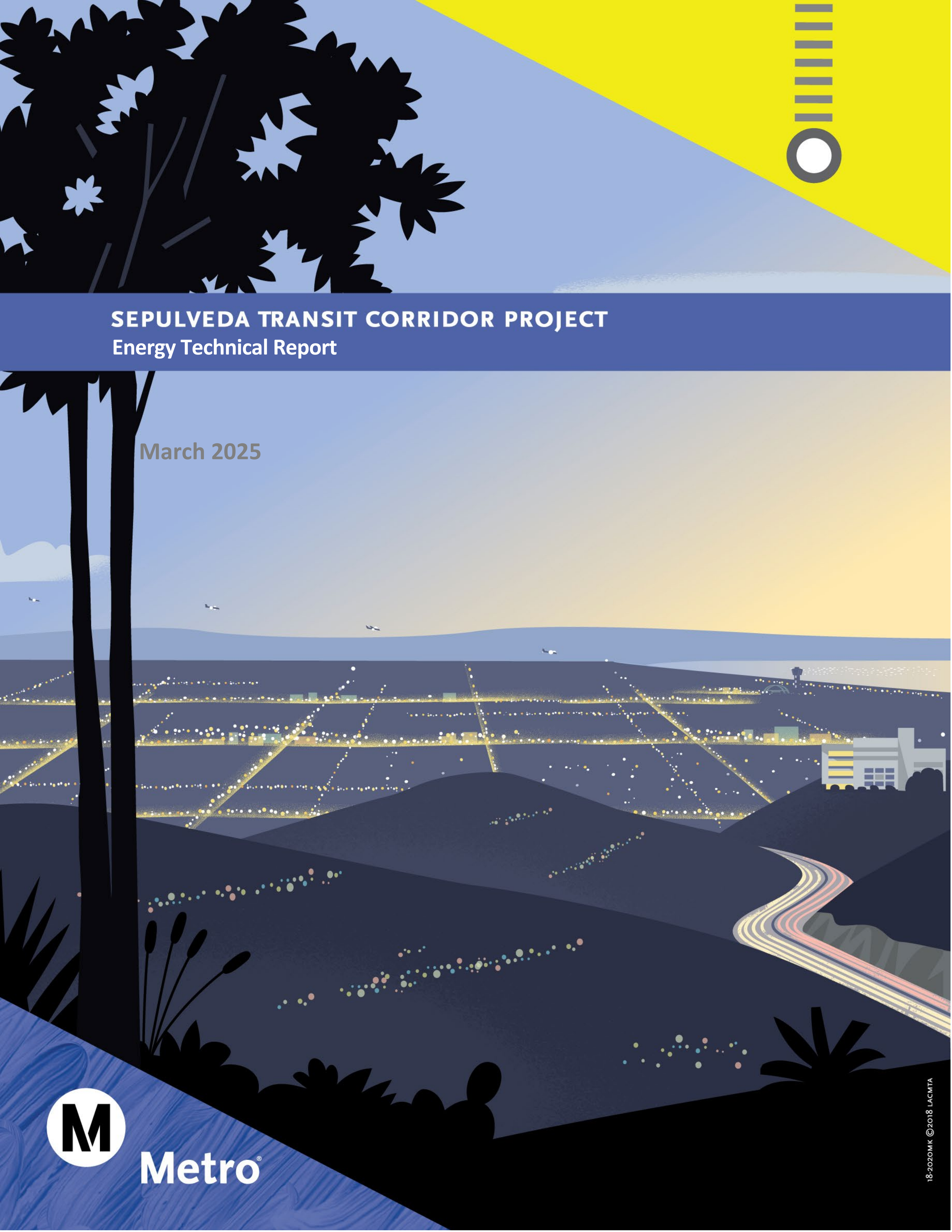
Appendix J. Energy Technical Report

SEPULVEDA TRANSIT CORRIDOR PROJECT
Energy Technical Report

March 2025



Metro

SEPULVEDA TRANSIT CORRIDOR PROJECT

Contract No. AE67085000

Energy Technical Report

Task 5.24.11

Prepared for:

Metro

Los Angeles County
Metropolitan Transportation Authority

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Abbreviations and Acronyms

AB	Assembly Bill
ABC	Accelerated Bridge Construction
APM	automated people mover
BEA	United States Bureau of Economic Analysis
BRT	bus rapid transit
BTS	Bureau of Transportation Statistics
Btu	British thermal units
CAFE	Corporate Average Fuel Economy
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CALGreen	California Green Building Standards Code
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCR	California Code of Regulations
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CIDH	cast-in-drilled-hole
DCP	City of Los Angeles Department of City Planning
DGE	diesel gallon equivalent
DPM	diesel particulate matter
ECMP	Energy Conservation and Management Plan
EIA	United States Energy Information Administration
EIR	Environmental Impact Report
EMAP	Energy Management Action Plan
EMFAC	California Air Resources Board EMission FACtors Model
EO	Executive Order
FTIP	Federal Transportation Improvement Program
gal_D/hp-hr	gallons diesel per horsepower-hour
GCP	Green Construction Policy
GWh	gigawatt-hour(s)
hp	horsepower
HRT	heavy rail transit
HTA	HTA Partners
I-10	Interstate 10

I-405	Interstate 405
IEPR	Integrated Energy Policy Report
kBtu	thousand British thermal units
LA100	Los Angeles 100 percent Renewable Energy Study
LA County Public Works	Los Angeles County Department of Public Works
LADWP	City of Los Angeles Department of Water and Power
LAMC	City of Los Angeles Municipal Code
LASRE	LA SkyRail Express
LAX	Los Angeles International Airport
LCFS	Low Carbon Fuel Standard
LEED	Leadership in Energy and Environmental Design
LF	load factor
LOSSAN	Los Angeles-San Diego-San Luis Obispo
LRT	light rail transit
LRTP	Long-Range Transportation Plan
MAP-21	Moving Ahead for Progress in the 21st Century Act
MBSSP	Moving Beyond Sustainability Strategic Plan
Metro	Los Angeles County Metropolitan Transportation Authority
MJ	megajoules
MMBtu	million British thermal units
MOW	maintenance-of-way
MRDC	Metro Rail Design Criteria
MRT	monorail transit
MSF	maintenance and storage facility
MW	megawatt
MWh	megawatt-hours
NOP	Notice of Preparation
NREL	National Renewable Energy Laboratory
OPR	Governor's Office of Planning and Research
Project	Sepulveda Transit Corridor Project
PV	photovoltaic
RPS	Renewable Portfolio Standard
RTP	Regional Transportation Plan
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SB	Senate Bill
SCAG	Southern California Association of Governments

scf	standard cubic feet
SCORE	Southern California Optimized Rail Expansion
SCS	Sustainable Communities Strategy
STCP	Sepulveda Transit Corridor Partners
TBM	tunnel boring machine
TPSS	traction power substation
UCLA	University of California, Los Angeles
US-101	U.S. Highway 101
VA	U.S. Department of Veterans Affairs
Valley	San Fernando Valley
VMT	vehicle miles traveled
VRM	vehicle revenue mile
Westside	Westside of Los Angeles
Wh	watt-hours
ZEV	zero-emission vehicle

1 INTRODUCTION

1.1 Project Background

The Sepulveda Transit Corridor Project (Project) is intended to provide a high-capacity rail transit alternative to serve the large and growing travel market and transit needs currently channeled through the Sepulveda Pass and nearby canyon roads between the San Fernando Valley (Valley) and the Westside of Los Angeles. The Project would have a northern terminus with a connection to the Van Nuys Metrolink/Amtrak Station and a southern terminus with a connection to the Los Angeles County Metropolitan Transportation Authority's (Metro) E Line. In addition to providing local and regional connections to the existing and future Metro rail and bus network, the Project is anticipated to improve access to major employment, educational, and cultural centers in the greater Los Angeles area.

In 2019, Metro completed the Sepulveda Transit Corridor Feasibility Study and released the Project's *Final Feasibility Report* (Metro, 2019a), which documented the transportation conditions and travel patterns in the Sepulveda corridor; identified mobility problems affecting travel between the Valley and the Westside; and defined the Purpose and Need, goals, and objectives of the Project. Using an iterative evaluation process, the Feasibility Study identified feasible transit solutions that met the Purpose and Need, goals, and objectives of the Project. The Feasibility Study determined that a reliable, high-capacity, fixed guideway transit system connecting the Valley to the Westside could be constructed along several different alignments. Such a transit system, operated as either heavy rail transit (HRT) or monorail transit (MRT), would serve the major travel markets in the Sepulveda Transit Corridor and would provide travel times competitive with the automobile.

1.2 Project Alternatives

In November 2021, Metro released a Notice of Preparation (NOP) of an Environmental Impact Report (EIR) pursuant to the California Environmental Quality Act, for the Project that included six alternatives (Metro, 2021). Alternatives 1 through 5 included a southern terminus station at the Metro E Line Expo/Sepulveda Station, and Alternative 6 included a southern terminus station at the Metro E Line Expo/Bundy Station. The alternatives were described in the NOP as follows:

- Alternative 1: Monorail with aerial alignment in the Interstate 405 (I-405) corridor and an electric bus connection to the University of California, Los Angeles (UCLA)
- Alternative 2: Monorail with aerial alignment in the I-405 corridor and an aerial automated people mover connection to UCLA
- Alternative 3: Monorail with aerial alignment in the I-405 corridor and underground alignment between the Getty Center and Wilshire Boulevard
- Alternative 4: Heavy rail with underground alignment south of Ventura Boulevard and aerial alignment generally along Sepulveda Boulevard in the San Fernando Valley
- Alternative 5: Heavy rail with underground alignment including along Sepulveda Boulevard in the San Fernando Valley
- Alternative 6: Heavy rail with underground alignment including along Van Nuys Boulevard in the San Fernando Valley and a southern terminus station on Bundy Drive

The NOP also stated that Metro is considering a No Project Alternative that would not include constructing a fixed guideway line. Metro established a public comment period of 74 days, extending from November 30, 2021, through February 11, 2022. Following the public comment period, refinements to the alternatives were made to address comments received. Further refinements to optimize the designs and address technical challenges of the alternatives were made in 2023 following two rounds of community open houses.

In July 2024, following community meetings held in May 2024, Alternative 2 was removed from further consideration in the environmental process because it did not provide advantages over the other alternatives, and the remaining alternatives represent a sufficient range of alternatives for environmental review, inclusive of modes and routes (Metro, 2024a). Detailed descriptions of the No Project Alternative and the five remaining "build" alternatives are presented in Sections 5 through 10.

1.3 Project Study Area

Figure 1-1 shows the Project Study Area. It generally includes Transportation Analysis Zones from Metro's travel demand model that are within 1 mile of the alignments of the four "Valley-Westside" alternatives from the *Sepulveda Transit Corridor Project Final Feasibility Report* (Metro, 2019a). The Project Study Area represents the area in which the transit concepts and ancillary facilities are expected to be located. The analysis of potential impacts encompasses all areas that could potentially be affected by the Project, and the EIR will disclose all potential impacts related to the Project.

1.4 Purpose of this Report and Structure

This technical report examines the environmental impacts of the Project as it relates to energy. It describes existing energy conditions in the Project Study Area, the regulatory setting, methodology for impact evaluation, and potential impacts from operation and construction of the project alternatives, including maintenance and storage facility (MSF) site options.

The report is organized according to the following sections:

- Section 1 Introduction
- Section 2 Regulatory and Policy Framework
- Section 3 Methodology
- Section 4 Future Background Projects
- Section 5 No Project Alternative
- Section 6 Alternative 1
- Section 7 Alternative 3
- Section 8 Alternative 4
- Section 9 Alternative 5
- Section 10 Alternative 6
- Section 11 Preparers of the Technical Report
- Section 12 References

Figure 1-1. Sepulveda Transit Corridor Project Study Area

Source: HTA, 2024

2 REGULATORY AND POLICY FRAMEWORK

2.1 Federal

2.1.1 The Energy Policy and Conservation Act

The Energy Policy and Conservation Act (EPCA) of 1975 was enacted to service the nation's energy demands and promote conservation methods when feasible. This federal Act mandated Corporate Average Fuel Economy (CAFE) standards beginning with 1978 model year vehicles, extended oil price controls to 1979, and directed the creation of a strategic petroleum reserve. The EPCA was subsequently amended in 1979 and directed the United States Department of Energy to establish energy conservation standards for consumer products.

2.1.2 Alternative Motor Fuels Act

The Alternative Motor Fuels Act of 1988 amended a portion of the Energy Policy and Conservation Act to encourage the use of alternative fuels, including electricity. This Act directed the Secretary of Energy to ensure that the maximum practicable number of federal passenger automobiles and light duty trucks be alcohol-powered vehicles, dual energy vehicles, natural gas-powered vehicles or natural gas dual energy vehicles.

2.1.3 Energy Policy Acts

The Energy Policy Act of 1992 reduced dependence on imported petroleum by addressing all aspects of energy supply and demand, including alternative fuels, renewable energy and energy efficiency. This Act encourages the use of alternative fuels through both regulatory and voluntary activities and through the approaches carried out by the United States Department of Energy. It requires federal, state, and alternative fuel provider fleets to acquire alternative fuel vehicles.

The Energy Policy Act of 2005 promulgated the development of grant programs, demonstration and testing initiatives, and tax incentives that promote alternative fuels and advanced vehicles production and use. This Act also amended prior regulations, including fuel economy testing procedures and Energy Policy Act of 1992 requirements for federal, state, and alternative fuel provider fleets. The Energy Policy Act of 2005 addresses energy production in the United States, including: (1) energy efficiency; (2) renewable energy; (3) oil and gas; (4) coal; (5) Tribal energy; (6) nuclear matters and security; (7) vehicles and motor fuels, including ethanol; (8) hydrogen; (9) electricity; (10) energy tax incentives; (11) hydropower and geothermal energy; and (12) climate change technology.

2.1.4 Safe, Accountable, Flexible, Efficient Transportation Equity Act

On August 10, 2005, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was signed into law. SAFETEA-LU guaranteed funding for highways, highway safety, and public transportation. SAFETEA-LU included provisions for improving safety, reducing traffic congestion, improving efficiency in freight movement, increasing inter-modal connectivity, and protecting the environment for the transportations system. SAFETEA-LU promotes more efficient and effective Federal surface transportation programs by focusing on transportation issues of national significance.

2.1.5 Energy Independence and Security Act

The Energy Independence and Security Act of 2007 includes several key provisions that will increase energy efficiency and the availability of renewable energy. The Act was designed to increase the supply of alternative fuel sources, improve efficiency for heating and cooling products, phase out incandescent light bulbs, and improve fuel efficiency standards.

2.1.6 Moving Ahead for Progress in the 21st Century Act

The Moving Ahead for Progress in the 21st Century (MAP-21) Act of 2012, was a multi-year transportation authorization for funding surface transportation programs. The Act incorporates energy conservation as a core consideration in surface transportation development and included, in surface transportation development funding, the funding of a public transportation research program with a focus on energy efficiency, system capacities, and other surface transportation factors. The funding mechanisms of MAP-21 were subsequently extended through the codification of several additional pieces of federal legislation:

- Highway and Transportation Funding Act of 2014 (Public Law 113-159): Extended surface transportation funding authorities through May 31, 2015, that would have otherwise expired after September 30, 2014
- Highway and Transportation Funding Act of 2015 (Public Law 114-21): Extended surface transportation funding authorities through July 31, 2015, that would have otherwise expired after September 30, 2014
- Surface Transportation and Veterans Health Care Choice Improvement Act of 2015 (Public Law 114-41): Extended surface transportation funding authorities through October 29, 2015, that would have otherwise expired after September 30, 2014
- Surface Transportation Extension Act of 2015 (Public Law 114-73): Extended surface transportation funding authorities through November 20, 2015, that would have otherwise expired after September 30, 2014
- Surface Transportation Extension Act of 2015, Part II (Public Law 114-73): Extended surface transportation funding authorities through December 4, 2015, that would have otherwise expired after September 30, 2014.

With the exception of the provisions of MAP-21, there is no federal legislation related specifically to the subject of energy efficiency in public transportation project development and operation.

2.2 State

2.2.1 The Warren-Alquist Act

The California Legislature passed the Warren-Alquist Act in 1974. The Warren-Alquist Act created the California Energy Commission (CEC), which is the State's primary energy policy and planning agency. The CEC has the following five major responsibilities:

1. Forecasting future energy needs and keeping historical energy data
2. Licensing thermal power plants 50 megawatts (MW) or larger
3. Promoting energy efficiency through appliance and building standards
4. Developing energy technologies and supporting renewable energy

5. Planning for and directing the state's response to energy emergencies

Senate Bill (SB) 1389 (Chapter 568, Statutes of 2002) requires the CEC to prepare a biennial integrated energy policy. The CEC adopts an Integrated Energy Policy Report (IEPR) every two years and an update every other year. The IEPR provides a summary of priority energy issues, outlining strategies and recommendations to further the goal of ensuring reliable, affordable, and environmentally responsible energy sources. The current IEPR is the *2023 Integrated Energy Policy Report Update* (CEC, 2024).

2.2.2 Assembly Bill 2076: Reducing Dependence on Petroleum

Pursuant to Assembly Bill (AB) 2076 of 2000, the CEC and the California Air Resources Board (CARB) prepared and adopted a joint agency report with recommendations for reducing dependence on petroleum. Included in this report are recommendations to increase the use of alternative fuels to 20 percent of on-road transportation fuel use by 2020 and 30 percent by 2030, significantly increase the efficiency of motor vehicles, and reduce per capita vehicle miles traveled (VMT). A performance-based goal of AB 2076 is to reduce petroleum demand to 15 percent below 2003 demand by 2030.

2.2.3 Assembly Bill 1007: Alternative Fuels Plan

The Alternative Fuels Plan of 2005 requires the CEC to prepare an alternative fuels plan to increase the use of alternative fuels in California. The Plan aims to diversify fuel sources and protect the state from oil spikes that affect prices, the economy, and jobs. Additionally, the Plan indicates that significant efforts would be needed to reduce VMT by all Californians through more effective land use and transportation planning and greater mass movement of people and goods.

2.2.4 Alternative and Renewable Fuel and Vehicle Technology Program

AB 118 of 2007 created the Alternative and Renewable Fuel and Vehicle Technology Program, to be administered by the CEC. The Program establishes measures including grant awards, revolving loans, and loan guarantees to develop and deploy new fuel and vehicle technologies to help achieve petroleum reductions. The Program was amended in 2008 and 2013 to allow the CEC itself to develop and deploy alternative and renewable fuels, alternative- and renewable-fueled vehicles, and other advanced transportation technologies to meet the state goals.

2.2.5 California Air Resources Board Off-Road Diesel Vehicle Regulation

On July 26, 2007, CARB adopted the Off-Road Vehicle Regulation to reduce diesel particulate matter (DPM) and nitrogen oxides (NO_x) emissions from in-use (existing) off-road, heavy-duty diesel vehicles in California. The regulation applies to all self-propelled off-road diesel vehicles of 25 horsepower or greater used in California and most two-engine vehicles (except on-road two-engine sweepers). The regulation also applies to vehicles that are rented or leased (rental or leased fleets). Examples include loaders, crawler tractors, skid steers, backhoes, forklifts, airport ground support equipment, water well drilling rigs, and two-engine cranes. Such vehicles are used in construction, mining, and industrial operations. The regulation does not apply to stationary equipment or portable equipment such as generators. The off-road vehicle regulation establishes emissions performance requirements, establishes reporting, disclosure, and labeling requirements for off-road vehicles, and it limits unnecessary idling. In November 2022, CARB amended the regulation to require fleets to phase out use of the oldest and highest-polluting off-road diesel vehicles in California; to prohibit the addition of high-emitting vehicles to a fleet; and to require the use of R99 or R100 renewable diesel in off-road diesel vehicles. Beginning January 1, 2024, all fleets are required to procure and use renewable diesel in all vehicles owned or operated in California that are subject to the off-road vehicle regulation, with some limited exceptions, including lack of available renewable diesel.[1]

2.2.6 California Code of Regulations Energy Efficiency Standards Title 24, Part 6, Chapter 2-53

In 2007, the California Building Standards Commission adopted the statewide mandatory California Green Building Standards (CALGreen) Part 11 of Title 24, California Code of Regulations (CCR). The Code was updated in 2010, 2013, 2016, 2019, and most recently in 2022 to require additional energy savings. CALGreen applies to the planning, design, operation, construction, use and occupancy of every newly constructed building or structure. The Title 24 requirements apply to all newly constructed nonresidential buildings and regulate minimum energy efficiencies for cooling, heating, ventilation, water heating, and lighting. CCR, Title 24, Part 11 identifies mandatory building measures and voluntary measures that may be incorporated into the design of buildings. Title 24 contains requirements for cool roofs, exterior lighting, bicycle parking, and electric vehicle charging. In addition, it requires mandatory inspections of energy systems (e.g., heat furnace, air conditioner, and mechanical equipment) for non-residential buildings larger than 10,000 square feet to ensure that all are working at their maximum capacity and according to their design efficiencies.

CALGreen includes both Mandatory, and Voluntary measures; Los Angeles County Metropolitan Transportation Authority's (Metro) Moving Beyond Sustainability Strategic Plan (MBSSP) established CALGreen Tier 2 as the standard for all its capital projects 10,000 square feet or greater. CALGreen Tier 2 includes required Mandatory, Prerequisite, and Elective reach code measures.

1. **CALGreen Tier 2 requires the following applicable project design features:**

- **CALGreen Tier 2 – Prerequisite Requirements**
  - To achieve CALGreen Tier 2 status, the Designer/Contractor shall meet the CALGreen Prerequisites. Refer to A5.602.2 CALGreen Verification Guidelines and Tier 2 Checklist:
    - Stations to comply with **CALGreen Tier 2** (CCR, Title 24, Part 11, California Green Building Standards Code (CALGreen) Tier 2.
    - Each station to be designed and constructed to comply with **CALGreen Tier 2 Prerequisite for Cool Roof**, Section A5.106.11.2.
    - Each station to be designed and constructed to be "**Solar Ready"**[2] California Energy Code, CCR, Title 24, Part 6, Section 110.10 - Solar Readiness.
    - Each station to be designed and constructed to comply with **CALGreen Tier 2 Prerequisite for Outdoor Lighting,** Energy Performance of Outdoor lighting power 90 percent of Part 6, Section A5.203.1.1.1.
    - Project to comply with **CALGreen Tier 2 Prerequisite for Construction and Demolition Waste reduction of** 80 percent of construction and demolition waste in Section A5.408.3.1.

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[1] Metro's Green Construction Policy also requires the use of Renewable Diesel.

[2] The CEC's "Solar Ready" designation applies when solar photovoltaic (PV) installations are not immediately required during construction, but mandatory Energy Code measures are implemented that prepare the building for future installation of a solar PV energy system.

- Project to comply with **CALGreen Tier 2 Prerequisite for Recycled Content** of 15 percent of materials based on estimated total cost or use two products from Table A5.405.4 for at least 75 percent by cost in Section A5.405.4.1.
- 2022 California Green Building Standards Code (CALGreen) Tier 2, California Building Standards Commission (Nonresidential), CCR, Title 24, Part 11, (or current version at 100 percent design).

- **CALGreen Tier 2 – Elective Requirements**
  - In addition to complying with applicable Mandatory measures in CALGreen Chapter 5 for nonresidential structures and buildings, and CALGreen Tier 2 Prerequisite measures, the project design and construction shall select additional Elective measures from Appendix A5 Nonresidential Voluntary Measures as described in A5.602.2 CALGreen Verification Guidelines Tier 2 Checklist, based on project design.

2. **CALGreen - Documentation Author's / Responsible Designer's Declaration Statement and Compliance Verification Checklist.**

- All occupied structures less than 10,000 square feet, the Designer/Contractor shall provide as part of each design package submittal a completed A5.602 CALGreen Mandatory CALGreen verification checklist, with signed Documentation Author's / Responsible Declaration Statement.
- All occupied structures greater than 10,000 square feet, the Designer/Contractor shall provide as part of each design package submittal a completed A5.602.2 CALGreen Tier 2 verification checklist with signed Documentation Author's / Responsible Declaration Statement.
- The Designer shall sign the Documentation Author's / Responsible Designer's Declaration Statement and provide completed verification checklist within the design and construction plans.

The Designer's Declaration Statement attests to the accuracy and completeness of the CALGreen Checklist and projects meeting either Mandatory or CALGreen Tier 2 design compliance, based on structure size requirement.

2.2.7 California Governor's Office Executive Orders for Energy Management

Since 2007, the California Governor's Office has issued a series of Executive Orders (EO) related to energy resources management and the expansion of statewide renewable energy infrastructure. The following EOs (Table 2-1) represent the most applicable actions addressing the generation and distribution of energy resources throughout California.

Table 2-1. California Governor's Office Executive Orders for Energy Management

Executive Order	Date Issued	Description
S-01-07	January 2007	Established a Low-Carbon Fuel Standard and directed the Secretary of the CalEPA to develop and propose protocols for measuring the life-cycle carbon intensity of transportation fuels.
S-13-08	November 2008	Directed state agencies to complete analysis of the effects of sea level rise in California, prepared in the California Sea Level Rise Vulnerability Assessment Report through coordination with the National Academy of Sciences.
S-14-08	November 2008	Established renewable energy generation share target for retail sellers of electricity of 33 percent renewably sourced by 2020.

Executive Order	Date Issued	Description
B-16-12	March 2012	Directed state agencies to encourage the commercialization of zero emission vehicles; set goal of one million zero emission vehicles in use statewide by 2020.
B-30-15	April 2015	Established a mid-term goal for 2030 of reducing GHG emissions by 40 percent below 1990 levels and required CARB to update its current AB 32 Scoping Plan to identify the measures to meet the 2030 target.
B-55-18	September 2018	Established a goal to achieve statewide carbon neutrality by 2045.
N-79-20	September 2020	Established a target to make all vehicles in the state emission free: cars and passenger trucks by 2035, medium and heavy duty trucks by 2045.

Source: California Governor's Office, 2024

AB = Assembly Bill
CalEPA = California Environmental Protection Agency
CARB = California Air Resources Board
GHG = greenhouse gas

2.2.8 Senate Bill 32

In 2016, the California State Legislature adopted SB 32—which adds Section 38566 to the Health and Safety Code and requires a commitment to reducing statewide GHG emissions to 1990 levels by 2020 and 40 percent below 1990 levels by 2030—and its companion, AB 197—which provides additional direction for developing the 2017 Scoping Plan. Both were signed by Governor Brown to update AB 32 and include an emissions reduction goal for the year 2030. SB 32 and AB 197 amend AB 32 and establish a new climate pollution reduction target of 40 percent below 1990 levels by 2030 and include provisions to ensure the benefits of state climate policies permeate disadvantaged communities.

