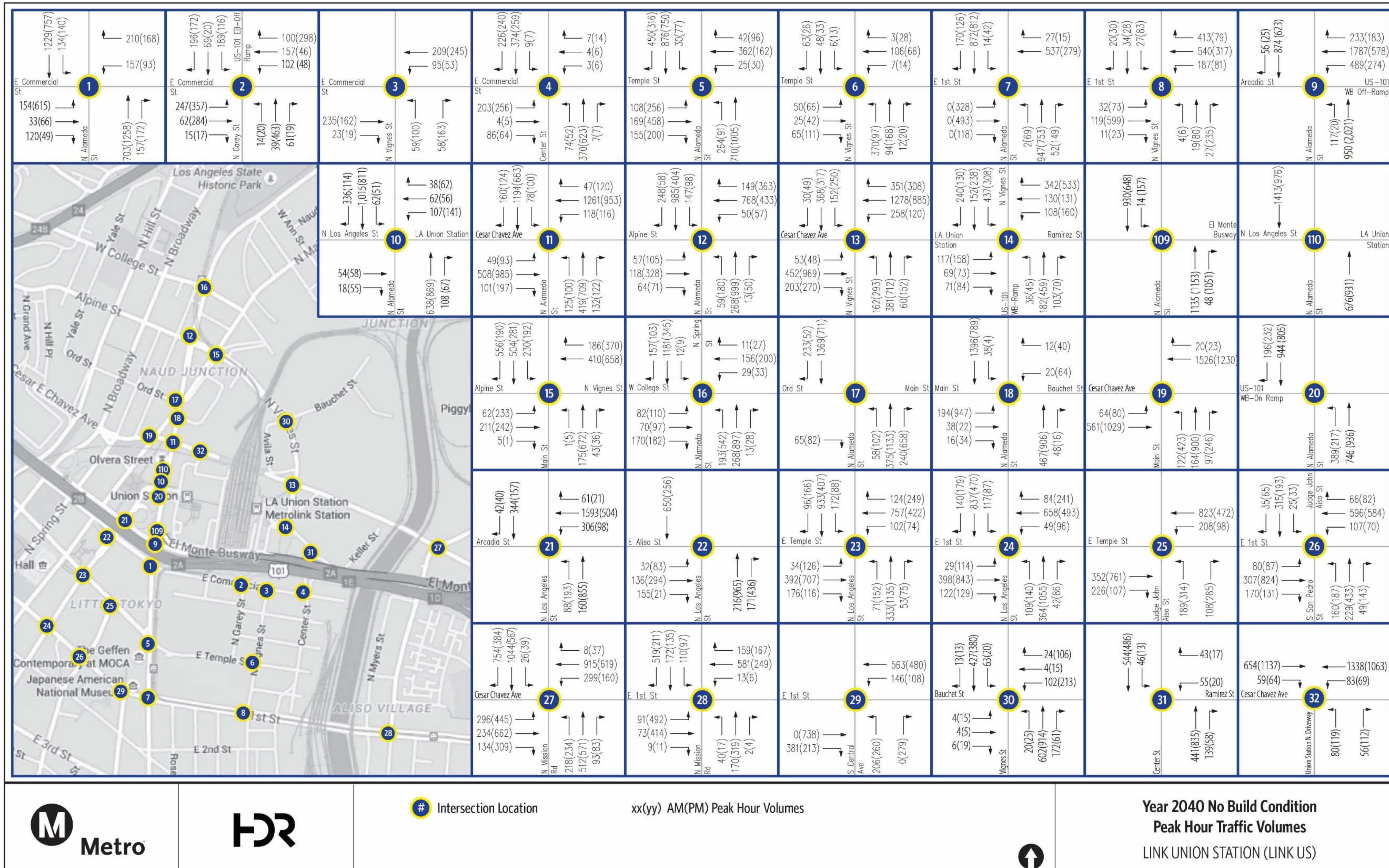

Figure 7-30. Year 2031 plus Project - Peak Hour Traffic Volumes

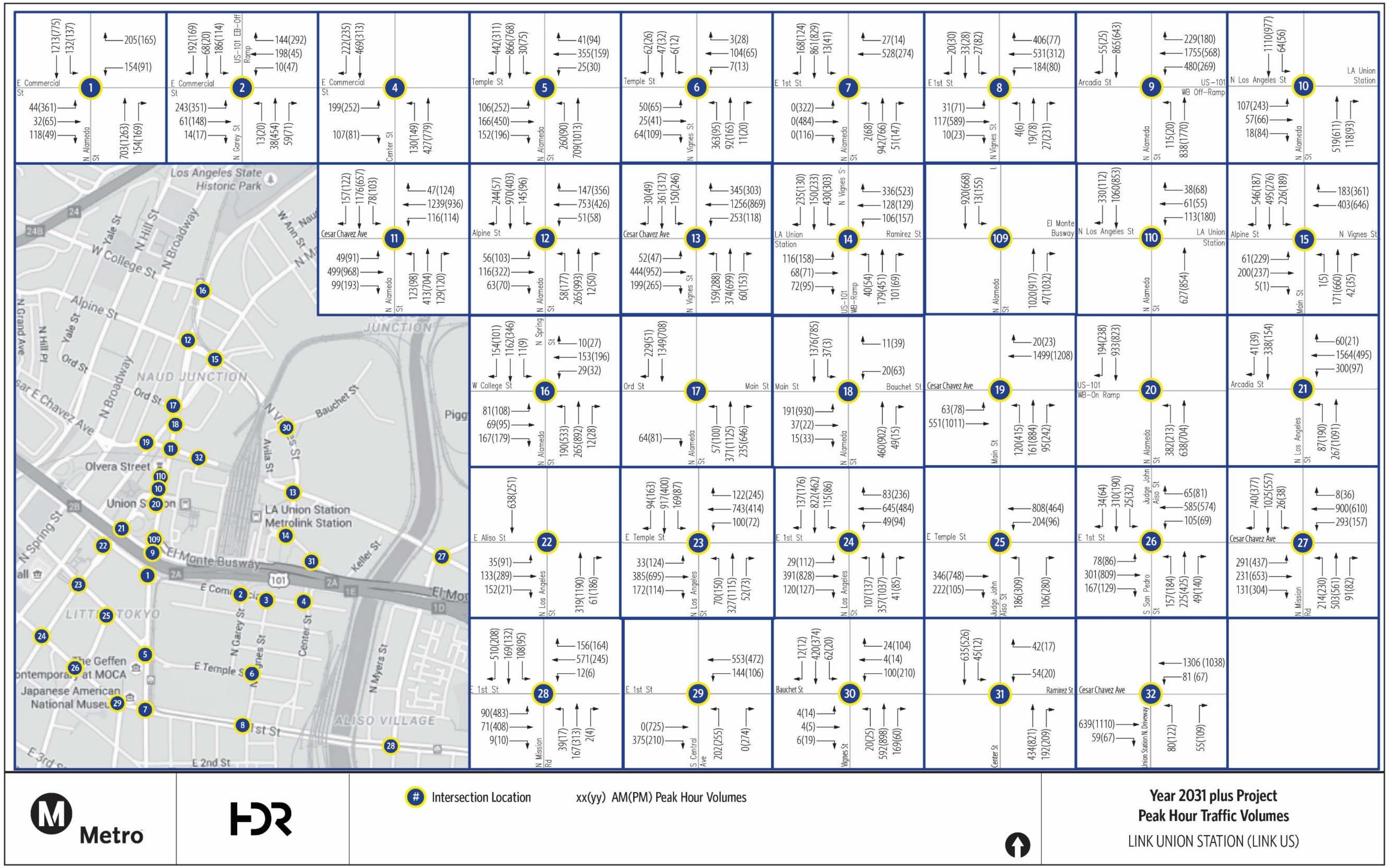

Figure 7-31. Year 2040 plus Project - Peak Hour Traffic Volumes

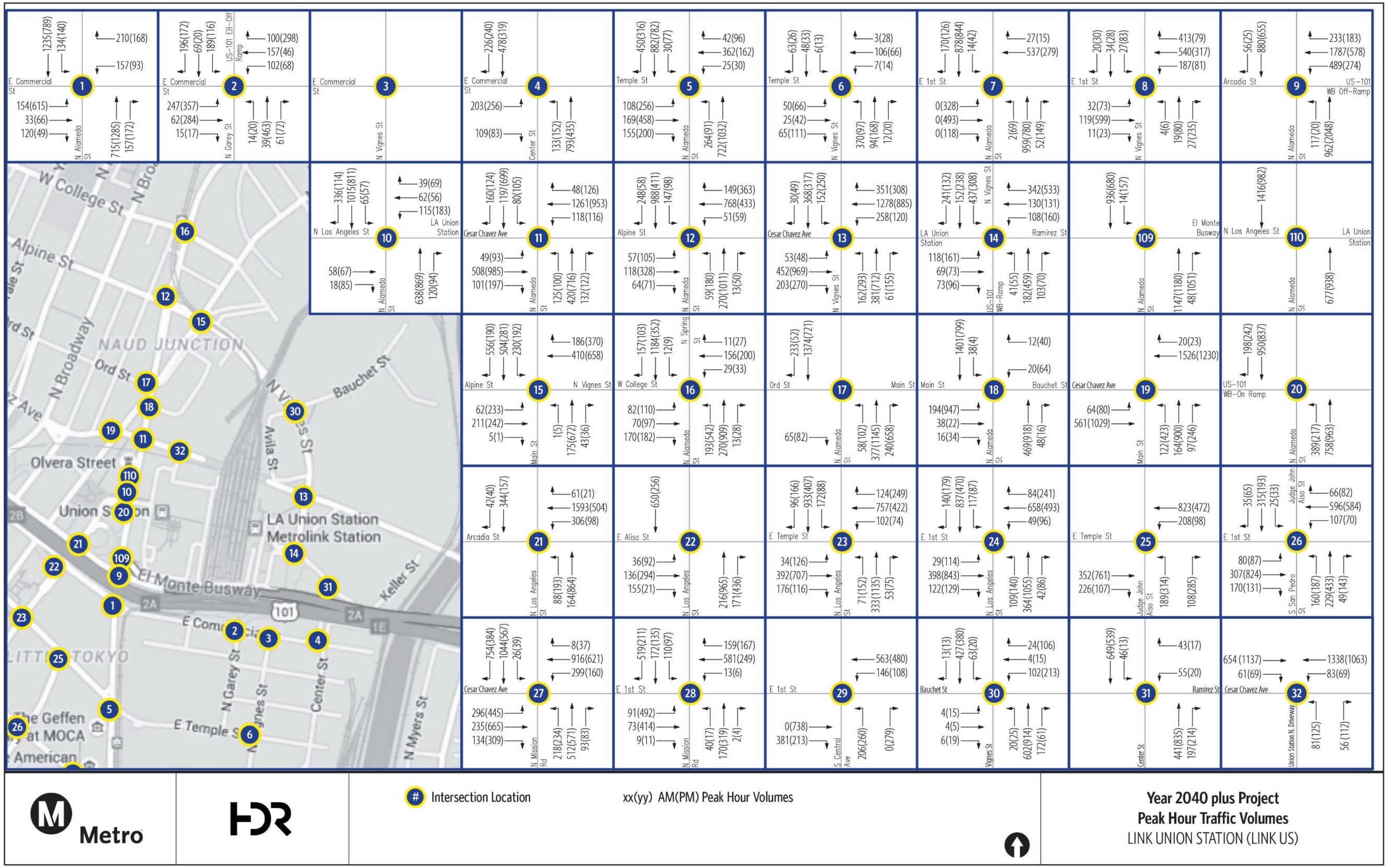

Table 12-1. Level of Service Summary

Intersection	Intersection	Year 2031 No Build						Year 2031 with Project						Year 2040 No Build						Year 2040 with Project					
		AM Peak			PM Peak			AM Peak			PM Peak			AM Peak			PM Peak			AM Peak			PM Peak		
		Delay (Sec)	V/C	LOS	Delay (Sec)	V/C	LOS	Delay (Sec)	V/C	LOS	Delay (Sec)	V/C	LOS	Delay (Sec)	V/C	LOS	Delay (Sec)	V/C	LOS	Delay (Sec)	V/C	LOS	Delay (Sec)	V/C	LOS
1	Alameda Street and Commercial Street	29.1	0.57	C	35.1	0.86	D	29.5	0.58	C	35.4	0.87	D	31.6	0.62	C	47.8	0.98	D	32.0	0.63	C	49.2	0.99	D
2	Garey Street and Commercial Street	31.3	0.39	C	34.1	0.49	C	62.9	0.63	**E**	62.9	0.73	**E**	31.3	0.39	C	34.6	0.49	C	55.5	0.65	**E**	42.3	0.73	D
3	Vignes Street and Commercial Street [a]	9.8	0.39	A	10.1	0.40	B	NA	NA	NA	NA	NA	NA	9.8	0.39	A	10.2	0.41	B	NA	NA	NA	NA	NA	NA
4	Center Street and Commercial Street [a]	17.2	0.71	C	57.5	1.18	**F**	83.0	1.27	**F**	157.4	1.62	**F**	18.0	0.73	C	62.5	1.22	**F**	90.7	1.3	**F**	166.5	1.65	**F**