In response to the 2030 GHG reduction target, CARB adopted *California's 2017 Climate Change Scoping Plan* (2017 Scoping Plan) at a public meeting held in December 2017 (CARB, 2017). The 2017 Scoping Plan was the third iteration of the State's Climate Change Scoping Plan—after the original publication in 2008 and a subsequent update in 2014—and outlined the strategies that the state would implement to achieve the 2030 GHG reduction target. The strategies included building upon the existing Cap-and-Trade Regulation,[3] Low Carbon Fuel Standard (LCFS), improved emissions standards, and increasing renewable energy. The strategies also included reducing methane (CH_4) emissions from agricultural and other wastes by using it to meet California's energy needs. CARB's projected statewide 2030 emissions accounted for 2020 GHG reduction policies and programs.

CARB stated that the 2017 Scoping Plan scenario, "is the best choice to achieve the state's climate and clean air goals". The majority of the reductions would result from the continuation of the Cap-and-Trade Regulation. Additional reductions are achieved by the following activities:

- Applying electricity sector standards (i.e., utility providers to supply at least 50 percent renewable electricity by 2030)

[3] "The Cap-and-Trade Regulation establishes a declining limit on major sources of GHG emissions. CARB creates allowances equal to the total amount of permissible emissions (i.e., the "cap"). One allowance equals one metric ton of carbon dioxide equivalent emissions (using the 100-year global warming potential). Each year, fewer allowances are created and the annual cap declines. An increasing annual auction reserve (or floor) price for allowances and the reduction in annual allowances creates a steady and sustained carbon price signal to prompt action to reduce GHG emissions." (CARB, 2024a).

- Doubling the energy efficiency savings at end uses
- Making additional reductions from the LCFS, implementing the short-lived GHG strategy (e.g., hydrofluorocarbons)
- Implementing the mobile source strategy and sustainable freight action plan. (The alternatives were designed to consider various combinations of these programs, as well as consideration of a carbon tax in the event the Cap-and-Trade Regulation is not continued. However, in July 2017, the California Legislature voted to extend the Cap-and-Trade Regulation to 2030)

2.2.9 Senate Bill 100

The adoption of SB 100—The 100 Percent Clean Energy Act of 2018 (2018)—updated the state's Renewable Portfolio Standard (RPS) to ensure that by 2030 at least 60 percent of statewide electricity is renewably sourced; it also set a goal of powering all retail electricity sold in the state and supporting state agency electricity needs with renewable and zero-carbon resources by 2045. SB 100 also included an interim RPS target of 50 percent by 2025. Additionally, SB 100 requires annual Joint Agency Reports to be prepared to track progress on expanding the availability of renewable resources and to assess the potential of emerging technologies in aiding the state's efforts to reduce GHG emissions from the energy sector. The first Joint Agency Report was published in 2021 and determined that approximately 63 percent of California's electricity retail sales in 2019 came from non-fossil fuel sources thanks to a combination of renewables, hydroelectric, and nuclear generation (CEC, 2021a). In response to SB 100, CARB published the *2022 Scoping Plan for Achieving Carbon Neutrality*, which was developed in collaboration with the state's energy providers to meet the 2045 carbon-free energy goal (CARB, 2022).

2.2.10 Senate Bill 1020

SB 1020 was adopted on September 16, 2022; it is a revision to SB 100 that would require that eligible renewable energy resources and zero-carbon resources supply the following:

- 90 percent of all retail electricity sales to California end-use customers by December 31, 2035, 95 percent by 2040, and 100 percent by 2045; and,
- 100 percent of electricity procured to serve all state agencies by December 31, 2035.

2.3 Regional

2.3.1 Southern California Association of Governments

The Southern California Association of Governments (SCAG) is the Metropolitan Planning Organization for Los Angeles, Orange, Ventura, Riverside, San Bernardino, and Imperial counties. SCAG addresses regional issues related to transportation, the economy, community development, and the environment. SCAG develops plans pertaining to transportation, growth management, hazardous waste management, housing, and air quality. SCAG is required by federal law to prepare and update a long-range Regional Transportation Plan (RTP). California SB 375 requires that the RTP include a Sustainable Communities Strategy (SCS) that outlines growth strategies for land use and transportation.

The SCAG Regional Council formally adopted the SCAG *Connect SoCal, 2024-2050 Regional Transportation Plan/Sustainable Communities Strategy* (2024-2050 RTP/SCS) on April 4, 2024 (SCAG, 2024). The 2024-2050 RTP/SCS focuses on maintaining and enhancing management of the transportation network while also expanding mobility choices by creating hubs that connect housing, jobs, and transit accessibility. It incorporates a range of best practices for increasing transportation choices, reducing dependence on personal automobiles, and encouraging growth in walkable communities. The 2024-2050 RTP/SCS optimizes opportunities for shorter trip distances and drivers to switch to electric vehicles by directing growth to areas with high quality transit. Development in these areas will be guided by strategies to focus growth near destinations and mobility options, promoting diverse housing choice, leveraging technology innovations, and supporting implementation of sustainability policies.

Transportation demand management is a set of strategies outlined in the 2024-2050 RTP/SCS that aims to reduce the demand for roadway travel, particularly from single-occupancy vehicles. These strategies and transportation choices improve sustainability, public health, and the quality of life by reducing congestion. The 2024-2050 RTP/SCS acknowledges that when transit ridership, carpooling, bicycling, and walking increase, the efficiency of the entire transportation system improves. Numerous co-benefits can materialize, including energy efficiency savings.

2.3.2 Los Angeles Countywide Sustainability Plan

In 2019, the Los Angeles County Sustainability Office published "Our County", a regional sustainability plan for the communities in Los Angeles County (LA County, 2019). It outlines what local governments and stakeholders can do to enhance their communities while reducing damage to the environment. It contains 12 goals focusing on a variety of sectors. Goals relevant to the Sepulveda Transit Corridor Project (Project) include the following:

- **Goal 7:** A fossil fuel-free LA County
  - By 2025 achieve a 25 percent reduction in total GHG emissions and add 3 gigawatts (GW) of new distributed energy
  - By 2035 achieve a 50 percent reduction in total GHG emissions and add 6 GW of new distributed energy resources
  - By 2045, add 10 GW of new distributed energy resources; and
  - By 2050, achieve carbon neutrality
- **Goal 8:** A convenient, safe, clean, and affordable transportation system that enhances mobility while reducing car dependency
  - By 2025, increase to at least 15 percent all trips by foot, bike, micromobility, or public transit and reduce average daily VMT per capita to 20 miles
  - By 2035, increase to at least 30 percent all trips by foot, bike, micromobility, or public transit and reduce average daily VMT per capita to 15 miles
  - By 2045, increase to at least 50 percent all trips by foot, bike, micromobility, or public transit and reduce average daily VMT per capita to 10 miles

2.3.3 Los Angeles County Metropolitan Transportation Authority

Over the past 15 years, Metro has implemented several policies and plans to enhance energy efficiency throughout its system. In 2011, Metro published its *Energy Conservation and Management Plan* (ECMP) (Metro, 2011a) to serve as a strategic blueprint for proactively guiding energy use in a sustainable, cost-effective, and efficient manner. The ECMP complements Metro's 2007 Energy and Sustainability Policy (Metro, 2007), focusing on electricity for rail vehicle propulsion, electricity for rail and bus facility purposes, natural gas for rail and bus facility purposes, and the application of renewable energy. The ECMP addresses current and projected energy needs based on 2010 utility data and existing agency plans to meet increasing ridership through system expansion and new facility construction incorporating Measure R (Metro, 2008) initiatives.

The ECMP examines both supply and demand aspects of energy consumption and analyzes energy use profiles and the various procurement options in terms of rate structures and supply contracts available to the agency. It also identifies opportunities to reduce energy consumption and realize cost savings through the implementation of low-cost operational initiatives and cost-effective capital retrofits. The ECMP includes an evaluation of an optimal organizational structure for its implementation and provides recommended strategies for achieving the objectives set forth. The ECMP strategies follow a process of Plan-Do-Check-Act by establishing the *Energy Management Action Plan* (EMAP), implementing the EMAP, conducting annual reviews, and adjusting or modifying the EMAP based on gathered feedback and documented performance. In the short term, the ECMP called for expansion of utility data collection and sub-metering of buildings and propulsion injection points to enhance the accuracy of system analyses and identify primary opportunities for improvements.

Following publication of the ECMP, Metro began preparing annual energy and resource reports to provide evaluations on the effectiveness of ECMP strategies. The most recent iteration is the *2019 Energy and Resource Report* (Metro, 2019b), which analyzes the sustainability and environmental performance of Metro operational activities during the 2017 calendar year. Key accomplishments highlighted in the *2019 Energy and Resource Report* (Metro, 2019b) include the expansion of electric vehicle charging station availability and Metro's electric vehicle fleet, improvement of Metro's sustainability goals and implementation, implementation of Metro Rail Design Criteria that utilizes sustainable features in project design and encourages the use of third-party certifications such as Leadership in Energy and Environmental Design (LEED) and Envision (Metro, 2019b). Metro's *2017 Energy and Resource Report* (Metro, 2017) analyzes the 2016 calendar year and is also relevant for information on systemwide energy usage.

In 2020 Metro published its MBSSP, a 10-year strategic plan that is the most comprehensive to date and sets goals, targets, strategies, and actions that align with and emanate from other key Metro guidance documents (Metro, 2020b). The plan is organized into topical strategic focus areas including Water Quality and Conservation; Solid Waste; Materials, Construction, and Operations; Energy Resource Management; Emissions and Pollution Control; Resilience and Climate Adaptation; and Economic and Workforce Development. By recognizing the intersectionality of these various focus areas, Metro designed a robust, holistic plan to guide the expansion and enhancement of its transit services into the future. Targets of the plan specifically related to energy include:

- Achieve LEED Silver certification (or Envision certification where LEED is not applicable) for all new facilities over 10,000 square feet; or, alternatively, Envision Version 3 certification where LEED is not applicable.
- Design and build 100 percent of capital projects to Title 24 Tier 2 standards.
- Reduce energy consumption by 17 percent at facilities from the 2030 Business-as-Usual Scenario.
- Increase onsite renewable energy generation to 7.5 MW.

Construction contractors will be required to comply with the provisions of the Metro Green Construction Policy (GCP), which was adopted in 2011—and subsequently updated in 2018—to reduce harmful air pollutant emissions during Metro construction projects (Metro, 2011b; Metro, 2020b).

Provisions of the GCP also contribute to minimizing energy consumption. Through adopting the GCP, Metro committed to the construction equipment requirements, construction best management practices, and implementation strategies for all construction projects performed on Metro properties or within Metro rights-of-way. The following summarized requirements are relevant to energy.

- All diesel engines used by contractors must be fueled with renewable diesel (2018 GCP Update).
- All off-road diesel-powered construction equipment greater than 50 horsepower (hp) shall meet Tier 4 off-road emission standards at a minimum.
- Every effort shall be made to utilize grid-based electric power at any construction site, where feasible.
- Best management practices shall include, at a minimum:
  - Maintain equipment according to manufacturer's specifications
  - Restrict idling of construction equipment and on-road heavy-duty trucks to a maximum of five minutes when not in use (CARB exceptions apply)
  - Work with local jurisdictions to improve traffic flow by signal synchronization during construction hours, where feasible
  - Configure construction parking to minimize traffic interference, where feasible
  - Schedule construction activities that affect traffic flow on the arterial system to off-peak hours to the extent practicable; and,
  - Use electric power in lieu of diesel power where available.

2.4 Local

2.4.1 City of Los Angeles General Plan and Associated Elements

The *City of Los Angeles General Plan* (DCP, 2001a) provides community development goals and policies relative to the distribution of land use. *The Citywide General Plan Framework Element* (DCP, 2001b) establishes the broad overall policy and direction for the City of Los Angeles General Plan. It provides a citywide context and a comprehensive long-range strategy to guide the comprehensive update of the General Plan's other elements. The Framework Element's infrastructure policies seek to ensure that the City of Los Angeles Department of Water and Power (LADWP) would be able to adequately provide electric power transmission following regional development patterns. The Framework Element's infrastructure policies will continue to ensure that the City of Los Angeles's transmission and distribution system is able to accommodate future peak electric demand for its customers.

The Citywide General Plan Infrastructure Systems Element (DCP, 2001c) provides a broad overview of goals, plans, and policies related to the conservation of the city's infrastructure and public systems. Electrical energy and power within the City of Los Angeles is provided and supplied by LADWP. The *2017 LADWP Power Strategic Long-Term Resource Plan* is a 20-year roadmap that guides the LADWP power system in its efforts to supply reliable electricity in an environmentally responsible and cost-effective manner (LADWP, 2017).

Adopted by the Los Angeles City Council in September 2016, Mobility Plan 2035 represents the transportation element of the *City of Los Angeles General Plan*, dedicated to improving multimodal connectivity throughout the City of Los Angeles. The Mobility Plan 2035 includes goal-oriented policies to decrease VMT per capita by 5 percent every 5 years, to 20 percent by 2035, and to reduce transportation-related energy use by 95 percent (DCP, 2016).

2.4.2 GreenLA Climate Action Plan

The City of Los Angeles began addressing the issue of global climate change in 2007 by publishing *GreenLA: An Action Plan to Lead the Nation in Fighting Global Warming* (LA Green Plan) (DCP, 2007). The LA Green Plan identified over 50 action items to address climate adaptation, and ClimateLA evaluated the potential efficacy of a range of strategies related to energy conservation, efficiency, and reduced reliance on automobiles for transportation (DCP, 2008).

2.4.3 City of Los Angeles Sustainable City Plan

Under Mayor Eric Garcetti the City of Los Angeles released its first-ever *Sustainable City pLAn* on April 8, 2015 (City of Los Angeles Mayor’s Office, 2015). Recognizing the risks posed by climate change, the pLAn set time-bound outcomes on climate action, most notably to reduce greenhouse gas emissions by 45 percent by 2025, 60 percent by 2035, and 80 percent by 2050, all against a 1990 baseline. On April 29, 2019, Mayor Garcetti released the Los Angeles’ Green New Deal, which is the first four-year update to the 2015 pLAn. The 2019 updates to the pLAn augments, expands, and elaborates in even more detail the city’s vision for a sustainable future and new aggressive goals to place the city on the path to a zero-carbon future by 2050. The 2019 updates to the pLAn accelerate the following targets (City of Los Angeles Mayor’s Office, 2019):

- Supply 55 percent renewable energy by 2025; 80 percent by 2036; and 100 percent by 2045 (LADWP)
- Reduce VMT per capita by at least 13 percent by 2025, 39 percent by 2035, and 45 percent by 2050
- Ensure 57 percent of new housing units are built within 1,500 feet of transit by 2025; and 75 percent by 2035
- Increase the percentage of zero emission vehicles in the city to 25 percent by 2025; 80 percent by 2035; and 100 percent by 2050; and,
- Convert all city fleet vehicles to zero emissions where technically feasible by 2028.

3 METHODOLOGY

This section describes the methodology used to estimate energy effects from temporary construction activities and long-term operations of each project alternative. The analysis for construction activities focuses on temporary, one-time expenditures of transportation fuels that would be consumed by off-road equipment and on-road vehicles involved in construction activities, which are direct energy effects that involve internal combustion engines burning motor gasoline and biodiesel fuel. The operational analysis evaluates both direct (e.g., electricity use) and indirect effects (e.g., fuel savings from vehicle miles traveled [VMT] reductions) on various energy resources on an annual basis.

For the purposes of this analysis, electricity consumption at the end use (i.e., rail car propulsion or building power) is considered a direct effect because the energy is directly used to supply power to particular components of project alternatives. In contrast, indirect energy effects associated with operation of the project alternatives involve the changes in the amount of petroleum-based transportation fuels and electricity consumed by on-road vehicles within the Project Study Area that would occur through community members choosing to travel by the Los Angeles County Metropolitan Transportation Authority (Metro) transit system in lieu of traveling by personal passenger vehicles. This characterization represents an indirect effect because the energy is not directly consumed by operation of the project alternatives components themselves.

3.1 Construction

Construction activities would require energy resources for off-road equipment; mobile sources including worker vehicles, vendor trucks, and haul trucks; and electricity consumption from electric-powered equipment and temporary onsite portable offices, lighting, and security features. Energy use was estimated as part of the analysis conducted for the *Sepulveda Transit Corridor Project Climate Change and Greenhouse Gas Emissions Technical Report* (Metro, 2025a) using a spreadsheet approach based on energy use and methodologies from the California Emissions Estimator Model (CalEEMod), version 2022.1.1.19 (CAPCOA, 2022), CARB's EMission FACtors (EMFAC) mobile source emissions inventory model (EMFAC2021, version 1.0.2), and the CARB Off-Road Diesel Engine Emissions Factors workbook (CARB, 2024b). CalEEMod is a model developed by the California Air Pollution Control Officers Association (CAPCOA) which quantifies ozone precursors, criteria pollutants, and GHG emissions from construction and operation of new land use development and linear projects in California; EMFAC2021 is a model developed and used by CARB to assess emissions from on-road vehicles including cars, trucks, and buses in California; and CARB maintains and updates its Off-Road Diesel Models and Documentation as part of its Mobile Source Emissions Inventory program.

The energy use estimates were based on alternative-specific construction data (schedule, equipment quantities, truck volumes, etc.) provided by design team engineers. Construction data for Alternatives 1, 3, 4, 5, and 6 went through a collaborative process with the environmental team to develop reasonable construction assumptions based on current phases of design plans. Where alternative-specific data were not available, reasonable assumptions based on similar infrastructure/transit projects and default values from CalEEMod were used in the analysis. Based on the scale of project alternatives and progress in design development, conservative construction assumptions were used for each project alternative and would likely yield conservative estimates of energy resources consumption.

3.1.1 Off-Road Equipment

Construction activities would utilize a variety of diesel-powered off-road equipment (e.g., cranes, bulldozers, excavators, etc.) on the active construction sites throughout the construction period. Off-road equipment horsepower (hp) ratings and load factors (LF) were obtained from the CalEEMod database. Off-road equipment diesel fuel use was estimated based on the alternative-specific equipment activity data, which included the equipment quantity, hp, LF, and daily usage (hours per day). Total diesel fuel use for a piece of equipment was based on the daily energy use multiplied by the total days of usage during the construction period.

For diesel-fueled off-road equipment, the CARB OFFROAD database contains fuel consumption factors for equipment up to 100 hp (0.0574 gallons diesel per horsepower-hour [0.0574 gal_D/hp-hr]) and for equipment over 100 hp (0.0516 gal_D/hp-hr). These consumption factors are referred to as Brake-Specific Fuel Consumption factors, because they are based on the brake hp of the equipment being used and the duration of use. Diesel fuel consumption for off-road equipment type *"i"* during construction activities were estimated using the following equation, where the LF is the average fraction of maximum engine load of the equipment over the duration of use and is expressed as a unitless value between zero and one:

$$Fuel\ Consumption_i\ [gal_D] = \ BSFC\ _i \left[{gal_D}/{bhp \cdot hr.}\right] \times bhp_i[hp] \times LF_i \times Usage_i[hrs]$$

To estimate the total amount of diesel fuel that would be consumed by off-road equipment during Project construction, fuel consumption was estimated for each piece of equipment's total hours of use and summed across the inventory for all equipment, phases, and activities involved in construction of the project alternatives.

3.1.2 On-Road Vehicles

Gasoline and diesel fuel would be used in worker vehicles commuting to and from the construction sites, vendor trucks for material deliveries (i.e., shoring structures, onsite concrete pouring, precast concrete components, and track segments), and haul trucks for bulk materials import and export. Consistent with CalEEMod standard methodology, the worker vehicle fleet mix consisted of 25 percent light-duty autos, 50 percent light-duty trucks type 1, and 25 percent light-duty trucks type 2. Based on EMFAC2021 data, most light-duty vehicle categories are gasoline powered; therefore, worker vehicle fuel consumption estimates were based solely on gasoline powered vehicles.

Consistent with CalEEMod's default parameters, the modeled construction vendor truck fleet mix for the project alternatives consisted of 50 percent medium-heavy duty trucks and 50 percent heavy-heavy duty trucks. The vendor truck fleet would also apply to onsite water trucks used for dust control. The haul truck fleet includes 100 percent heavy-heavy duty trucks. Truck trips that would be involved in transporting precast materials from offsite casting facilities were accounted for within the haul truck activity inventory.[4] Based on EMFAC2021 data, most heavy-duty truck vehicle categories are diesel-powered; therefore, estimates of vendor and haul truck fuel consumption were based solely on diesel-powered trucks.

[4] The casting facility itself will be subject to independent environmental clearance; an estimation of the energy requirements to construct and operate the casting facility would be speculative at this time and would not provide further informational value.

Regarding the regional fleet mix used in the construction vehicle energy analysis, gasoline and diesel fuel consumption factors for workers' vehicles, vendor delivery trucks, and haul trucks are based on EMFAC2021 aggregate vehicle speeds and aggregate model years for Los Angeles County in the corresponding years that activities are forecast to occur.

3.1.3 Electricity Consumption

Construction activities would also consume electricity through various end uses. For project alternatives that include underground segments—Alternative 3, Alternative 4, Alternative 5, and Alternative 6—an electric-powered tunnel boring machine (TBM) would be utilized to construct the tunnel. Electricity would also be consumed by onsite portable offices for each project alternative. For each project alternative, it was assumed that three portable offices would be utilized throughout the duration of the construction period. Specific sizes of portable offices are currently unknown. Each portable office was assumed to have an area of 720 square feet, which is on the higher end for portable office trailers.

Electricity for the Project Study Area is primarily provided by the City of Los Angeles Department of Water and Power (LADWP). CalEEMod includes electricity use factors for LADWP for general office buildings. For TBM activity, electricity was estimated based on the power requirements of the TBM multiplied by the estimated total hours of use throughout the construction period.

3.2 Operation

The operational analysis addresses direct and indirect energy effects of the Project's annual operations following the completion of construction activities. Direct effects would result from the energy required to power the transit system and operations at the maintenance and storage facility (MSF). Indirect energy effects would be attributed to changes in overall regional transportation fuels consumption resulting from the reduction in VMT associated with vehicle trips displaced by transit ridership.

On December 10, 2022, the City of Los Angeles passed Ordinance 187714, which would require all newly constructed buildings in the City of Los Angeles to be all-electric (City of Los Angeles, 2022). This ordinance was added to the City of Los Angeles Municipal Code under Section 99.04.106.8 and had an effective date of January 1, 2023. Based on this ordinance, the energy analysis does not include combustion of natural gas related to building space and water heating for stations, the MSF and MSF Option 1, and the electric bus facility proposed for Alternative 1 and Alternative 3. For the purposes of this report, the operational energy consumption estimates for Existing Conditions (2021) and the project alternatives are standardized in British thermal units (Btu), thousand-Btu (kBtu), and million-Btu (MMBtu).

3.2.1 Electricity Consumption

Each project alternative's transit system would be electric powered, and its traction power substations (TPSS) would consume electricity. In addition to TPSSs, various components of project alternatives would consume electricity such as stations, MSFs, and electric buses.

Electricity consumption related to TPSSs and electric buses was estimated outside of CalEEMod and was based on alternative-specific electricity consumption data provided by the project design team. Electricity consumption estimates related to MSFs and stations were provided by the respective design teams for Alternatives 1, 3, 4 and 5. Alternative 6 electricity consumption was estimated using a combination of traction power requirements provided by the project design team and MSF and station demand using CalEEMod. Parking areas were modeled as a "Parking Lot" land use in CalEEMod. For stations, the project design team provided estimates of electricity use related to lighting, ventilation, and elevator use. Annual electricity consumption in megawatt-hours was estimated for the components of each project alternative.

The energy analysis is based on a horizon year of 2045, which is also the target year of Senate Bill (SB) 100, which would require renewable energy resources and zero-carbon resources to supply 100 percent of electricity. LADWP partnered with the National Renewable Energy Laboratory on the *Los Angeles 100 percent Renewable Energy Study* (LA100) (NREL, 2021). LA100 analyzed potential scenarios that provided a pathway for the city to achieve a 100 percent renewable power system by 2045. The potential scenarios were based on projections for electricity demand and electricity supply with varying assumptions. Of all the scenarios analyzed, the SB 100 scenario is the only scenario that would allow for electricity generation to come from natural gas through the use of renewable electricity credits, which are a market-based mechanism to help meet renewable energy targets (NREL, 2021). The SB 100 scenario allows for a portion of electricity generation from natural gas combustion. The LA100 has potential scenarios to reach this goal by 2035; however, those forecasts relied upon an assumption that no energy provided by natural gas generation or biofuels would be allowed and additional costs would be incurred throughout its implementation.

For this analysis, it was conservatively assumed the goal would not be met until the compliance date of 2045, ensuring that electricity use from project alternatives is not underestimated. Under the SB 100 scenario, combustion of natural gas could provide up to 10 percent of electricity generation; thus, it was assumed the 2045 power mix for LADWP would consist of 90 percent renewables and 10 percent non-renewables. LADWP’s 2022 power mix consisted of 35 percent renewables and 65 percent non-renewables (LADWP, 2023). In 2022, the non-renewable portion of the power mix was 65 percent and in 2045, the non-renewable portion of the power mix would be 10 percent, which would result in an approximately 84 percent reduction of non-renewables between 2022 and 2045.

3.2.2 Building Operations Natural Gas Consumption

On December 10, 2022, the City of Los Angeles passed Ordinance 187714, which would require all newly constructed buildings in the City of Los Angeles to be all-electric (City of Los Angeles, 2022). This ordinance was added to the City of Los Angeles Municipal Code (LAMC) under Section 99.04.106.8 and had an effective date of January 1, 2023. Based on this ordinance, the energy analysis did not include combustion of natural gas related to building space and water heating because project alternative buildings would be considered new construction and would be required to comply with the LAMC.

3.2.3 On-Road Motor Vehicle Energy Consumption

The *Sepulveda Transit Corridor Project Transportation Technical Report* evaluated VMT in the Project Study Area for the Existing Conditions under baseline year 2021 (Existing Conditions 2021), the 2045 Without Project Conditions, and for each project alternative in the projected horizon year of 2045 (Metro, 2025b), as summarized in Table 3-1. To estimate the annual changes in fuel consumption associated with on-road vehicle activity, the daily VMT values for each scenario were converted to annual VMT using a factor of 347 days per year, which accounts for reduced weekend and holiday mileage (CARB, 2008). Fuel consumption factors were generated from EMFAC2021 and were based on a regional aggregate fleet mix comprised of all vehicle categories, fuel types, model years, and average speeds for the corresponding year of analysis (i.e., 2021 or 2045).