5	Alameda Street and Temple Street	14.6	0.67	B	16.7	0.74	B	14.7	0.68	B	15.8	0.75	B	16.3	0.69	B	16.9	0.75	B	16.3	0.69	B	16.9	0.77	B
6	Vignes Street and Temple Street [a]	15.4	0.72	C	9.9	0.42	A	15.4	0.72	C	9.9	0.42	A	15.9	0.73	C	10	0.43	A	15.9	0.73	C	10	0.43	A
7	Alameda Street and First Street	18.3	0.54	B	17.3	0.61	B	18.3	0.55	B	17.9	0.63	B	18.5	0.55	B	16.2	0.63	B	18.5	0.56	B	16.2	0.64	B
8	Vignes Street and First Street	20.2	0.51	C	27.6	0.59	C	20.2	0.51	C	27.5	0.59	C	21.1	0.51	C	26.9	0.59	C	21.1	0.51	C	26.6	0.59	C
9	Alameda Street and El Monte Busway/Arcadia Street	21.1	0.88	C	14.6	0.62	B	21.2	0.88	C	14.5	0.62	B	90.3	0.89	**F**	15.7	0.69	B	90.0	0.90	**F**	15.6	0.69	B
10	Alameda Street and Los Angeles Street EB [a]	12.1	0.32	B	12.4	0.34	B	11.7	0.33	B	12.6	0.35	B	28.0	0.65	C	15.5	0.59	B	28.1	0.66	C	14.2	0.62	B
110	Alameda Street and Los Angeles Street WB [a]	4.3	0.34	A	5.7	0.30	A	4.4	0.34	A	7.0	0.33	A	0.1	0.45	A	0.2	0.31	A	0.1	0.45	A	0.2	0.32	A
11	Alameda Street and Cesar Chavez Avenue	20.7	0.77	C	17.1	0.69	B	20.9	0.77	C	16.9	0.69	B	29.7	0.87	C	21.1	0.75	C	29.7	0.87	C	21.2	0.75	C