Table 3-1. Project Study Area Vehicle Miles Traveled

Scenario	Daily On-Road VMT (Vehicle Miles per Day)	Annual On-Road VMT (Vehicle Miles per Year)
Existing Conditions (2021)	456,869,300	158,533,647,100
2045 Without Project Conditions	568,557,200	197,289,348,400
2045 Alternative 1	568,316,300	197,205,756,100
2045 Alternative 3	568,190,800	197,162,207,600
2045 Alternative 4	567,957,300	197,081,183,100
2045 Alternative 5	567,951,900	197,079,309,300
2045 Alternative 6	568,003,600	197,097,249,200

Source: HTA, 2024

VMT = vehicle miles traveled

Additionally, mobile source fuel consumption would be associated with employees traveling to and from each project alternative's MSF. Daily employee trips were based on the number of MSF employees multiplied by two to account for trips to and from the MSF. The trip length for employees was based on CalEEMod's default value for non-residential Home-to-Work trips for a General Office Building. As a conservative approach, the MSF employee trip analysis assumed that each employee would make independent trips commuting to and from the facility, and that no ridesharing would occur. This is consistent with the analyses for Air Quality and Climate Change and Greenhouse Gas Emissions. The daily trips and trip length were multiplied together to derive a daily VMT. Like the VMT analysis, the daily VMT for employee travel was multiplied by 347 to generate the annual VMT. Fuel use factors were generated from EMFAC2021 and were based on all vehicle categories and fuel types, aggregate speeds and model years, and calendar year 2045.

To note, the EMFAC2021 model uses units of diesel gallon equivalents (DGE) to characterize natural gas consumed by on-road vehicles, and all natural gas estimates presented in the discussions of Existing Conditions (2021) and the project alternatives are expressed in this term (CARB, 2021). The EMFAC2021 database relies on an energy content conversion factor of approximately 144 standard cubic feet (scf) of natural gas per DGE (Caltrans, 2021).

3.3 CEQA Thresholds of Significance

For the purposes of the Environmental Impact Report, impacts are considered significant if the project would:

- Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.
- Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

In addition to the Appendix G criteria, California Environmental Quality Act Guidelines,[5] Appendix F: Energy Resources provides an overview of the potential energy-related impacts to consider in making determinations of significance:

[5] CEQA Guidelines refers to Title 14, Division 6, Chapter 3 of the California Code of Regulations and are administrative regulations governing implementation of the California Environmental Quality Act.

- The project's energy requirements and its energy use efficiencies by amount and fuel type for each stage of the project including construction, operation, maintenance, and/or removal.
- The effects of the project on local and regional energy supplies and on requirements for additional capacity.
- The effects of the project on peak and base period demands for electricity and other forms of energy.
- The degree to which the project complies with existing energy standards.
- The effects of the project on energy resources.
- The project's projected transportation energy use requirements and its overall use of efficient transportation alternatives.

4 FUTURE BACKGROUND PROJECTS

This section describes planned improvements to highway, transit, and regional rail facilities within the Project Study Area and the region that would occur whether or not the Project is constructed. These improvements are relevant to the analysis of the No Project Alternative and the project alternatives because they are part of the future regional transportation network within which the Project would be incorporated. These improvements would not be considered reasonably foreseeable consequences of not approving the Project as they would occur whether or not the Project is constructed.

The future background projects include all existing and under-construction highway and transit services and facilities, as well as the transit and highway projects scheduled to be operational by 2045 according to the *Measure R Expenditure Plan* (Metro, 2008), the *Measure M Expenditure Plan* (Metro, 2016), the Southern California Association of Governments (SCAG) *Connect SoCal, 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy* (2020-2045 RTP/SCS) (SCAG, 2020a, 2020b), and the Federal Transportation Improvement Program (FTIP), with the exception of the Sepulveda Transit Corridor Project (Project). The year 2045 was selected as the analysis year for the Project because it was the horizon year of SCAG's adopted RTP/SCS at the time Metro released the NOP for the Project.

4.1 Highway Improvements

The only major highway improvement in the Project Study Area included in the future background projects is the Interstate 405 (I-405) Sepulveda Pass ExpressLanes project (ExpressLanes project). This would include the ExpressLanes project as defined in the *2021 FTIP Technical Appendix, Volume II of III* (SCAG, 2021a), which is expected to provide for the addition of one travel lane in each direction on I-405 between U.S. Highway 101 (US-101) and Interstate 10 (I-10). Metro is currently studying several operational and physical configurations of the ExpressLanes project, which may also be used by commuter or rapid bus services, as are other ExpressLanes in Los Angeles County.

4.2 Transit Improvements

Table 4-1 lists the transit improvements that would be included in the future background projects. This list includes projects scheduled to be operational by 2045 as listed in the *Measure R and Measure M Expenditure Plans* (with the exception of the Project) as well as the Inglewood Transit Connector and LAX APM. In consultation with the Federal Transit Administration, Metro selected 2045 as the analysis year to provide consistency across studies for Measure M transit corridor projects. The Inglewood Transit Connector, a planned automated people mover (APM), which was added to the FTIP with *Consistency Amendment #21-05* in 2021, would also be included in the future background projects (SCAG, 2021b). These projects would also include the Los Angeles International Airport (LAX) APM, currently under construction by Los Angeles World Airports. The APM will extend from a new Consolidated Rent-A-Car Center to the Central Terminal Area of LAX and will include four intermediate stations. In addition, the new Airport Metro Connector Transit Station at Aviation Boulevard and 96th Street will also serve as a direct connection from the Metro K Line and Metro C Line to LAX by connecting with one of the APM stations.

During peak hours, heavy rail transit (HRT) services would generally operate at 4-minute headways (i.e., the time interval between trains traveling in the same direction), and light rail transit (LRT) services would operate at 5- to 6-minute headways. During off-peak hours, HRT services would generally operate at 8-minute headways and LRT services at 10- to 12-minute headways. Bus rapid transit (BRT) services would generally operate at peak headways between 5 and 10 minutes and off-peak headways between

10 and 14 minutes. The Inglewood Transit Connector would operate at a headway of 6 minutes, with more frequent service during major events. The LAX APM would operate at 2-minute headways during peak and off-peak periods.

Table 4-1. Fixed Guideway Transit System in 2045

Transit Line	Mode	Alignment Description[a]
Metro A Line	LRT	Claremont to downtown Long Beach via downtown Los Angeles
Metro B Line	HRT	Union Station to North Hollywood Station
Metro C Line	LRT	Norwalk to Torrance
Metro D Line	HRT	Union Station to Westwood/VA Hospital Station
Metro E Line	LRT	Downtown Santa Monica Station to Lambert Station (Whittier) via downtown Los Angeles
Metro G Line	BRT	Pasadena to Chatsworth[b]
Metro K Line	LRT	Norwalk to Expo/Crenshaw Station
East San Fernando Valley Light Rail Transit Line	LRT	Metrolink Sylmar/San Fernando Station to Metro G Line Van Nuys Station
Southeast Gateway Line	LRT	Union Station to Artesia
North San Fernando Valley Bus Rapid Transit Network Improvements	BRT	North Hollywood to Chatsworth[c]
Vermont Transit Corridor	BRT	Hollywood Boulevard to 120th Street
Inglewood Transit Connector	APM	Market Street/Florence Avenue to Prairie Avenue/Hardy Street
Los Angeles International Airport APM	APM	Aviation Boulevard/96th Street to LAX Central Terminal Area

Source: HTA, 2024

[a]Alignment descriptions reflect the project definition as of the date of the Project's Notice of Preparation (Metro, 2021).

[b]As defined in Metro Board actions of July 2018 and May 2021, the Metro G Line will have an eastern terminus near Pasadena City College and will include aerial stations at Sepulveda Boulevard and Van Nuys Boulevard.

[c]The North San Fernando Valley network improvements are assumed to be as approved by the Metro Board in December 2022.

4.3 Regional Rail Projects

The future background projects would include the Southern California Optimized Rail Expansion (SCORE) program, which is Metrolink's Capital Improvement Program that will upgrade the regional rail system (including grade crossings, stations, and signals) and add tracks as necessary to be ready in time for the 2028 Olympic and Paralympic Games. The SCORE program will also help Metrolink to move toward a zero emissions future. The following SCORE projects planned at Chatsworth and Burbank Stations will upgrade station facilities and allow 30-minute all-day service in each direction by 2045 on the Metrolink Ventura County Line:

1. Chatsworth Station: This SCORE project will include replacing an at-grade crossing and adding a new pedestrian bridge and several track improvements to enable more frequent and reliable service.
2. Burbank Station: This SCORE project will include replacing tracks, adding a new pedestrian crossing, and realigning tracks to achieve more frequency, efficiency, and shorter headways.

In addition, the Link Union Station project will provide improvements to Los Angeles Union Station that will transform the operations of the station by allowing trains to arrive and depart in both directions, rather than having to reverse direction to depart the station. Link Union Station will also prepare Union Station for the arrival of California High-Speed Rail, which will connect Union Station to other regional multimodal transportation hubs such as Hollywood Burbank Airport and the Anaheim Regional Transportation Intermodal Center.

5 NO PROJECT ALTERNATIVE

The only reasonably foreseeable transportation project under the No Project Alternative would be improvements to Metro Line 761, which would continue to serve as the primary transit option through the Sepulveda Pass with peak-period headways of 10 minutes in the peak direction and 15 minutes in the other direction. Metro Line 761 would operate between the Metro E Line Expo/Sepulveda Station and the Metro G Line Van Nuys Station, in coordination with the opening of the East San Fernando Valley Light Rail Transit Line, rather than to its current northern terminus at the Sylmar Metrolink Station.

5.1 Existing Conditions

This section provides a brief discussion of the types of energy resources that would be consumed by construction and operation of the No Project Alternative and how they are produced and distributed to the respective end uses at the state and regional levels. Energy resources involved in the transit system implementation include direct uses such as transportation fuels for locomotives and electricity use at stations and indirect uses such as fuel consumed by regional vehicular travel on the roadway network.

- **Transportation Fuels**. The internal combustion engines of on-road motor vehicles, locomotives, and off-road equipment use fossil fuel (petroleum) energy for propulsion. Gasoline and diesel fuel are formulations of fossil fuels refined for use in various applications. Gasoline is the primary fuel source for most passenger automobiles, and diesel fuel is the primary fuel source for most off-road equipment and medium and heavy-duty trucks.
- **Electricity**. The production of electricity requires the consumption or conversion of other natural resources, whether it be water (hydroelectric power), wind, oil, gas, coal, or solar energy. The delivery of electricity as a utility involves several system components for distribution and use. Electricity is distributed through a network of transmission and distribution lines referred to as a power grid. Energy capacity, or electrical power, is generally measured in watts (W), while energy use is measured in watt-hours (Wh), which is the integral electricity consumption over a time period of 1 hour. On a utility scale, the capacity of electricity generation and amount of consumption is generally described in megawatt (MW) and megawatt-hours (MWh), respectively. For discussions involving regional-scale electricity generation and consumption, the unit of gigawatt-hours (GWh) is used, which is equivalent to 1,000 MWh.

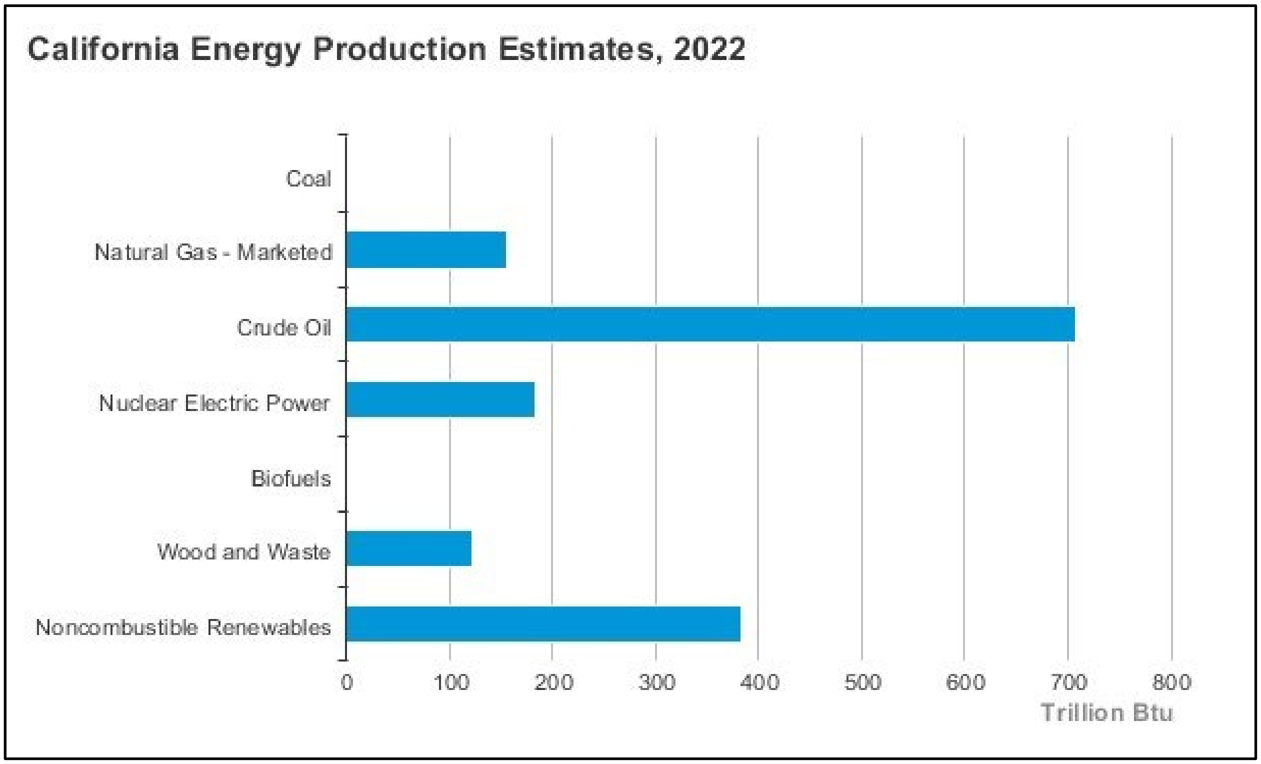
5.1.1 State Energy Resources

California is the most populous state in the nation, has the largest economy, and is second only to Texas in total energy consumption (U.S. Census Bureau, 2021; BEA, 2019a; EIA, 2024b). California also has the world's fifth-largest economy and leads the nation in both agricultural and manufacturing gross domestic product (BEA, 2019b). Despite California's many energy-intensive industries, the state has one of the lowest per-capita energy consumption levels in the United States (EIA, 2023a). California's extensive efforts to increase energy efficiency and implement alternative technologies have slowed growth in energy demand. The state is also rich in energy resources. California is among the nation's top producers of conventional hydroelectric power and is second only to Texas in nonhydroelectric renewable-sourced electricity generation. In addition, California has an abundant supply of crude oil and accounts for one-tenth of the United States crude oil refining capacity.

Energy is produced in California from a diverse portfolio of renewable and non-renewable resources. Figure 5-1 shows that crude oil is the largest source of energy in California, accounting for approximately

708.9 trillion Btu in 2022, which constituted 46 percent of total statewide energy production (EIA, 2024a). To meet state environmental regulations, California refineries are configured to produce cleaner fuels. Refineries in the state often operate at or near maximum capacity because of the high demand for those petroleum products and the lack of interstate pipelines that can deliver them into the state (CEC, 2021a). In 2022, the noncombustible renewable energy resources, including hydroelectric, geothermal, solar, and wind energy, collectively accounted for 383.3 trillion Btu of annual energy production, equal to 24.7 percent of the total statewide resources. Natural gas and nuclear electric power constituted approximately 10 percent and 11.8 percent of statewide production, respectively, and the combination of wood energy and biomass waste energy provided 5.4 percent of production in 2022. Biofuels accounted for 1.5 percent, and coal fueled about 0.1 percent of the in-state, utility-scale net generation, and all of that power was generated at industrial facilities (EIA, 2024b).

Figure 5-1. 2022 Statewide Energy Production Resources



Source: EIA, 2024c

5.1.1.1 Electricity Generation

As of 2022, California is the fourth-largest electricity producer in the nation and accounted for about 5 percent of U.S. utility-scale (1-MW and larger) power generation. Renewable resources, including hydropower and small-scale (less than 1 MW), customer-sited solar photovoltaic systems, supplied more than half of California's total in-state electricity generation, and natural gas-fired power plants provided approximately two-fifths (EIA, 2023b). Nuclear power's share of state generation in 2022 was less than one-tenth, down from nearly one-fifth in 2011. The decrease resulted from the retirement of the San Onofre nuclear power plant in mid-2013, which left the state with only one operating commercial nuclear power plant—the two-reactor Diablo Canyon facility. Overall, California generated approximately 203.4 million MWh of electricity annually in 2022, and the statewide grid provided a net summer capacity of 85,981 MW.

Table 5-1 provides a summary of the annual in-state electricity generation by supply resource during the decade spanning backwards from 2022–2013 in units of GWh. Key trends observed in the data include the ten-fold expansion of solar generation from 3,813.7 GWh in 2013 to 38,789.4 GWh in 2022, as well as a nearly 70 percent decrease in reliance on coal-powered generation from 823.3 GWh in 2013 to 251.6 GWh in 2022.

In 2019, California's in-state electricity net generation from all renewable resources combined was greater than that of any other state, including generation from hydroelectric power and from small-scale, customer-sited solar generation. California is the nation's top producer of electricity from solar, geothermal, and biomass energy. In 2019, the state was also the nation's second-largest producer of electricity from conventional hydroelectric power and the fifth largest from wind energy. California's greatest solar resource is in the state's southeastern deserts, where all of its solar thermal facilities and largest solar PV plants are located. However, solar PV facilities are located throughout the state. By 2019, solar supplied 14 percent of the state's utility-scale electricity net generation; and when small-scale solar generation is added, solar energy provided one-fifth of the state's total net generation. By November 2020, California had about 13,000 MW of utility-scale solar power capacity, more than any other state; when small-scale, customer-sited facilities are included, the state had almost 24,000 MWs of solar capacity. California's Renewables Portfolio Standard was enacted in 2002 and has been revised several times since then. It requires that 33 percent of electricity retail sales in California come from eligible renewable resources by 2020, 60 percent by 2030, and 100 percent by 2045.

Table 5-1. California In-State Electricity Generation Profile 2022–2013 (gigawatt hour(s))

Primary Source	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Battery Storage	-447.6	-154.7	-27.6	-22.6	-22.4	11.5	-4.3	-1.3	-1.1	-1.2
Coal	251.6	294.2	290.3	240.5	281.3	291.1	318.9	297.9	804.8	823.2
Geothermal	11,181.0	11,127.5	11,366.5	10,914.1	11,676.8	11,559.6	11,457.3	11,883.1	12,101.7	12,306.6
Hydroelectric	17,644.1	14,677.6	21,377.5	38,354.8	26,330.7	42,363.1	28,942.1	13,808.5	16,531.3	23,754.6
Natural Gas	96,371.6	97,427.1	92,046.7	85,840.8	89,804.7	88,350.2	97,073.7	116,139.6	120,426.4	119,522.9
Nuclear	17,593.3	16,477.4	16,258.7	16,165.4	18,213.5	17,901.1	18,907.6	18,505.4	16,986.0	17,911.9
Other[a]	643.8	730.6	722.3	787.7	851.1	824.1	670.0	813.0	848.9	817.3
Other Biomass[b]	2,416.6	2,574.4	2,615.1	2,722.6	2,823.8	2,841.0	2,909.9	2,883.7	2,913.3	2,843.2
Other Gas[c]	1,411.5	1,368.9	1,538.0	1,476.2	1,454.0	1,408.3	1,426.8	1,548.6	1,333.0	1,405.7
Petroleum	155.0	77.0	43.9	51.0	68.9	45.8	175.6	84.5	66.3	68.9
Pumped Storage	-155.0	-317.4	-37.1	-30.6	-148.6	407.5	-259.3	112.7	-104.7	196.3
Solar	38,789.4	34,863.9	30,272.6	28,331.5	26,985.2	24,352.9	18,806.7	14,814.4	9,931.8	3,813.7
Wind	14,638.1	15,177.0	13,583.1	13,735.1	14,024.0	12,822.9	13,509.0	12,229.6	12,992.5	12,822.1
Wood	2,890.7	2,841.7	3,033.7	3,217.9	3,122.6	2,967.5	3,029.3	3,584.2	3,977.4	3,792.1
Total Generation	**203,383.9**	**197,165.1**	**193,083.5**	**201,784.2**	**195,465.6**	**206,146.5**	**196,963.2**	**196,703.9**	**198,807.6**	**200,077.1**

Source: EIA, 2024d

[a]"Other" includes non-biogenic municipal solid waste, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, tire-derived fuels, waste heat, and miscellaneous technologies.

[b]"Other Biomass" includes agricultural byproducts, landfill gas, biogenic municipal solid waste, other biomass (solid, liquid, and gas) and sludge waste.

[c]"Other Gas" includes blast furnace gas, and other manufactured and waste gases derived from fossil fuels.

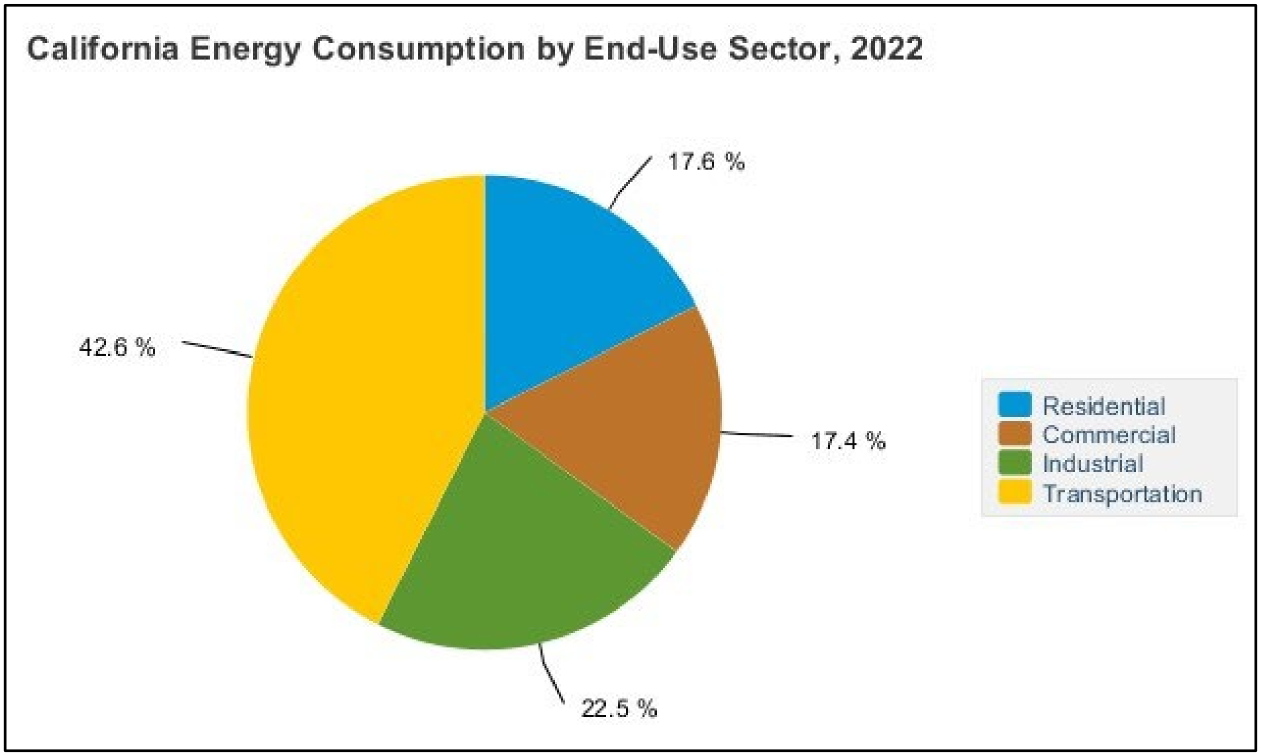
5.1.1.2 Transportation Fuels Supply

As of 2022, California has the sixth-largest share of crude oil reserves among the 50 states and is the seventh-largest crude oil producer (EIA, 2024a). Underground reservoirs along California's Pacific Coast, including in the Los Angeles Basin and those in the state's Central Valley, contain major crude oil reserves. The most prolific oil-producing area in the state is the San Joaquin Basin in the southern half of California's Central Valley. Overall, California's crude oil production has declined steadily since 1985, but the state remains one of the nation's top crude oil producers and accounted for about 4 percent of United States production in 2022 (EIA, 2024a). California ranks third in petroleum refining capacity—after Texas and Louisiana—and accounts for one-tenth of the nation's total. A network of crude oil pipelines connects California's oil production to the state's refining centers, which are located primarily in the Los Angeles area, the San Francisco Bay Area, and the San Joaquin Valley (EIA, 2023b). California refiners also process large volumes of foreign and Alaskan crude oil. As crude oil production in California and Alaska has declined, California refineries have become increasingly dependent on imports from other countries to meet the state's needs. Led by Saudi Arabia, Iraq, Ecuador, and Colombia, foreign suppliers provided more than half of the crude oil refined in California in 2022.

5.1.2 Statewide Use Patterns

Figure 5-2 displays the statewide energy consumption by end use sector for the most recent year of verified data available, 2022 (EIA, 2024b). Overall, the transportation sector accounts for nearly two-fifths of California's end-use energy consumption. Reducing per capita transportation fuels consumption is a pillar of the state’s initiatives to decrease reliance on fossil fuels as the population continues to grow. The industrial sector is the second-largest energy consumer in California and uses almost one-fourth of the State's energy. The commercial sector and the residential sector account for roughly equal amounts of the state's end-use energy consumption, at slightly less than one-fifth each. As previoiusly discussed, California has promulgated a robust regulatory framework to reduce energy consumption across the various end-use sectors.