12	Alameda Street and Vignes Street/Alpine Street	11.6	0.58	B	13.8	0.62	B	13.7	0.58	B	18.1	0.62	B	12.5	0.59	B	14.4	0.63	B	12.5	0.59	B	14.5	0.63	B
13	Vignes Street and Cesar Chavez Avenue	18.5	0.78	B	25.1	0.86	C	19.9	0.78	B	25.9	0.86	C	18.1	0.79	B	21	0.88	C	18.1	0.79	B	21.1	0.88	C
14	Vignes Street and Ramirez Street	23.3	0.43	C	24.5	0.53	C	23.4	0.43	C	24.8	0.54	C	23.3	0.43	C	26	0.54	C	23.3	0.43	C	25.9	0.55	C
15	Vignes Street and Main Street	27.2	0.59	C	74.6	1.01	**E**	17.6	0.60	B	50.7	0.99	D	18.8	0.6	B	62.8	1.04	**E**	18.8	0.6	B	63.8	1.07	**E**
16	Alameda Street/Spring Street and College Street	16.5	0.61	B	17.7	0.71	B	16.5	0.62	B	17.9	0.71	B	16.8	0.63	B	16.8	0.73	B	16.8	0.63	B	17.1	0.73	B
17	Alameda Street and Main Street/Ord Street [a]	0.7	0.34	A	0.7	0.41	A	0.7	0.34	A	0.7	0.41	A	0.7	0.35	A	0.7	0.42	A	0.7	0.35	A	0.7	0.42	A
18	Alameda Street and Main Street/Bauchet Street	5.8	0.42	A	9.6	0.57	A	5.7	0.42	A	9.8	0.58	A	5.3	0.42	A	14	0.6	B	5.3	0.42	A	14.3	0.6	B
19	Main Street and Cesar Chavez Avenue	7.7	0.44	A	19.8	0.64	B	7.7	0.44	A	19.8	0.64	B	7.1	0.45	A	19.6	0.67	B	7.1	0.45	A	19.4	0.67	B
20	Alameda Street and Northbound US-101 [b]																								