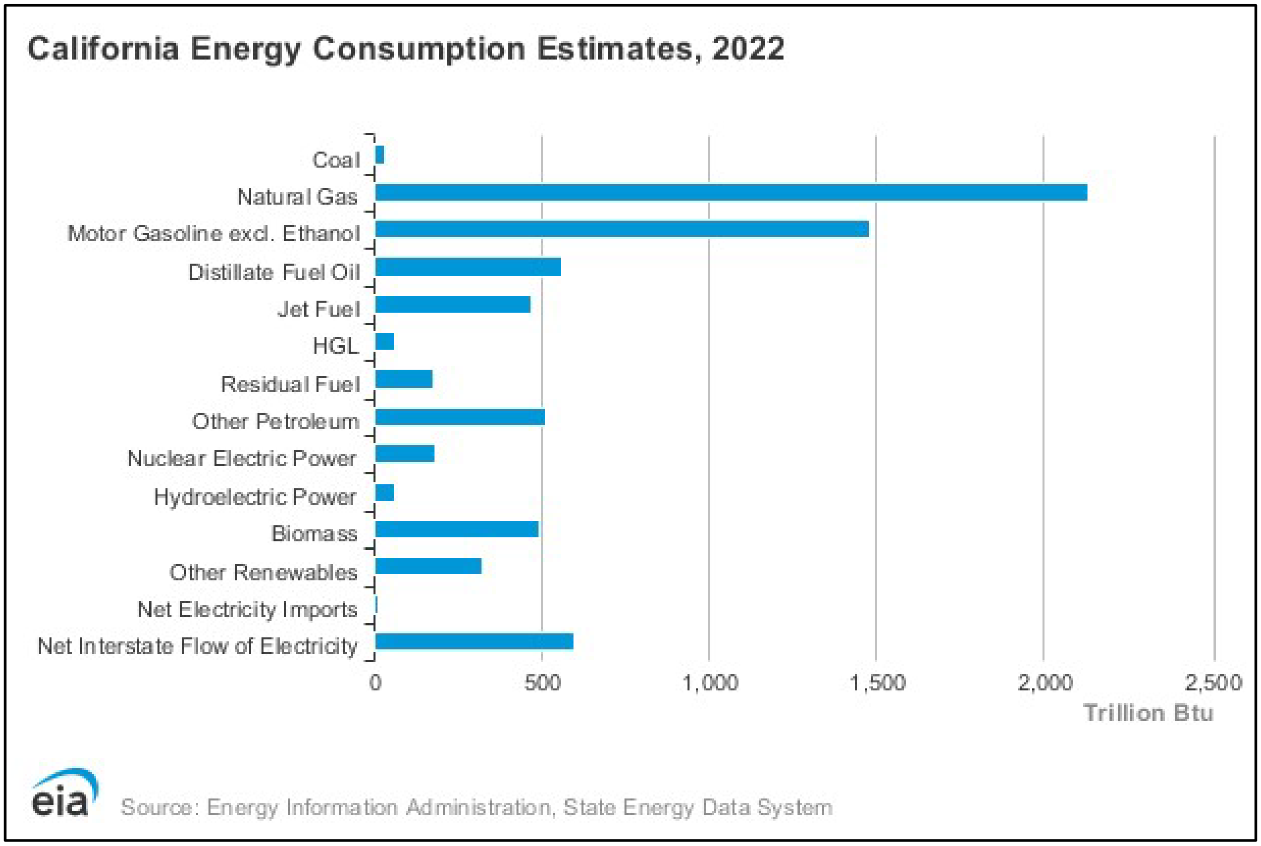
Figure 5-2. Annual Statewide Energy Consumption by End-Use Sector



Source: EIA, 2024b

Figure 5-3 summarizes the 2022 statewide annual energy consumption by resource origin. As mentioned previously, natural gas is the most consumed energy resource in the state, with nearly 10 times as much natural gas used by consumers as is produced by California reserves and processing facilities. Crude oil is refined and distilled to produce motor gasoline, distillate fuel oil, jet fuel, hydrocarbon gas liquids, residual fuel, and other petroleum products. The chart also demonstrates that California has a net import of approximately 600.4 trillion btu of electricity annually.

Figure 5-3. 2022 Annual Statewide Energy Consumption by Source



Source: EIA, 2024a

5.1.2.1 Electricity Consumption

In 2022, California was the nation's largest net importer of electricity from out of state and received about 28 percent of its electricity supply from generating facilities outside the state (EIA, 2024b). California has the second-highest electricity retail sales in the nation, after Texas, but it has the lowest retail sales per capita. The commercial sector accounts for almost half of California's electricity retail sales. The residential sector, where more than one-fourth of California households use electricity for home heating, accounts for more than one-third of sales. Almost all the rest of the state's electricity retail sales are to the industrial sector. A very small amount goes to the transportation sector.

5.1.2.2 Transportation Fuels Consumption

California is the nation's second-largest consumer of petroleum products, after Texas, and accounts for 10 percent of the nation's total consumption. The state is the largest United States consumer of motor gasoline and jet fuel, and 85 percent of the petroleum consumed in California is used in the transportation sector. The industrial sector, the second-largest petroleum-consuming sector, uses 12 percent of the petroleum consumed in the state. The commercial sector accounts for more than 2 percent, and the residential sector consumes less than 1 percent (EIA, 2023a).

5.1.3 Local Energy Resources

The discussion of local energy resources focuses on electricity, natural gas, and petroleum-based transportation fuels (motor gasoline and diesel fuel) supplied to Los Angeles County and the Project

Study Area. This section also summarizes Metro's existing systemwide energy consumption using the most recently published data available (Metro, 2019b).

5.1.3.1 Electricity

The City of Los Angeles Department of Water and Power (LADWP) power system serves approximately 4 million people and is the nation's largest municipal utility. Its service area covers the City of Los Angeles and many areas of the Owens Valley, with annual sales exceeding 26 million MWh. LADWP is a "vertically integrated" utility, both owning and operating the majority of its generation, transmission, and distribution systems. LADWP strives to be self-sufficient in providing electricity to its customers and does so by maintaining generation resources that are equal to or greater than its customers' electrical needs. LADWP's operations are financed solely through sales of water and electric services.

LADWP obtains electricity from various generating resources that utilize coal, nuclear, natural gas, hydroelectric, and renewable resources to generate power. LADWP obtains power from four municipally owned power plants within the Los Angeles Basin, LADWP Hydrogenerators on the Los Angeles Aqueduct, shared ownership generating facilities in the Southwest, and power purchased from the Southwest and Pacific Northwest. LADWP has a power infrastructure comprising a total of 34 generation plants and approximately 3,636 miles of overhead transmission lines spanning five western states. LADWP also purchases excess power, as it is available, from self-generators interconnected with the LADWP within the City of Los Angeles.

According to LADWP's 2022 Power Content Label submitted to the California Energy Commission (CEC), LADWP has a net dependable generation capacity greater than 8,000 MW (LADWP, 2021). On August 31, 2017, LADWP's power system experienced a record instantaneous peak demand of 6,502 MW. As of 2019, approximately 34 percent of LADWP's delivered power mix to customers was derived from renewable resources, which meets and exceeds the statewide target of 33 percent renewably sourced electricity generation by 2020, pending verification by the CEC (LADWP, 2021). The annual LADWP electricity sale to customers for 2019 was approximately 23,402.7 GWh (CEC, 2019).

5.1.3.2 Transportation Fuels

As previously discussed, transportation accounts for nearly 40 percent of the total statewide energy consumption, and petroleum-based fuels currently account for 90 percent of California's transportation energy sources (CEC, 2024a). However, the state is now working on developing flexible strategies to reduce petroleum use, as evidenced by the robust regulatory framework promulgated to enhance energy efficiency and decrease reliance on passenger vehicles and non-renewable resources in general. The CEC predicts that the demand for gasoline will continue to decrease over the next decade, and there will be an increase in the use of alternative fuels, such as natural gas, biofuels, and electricity (CEC, 2018). On September 23, 2020, Governor Gavin Newsom signed Executive Order N-79-20, setting a 100 percent zero emission vehicle (ZEV) target for new passenger vehicle sales by 2035 and a 100 percent zero-emission vehicle operations target for medium- and heavy-duty vehicles in the state by 2045 (CEC, 2021b).

According to CEC fuel sales data, Los Angeles County contained approximately 2,063 transportation fueling stations in 2019 (CEC, 2020b). In the same year, countywide fuel sales comprised approximately 3,559 million gallons of gasoline and 276 million gallons of diesel fuel. By volume, Los Angeles County accounted for approximately 23.2 percent of statewide gasoline sales and approximately 15.7 percent of statewide diesel fuel sales. Despite substantial increases in population (from approximately 9.8 million in 2010 to 10.0 million in 2019), total countywide gasoline fuel sales have remained relatively constant over the course of the past decade, as the CEC estimates approximately 3,658 million gallons of gasoline were sold within Los Angeles County in 2010.

5.1.4 Metro Energy Inventory

Metro’s contribution to regional energy consumption includes on-road vehicle fuel use (primarily compressed natural gas) and electricity for rail vehicle propulsion and maintenance and administrative facility operation. The *2019 Energy and Resource Report* examined Metro’s energy use for the 2019 calendar year and refined estimates prepared by previous analysis (Metro, 2019b).

Table 5-2 presents an overview of the Metro system energy consumption by end use between 2015 and 2019. As of 2019, the Metro system comprised 124,695,827 revenue miles consuming approximately 5,357.3 million megajoules (MJ) of energy per revenue mile, for a total of 6,667.1 million MJ. Overall, Metro system energy consumption has decreased by 6.9 percent during the period from 2015 to 2019. Metro has prioritized generating system energy from alternative fuels in recent years. As of 2019, approximately 30 percent of Metro’s electricity was generated by renewable sources. Metro plans to phase out all directly operated natural gas buses by 2030 to be replaced by ZEVs.

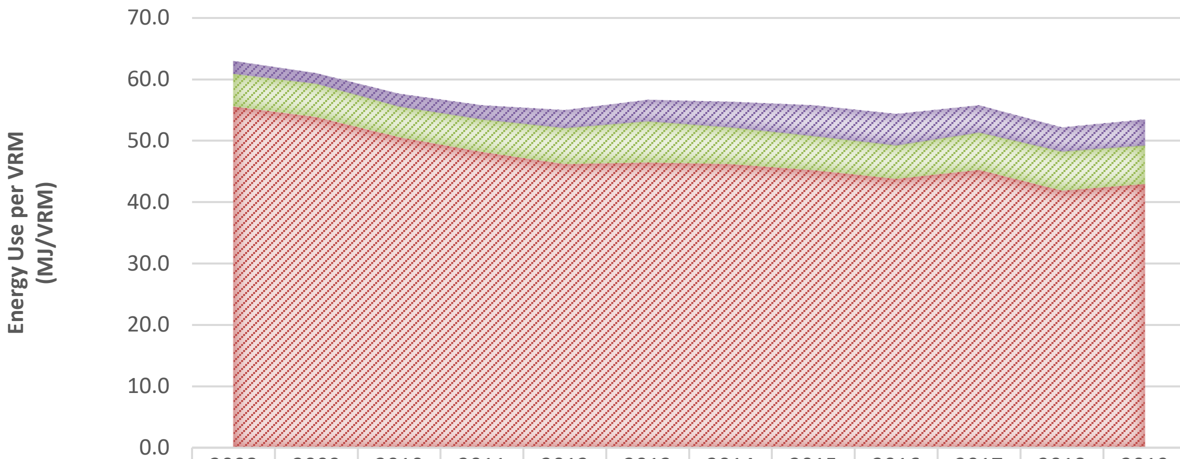
Table 5-2. Metro Operations Annual Energy Consumption (in Megajoules)

End Use	2015	2016	2017	2018	2019
Vehicle Fuel	5,796,786,075	5,644,897,527	5,787,683,879	5,317,489,842	5,357,290,785
Rail Propulsion	719,276,609	711,196,744	775,022,735	817,378,502	781,571,203
Facilities	642,626,521	660,898,312	564,325,336	491,666,179	528,225,942
Total	7,158,689,205	7,016,992,583	7,127,031,949	6,626,534,523	6,667,087,930

Source: Metro, 2019b

The *2019 Energy and Resource Report's* technical appendix also includes data describing Metro system energy use per vehicle revenue mile (VRM) (Metro, 2019b). Examining this data can provide insight as to how Metro is managing its energy resource consumption in relation to the expansion of its service network. Figure 5-4 presents a chart that shows the trend in Metro energy use per VRM over the past 12 years (2008–2019) since the reporting program began. As shown on Figure 5-4, total energy use per VRM decreased from 63.0 MJ/VRM in 2008 to 53.5 MJ/VRM in 2019, representing a 15 percent reduction over the 12-year period. The data demonstrates the efficacy of Metro’s energy efficiency programs to deliver high quality transit options that meet regional growth demands while also conserving energy where possible.

Figure 5-4. Metro Systemwide Energy Use per Vehicle Revenue Mile



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Facilities	2.1	1.7	2.1	2.3	2.9	3.5	4.2	5.0	5.1	4.4	3.9	4.2
Rail Propulsion	5.3	5.4	5.0	5.3	5.9	6.7	6.0	5.6	5.5	6.1	6.4	6.3
Vehicle Fuel	55.6	53.9	50.6	48.2	46.2	46.5	46.2	45.2	43.8	45.3	41.9	43.0

Year

Source: Metro, 2019b

Includes mixed commercial and industrial land uses within the Project Study Area.

5.2 Impact Evaluation

5.2.1 Impact ENG-1: Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

5.2.1.1 Construction Impacts

Under the No Project Alternative, none of the project alternatives would be constructed. As a result, the energy consumption associated with the construction activities, such as the operation of construction equipment, on-road vehicles, and the manufacturing and transport of materials for the Project, would not occur. As no construction related to the Project would take place, there would be no temporary increase in demand for fossil fuels, energy, or other resources associated with construction activities. Therefore, no-construction related energy impacts would occur under the No Project Alternative.

5.2.1.2 Operational Impacts

The No Project Alternative annual vehicle travel energy resource consumption was estimated for two scenarios: No Project Alternative compared to 2045 Without Project Conditions and No Project Alternative compared to Existing Conditions 2021. Under the No Project Alternative, the Project would not be implemented and no new rail transit infrastructure and associated energy consumption would occur. Metro's current energy demand would remain unchanged with planned improvements in the energy efficiency of Metro's facilities and transit services to be implemented consistent with Metro's ECMP.

While no increase in direct energy consumption would result from the No Project Alternative, the No Project Alternative also would not provide the benefit of long-term reductions in regional VMT associated with the project alternatives. The additional bus stops related to Metro Line 761 would not place substantially new demands on energy supply as Metro Line 761 is an existing bus line. The bus line would be operated in accordance with Metro's ECMP and would therefore not be a wasteful, inefficient, or unnecessary energy use.

The No Project Alternative would maintain existing transit service through the year 2045. No new rail transit infrastructure would be built within the Project Study Area aside from projects currently under construction or funded for construction and operation by 2045 via the 2008 Measure R (Metro, 2008) or 2016 Measure M (Metro, 2016) sales taxes. The 2045 Without Project Conditions includes highway and transit projects identified for funding in Metro's Long-Range Transportation Plan (LRTP) (Metro, 2020a) and the Southern California Association of Governments (SCAG) *Connect SoCal, 2024-2050 Regional Transportation Plan/Sustainable Communities Strategy* (2024-2050 RTP/SCS) (SCAG, 2024). It also includes existing projects from the regional base year (2019) and planned regional projects in operation in the horizon year (2045). These existing and future projects would consume energy but have undergone or would undergo project-specific environmental clearance and would implement project-specific mitigation measures, as necessary, to avoid or minimize wasteful, inefficient, or unnecessary energy use.

Table 5-3 presents a summary of the annual vehicle miles traveled (VMT) and energy resource consumption associated with on-road vehicle activity for Existing Conditions (2021) and the 2045 Without Project Conditions. The 2045 Without Project Conditions would result in an 899 percent increase in electricity consumption, a 17 percent decrease in gasoline consumption, a 20 percent increase in diesel fuel consumption, and a 57 percent decrease in natural gas consumption compared to Existing Conditions. Relative to Existing Conditions, the 2045 Without Project Conditions would consume 12,006,139 MWh more electricity, 1,056,617,543 gallons less of gasoline, 216,546,528 gallons more of diesel fuel, and 67,378,887 diesel gallon equivalent (DGE) less natural gas. Using a standardized conversion to million British thermal units (MMBtu) of energy, the No Project Alternative would consume 70,442,694 MMTBU less energy annually than Existing Conditions in 2021. This amount of energy is equivalent to 563,686,062 gallons of motor gasoline per year.

Table 5-3. Annual On-Road Vehicle Travel Energy Resource Consumption for 2045 Without Project Conditions Compared to Existing Conditions (Baseline Year 2021)

Scenario/Parameter	Annual VMT	Electricity (MWh)	Gasoline (gal)	Diesel (gal)	Natural Gas (DGE)
Existing Conditions (2021)	158,533,647,100	1,335,920	6,263,093,314	1,086,863,738	118,752,791
2045 Without Project Conditions	197,289,348,400	13,342,059	5,206,475,771	1,303,410,265	51,373,904
Net Change in Consumption	**38,755,701,300**	**12,006,139**	**-1,056,617,543**	**216,546,528**	**-67,378,887**
Net Change (%)	24.4	898.7	-16.9	19.9	-56.7
Conversion Factor (kBtu/MWh or kBtu/gal)		3,412/MWh	125.0/gal	138.7 /gal	138.7/gal
Annual Energy Consumption (MMBtu)		***40,964,947***	***-132,077,193***	***30,035,003***	***-9,345,452***
Net Annual Energy Consumption (MMBtu)		**-70,422,694**			

Source: HTA, 2024

DGE = diesel gallon equivalents
gal = gallon
kBtu = thousand British thermal units

MMBtu = million British thermal units
MWh = megawatt-hours
VMT = vehicle miles traveled

While Metro Line 761 would consume energy, the bus line would also offset use of petroleum fuels by personal automobiles. The bus line would be operated in accordance with Metro's Energy Conservation and Management Plan and would therefore not be a wasteful, inefficient, or unnecessary energy use. The No Project Alternative would not include the operation of any Project-related facilities or infrastructure. The No Project Alternative would not result in a significant impact related to operational energy consumption. Therefore, the No Project Alternative would result in no impact related to operational energy consumption.

5.2.2 Impact ENG-2: Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

5.2.2.1 Construction Impacts

The No Project Alternative would not include construction of any project components that could interfere with energy plans. Construction activities associated with rerouting Metro Line 761 would involve limited use of power tools in order to install new bus stop infrastructure. However, all construction activities under the No Project Alternative would be consistent with state and local energy plans and policies to reduce energy consumption, because activities would comply with Metro's GCP, the California Green Building Standards Code, and Title 24. Therefore, the No Project Alternative would result in no construction impact related to energy plans.

5.2.2.2 Operational Impacts

The No Project Alternative maintains existing transit service through the year 2045. The only transportation improvement that is reasonably foreseeable within the Project Study Area is the rerouting of Metro Line 761, which would not provide new transit service but would provide a transit connection to the Van Nuys Metrolink Station and the Metro E Line Expo/Sepulveda Station. It is anticipated that Metro Line 761, along with most bus service in the Metro system, would be electrically powered by 2035. No substantial physical change to the environment would occur under the No Project Alternative.

The No Project Alternative would not include operation of Project-related facilities or infrastructure. As of 2017, approximately 30 percent of Metro's electricity is generated by renewable sources, and the seven Metro-owned solar installations around the greater Los Angeles area generated a total of 2,670 MWh. Metro has a goal of 50 percent renewable energy use by 2030. Additionally, Metro operates 11 Leadership in Energy and Environmental Design-certified buildings representing nearly 2 million square feet of floor area. The No Project Alternative would not provide a high-capacity rail transit improvement in the Project Study Area to support regional and local conservation plans in reducing VMT. However, the No Project Alternative also would not interfere with Metro's commitments to improving energy efficiency or expanding its alternative energy infrastructure. The No Project Alternative would result in a less than significant operational impact related to energy plans.

5.3 Mitigation Measures

5.3.1 Construction Impacts

No mitigation measures are required.

5.3.2 Operational Impacts

No mitigation measures are required.

5.3.3 Impacts After Mitigation

No mitigation measures are required; impacts are less than significant.

6 ALTERNATIVE 1

6.1 Alternative Description

Alternative 1 is an entirely aerial monorail alignment that would run along the Interstate 405 (I-405) corridor and would include eight aerial monorail transit (MRT) stations and a new electric bus route from the Los Angeles County Metropolitan Transportation Authority's (Metro) D Line Westwood/VA Hospital Station to the University of California, Los Angeles (UCLA) Gateway Plaza via Wilshire Boulevard and Westwood Boulevard. This alternative would provide transfers to five high-frequency fixed guideway transit and commuter rail lines, including the Metro E, Metro D, and Metro G Lines, the East San Fernando Valley Light Rail Transit Line, and the Metrolink Ventura County Line. The length of the alignment between the terminus stations would be approximately 15.1 miles. The length of the bus route would be 1.5 miles.

The eight aerial MRT stations and three bus stops would be as follows:

1. Metro E Line Expo/Sepulveda Station (aerial)
2. Santa Monica Boulevard Station (aerial)
3. Wilshire Boulevard/Metro D Line Station (aerial)
    a. Wilshire Boulevard/VA Medical Center bus stop
    b. Westwood Village bus stop
    c. UCLA Gateway Plaza bus stop
4. Getty Center Station (aerial)
5. Ventura Boulevard/Sepulveda Boulevard Station (aerial)
6. Metro G Line Sepulveda Station (aerial)
7. Sherman Way Station (aerial)
8. Van Nuys Metrolink Station (aerial)

6.1.1 Operating Characteristics

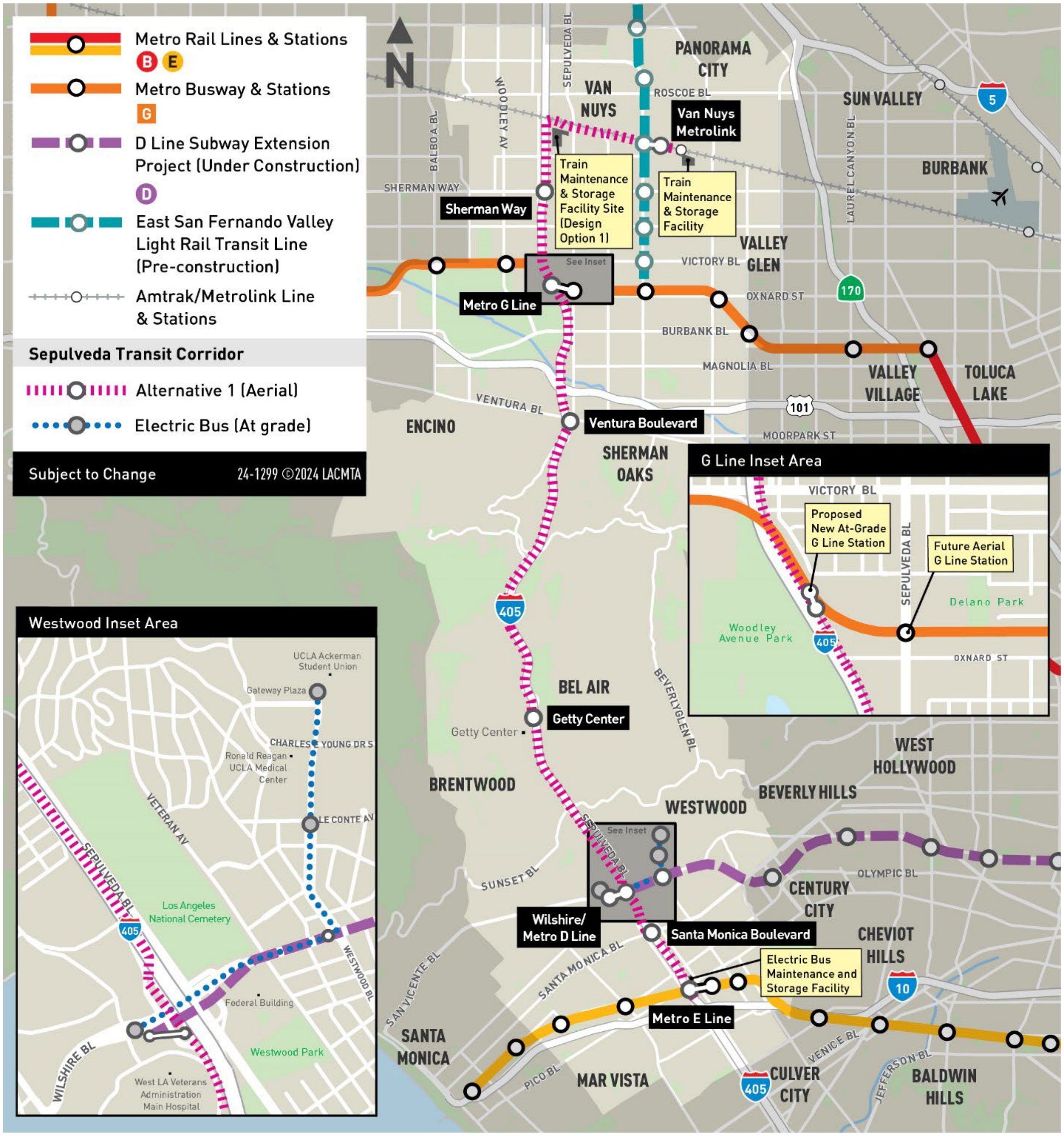
6.1.1.1 Alignment

As shown on Figure 6-1, from its southern terminus at the Metro E Line Expo/Sepulveda Station, the alignment of Alternative 1 would generally follow I-405 to the Los Angeles-San Diego-San Luis Obispo (LOSSAN) rail corridor near the alignment's northern terminus at the Van Nuys Metrolink Station. At several points, the alignment would transition from one side of the freeway to the other or to the median. North of U.S. Highway 101 (US-101), the alignment would be on the east side of the I-405 right-of-way and would then curve eastward along the south side of the LOSSAN rail corridor to Van Nuys Boulevard.

The proposed southern terminus station would be located west of the existing Metro E Line Expo/Sepulveda Station and east of I-405 between Pico Boulevard and Exposition Boulevard. Tail tracks would extend just south of the station adjacent to the eastbound Interstate 10 to northbound I-405 connector over Exposition Boulevard. North of the Metro E Line Expo/Sepulveda Station, a storage track would be located off the main alignment north of Pico Boulevard between I-405 and Cotner Avenue. The alignment would continue north along the east side of I-405 until just south of Santa Monica Boulevard, where a proposed station would be located between the I-405 northbound travel lanes and Cotner Avenue. The alignment would cross over the northbound and southbound freeway lanes north of Santa Monica Boulevard and travel along the west side of I-405, before reaching a proposed station within the

I-405 southbound-to-eastbound loop off-ramp to Wilshire Boulevard, near the Metro D Line Westwood/VA Hospital Station.

Figure 6-1. Alternative 1: Alignment



Source: LASRE, 2024; HTA, 2024

An electric bus would serve as a shuttle between the Wilshire Boulevard/Metro D Line Station and UCLA Gateway Plaza. From the Wilshire Boulevard/Metro D Line Station, the bus would travel east on Wilshire Boulevard and turn north on Westwood Boulevard to UCLA Gateway Plaza and make an intermediate stop in Westwood Village near the intersection of Le Conte Avenue and Westwood Boulevard.

North of Wilshire Boulevard, the monorail alignment would transition over the southbound I-405 freeway lanes to the freeway median, where it would continue north over the Sunset Boulevard overcrossing. The alignment would remain in the median to Getty Center Drive, where it would cross over the southbound freeway lanes to the west side of I-405, just north of the Getty Center Drive undercrossing, to the proposed Getty Center Station located north of the Getty Center tram station. The alignment would return to the median for a short distance before curving back to the west side of I-405, south of the Sepulveda Boulevard undercrossing north of the Getty Center Drive interchange. After crossing over Bel Air Crest Road and Skirball Center Drive, the alignment would return to the median and run under the Mulholland Drive Bridge, then continue north within the I-405 median to descend into the San Fernando Valley (Valley).

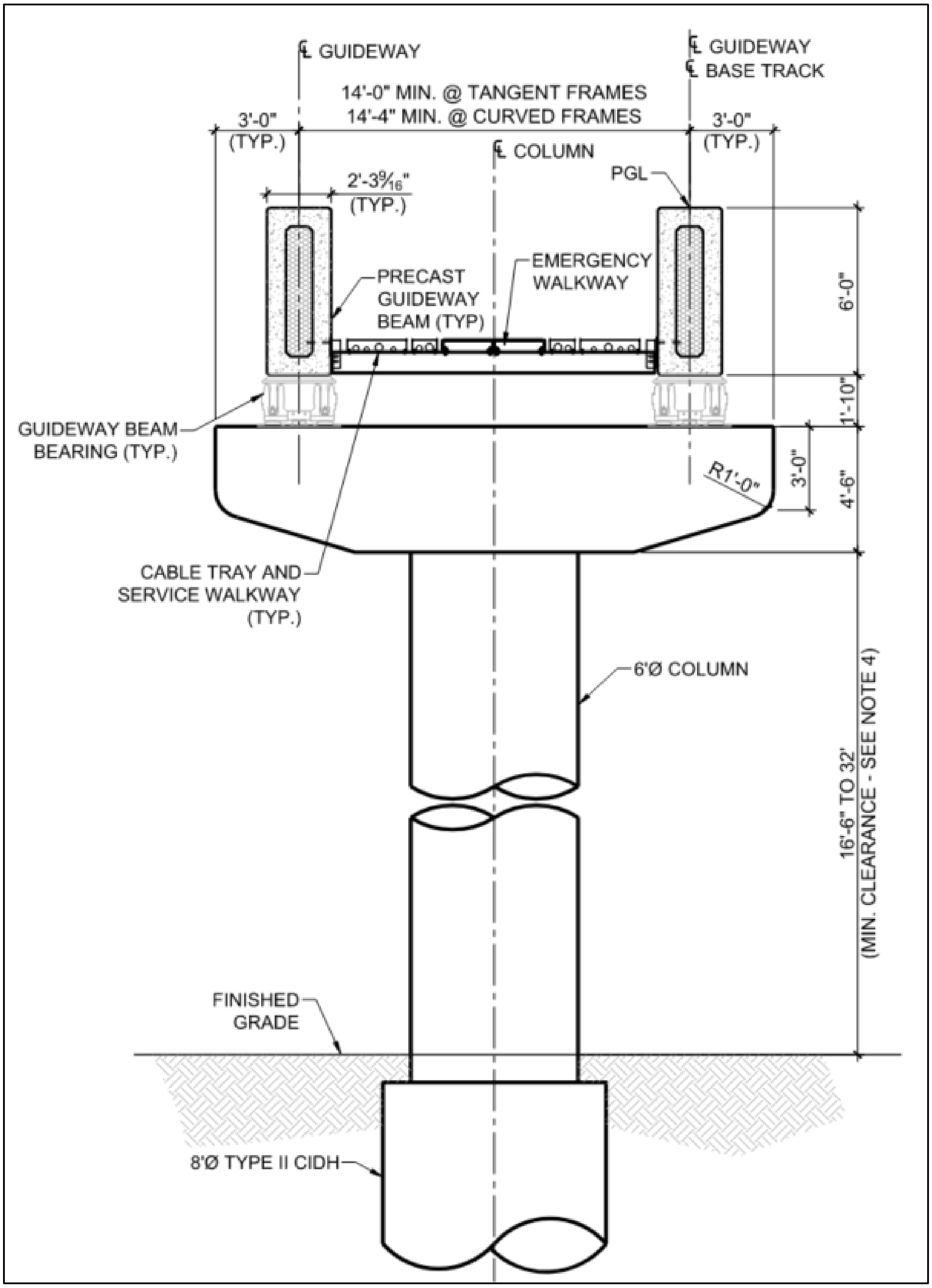
Near Greenleaf Street, the alignment would cross over the northbound freeway lanes and northbound on-ramps toward the proposed Ventura Boulevard Station on the east side of I-405. This station would be located above a transit plaza and would replace an existing segment of Dickens Street adjacent to I-405, just south of Ventura Boulevard. Immediately north of the Ventura Boulevard Station, the alignment would cross over northbound I-405 to the US-101 connector and continue north between the connector and the I-405 northbound travel lanes. The alignment would continue north along the east side of I-405—crossing over US-101 and the Los Angeles River—to a proposed station on the east side of I-405 near the Metro G Line Busway. A new at-grade station on the Metro G Line would be constructed for Alternative 1 adjacent to the proposed monorail station. These proposed stations are shown on the Metro G Line inset area on Figure 6-1.

The alignment would then continue north along the east side of I-405 to the proposed Sherman Way Station. The station would be located inside the I-405 northbound loop off-ramp to Sherman Way. North of the station, the alignment would continue along the eastern edge of I-405, then curve to the southeast parallel to the LOSSAN rail corridor. The alignment would remain aerial along Raymer Street east of Sepulveda Boulevard and cross over Van Nuys Boulevard to the proposed terminus station adjacent to the Van Nuys Metrolink/Amtrak Station. Overhead utilities along Raymer Street would be undergrounded where they would conflict with the guideway or its supporting columns. Tail tracks would be located southeast of this terminus station.

6.1.1.2 Guideway Characteristics

The monorail alignment of Alternative 1 would be entirely aerial, utilizing straddle-beam monorail technology, which allows the monorail vehicle to straddle a guide beam that both supports and guides the vehicle. Northbound and southbound trains would travel on parallel beams supported by either a single-column or a straddle-bent structure. Figure 6-2 shows a typical cross-section of the aerial monorail guideway.

Figure 6-2. Typical Monorail Guideway Cross-Section

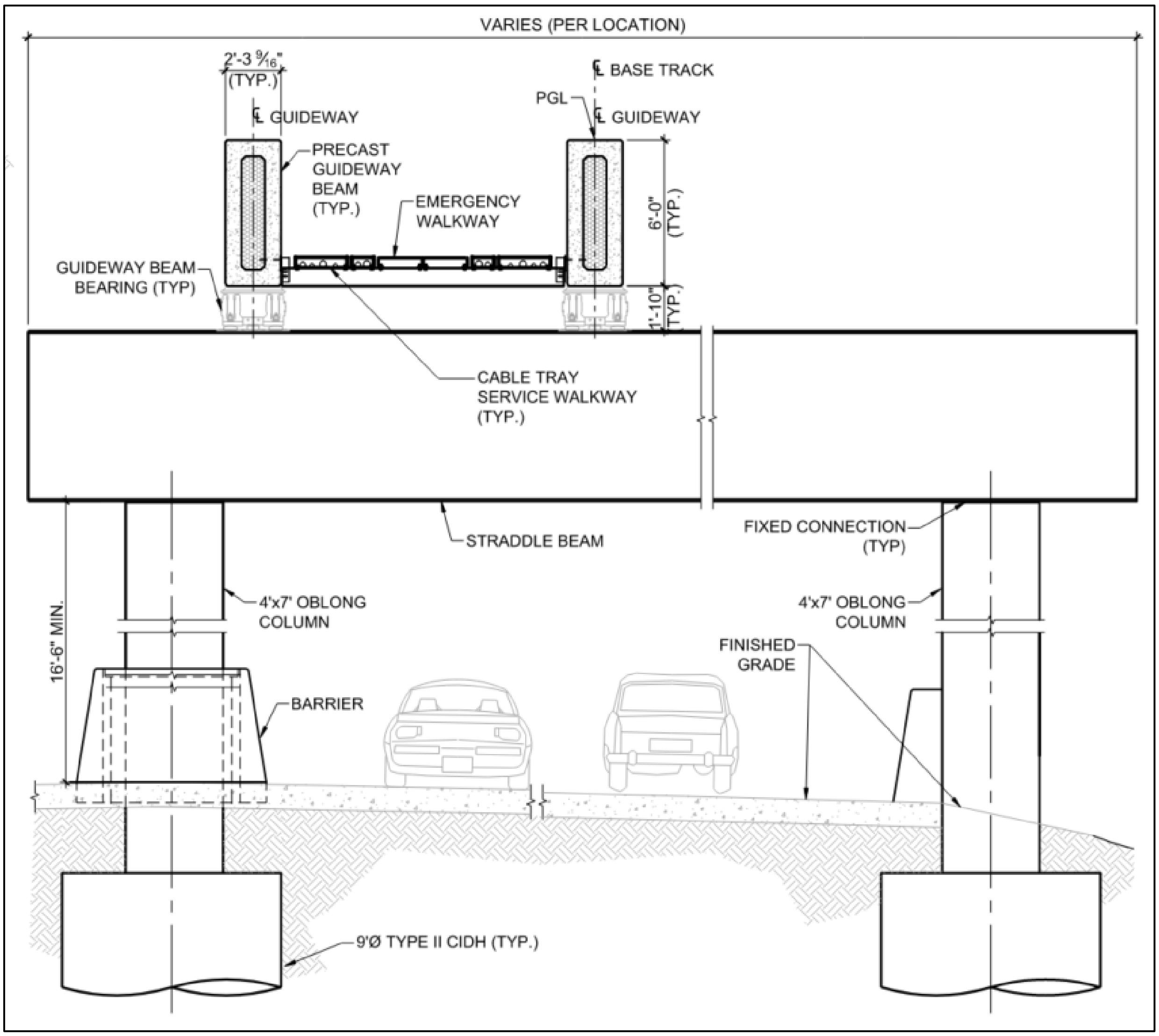


Source: LASRE, 2024

On a typical guideway section (i.e., not at a station), guide beams would rest on 20-foot-wide column caps (i.e., the structure connecting the columns and the guide beams), with typical spans (i.e., the distance between columns) ranging from 70 to 190 feet. The bottom of the column caps would typically be between 16.5 feet and 32 feet above ground level.

Over certain segments of roadway and freeway facilities, a straddle-bent configuration, as shown on Figure 6-3, consisting of two concrete columns constructed outside of the underlying roadway would be used to support the guide beams and column cap. Typical spans for these structures would range between 65 and 70 feet. A minimum 16.5-foot clearance would be maintained between the underlying roadway and the bottom of the column caps.

Figure 6-3. Typical Monorail Straddle-Bent Cross-Section



Source: LASRE, 2024

Structural support columns would vary in size and arrangement by alignment location. Columns would be 6 feet in diameter along main alignment segments adjacent to I-405 and be 4 feet wide by 6 feet long in the I-405 median. Straddle-bent columns would be 4 feet wide by 7 feet long. At stations, six rows of dual 5-foot by- 8-foot columns would support the aerial guideway. Beam switch locations and long-span structures would also utilize different sized columns, with dual 5-foot columns supporting switch locations and 9-foot- or 10-foot-diameter columns supporting long-span structures. Crash protection barriers would be used to protect the columns. Columns would have a cast-in-drilled-hole (CIDH) pile foundation extending 1 foot in diameter beyond the column width with varying depths for appropriate geotechnical considerations and structural support.

6.1.1.3 Vehicle Technology

Alternative 1 would utilize straddle-beam monorail technology, which allows the monorail vehicle to straddle a guide beam that both supports and guides the vehicle. Rubber tires would sit both atop and on each side of the guide beam to provide traction and guide the train. Trains would be automated and powered by power rails mounted to the guide beam, with planned peak-period headways of 166 seconds and off-peak-period headways of 5 minutes. Monorail trains could consist of up to eight cars. Alternative 1 would have a maximum operating speed of 56 miles per hour; actual operating speeds would depend on the design of the guideway and distance between stations.

Monorail train cars would be 10.5 feet wide, with two double doors on each side. End cars would be 46.1 feet long with a design capacity of 97 passengers, and intermediate cars would be 35.8 feet long and have a design capacity of 90 passengers.

The electric bus connecting the Wilshire Boulevard/Metro D Line Station, Westwood Village, and UCLA Gateway Plaza would be a battery electric, low-floor transit bus, either 40 or 60 feet in length. The buses would run with headways of 2 minutes during peak periods. The electric bus service would operate in existing mixed-flow travel lanes.

6.1.1.4 Stations

Alternative 1 would include eight aerial MRT stations with platforms approximately 320 feet long, elevated 50 feet to 75 feet above the existing ground level. The Metro E Line Expo/Sepulveda, Santa Monica Boulevard, Ventura Boulevard/Sepulveda Boulevard, Sherman Way, and Van Nuys Metrolink Stations would be center-platform stations where passengers would travel up to a shared platform that would serve both directions of travel. The Wilshire Boulevard/Metro D Line, Getty Center, and Metro G Line Sepulveda Stations would be side-platform stations where passengers would select and travel up to one of two station platforms, depending on their direction of travel. Each station, regardless of whether it has side or center platforms, would include a concourse level prior to reaching the train platforms. Each station would have a minimum of two elevators, two escalators, and one stairway from ground level to the concourse.

Station platforms would be approximately 320 feet long and would be supported by six rows of dual 5-foot by 8-foot columns. Station platforms would be covered, but not enclosed. Side-platform stations would be 61.5 feet wide to accommodate two 13-foot-wide station platforms with a 35.5-foot-wide intermediate gap for side-by-side trains. Center-platform stations would be 49 feet wide, with a 25-foot-wide center platform.

Monorail stations would include automatic, bi-parting fixed doors along the edges of station platforms. These doors would be integrated into the automatic train control system and would not open unless a train is stopped at the platform.

The following information describes each station, with relevant entrance, walkway, and transfer information. Bicycle parking would be provided at each station.

Metro E Line Expo/Sepulveda Station

- This aerial station would be located near the existing Metro E Line Expo/Sepulveda Station, just east of I-405 between Pico Boulevard and Exposition Boulevard.
- A transit plaza and station entrance would be located on the east side of the station.
- An off-street passenger pick-up/drop-off loop would be located south of Pico Boulevard west of Cotner Avenue.
- An elevated pedestrian walkway would connect the concourse level of the proposed station to the Metro E Line Expo/Sepulveda Station within the fare paid zone.
- Passengers would be able to park at the existing Metro E Line Expo/Sepulveda Station parking facility, which provides 260 parking spaces. No additional automobile parking would be provided at the proposed station.

Santa Monica Boulevard Station

- This aerial station would be located just south of Santa Monica Boulevard, between the I-405 northbound travel lanes and Cotner Avenue.
- Station entrances would be located on the southeast and southwest corners of Santa Monica Boulevard and Cotner Avenue. The entrance on the southeast corner of the intersection would be connected to the station concourse level via an elevated pedestrian walkway spanning Cotner Avenue.
- No dedicated station parking would be provided at this station.

Wilshire Boulevard/Metro D Line Station

- This aerial station would be located west of I-405 and south of Wilshire Boulevard within the southbound I-405 loop off-ramp to eastbound Wilshire Boulevard.
- An elevated pedestrian walkway spanning the adjacent I-405 ramps would connect the concourse level of the proposed station to a station plaza adjacent to the Metro D Line Westwood/VA Hospital Station within the fare paid zone. The station plaza would be the only entrance to the proposed station.
- The station plaza would include an electric bus stop and provide access to the Metro D Line Station via a new station entrance and concourse constructed using a knock-out panel provided in the Metro D Line Station.
- The passenger pick-up/drop-off facility at the Metro D Line Station would be reconfigured, maintaining the original capacity.
- No dedicated station parking would be provided at this station.

Getty Center Station

- This aerial station would be located on the west side of I-405 near the Getty Center, approximately 1,000 feet north of the Getty Center tram station.
- An elevated pedestrian walkway would connect the concourse level of the proposed station to the Getty Center tram station. The proposed connection would occur outside the fare paid zone.
- The pedestrian walkway would provide the only entrance to the proposed station.

- No dedicated station parking would be provided at this station.

Ventura Boulevard/Sepulveda Boulevard Station

- This aerial station would be located east of I-405, just south of Ventura Boulevard.
- A transit plaza, including two station entrances, would be located on the east side of the station. The plaza would require the closure of a 0.1-mile segment of Dickens Street between Sepulveda Boulevard and Ventura Boulevard, with a passenger pick-up/drop-off loop and bus stops provided south of the station, off Sepulveda Boulevard.
- No dedicated station parking would be provided at this station.

Metro G Line Sepulveda Station

- This aerial station would be located near the Metro G Line Sepulveda Station, between I-405 and the Metro G Line Busway.
- Entrances to the MRT station would be located on both sides of a proposed new Metro G Line bus rapid transit (BRT) station.
- An elevated pedestrian walkway would connect the concourse level of the proposed station to the proposed new Metro G Line BRT station outside of the fare paid zone.
- Passengers would be able to park at the existing Metro G Line Sepulveda Station parking facility, which has a capacity of 1,205 parking spaces. Currently, only 260 parking spaces are used for transit parking. No additional automobile parking would be provided at the proposed station.

Sherman Way Station

- This aerial station would be located inside the I-405 northbound loop off-ramp to Sherman Way.
- A station entrance would be located on the north side of Sherman Way.
- An on-street passenger pick-up/drop-off area would be provided on the north side of Sherman Way west of Firmament Avenue.
- No dedicated station parking would be provided at this station.

Van Nuys Metrolink Station

- This aerial station would be located on the east side of Van Nuys Boulevard, just south of the LOSSAN rail corridor, incorporating the site of the current Amtrak ticket office.
- A station entrance would be located on the east side of Van Nuys Boulevard just south of the LOSSAN rail corridor. A second entrance would be located north of the LOSSAN rail corridor with an elevated pedestrian walkway connecting to both the concourse level of the proposed station and the platform of the Van Nuys Metrolink/Amtrak Station.
- Existing Metrolink station parking would be reconfigured, maintaining approximately the same number of spaces, but 180 parking spaces would be relocated north of the LOSSAN rail corridor. Metrolink parking would not be available to Metro transit riders.

6.1.1.5 Station-to-Station Travel Times

Table 6-1 presents the station-to-station distance and travel times for Alternative 1. The travel times include both run time and dwell time. Dwell time is 30 seconds per station. Northbound and southbound travel times vary slightly because of grade differentials and operational considerations at end-of-line stations.

Table 6-1. Alternative 1: Station-to-Station Travel Times and Station Dwell Times

From Station	To Station	Distance (miles)	Northbound Station-to-Station Travel Time (seconds)	Southbound Station-to-Station Travel Time (seconds)	Dwell Time (seconds)
Metro E Line Station					*30*
Metro E Line	Santa Monica Boulevard	0.9	122	98	—
Santa Monica Boulevard Station					*30*
Santa Monica Boulevard	Wilshire/Metro D Line	0.7	99	104	—
Wilshire/Metro D Line Station					*30*
Wilshire/Metro D Line	Getty Center	2.9	263	266	—
Getty Center Station					*30*
Getty Center	Ventura Boulevard	4.7	419	418	—
Ventura Boulevard Station					*30*
Ventura Boulevard	Metro G Line	2.0	177	184	—
Metro G Line Station					*30*
Metro G Line	Sherman Way	1.5	135	134	—
Sherman Way Station					*30*
Sherman Way	Van Nuys Metrolink	2.4	284	284	—
Van Nuys Metrolink Station					*30*

Source: LASRE, 2024

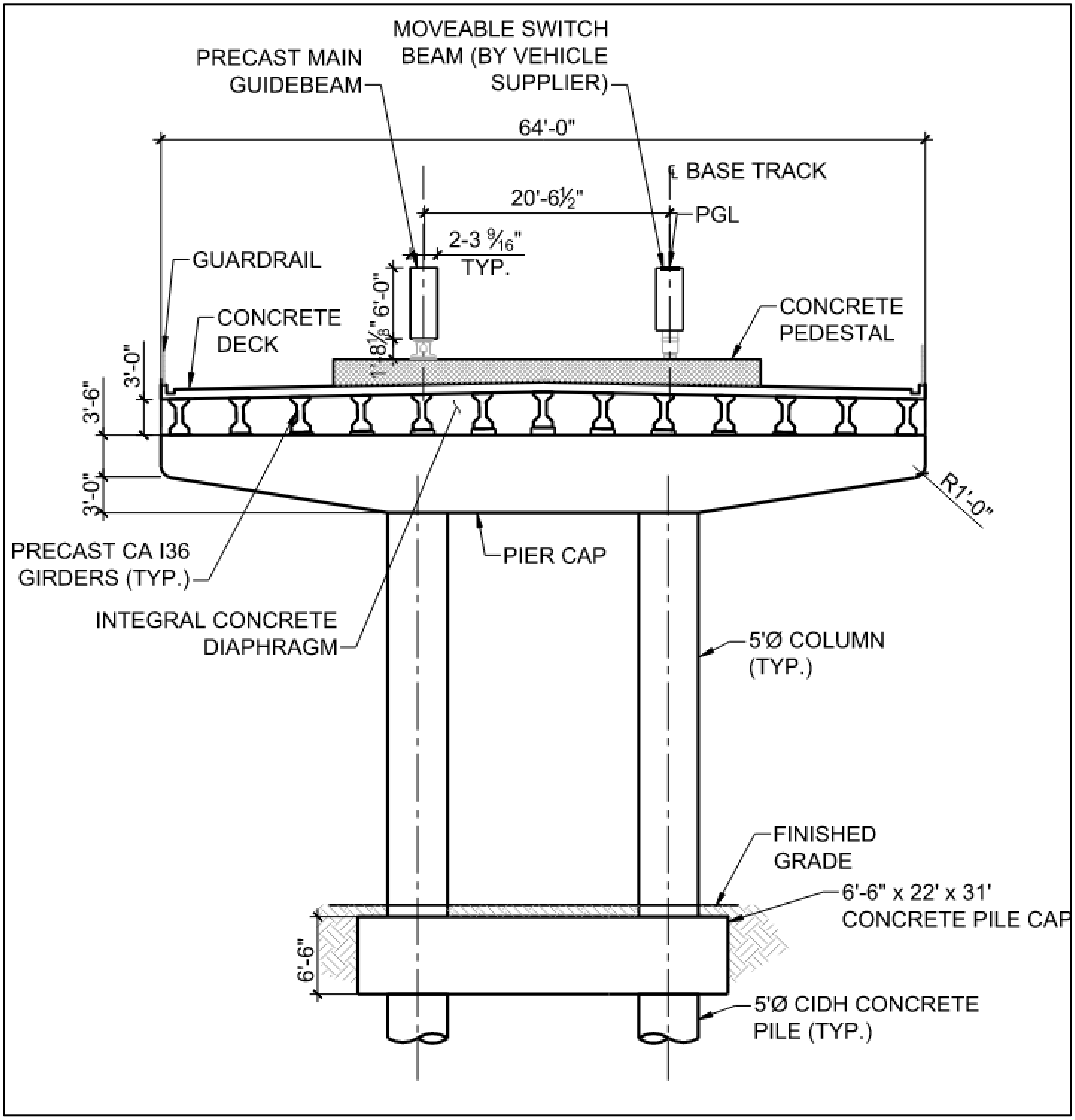
— = no data

6.1.1.6 Special Trackwork

Alternative 1 would include five pairs of beam switches to enable trains to cross over to the opposite beam. From south to north, the first pair of beam switches would be located just north of the Metro E Line Expo/Sepulveda Station. The second pair of beam switches would be located near the Wilshire Boulevard/Metro D Line Station on the north side of Wilshire Boulevard, within the Wilshire Boulevard westbound to I-405 southbound loop on-ramp. A third pair of beam switches would be located in the Sepulveda Pass just south of Mountaingate Drive and Sepulveda Boulevard. A fourth pair of beam switches would be located south of the Metro G Line Station between the I-405 northbound lanes and the Metro G Line Busway. The final pair would be located near the Van Nuys Metrolink Station.

At beam switch locations, the typical cross-section of the guideway would increase in column and column cap width. The column cap at these locations would be 64 feet wide, with dual 5-foot-diameter columns. Underground pile caps for additional structural support would also be required at beam switch locations. Figure 6-4 shows a typical cross-section of the monorail beam switch.

Figure 6-4. Typical Monorail Beam Switch Cross-Section



Source: LASRE, 2024

6.1.1.7 Monorail Maintenance and Storage Facility

MSF Base Design

In the maintenance and storage facility (MSF) Base Design for Alternative 1, the MSF would be located on City of Los Angeles Department of Water and Power (LADWP) property east of the Van Nuys Metrolink Station. The MSF Base Design site would be approximately 18 acres and would be designed to accommodate a fleet of 208 monorail vehicles. The site would be bounded by the LOSSAN rail corridor to the north, Saticoy Street to the south, and property lines extending north of Tyrone and Hazeltine Avenues to the east and west, respectively.

Monorail trains would access the site from the main alignment's northern tail tracks at the northwest corner of the site. Trains would travel parallel to the LOSSAN rail corridor before curving southeast to maintenance facilities and storage tracks. The guideway would remain in an aerial configuration within the MSF Base Design, including within maintenance facilities.

The site would include the following facilities:

- Primary entrance with guard shack
- Primary maintenance building that would include administrative offices, an operations control center, and a maintenance shop and office
- Train car wash building
- Emergency generator
- Traction power substation (TPSS)
- Maintenance-of-way (MOW) building
- Parking area for employees

MSF Design Option 1

In the MSF Design Option 1, the MSF would be located on industrial property, abutting Orion Avenue, south of the LOSSAN rail corridor. The MSF Design Option 1 site would be approximately 26 acres and would be designed to accommodate a fleet of 224 monorail vehicles. The site would be bounded by I-405 to the west, Stagg Street to the south, the LOSSAN rail corridor to the north, and Orion Avenue and Raymer Street to the east. The monorail guideway would travel along the northern edge of the site.

Monorail trains would access the site from the monorail guideway east of Sepulveda Boulevard, requiring additional property east of Sepulveda Boulevard and north of Raymer Street. From the northeast corner of the site, trains would travel parallel to the LOSSAN rail corridor before turning south to maintenance facilities and storage tracks parallel to I-405. The guideway would remain in an aerial configuration within the MSF Design Option 1, including within maintenance facilities.