21	Los Angeles Street and Arcadia Street	7.7	0.59	A	4.8	0.52	A	7.8	0.59	A	5.1	0.52	A	8.9	0.62	A	5.9	0.44	A	9.0	0.62	A	6.0	0.44	A
22	Los Angeles Street and Aliso Street	9.4	0.30	A	11.8	0.61	B	9.5	0.30	A	11.7	0.62	B	10.1	0.3	B	12.1	0.64	B	10.2	0.3	B	12.2	0.64	B
23	Los Angeles Street and Temple Street	15.2	0.61	B	17.6	0.78	B	15.2	0.61	B	17.6	0.78	B	15.1	0.62	B	18	0.82	B	15.1	0.62	B	18	0.82	B
24	Los Angeles Street and First Street	15.2	0.55	B	20.7	0.90	C	15.2	0.55	B	20.7	0.90	C	14.1	0.56	B	21.9	0.97	C	14.1	0.56	B	21.9	0.97	C
25	Judge John Aiso Street and Temple Street	8.3	0.40	A	8.0	0.43	A	8.2	0.40	A	7.7	0.43	A	7.8	0.41	A	8.2	0.44	A	7.8	0.41	A	8.1	0.44	A
26	Judge John Aiso Street/San Pedro Street and First Street	15.6	0.44	B	15.3	0.66	B	15.6	0.44	B	15.3	0.66	B	16.1	0.45	B	15.4	0.67	B	16.1	0.45	B	15.3	0.67	B
27	Mission Road and Cesar Chavez Avenue	58.0	1.11	**E**	25.6	0.89	C	58.1	1.11	**E**	25.7	0.89	C	59.7	1.21	**E**	26.6	0.92	C	59.7	1.21	**E**	26.6	0.92	C
28	Mission Road and First Street	25.8	0.81	C	33.2	0.89	C	25.8	0.81	C	33.2	0.89	C	26.9	0.83	C	36.9	0.93	D	26.9	0.83	C	36.9	0.93	D
29	Central Avenue and First Street	8.8	0.33	A	11.3	0.49	B	8.8	0.33	A	11.3	0.49	B	9.1	0.33	A	11.4	0.5	B	9.1	0.33	A	11.3	0.5	B