The site would include the following facilities:

- Primary entrance with guard shack
- Primary maintenance building that would include administrative offices, an operations control center, and a maintenance shop and office
- Train car wash building
- Emergency generator
- TPSS
- MOW building
- Parking area for employees

Figure 6-5 shows the locations of the MSF Base Design and MSF Design Option 1 for Alternative 1.

Figure 6-5. Alternative 1: Maintenance and Storage Facility Options

Source: LASRE, 2024; HTA, 2024

6.1.1.8 Electric Bus Maintenance and Storage Facility

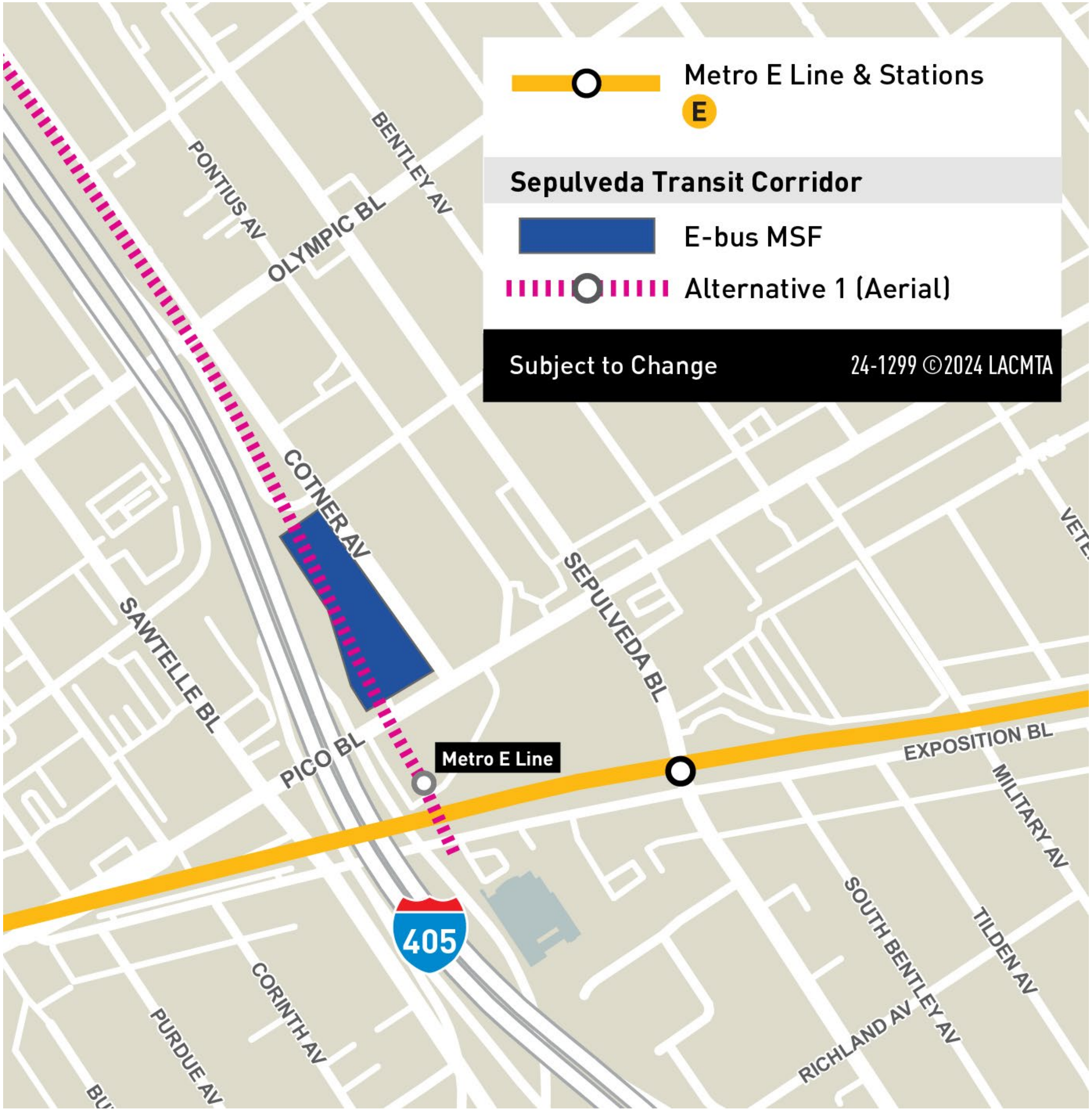
An electric bus MSF would be located on the northwest corner of Pico Boulevard and Cotner Avenue and would be designed to accommodate 14 electric buses. The site would be approximately 2 acres and would comprise six parcels bounded by Cotner Avenue to the east, I-405 to the west, Pico Boulevard to the south, and the I-405 northbound on-ramp to the north.

The site would include approximately 45,000 square feet of buildings and include the following facilities:

- Maintenance shop and bay
- Maintenance office
- Operations center
- Bus charging equipment
- Parts storeroom with service areas
- Parking area for employees

Figure 6-6 shows the location of the proposed electric bus MSF.

Figure 6-6. Alternative 1: Electric Bus Maintenance and Storage Facility



Source: LASRE, 2024; HTA, 2024

6.1.1.9 Traction Power Substations

TPSSs transform and convert high voltage alternating current supplied from power utility feeders into direct current suitable for transit operation. A TPSS on a site of approximately 8,000 square feet would be located approximately every 1 mile along the alignment. Table 6-2 lists the TPSS locations proposed for Alternative 1.

Figure 6-7 shows the TPSS locations along the Alternative 1 alignment.

Table 6-2. Alternative 1: Traction Power Substation Locations

TPSS No.	TPSS Location Description	Configuration
1	TPSS 1 would be located east of I-405, just south of Exposition Boulevard and the monorail guideway tail tracks.	At-grade
2	TPSS 2 would be located west of I-405, just north of Wilshire Boulevard, inside the Westbound Wilshire Boulevard to I-405 Southbound Loop On-Ramp.	At-grade
3	TPSS 3 would be located west of I-405, just north of Sunset Boulevard, inside the Church Lane to I-405 Southbound Loop On-Ramp.	At-grade
4	TPSS 4 would be located east of I-405 and Sepulveda Boulevard, just north of the Getty Center Station.	At-grade
5	TPSS 5 would be located west of I-405, just east of the intersection between Promontory Road and Sepulveda Boulevard.	At-grade
6	TPSS 6 would be located between I-405 and Sepulveda Boulevard, just north of the Skirball Center Drive Overpass.	At-grade
7	TPSS 7 would be located east of I-405, just south of Ventura Boulevard Station, between Sepulveda Boulevard and Dickens Street.	At-grade
8	TPSS 8 would be located east of I-405, just south of the Metro G Line Sepulveda Station.	At-grade
9	TPSS 9 would be located east of I-405, just east of the Sherman Way Station, inside the I-405 Northbound Loop Off-Ramp to Sherman Way westbound.	At-grade
10	TPSS 10 would be located east of I-405, at the southeast quadrant of the I-405 overcrossing with the LOSSAN rail corridor.	At-grade
11	TPSS 11 would be located east of I-405, at the southeast quadrant of the I-405 overcrossing with the LOSSAN rail corridor.	At-grade (within MSF Design Option)
12	TPSS 12 would be located between Van Nuys Boulevard and Raymer Street, south of the LOSSAN rail corridor.	At-grade
13	TPSS 13 would be located south of the LOSSAN rail corridor, between Tyrone Avenue and Hazeltine Avenue.	At-grade (within MSF Base Design)

Source: LASRE, 2024; HTA, 2024

Figure 6-7. Alternative 1: Traction Power Substation Locations

Source: LASRE, 2024; HTA, 2024

6.1.1.10 Roadway Configuration Changes

Table 6-3 lists the roadway changes necessary to accommodate the guideway of Alternative 1. Figure 6-8 shows the location of these roadway changes in the Sepulveda Transit Corridor Project (Project) Study Area, except for I-405 configuration changes, which would occur throughout the corridor.

Table 6-3. Alternative 1: Roadway Changes

Location	From	To	Description of Change
Cotner Avenue	Nebraska Avenue	Santa Monica Boulevard	Roadway realignment to accommodate aerial guideway columns and station access
Beloit Avenue	Massachusetts Avenue	Ohio Avenue	Roadway narrowing to accommodate aerial guideway columns
I-405 Southbound On-Ramp, Southbound Off-Ramp, and Northbound On-Ramp at Wilshire Boulevard	Wilshire Boulevard	I-405	Ramp realignment to accommodate aerial guideway columns and I-405 widening
Sunset Boulevard	Gunston Drive	I-405 Northbound Off-Ramp at Sunset Boulevard	Removal of direct eastbound to southbound on-ramp to accommodate aerial guideway columns and I-405 widening. Widening of Sunset Boulevard bridge with additional westbound lane
I-405 Southbound On-Ramp and Off-Ramp at Sunset Boulevard and North Church Lane	Sunset Boulevard	Not Applicable	Ramp realignment to accommodate aerial guideway columns and I-405 widening
I-405 Northbound On-Ramp and Off-Ramp at Sepulveda Boulevard near I-405 Exit 59	Sepulveda Boulevard near I-405 Northbound Exit 59	Sepulveda Boulevard / I-405 Undercrossing (near Getty Center)	Ramp realignment to accommodate aerial guideway columns and I-405 widening
Sepulveda Boulevard	I-405 Southbound Skirball Center Drive Ramps (north of Mountaingate Drive)	Skirball Center Drive	Roadway realignment into existing hillside to accommodate aerial guideway columns and I-405 widening
I-405 Northbound On-Ramp at Mulholland Drive	Mulholland Drive	Not Applicable	Roadway realignment into the existing hillside between the Mulholland Drive Bridge pier and abutment to accommodate aerial guideway columns and I-405 widening
Dickens Street	Sepulveda Boulevard	Ventura Boulevard	Vacation and permanent removal of street for Ventura Boulevard Station construction. Pick-up/drop-off area would be provided along Sepulveda Boulevard at the truncated Dickens Street
Sherman Way	Haskell Avenue	Firmament Avenue	Median improvements, passenger drop-off and pick-up areas, and bus pads within existing travel lanes
Raymer Street	Sepulveda Boulevard	Van Nuys Boulevard	Curb extensions and narrowing of roadway width to accommodate aerial guideway columns
I-405	Sunset Boulevard	Bel Terrace	I-405 widening to accommodate aerial guideway columns in the median

Location	From	To	Description of Change
I-405	Sepulveda Boulevard Northbound Off-Ramp (Getty Center Drive interchange)	Sepulveda Boulevard Northbound On-Ramp (Getty Center Drive interchange)	I-405 widening to accommodate aerial guideway columns in the median
I-405	Skirball Center Drive	I-405 Northbound On-Ramp at Mulholland Drive	I-405 widening to accommodate aerial guideway columns in the median

Source: LASRE, 2024; HTA, 2024

Figure 6-8. Alternative 1: Roadway Changes

Source: LASRE, 2024; HTA, 2024

In addition to the changes made to accommodate the guideway, as listed in Table 6-3, roadways and sidewalks near stations would be reconstructed, which would result in modifications to curb ramps and driveways.

6.1.1.11 Fire/Life Safety – Emergency Egress

Continuous emergency evacuation walkways would be provided along the guideway. The walkways would typically consist of structural steel frames anchored to the guideway beams to support non-slip walkway panels. The walkways would be located between the two guideway beams for most of the alignment; however, where the beams split apart, such as entering center-platform stations, short portions of the walkway would be located on the outside of the beams.

6.1.2 Construction Activities

Construction activities for Alternative 1 would include constructing the aerial guideway and stations, widening I-405, and constructing ancillary facilities. Construction of the transit through substantial completion is expected to have a duration of 6½ years. Early works, such as site preparation, demolition, and utility relocation, could start in advance of construction of the transit facilities.

Aerial guideway construction would begin at the southern and northern ends of the alignment and connect in the middle. Constructing the guideway would require a combination of freeway and local street lane closures throughout the work limits to provide sufficient work area. The first stage of I-405 widening would include a narrowing of adjacent freeway lanes to a minimum width of 11 feet (which would eliminate shoulders) and placing K-rail on the outside edge of the travel lanes to create outside work areas. Within these outside work zones, retaining walls, drainage infrastructure, and outer pavement widenings would be constructed to allow for I-405 widening. The reconstruction of on- and off-ramps would be the final stage of I-405 widening.

A median work zone along I-405 for the length of the alignment would be required for erection of the guideway structure. In the median work zone, demolition of the existing median and drainage infrastructure would be followed by the installation of new K-rail and installation of guideway structural components, which would include full directional freeway closures when guideway beams must be transported into the median work areas during late-night hours. Additional night and weekend directional closures would be required for installation of long-span structures over I-405 travel lanes where the guideway would transition from the median.

Aerial station construction is anticipated to last the duration of construction activities for Alternative 1 and would include the following general sequence of construction:

- Site clearing
- Utility relocation
- Construction fencing and rough grading
- CIDH pile drilling and installation
- Transport of casting items and materials from other locations to onsite staging areas
- Elevator pit excavation
- Soil and material removal
- Pile cap and pier column construction
- Concourse level and platform level falsework for cast-in-place structural concrete
- Guideway beam installation
- Elevator and escalator installation
- Completion of remaining concrete elements such as pedestrian bridges
- Architectural finishes and mechanical, electrical, and plumbing installation

Alternative 1 would require construction of a concrete casting facility for columns and beams associated with the elevated guideway. A specific site has not been identified; however, it is expected that the facility would be located on industrially zoned land adjacent to a truck route in either the Antelope Valley or Riverside County. When a site is identified, the contractor would obtain all permits and approvals necessary from the relevant jurisdiction, the appropriate air quality management entity, and other regulatory entities.

TPSS construction would require additional lane closures. Large equipment including transformers, rectifiers, and switchgears would be delivered and installed through prefabricated modules where possible in at-grade TPSSs. The installation of transformers would require temporary lane closures on Exposition Boulevard, Beloit Avenue, Sepulveda Boulevard just north of Cashmere Street, and the I-405 northbound on-ramp at Burbank Boulevard.

Table 6-4 and Figure 6-9 show the potential construction staging areas for Alternative 1. Staging areas would provide the necessary space for the following activities:

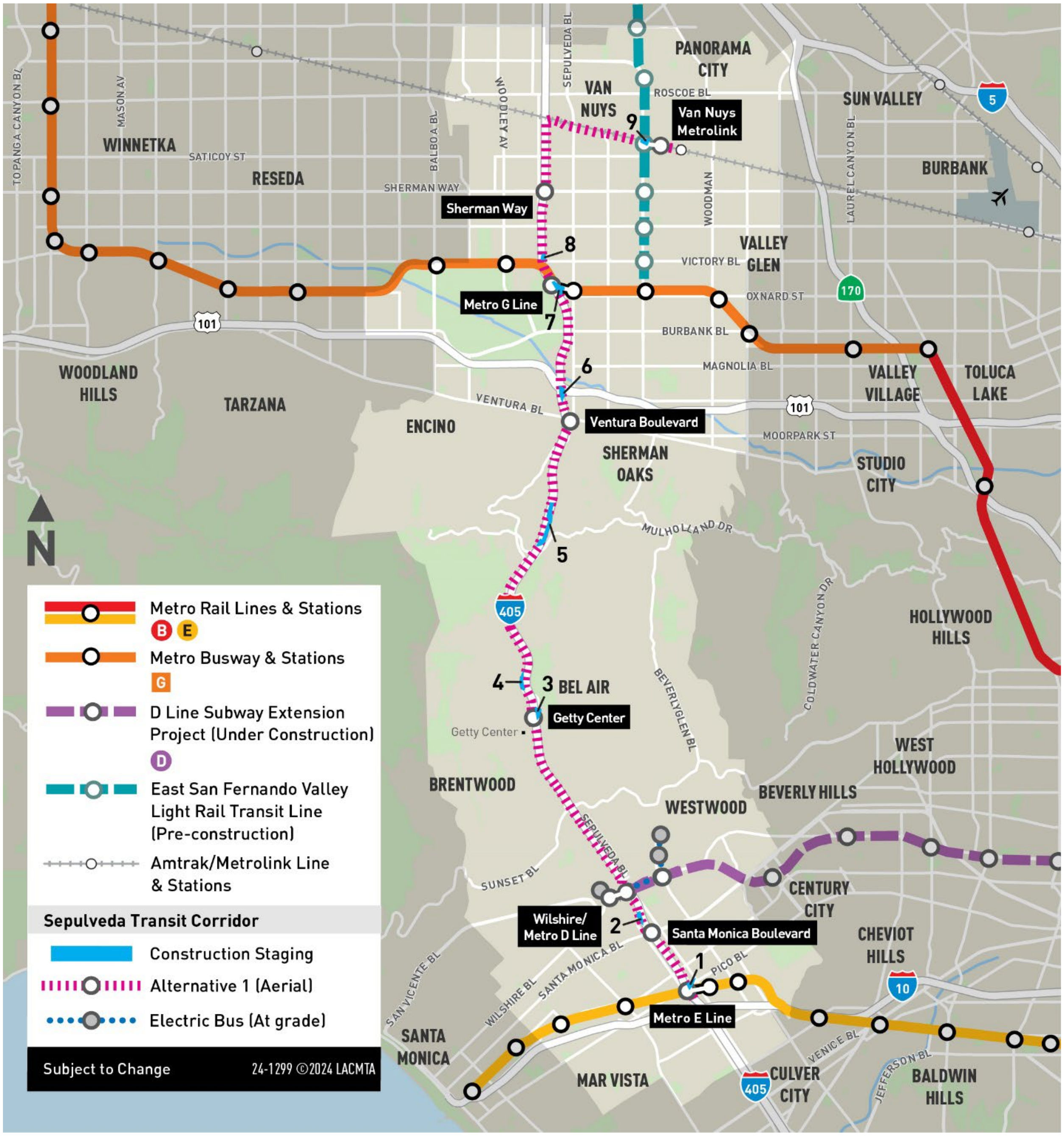
- Contractors' equipment
- Receiving deliveries
- Storing materials
- Site offices
- Work zone for excavation
- Other construction activities (including parking and change facilities for workers, location of construction office trailers, storage, staging and delivery of construction materials and permanent plant equipment, and maintenance of construction equipment)

Table 6-4. Alternative 1: Construction Staging Locations

No.	Location Description
1	Public Storage between Pico Boulevard and Exposition Boulevard, east of I-405
2	South of Dowlen Drive and east of Greater LA Fisher House
3	At 1400 N Sepulveda Boulevard
4	At 1760 N Sepulveda Boulevard
5	East of I-405 and north of Mulholland Drive Bridge
6	Inside of I-405 Northbound to US-101 Northbound Loop Connector, south of US-101
7	ElectroRent Building south of Metro G Line Busway, east of I-405
8	Inside the I-405 Northbound Loop Off-Ramp at Victory Boulevard
9	Along Cabrito Road east of Van Nuys Boulevard

Source: LASRE, 2024; HTA, 2024

Figure 6-9. Alternative 1: Construction Staging Locations



Source: LASRE, 2024; HTA, 2024

6.2 Existing Conditions

This section provides a brief discussion of the types of energy resources that would be consumed by construction and operation of Alternative 1 and how they are produced and distributed to the respective end uses at the state and regional levels. Energy resources involved in the transit system implementation include direct uses, such as transportation fuels for locomotives and electricity use at stations, and indirect uses such as fuel consumed by regional vehicular travel on the roadway network.

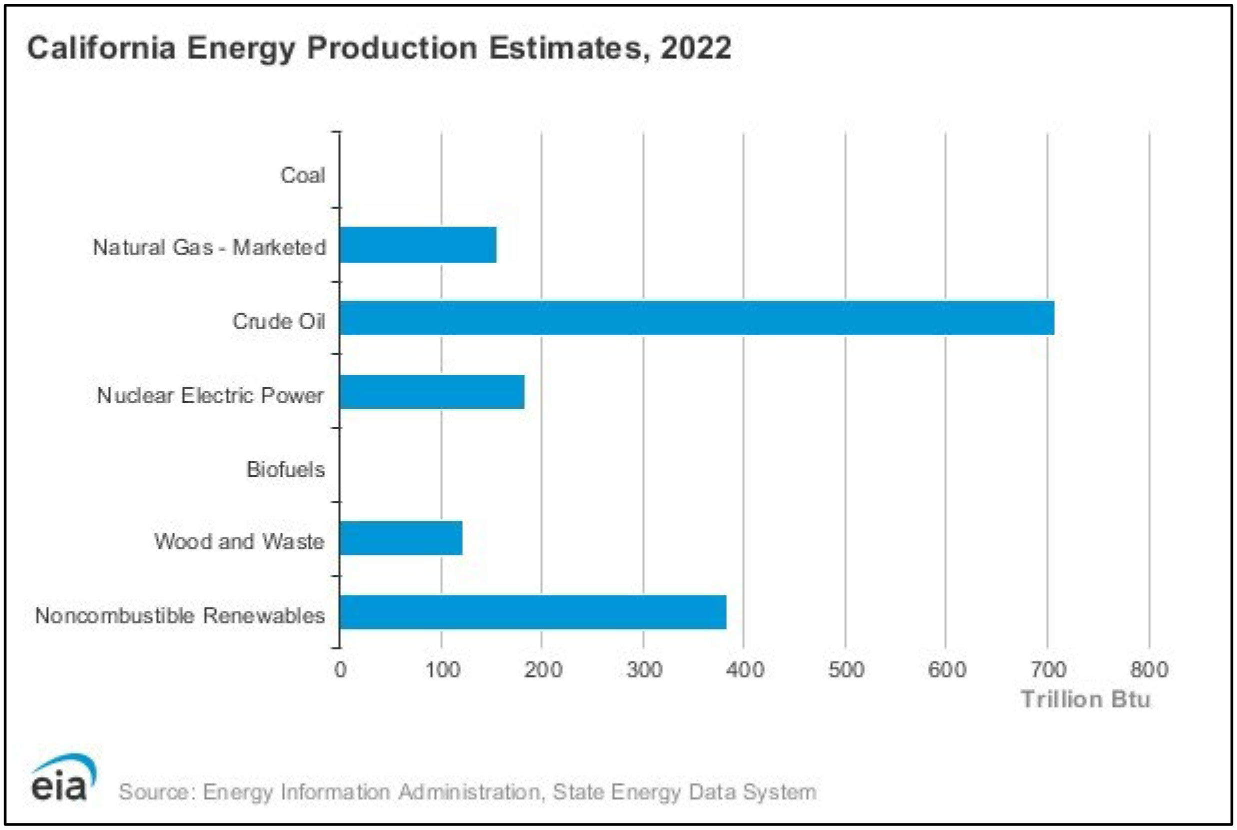
- **Transportation Fuels**. The internal combustion engines of on-road motor vehicles, locomotives, and off-road equipment use fossil fuel (petroleum) energy for propulsion. Gasoline and diesel fuel are formulations of fossil fuels refined for use in various applications. Gasoline is the primary fuel source for most passenger automobiles, and diesel fuel is the primary fuel source for most off-road equipment and medium and heavy-duty trucks. The analyses presented in this report also disclose electricity and natural gas consumption associated with on-road vehicle activity.
- **Electricity**. The production of electricity requires the consumption or conversion of other natural resources, whether it be water (hydroelectric power), wind, oil, gas, coal, or solar energy. The delivery of electricity as a utility involves several system components for distribution and use. Electricity is distributed through a network of transmission and distribution lines referred to as a power grid. Energy capacity, or electrical power, is generally measured in watts (W), while energy use is measured in watt-hours (Wh), which is the integral electricity consumption over a time period of 1 hour. On a utility scale, the capacity of electricity generation and amount of consumption is generally described in megawatt (MW) and megawatt-hours (MWh), respectively. For discussions involving regional scale electricity generation and consumption, units of gigawatt-hours (GWh) are used, which is equivalent to 1,000 MWh.

6.2.1 State Energy Resources

California is the most populous state in the nation, has the largest economy, and is second only to Texas in total energy consumption (U.S. Census Bureau, 2021; BEA, 2019a; EIA, 2024b. California also has the world's fifth-largest economy and leads the nation in both agricultural and manufacturing gross domestic product (BEA, 2019b). Despite California's many energy-intensive industries, the state has one of the lowest per capita energy consumption levels in the United States (EIA, 2023a). California's extensive efforts to increase energy efficiency and implement alternative technologies have slowed growth in energy demand. The state is also rich in energy resources. California is among the nation's top producers of conventional hydroelectric power and is second only to Texas in nonhydroelectric renewable-sourced electricity generation. In addition, California has an abundant supply of crude oil and accounts for one-tenth of the United States crude oil refining capacity.

Energy is produced in California from a diverse portfolio of renewable and non-renewable resources. Figure 6-10 shows that crude oil is the largest source of energy in California, accounting for approximately 708.9 trillion Btu in 2022, which constituted 46 percent of total statewide energy production (EIA, 2024a). To meet state environmental regulations, California refineries are configured to produce cleaner fuels. Refineries in the state often operate at or near maximum capacity because of the high demand for those petroleum products and the lack of interstate pipelines that can deliver them into the state (CEC, 2021b). In 2022, the noncombustible renewable energy resources, including hydroelectric, geothermal, solar, and wind energy, collectively accounted for 383.3 trillion Btu of annual energy production, equal to 24.7 percent of the total statewide resources. Natural gas and nuclear electric power constituted approximately 10 percent and 11.8 percent of statewide production, respectively, and the combination of wood energy and biomass waste energy provided 5.4 percent of production in 2022. Biofuels accounted for 1.5 percent, and coal fueled about 0.1 percent of the in-state, utility-scale net generation, and all of that power was generated at industrial facilities (EIA, 2024b).

Figure 6-10. 2022 Statewide Energy Production Resources



Source: EIA, 2024a

6.2.1.1 Electricity Generation

As of 2022, California is the fourth-largest electricity producer in the nation and accounted for about 5 percent of U.S. utility-scale (1-MW and larger) power generation. Renewable resources, including hydropower and small-scale (less than 1 MW), customer-sited solar photovoltaic (PV) systems, supplied more than half of California's total in-state electricity generation, and natural gas-fired power plants provided approximately two-fifths (EIA, 2024b). Nuclear power's share of state generation in 2022 was less than one-tenth, down from nearly one-fifth in 2011. The decrease resulted from the retirement of the San Onofre nuclear power plant in mid-2013, which left the state with only one operating commercial nuclear power plant—the two-reactor Diablo Canyon facility. Overall, California generated approximately 203.4 million MWh of electricity annually in 2022, and the statewide grid provided a net summer capacity of 85,981 MW.

Table 6-5 provides a summary of the annual in-state electricity generation by supply resource during the decade spanning backwards from 2022–2013 in units of GWh. Key trends observed in the data include the ten-fold expansion of solar generation from 3,813.7 GWh in 2013 to 38,789.4 GWh in 2022, as well as a nearly 70 percent decrease in reliance on coal-powered generation from 823.3 GWh in 2013 to 251.6 GWh in 2022.

Table 6-5. California In-State Electricity Generation Profile 2022–2013 (gigawatt hour(s))

Primary Source	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Battery Storage	-447.6	-154.7	-27.6	-22.6	-22.4	11.5	-4.3	-1.3	-1.1	-1.2
Coal	251.6	294.2	290.3	240.5	281.3	291.1	318.9	297.9	804.8	823.2
Geothermal	11,181.0	11,127.5	11,366.5	10,914.1	11,676.8	11,559.6	11,457.3	11,883.1	12,101.7	12,306.6
Hydroelectric	17,644.1	14,677.6	21,377.5	38,354.8	26,330.7	42,363.1	28,942.1	13,808.5	16,531.3	23,754.6
Natural Gas	96,371.6	97,427.1	92,046.7	85,840.8	89,804.7	88,350.2	97,073.7	116,139.6	120,426.4	119,522.9
Nuclear	17,593.3	16,477.4	16,258.7	16,165.4	18,213.5	17,901.1	18,907.6	18,505.4	16,986.0	17,911.9
Other[a]	643.8	730.6	722.3	787.7	851.1	824.1	670.0	813.0	848.9	817.3
Other Biomass[b]	2,416.6	2,574.4	2,615.1	2,722.6	2,823.8	2,841.0	2,909.9	2,883.7	2,913.3	2,843.2
Other Gas[c]	1,411.5	1,368.9	1,538.0	1,476.2	1,454.0	1,408.3	1,426.8	1,548.6	1,333.0	1,405.7
Petroleum	155.0	77.0	43.9	51.0	68.9	45.8	175.6	84.5	66.3	68.9
Pumped Storage	-155.0	-317.4	-37.1	-30.6	-148.6	407.5	-259.3	112.7	-104.7	196.3
Solar	38,789.4	34,863.9	30,272.6	28,331.5	26,985.2	24,352.9	18,806.7	14,814.4	9,931.8	3,813.7
Wind	14,638.1	15,177.0	13,583.1	13,735.1	14,024.0	12,822.9	13,509.0	12,229.6	12,992.5	12,822.1
Wood	2,890.7	2,841.7	3,033.7	3,217.9	3,122.6	2,967.5	3,029.3	3,584.2	3,977.4	3,792.1
Total Generation	**203,383.9**	**197,165.1**	**193,083.5**	**201,784.2**	**195,465.6**	**206,146.5**	**196,963.2**	**196,703.9**	**198,807.6**	**200,077.1**

Source: EIA, 2024b

[a]"Other" includes non-biogenic municipal solid waste, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, tire-derived fuels, waste heat, and miscellaneous technologies.

[b]"Other Biomass" includes agricultural byproducts, landfill gas, biogenic municipal solid waste, other biomass (solid, liquid, and gas) and sludge waste.

[c]"Other Gas" includes blast furnace gas, and other manufactured and waste gases derived from fossil fuels.

In 2019, California's in-state electricity net generation from all renewable resources combined was greater than that of any other state, including generation from hydroelectric power and from small-scale, customer-sited solar generation. California is the nation's top producer of electricity from solar, geothermal, and biomass energy. In 2019, the state was also the nation's second-largest producer of electricity from conventional hydroelectric power and the fifth largest from wind energy. California's greatest solar resource is in the state's southeastern deserts, where all of its solar thermal facilities and largest solar PV plants are located. However, solar PV facilities are located throughout the state. By 2019, solar supplied 14 percent of the state's utility-scale electricity net generation; and when small-scale solar generation is added, solar energy provided one-fifth of the state's total net generation. By November 2020, California had about 13,000 MW of utility-scale solar power capacity, more than any other state; when small-scale, customer-sited facilities are included, the state had almost 24,000 MWs of solar capacity. California's Renewables Portfolio Standard was enacted in 2002 and has been revised several times since then. It requires that 33 percent of electricity retail sales in California come from eligible renewable resources by 2020, 60 percent by 2030, and 100 percent by 2045.

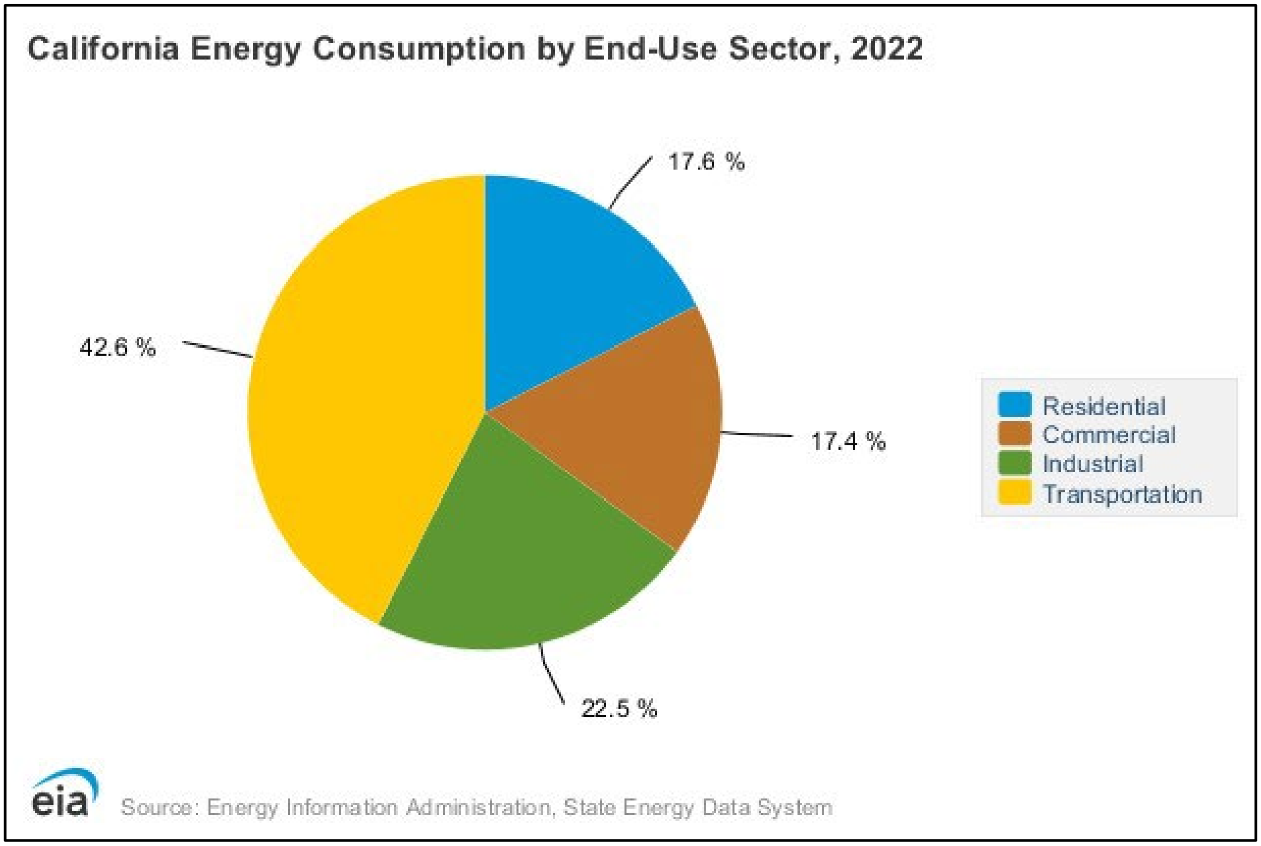
6.2.1.2 Transportation Fuels Supply

As of 2022, California has the sixth-largest share of crude oil reserves among the 50 states and is the seventh-largest crude oil producer (EIA, 2024a). Underground reservoirs along California's Pacific Coast, including in the Los Angeles Basin and those in the state's Central Valley, contain major crude oil reserves. The most prolific oil-producing area in the state is the San Joaquin Basin in the southern half of California's Central Valley. Overall, California's crude oil production has declined steadily since 1985, but the state remains one of the nation's top crude oil producers and accounted for about 4 percent of United States production in 2022 (EIA, 2024a). California ranks third in petroleum refining capacity—after Texas and Louisiana—and accounts for one-tenth of the nation's total. A network of crude oil pipelines connects California's oil production to the state's refining centers, which are located primarily in the Los Angeles area, the San Francisco Bay Area, and the San Joaquin Valley (EIA, 2023b). California refiners also process large volumes of foreign and Alaskan crude oil. As crude oil production in California and Alaska has declined, California refineries have become increasingly dependent on imports from other countries to meet the state's needs. Led by Saudi Arabia, Iraq, Ecuador, and Colombia, foreign suppliers provided more than half of the crude oil refined in California in 2022.

6.2.2 Statewide Use Patterns

Figure 6-11 displays the statewide energy consumption by end use sector for the most recent year of verified data available, 2022 (EIA, 2024b). Overall, the transportation sector accounts for nearly two-fifths of California's end-use energy consumption. Reducing per capita transportation fuels consumption is a pillar of the state’s initiatives to decrease reliance on fossil fuels as the population continues to grow. The industrial sector is the second-largest energy consumer in California and uses almost one-fourth of the state's energy. The commercial sector and the residential sector account for roughly equal amounts of the state's end-use energy consumption, at slightly less than one-fifth each. As previously discussed, California has promulgated a robust regulatory framework to reduce energy consumption across the various end-use sectors.

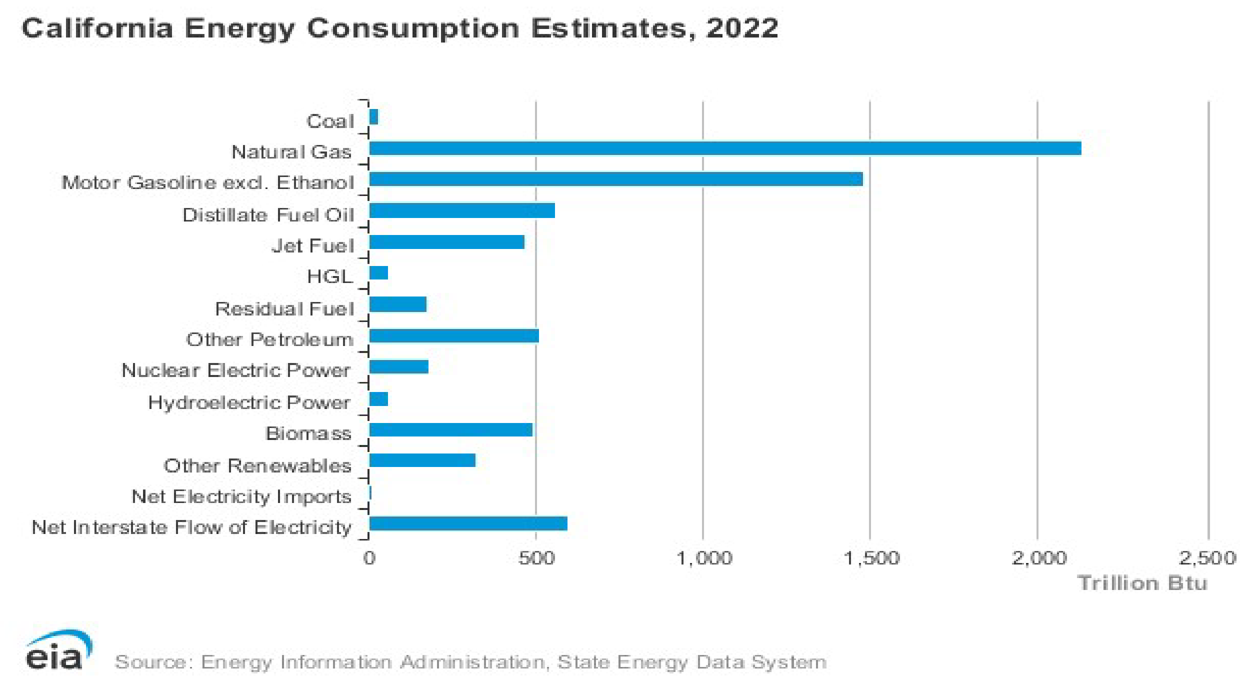
Figure 6-11. Annual Statewide Energy Consumption by End-Use Sector



Source: EIA, 2024b

Figure 6-12 summarizes the 2022 statewide annual energy consumption by resource origin. As mentioned previously, natural gas is the most consumed energy resource in the state, with nearly 10 times as much natural gas used by consumers as is produced by California reserves and processing facilities. Crude oil is refined and distilled to produce motor gasoline, distillate fuel oil, jet fuel, hydrocarbon gas liquids, residual fuel, and other petroleum products. The chart also demonstrates that California has a net import of approximately 600.4 trillion btu of electricity annually.

Figure 6-12. 2022 Annual Statewide Energy Consumption by Source



Source: EIA, 2024b

6.2.2.1 Electricity Consumption

In 2022, California was the nation's largest net importer of electricity from out of state and received about 28 percent of its electricity supply from generating facilities outside the state (EIA, 2024a). California has the second-highest electricity retail sales in the nation, after Texas, but it has the lowest retail sales per capita. The commercial sector accounts for almost half of California's electricity retail sales. The residential sector, where more than one-fourth of California households use electricity for home heating, accounts for more than one-third of sales. Almost all the rest of the state's electricity retail sales are to the industrial sector. A very small amount goes to the transportation sector.

6.2.2.2 Transportation Fuels Consumption

California is the nation’s second-largest consumer of petroleum products, after Texas, and accounts for 10 percent of the nation's total consumption. The state is the largest United States consumer of motor gasoline and jet fuel, and 85 percent of the petroleum consumed in California is used in the transportation sector. The industrial sector, the second-largest petroleum-consuming sector, uses 12 percent of the petroleum consumed in the state. The commercial sector accounts for more than 2 percent, and the residential sector consumes less than 1 percent (EIA, 2023a).

6.2.3 Local Energy Resources

The discussion of local energy resources focuses on electricity, natural gas, and petroleum-based transportation fuels (motor gasoline and diesel fuel) supplied to Los Angeles County and the Project Study Area. This section also summarizes Metro’s existing systemwide energy consumption using the most recently published data available (Metro, 2019b).

6.2.3.1 Electricity

The LADWP power system serves approximately 4 million people and is the nation's largest municipal utility. Its service territory area covers the City of Los Angeles and many areas of the Owens Valley, with annual sales exceeding 26 million MWh. LADWP is a "vertically integrated" utility, both owning and operating the majority of its generation, transmission, and distribution systems. LADWP strives to be self-sufficient in providing electricity to its customers and does so by maintaining generation resources that are equal to or greater than its customers' electrical needs. LADWP's operations are financed solely through sales of water and electric services.

LADWP obtains electricity from various generating resources that utilize coal, nuclear, natural gas, hydroelectric, and renewable resources to generate power. LADWP obtains power from four municipally owned power plants within the Los Angeles Basin, LADWP Hydrogenerators on the Los Angeles Aqueduct, shared ownership generating facilities in the Southwest, and power purchased from the Southwest and Pacific Northwest. LADWP has a power infrastructure comprising a total of 34 generation plants and approximately 3,636 miles of overhead transmission lines spanning five western states. LADWP also purchases excess power, as it is available, from self-generators interconnected with the LADWP within the City of Los Angeles.

According to LADWP's 2022 Power Content Label submitted to the California Energy Commission (CEC), LADWP has a net dependable generation capacity greater than 8,000 MW (LADWP, 2021). On August 31, 2017, LADWP's power system experienced a record instantaneous peak demand of 6,502 MW. As of 2019, approximately 34 percent of LADWP's delivered power mix to customers was derived from renewable resources, which meets and exceeds the statewide target of 33 percent renewably sourced electricity generation by 2020, pending verification by the CEC (LADWP, 2021). The annual LADWP electricity sale to customers for 2019 was approximately 23,402.7 GWh (CEC, 2019).

6.2.3.2 Transportation Fuels

As previously discussed, transportation accounts for nearly 40 percent of the total statewide energy consumption, and petroleum-based fuels currently account for 90 percent of California's transportation energy sources (CEC, 2024a). However, the state is now working on developing flexible strategies to reduce petroleum use, as evidenced by the robust regulatory framework promulgated to enhance energy efficiency and decrease reliance on passenger vehicles and non-renewable resources in general. The CEC predicts that the demand for gasoline will continue to decrease over the next decade, and there will be an increase in the use of alternative fuels, such as natural gas, biofuels, and electricity (CEC, 2018). On September 23, 2020, Governor Gavin Newsom signed Executive Order N-79-20, setting a 100 percent zero emission vehicle (ZEV) target for new passenger vehicle sales by 2035 and a 100 percent zero-emission vehicle operations target for medium- and heavy-duty vehicles in the state by 2045 (CEC, 2021b).

According to CEC fuel sales data, Los Angeles County contained approximately 2,063 transportation fueling stations in 2019 (CEC, 2020b). In the same year, countywide fuel sales comprised approximately 3,559 million gallons of gasoline and 276 million gallons of diesel fuel. By volume, Los Angeles County accounted for approximately 23.2 percent of statewide gasoline sales and approximately 15.7 percent of statewide diesel fuel sales. Despite substantial increases in population (from approximately 9.8 million in 2010 to 10.0 million in 2019), total countywide gasoline fuel sales have remained relatively constant over the course of the past decade, as the CEC estimates approximately 3,658 million gallons of gasoline were sold within Los Angeles County in 2010.

6.2.4 Metro Energy Inventory

Metro's contribution to regional energy consumption includes on-road vehicle fuel use (primarily compressed natural gas) and electricity for rail vehicle propulsion and maintenance and administrative facility operation. The *2019 Energy and Resource Report* examined Metro's energy use for the 2019 calendar year and refined estimates prepared by previous analysis (Metro, 2019b).

Table 6-6 presents an overview of the Metro system energy consumption by end use between 2015 and 2019. As of 2019, the Metro system comprised 124,695,827 revenue miles consuming approximately 5,357.3 million megajoules (MJ) of energy per revenue mile, for a total of 6,667.1 million MJ. Overall, Metro system energy consumption has decreased by 6.9 percent during the period from 2015 to 2019. Metro has prioritized generating system energy from alternative fuels in recent years. As of 2019, approximately 30 percent of Metro's electricity is generated by renewable sources. Metro plans to phase out all directly operated natural gas buses by 2030 to be replaced by ZEVs.

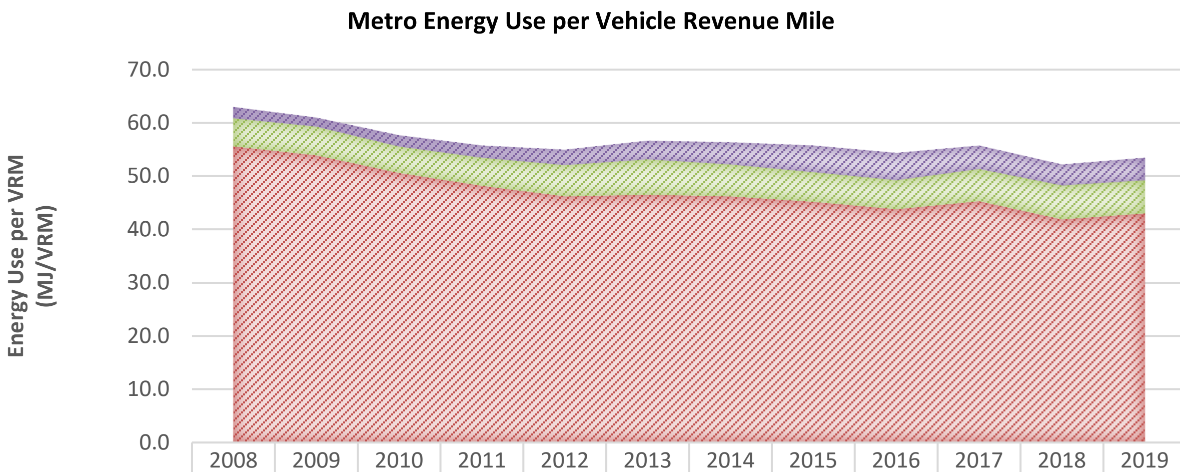
Table 6-6. Metro Operations Annual Energy Consumption (in Megajoules)

End Use	2015	2016	2017	2018	2019
Vehicle Fuel	5,796,786,075	5,644,897,527	5,787,683,879	5,317,489,842	5,357,290,785
Rail Propulsion	719,276,609	711,196,744	775,022,735	817,378,502	781,571,203
Facilities	642,626,521	660,898,312	564,325,336	491,666,179	528,225,942
Total	7,158,689,205	7,016,992,583	7,127,031,949	6,626,534,523	6,667,087,930

Source: Metro, 2019b

The *2019 Energy and Resource Report's* technical appendix also includes data describing Metro system energy use per vehicle revenue mile (VRM) (Metro, 2019b). Examining this data can provide insight as to how Metro is managing its energy resource consumption in relation to the expansion of its service network. Figure 6-13 presents a chart that shows the trend in Metro energy use per VRM over the past 12 years (2008–2019) since the reporting program began. As shown on Figure 6-13, total energy use per VRM decreased from 63.0 MJ/VRM in 2008 to 53.5 MJ/VRM in 2019, representing a 15 percent reduction over the 12-year period. The data demonstrates the efficacy of Metro's energy efficiency programs to deliver high quality transit options that meet regional growth demands while also conserving energy where possible.

Figure 6-13. Metro Systemwide Energy Use per Vehicle Revenue Mile



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Facilities	2.1	1.7	2.1	2.3	2.9	3.5	4.2	5.0	5.1	4.4	3.9	4.2
Rail Propulsion	5.3	5.4	5.0	5.3	5.9	6.7	6.0	5.6	5.5	6.1	6.4	6.3
Vehicle Fuel	55.6	53.9	50.6	48.2	46.2	46.5	46.2	45.2	43.8	45.3	41.9	43.0

Year

Source: Metro, 2019b

Includes mixed commercial and industrial land uses within the Project Study Area.

6.3 Impact Evaluation

6.3.1 Impact ENG-1: Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

6.3.1.1 Construction Impacts

Alternative 1 would require petroleum-based transportation fuels and electricity to construct the transit system. Construction activities would comply with Metro's GCP, and construction equipment would be maintained in accordance with manufacturers' specifications. Construction would result in a one-time expenditure of approximately 5,609,190 gallons of diesel fuel, 515,777 gallons of gasoline, and 255 megawatt-hours (MWh) of electricity (Metro, 2024b). Table 6-7 provides a summary of the energy consumption estimated for construction of Alternative 1.

Table 6-7. Alternative 1: Construction Fuel and Electricity Consumption

Source Type	Fuel Consumption (gal)	Electricity Consumption (MWh)
Mobile Source Fuel Consumption		
Off-Road Equipment (Diesel)	4,881,426	NA
Worker Vehicles (Gasoline)	515,777	NA
Vendor Trucks (Diesel)	169,976	NA
Haul Trucks (Diesel)	557,789	NA
Electricity Consumption		
Onsite Portable Offices	NA	255

Source Type	Fuel Consumption (gal)	Electricity Consumption (MWh)
Summary		
Total Gasoline (gal):	**515,777**	**NA**
Total Diesel (gal):	**5,609,190**	**NA**
Total Electricity (MWh):	**NA**	**255**

Source: Metro, 2024c

gal = gallons
MWh = megawatt-hour
NA = not applicable

All equipment and vehicles used in construction activities would comply with applicable California Air Resources Board regulations, Low Carbon Fuel Standards, and the Corporate Average Fuel Economy (CAFE) Standards. Construction would not place an undue burden on available energy resources. The one-time expenditure of energy associated with diesel fuel consumption would be offset by operations within approximately 7.5 years through transportation mode shift, and the one-time expenditure of energy associated with gasoline consumption would be offset by operations within 1 year. The temporary additional transportation fuels consumption does not require additional capacity provided at the local or regional level. CEC transportation energy demand forecasts indicate that gasoline and diesel fuel production is anticipated to increase between 2021 and 2035, while demand for both gasoline and diesel transportation fuels is projected to decrease over the same time period (CEC, 2021b). Construction vehicles and equipment activities would not place an undue burden on available petroleum fuel resources during construction of Alternative 1.

Construction activities may include lighting for security and safety in construction zones. Nighttime construction would be limited; lighting would be sparse and would not require additional capacity provided at the local or regional level.

The GCP requires and commits project contractors to using newer engines for off-road, diesel-powered construction equipment that are more fuel efficient than older models. All equipment and vehicles would be maintained in accordance with manufacturer specifications and would be subject to idling limits. As required by the California Green Building Standards (CALGreen) Code Tier 2, at least 80 percent of the nonhazardous construction debris generated by demolition activities will be diverted from landfills. Also, CALGreen includes the mandatory requirement to reuse or recycle all clean soil that would be displaced during construction of Alternative 1, which would result in reduced energy consumption from hauling trucks. Furthermore, the Metro 2020 Moving Beyond Sustainability Strategic Plan and the Metro Design Criteria and Standards require and commit contractors to using high-efficiency lighting as opposed to less energy-efficient lighting sources in alignment with Leadership in Energy and Environmental Design (LEED) sustainability energy standards.

Based on the substantiation previously described, construction would not result in wasteful, inefficient, or unnecessary consumption of energy resources. Therefore, Alternative 1 would result in a less-than-significant impact related to construction activities.

6.3.1.2 Operational Impacts

As described in the Methodology Section, future operations involved under Alternative 1 would consume energy resources in the forms of electricity (at TPSSs for monorail propulsion, electric bus power, MSF and electric bus MSF operations; at stations for lighting, accessibility features, and parking facilities; and as power for a fraction of regional vehicle miles traveled (VMT) by electric and plug-in hybrid vehicles), petroleum fuels (gasoline for Metro employee trips and a fraction of regional VMT, and diesel fuel for an emergency generator at the MSF and a fraction of regional VMT), and natural gas (a small fraction of regional VMT by vehicles powered by natural gas). End uses that comprise direct energy resource consumption associated with Alternative 1 operations include TPSSs, electric buses, MSFs, stations and parking, and Metro employee trips. End uses comprising indirect energy consumption include the changes in regional vehicle trips and VMT patterns that would result under the new transit system. Table 6-8 presents a summary of the annual energy consumption by resource attributable to Alternative 1 operations in the horizon year of 2045 and compares the consumption to the 2045 Without Project Conditions.