Table 12-1. Level of Service Summary

Intersection	Intersection	Year 2031 No Build						Year 2031 with Project						Year 2040 No Build						Year 2040 with Project					
		AM Peak			PM Peak			AM Peak			PM Peak			AM Peak			PM Peak			AM Peak			PM Peak		
		Delay (Sec)	V/C	LOS	Delay (Sec)	V/C	LOS	Delay (Sec)	V/C	LOS	Delay (Sec)	V/C	LOS	Delay (Sec)	V/C	LOS	Delay (Sec)	V/C	LOS	Delay (Sec)	V/C	LOS	Delay (Sec)	V/C	LOS
30	Vignes Street and Bauchet Street	11.4	0.29	B	20.0	0.49	B	11.1	0.29	B	20.0	0.49	B	11.8	0.29	B	20.9	0.5	C	11.9	0.29	B	20.5	0.5	C
31	Ramirez Street and Center Street	1.7	0.24	A	0.6	0.35	A	1.7	0.2	A	0.6	0.35	A	1.8	0.21	A	0.7	0.36	A	1.7	0.28	A	0.7	0.37	A
32	Union Station North Driveway and Cesar Chavez Avenue	13.6	0.54	B	14.0	0.51	B	13.6	0.54	B	14.0	0.51	B	13.0	0.54	B	14.1	0.52	B	13.0	0.54	B	14.1	0.53	B

Notes:
[a] Non-signalized intersection
[b] Freeway on-ramp, neither signalized nor STOP-sign controlled
LOS = level of service; Sec = Seconds; V/C = Volume to Capacity; WB = Westbound; EB = Eastbound; NA = Not Applicable

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