Table 6-8. Alternative 1: Operations Annual Energy Consumption Relative to the 2045 Without Project Conditions

End Use	Electricity (MWh)	Gasoline (gal)	Diesel (gal)	Natural Gas (DGE)
Alternative 1				
Main Line Traction Power	70,560	—	—	—
Stations and Parking	9,291	—	—	—
MSF and Electric Bus MSF[a]	9,991	—	4,421	—
Metro Employee Trips	281	109,767	27,480	1,083
Regional On-Road VMT	13,334,038	5,203,345,789	1,302,626,693	51,343,019
Alternative 1 Total Annual Consumption[b]	**13,424,161**	**5,203,455,557**	**1,302,658,593**	**51,344,102**
2045 Without Project Conditions				
Regional On-Road VMT	13,342,059	5,206,475,771	1,303,410,265	51,373,904
Net Change in Annual Resource Consumption	**82,102**	**-3,020,214**	**-751,672**	**-29,801**
Conversion Factor	*3,412 kBtu/MWh*	*125.0 kBtu/gal*	*138.7 kBtu/gal*	*138.7 kBtu/gal*
Net Change in Annual Energy Consumption (MMBtu)	***280,132***	***-377,527***	***-104,257***	***-4,134***
Net Change in Total Energy Consumption (MMBtu)	**-205,785**			

Source: LASRE, 2024; HTA, 2024; BTS, 2024

[a]Diesel fuel consumption at the MSF is attributed to emergency generators.
[b]Values may not sum exactly due to rounding.

— = no data
DGE = diesel gallon equivalent
gal = gallon
kBtu = thousand British thermal units
MMBtu = million British thermal units
MWh = megawatt-hour
VMT = vehicle miles traveled

As shown in Table 6-8, operation of Alternative 1 in the horizon year of 2045 would result in a net annual increase in regional electricity demand of 82,102 MWh and would result in a net annual reduction of 3,020,214 gallons of gasoline, 751,672 gallons of diesel fuel, and 29,801 diesel gallon equivalent (DGE) of natural gas relative to 2045 Without Project Conditions. Converting each of these quantities to standardized units of MMBtu, Alternative 1 operations would result in a net decrease of 205,785 MMBtu annually in 2045. This amount of energy savings is equivalent to 1,646,702 gallons of motor gasoline per year. The electricity consumption would be more than offset by the energy savings in the forms of petroleum fuels and natural gas, and the consumption would power a mass transit system that would contribute to regional efforts to enhance energy efficiency and reduce reliance on nonrenewable resources. Therefore, Alternative 1 would result in a substantial decrease in overall regional energy consumption, and this impact would be less than significant.

Table 6-9 summarizes the Alternative 1 annual energy consumption for each resource compared to Existing Conditions (2021). This is presented for informational purposes only. As shown in Table 6-9, Alternative 1 operations would result in a net increase of 12,088,241 MWh of electricity and 215,794,856 gallons of diesel fuel and would result in a net decrease of 1,059,637,757 gallons of gasoline and 67,408,689 DGE of natural gas relative to Existing Conditions (2021). When standardized in units of MMBtu, operation of Alternative 1 in 2045 would consume approximately 70,628,480 MMBtu less of collective energy resources on an annual basis than Existing Conditions in the baseline year of 2021. This amount of energy is equivalent to 565,172,731 gallons of motor gasoline per year.

Table 6-9. Alternative 1: Operations Annual Energy Consumption (Horizon Year 2045) Relative to Existing Conditions (Baseline Year 2021)

End Use	Electricity (MWh)	Gasoline (gal)	Diesel (gal)	Natural Gas (DGE)
Alternative 1 (2045)				
Main Line Traction Power	70,560	—	—	—
Stations and Parking	9,291	—	—	—
MSF and Electric Bus MSF[a]	9,991	—	4,421	—
Metro Employee Trips	281	109,767	27,480	1,083
Regional On-Road VMT	13,334,038	5,203,345,789	1,302,626,693	51,343,019
Alternative 1 Total Annual Consumption[b]	**13,424,161**	**5,203,455,557**	**1,302,658,593**	**51,344,102**
Existing Conditions (2021)				
Regional On-Road VMT	1,335,920	6,263,093,314	1,086,863,738	118,752,791
Net Change in Annual Resource Consumption	**12,088,241**	**-1,059,637,757**	**215,794,856**	**-67,408,689**
Conversion Factor	*3,412 kBtu/MWh*	*125.0 kBtu/gal*	*138.7 kBtu/gal*	*138.7 kBtu/gal*
Net Change in Annual Energy Consumption (MMBtu)	***41,245,078***	***-132,454,720***	***29,930,746***	***-9,349,585***
Total Net Change in Energy Consumption (MMBtu)	**-70,628,480**			

Source: LASRE, 2024; HTA, 2024; BTS, 2024

[a]Diesel fuel consumption at the MSF is attributed to emergency generators.
[b]Values may not sum exactly due to rounding.

— = no data
DGE = diesel gallon equivalent
gal = gallon
kBtu = thousand British thermal units
MMBtu = million British thermal units
MWh = megawatt-hour
VMT = vehicle miles traveled

6.3.1.3 Maintenance and Storage Facilities

MSF Base Design

As shown in Table 6-8 and Table 6-9, operation of the MSF Base Design and the Electric Bus MSF in the horizon year of 2045 would result in an annual increase in regional electricity demand of 9,991 MWh and 4,421 gallons of diesel fuel. As discussed in Section 6.3.1.1, Alternative 1 operations collectively would result in a net decrease of 205,785 MMBtu annually in 2045. Construction of the MSF Base Design would require petroleum-based transportation fuels and electricity. Construction activities would comply with Metro's GCP and adhere to Metro's policy for aligning with LEED Silver sustainable certification. The required energy demand to construct and operate the MSF Base Design would be more than offset by the energy savings in the forms of petroleum fuels and natural gas, and the consumption would support a mass transit system that would contribute to regional efforts to enhance energy efficiency and reduce reliance on nonrenewable resources. Construction and operation of the MSF Base Design would not result in wasteful, inefficient, or unnecessary consumption of energy resources, and the MSF Base Design would result in a less than significant impact.

MSF Design Option 1

MSF Design Option 1 would locate the MSF at a different address than the MSF Base Design. Energy use would be similar as presented for the MSF Base Design. Like the MSF Base Design, the required energy demand to construct and operate the MSF Design Option 1 would be more than offset by the energy savings in the forms of petroleum fuels and natural gas, and the consumption would support a mass transit system that would contribute to regional efforts to enhance energy efficiency and reduce reliance on nonrenewable resources. Furthermore, MSF Design Option 1 would adhere to Metro's policy for aligning with LEED Version 4 Building and Design Construction (LEED v4 BD+C) Level Silver certification and Envision Version 3 certification if LEED is not applicable. Therefore, construction and operation would not result in wasteful, inefficient, or unnecessary consumption of energy resources and MSF Design Option 1 would result in a less than significant impact.

Electric Bus MSF

The Electric BUS MSF energy demand is included in the discussion of the MSF Base Design and as described for Alternative 1 in Section 6.3.1.1. Like the MSF Base Design, the required energy demand to construct and operate the Electric Bus MSF would be more than offset by the energy savings in the forms of petroleum fuels and natural gas, and the consumption would support a mass transit system that would contribute to regional efforts to enhance energy efficiency and reduce reliance on nonrenewable resources. Furthermore, the Electric Bus MSF would adhere to Metro's policy for aligning with LEED Silver sustainable certification. Therefore, construction and operation of the Electric bus MSF would not result in wasteful, inefficient, or unnecessary consumption of energy resources, and construction and operation of the Electric bus MSF would result in a less than significant impact.

6.3.2 Impact ENG-2: Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

6.3.2.1 Construction Impacts

Alternative 1 would require petroleum-based transportation fuels and electricity to construct the transit system. Construction would result in a one-time expenditure of approximately 5,609,190 gallons of diesel fuel, 515,777 gallons of gasoline, and 255 MWh of electricity. Alternative 1 would be consistent with state and local energy plans and policies to reduce energy consumption as activities would comply with Metro's GCP, CALGreen Code, Title 24, and LEED Version 4 Building and Design Construction (LEED v4 BD+C) Level Silver certification. The GCP requires and commits project contractors to using newer engines for off-road, diesel-powered construction equipment that are more fuel efficient than older models, as well as using renewable diesel fuel for all applicable on-road truck and off-road equipment. Compliance with GCP would limit excess petroleum fuels consumption. The CALGreen Code requires reduction, disposal, and recycling of at least 80 percent of nonhazardous construction materials and requires demolition debris to be recycled and/or salvaged, which would ultimately result in reductions of indirect energy use associated with waste disposal and storage. Alternative 1 would comply with state and local plans for energy efficiency in construction activities. Therefore, Alternative 1 would result in a less-than-significant impact related to construction activities.

6.3.2.2 Operational Impacts

Alternative 1 would be a high capacity fixed guideway transit system providing energy efficient mass transit to a region in need of enhanced accessibility options. It reduces auto passenger vehicle trips and reduces reliance on petroleum-based transportation fuels. Alternative 1 qualifies as a "sustainable transportation project" as defined by the California Office of Planning and Research, because it encourages the use of transit and zero emission vehicles and reduces on-road VMT (OPR, 2018). The benefits of Alternative 1 are consistent with the goals, objectives, and policies of SCAG and the City of Los Angeles as outlined in the local regulatory framework previously described. As the renewable energy portfolios of Metro and local jurisdictions expand over time, natural resources consumption to provide the electricity required for operations would become more energy efficient. Alternative 1 would not conflict with any adopted plan or regulation to enhance energy efficiency or reduce transportation fuels consumption and would support the initiatives of the MBSSP. In addition, Alternative 1 would not interfere with renewable portfolio targets and would not result in a wasteful or inefficient expenditure of energy resources. Alternative 1 would positively contribute to statewide, regional, and local efforts to create a more efficient and sustainable transportation infrastructure network. Therefore, Alternative 1 would result in a less-than-significant-impact related to operational activities.

6.3.2.3 Maintenance and Storage Facilities

MSF Base Design

The MSF Base Design would support Alternative 1 operations, providing energy efficient mass transit to the region and reducing auto passenger vehicle trips. The benefits of Alternative 1 are consistent with the goals, objectives, and policies of SCAG and the City of Los Angeles. In addition, the MSF Base Design would achieve a minimum of LEED Version 4 Building and Design Construction (LEED v4 BD+C) Level Silver certification and Envision Version 3 certification if LEED is not applicable. The MSF Base Design would be designed to meet Tier 2 of CALGreen (LASRE, 2024). The MSF Base Design would not conflict with any adopted plan or regulation to enhance energy efficiency or reduce transportation fuels consumption and would support the initiatives of the MBSSP. In addition, the MSF Base Design would not interfere with renewable portfolio targets and would not result in a wasteful or inefficient expenditure of energy resources. The MSF Base Design would positively contribute to statewide, regional, and local efforts to create a more efficient and sustainable transportation infrastructure network. Therefore, the MSF Base Design would result in a less than significant impact related to conflicting with or obstructing renewable energy and energy efficiency planning initiatives.

MSF Design Option 1

The MSF Design Option 1 would locate the MSF at a different address than the MSF Base Design. Energy use would be similar as presented for the MSF Base Design. Like the MSF Base Design, MSF Design Option 1 would be designed to achieve a minimum of LEED Silver and would be designed to meet Tier 2 of the CALGreen Code (LASRE, 2024). The MSF Design Option 1 would positively contribute to statewide, regional, and local efforts to create a more efficient and sustainable transportation infrastructure network. Therefore, the MSF Design Option 1 would result in a less than significant impact.

Electric Bus MSF

The Electric Bus MSF would support the Alternative 1 electric bus connection connecting the Wilshire Boulevard/Metro D Line Station, Westwood Village, and UCLA Gateway Plaza. Like the MSF Base Design, the Electric Bus MSF would support Alternative 1 operations, providing energy efficient mass transit to the region and reducing auto passenger vehicle trips, thereby supporting regional and local goals, objectives, and policies. The benefits of Alternative 1 are consistent with the goals, objectives, and policies of SCAG and the City of Los Angeles. Like the MSF Base Design, the Electric Bus MSF would be achieve a minimum of LEED Version 4 Building and Design Construction (LEED v4 BD+C) Level Silver certification—and Envision Version 3 certification if LEED is not applicable— and would Tier 2 of the CALGreen Code (LASRE, 2024). The Electric Bus MSF would not conflict with any adopted plan or regulation to enhance energy efficiency or reduce transportation fuels consumption and would support the initiatives of the MBSSP. In addition, the Electric Bus MSF would not interfere with renewable portfolio targets and would not result in a wasteful or inefficient expenditure of energy resources. The Electric Bus MSF would positively contribute to statewide, regional, and local efforts to create a more efficient and sustainable transportation infrastructure network. Therefore, the Electric Bus MSF would result in a less than significant impact.

6.4 Mitigation Measures

6.4.1 Construction Impacts

No mitigation measures are required.

6.4.2 Operational Impacts

No mitigation measures are required.

6.4.3 Impacts After Mitigation

No mitigation measures are required; impacts are less than significant.

7 ALTERNATIVE 3

7.1 Alternative Description

Alternative 3 is an aerial monorail alignment that would run along the Interstate 405 (I-405) corridor and would include seven aerial monorail transit (MRT) stations and an underground tunnel alignment between the Getty Center and Wilshire Boulevard with two underground stations. This alternative would provide transfers to five high-frequency fixed guideway transit and commuter rail lines, including the Los Angeles County Metropolitan Transportation Authority's (Metro) E, Metro D, and Metro G Lines, the East San Fernando Valley Light Rail Transit Line, and the Metrolink Ventura County Line. The length of the alignment between the terminus stations would be approximately 16.1 miles, with 12.5 miles of aerial guideway and 3.6 miles of underground configuration.

The seven aerial and two underground MRT stations would be as follows:

1. Metro E Line Expo/Sepulveda Station (aerial)
2. Santa Monica Boulevard Station (aerial)
3. Wilshire Boulevard/Metro D Line Station (underground)
4. UCLA Gateway Plaza Station (underground)
5. Getty Center Station (aerial)
6. Ventura Boulevard/Sepulveda Boulevard Station (aerial)
7. Metro G Line Sepulveda Station (aerial)
8. Sherman Way Station (aerial)
9. Van Nuys Metrolink Station (aerial)

7.1.1 Operating Characteristics

7.1.1.1 Alignment

As shown on Figure 7-1, from its southern terminus at the Metro E Line Expo/Sepulveda Station, the alignment of Alternative 3 would generally follow I-405 to the Los Angeles-San Diego-San Luis Obispo (LOSSAN) rail corridor, except for an underground segment between Wilshire Boulevard and the Getty Center.

The proposed southern terminus station would be located west of the existing Metro E Line Expo/Sepulveda Station, east of I-405 between Pico Boulevard and Exposition Boulevard. Tail tracks would extend just south of the station adjacent to the eastbound Interstate 10 to northbound I-405 connector over Exposition Boulevard. North of the Metro E Line Expo/Sepulveda Station, a storage track would be located off of the main alignment north of Pico Boulevard between I-405 and Cotner Avenue. The alignment would continue north along the east side of I-405 until just south of Santa Monica Boulevard, where a proposed station would be located between the I-405 northbound travel lanes and Cotner Avenue. The alignment would cross over the northbound and southbound freeway lanes north of Santa Monica Boulevard and travel along the west side of I-405. Once adjacent to the U.S. Department of Veterans Affairs (VA) Hospital site, the alignment would cross back over the I-405 lanes and Sepulveda Boulevard, before entering an underground tunnel south of the Federal Building parking lot.

Figure 7-1. Alternative 3: Alignment

Source: LASRE, 2024; HTA, 2024

The alignment would proceed east underground and turn north under Veteran Avenue toward the proposed Wilshire Boulevard/Metro D Line Station located under the University of California, Los Angeles (UCLA) Lot 36 on the east side of Veteran Avenue north of Wilshire Boulevard. North of this station, the underground alignment would curve northeast parallel to Weyburn Avenue before curving north and traveling underneath Westwood Plaza at Le Conte Avenue. The alignment would follow Westwood Plaza until the underground UCLA Gateway Plaza Station in front of the Luskin Conference

Center. The alignment would then continue north under the UCLA campus until Sunset Boulevard, where the tunnel would curve northwest for approximately 2 miles to rejoin I-405.

The Alternative 3 alignment would transition from an underground configuration to an aerial guideway structure after exiting the tunnel portal located at the northern end of the Leo Baeck Temple parking lot. The alignment would cross over Sepulveda Boulevard and the I-405 lanes to the proposed Getty Center Station on the west side of I-405, just north of the Getty Center tram station. The alignment would return to the median for a short distance before curving back to the west side of I-405 south of the Sepulveda Boulevard undercrossing north of the Getty Center Drive interchange. After crossing over Bel Air Crest Road and Skirball Center Drive, the alignment would again return to the median and run under the Mulholland Drive Bridge, then continue north within the I-405 median to descend into the San Fernando Valley (Valley).

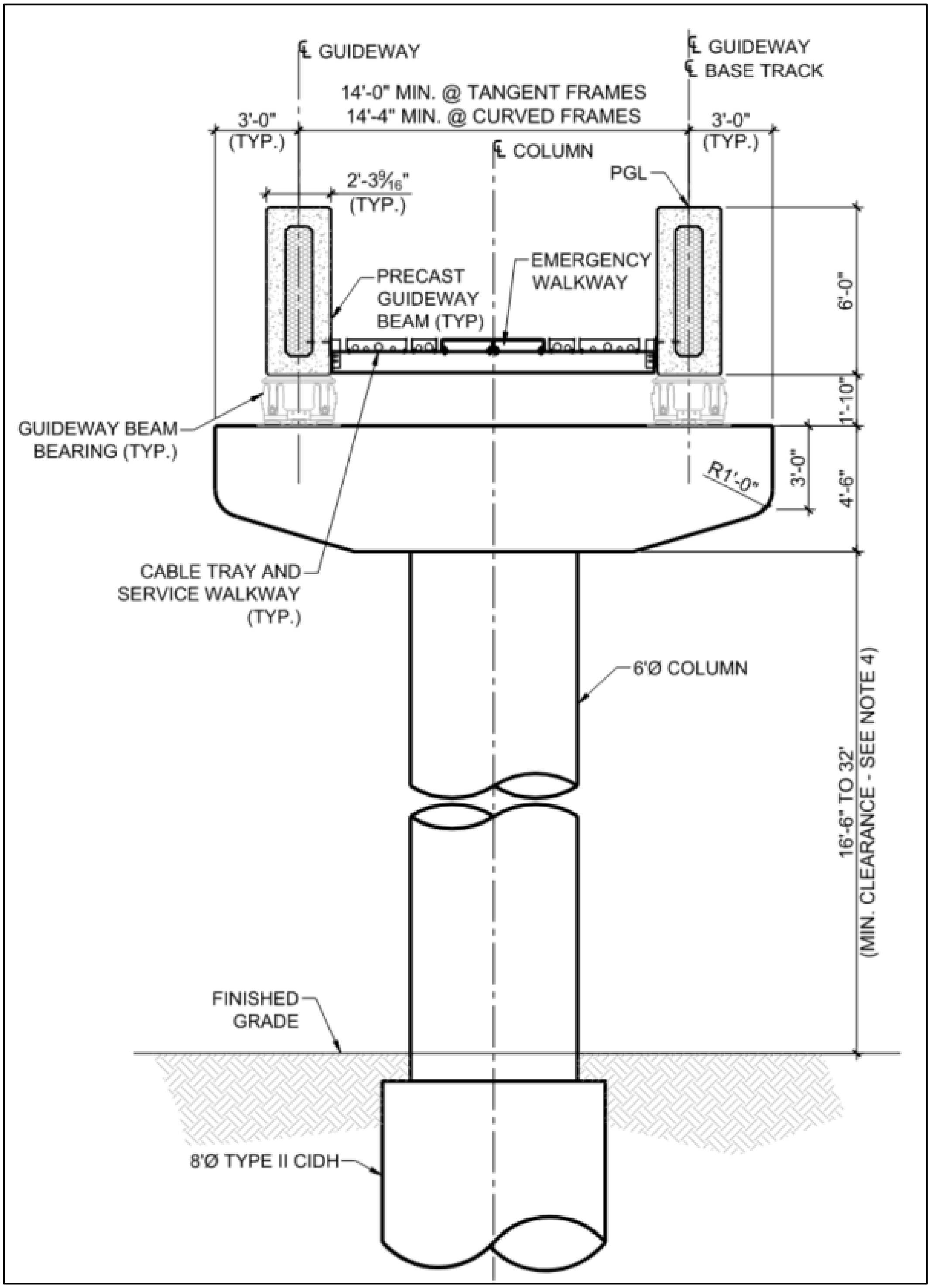
Near Greenleaf Street, the alignment would cross over the northbound freeway lanes and on-ramps toward the proposed Ventura Boulevard Station on the east side of I-405. This station would be located above a transit plaza and replace an existing segment of Dickens Street adjacent to I-405, just south of Ventura Boulevard. Immediately north of the Ventura Boulevard Station, the alignment would cross over the northbound I-405 to U.S. Highway 101 (US-101) connector and continue north between the connector and the I-405 northbound travel lanes. The alignment would continue north along the east side of I-405—crossing over US-101 and the Los Angeles River—to a proposed station on the east side of I-405 near the Metro G Line Busway. A new at-grade station on the Metro G Line would be constructed for Alternative 3 adjacent to the proposed station. These proposed stations are shown on the Metro G Line inset area on Figure 7-1.

The alignment would then continue north along the east side of I-405 to the proposed Sherman Way Station. The station would be located inside the I-405 northbound loop off-ramp to Sherman Way. North of the station, the alignment would continue along the eastern edge of I-405, then curve to the southeast parallel to the LOSSAN rail corridor. The alignment would run elevated along Raymer Street east of Sepulveda Boulevard and cross over Van Nuys Boulevard to the proposed terminus station adjacent to the Van Nuys Metrolink/Amtrak Station. Overhead utilities along Raymer Street would be undergrounded where they would conflict with the guideway or its supporting columns. Tail tracks would be located southeast of this terminus station.

7.1.1.2 Guideway Characteristics

Alternative 3 would utilize straddle-beam monorail technology, which allows the monorail vehicle to straddle a guide beam that both supports and guides the vehicle. Alternative 3 would operate on aerial and underground guideways with dual-beam configurations. Northbound and southbound trains would travel on parallel beams either in the same tunnel or supported by a single-column or straddle-bent aerial structure. Figure 7-2 shows a typical cross-section of the aerial monorail guideway.

Figure 7-2. Typical Aerial Monorail Guideway Cross-Section

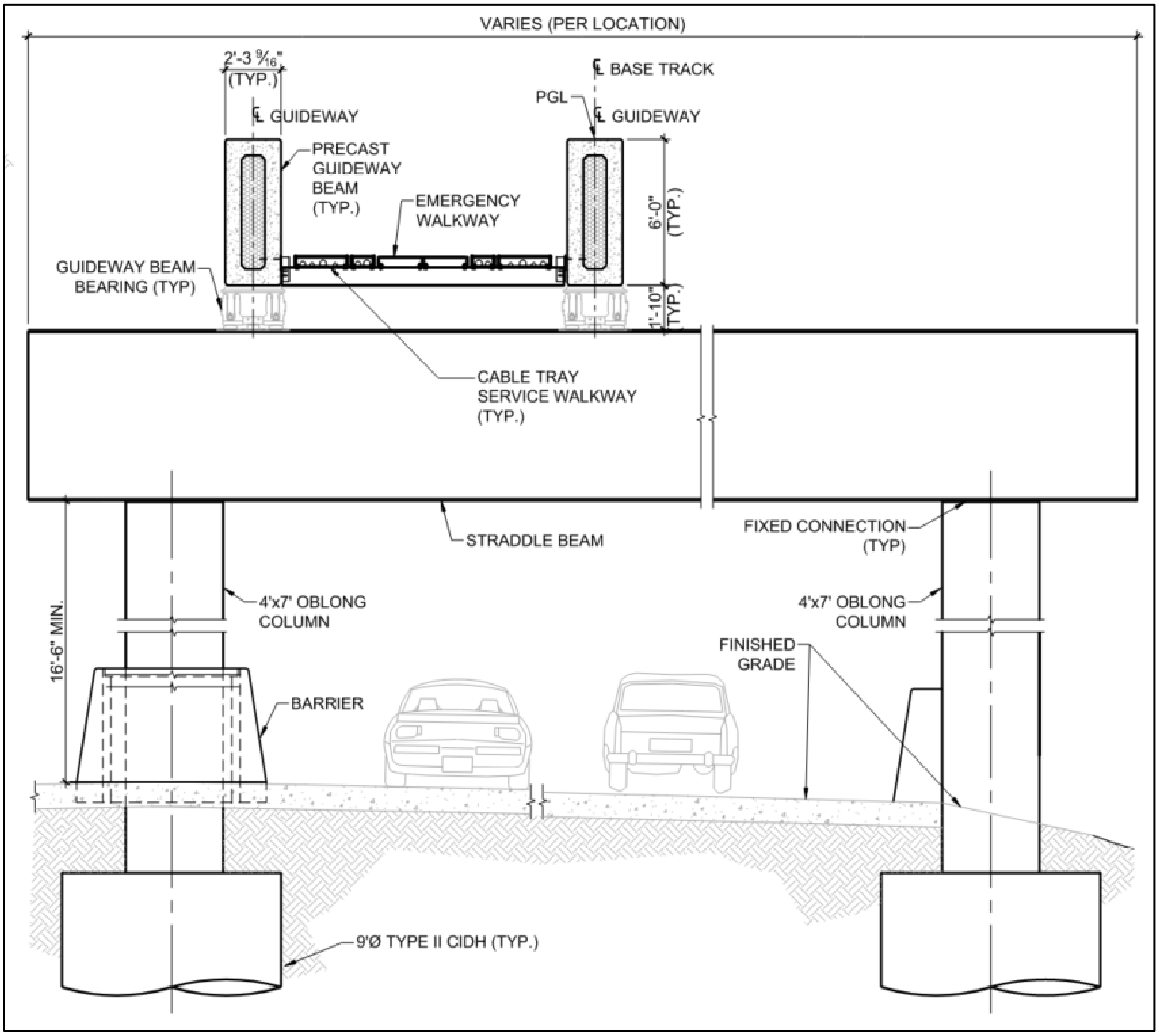


Source: LASRE, 2024

On a typical guideway section (i.e., not at a station), guide beams would rest on 20-foot-wide column caps (i.e., the structure connecting the columns and the guide beams), with typical spans (i.e., the distance between columns) ranging from 70 to 190 feet. The bottom of the column caps would typically be between 16.5 feet and 32 feet above ground level.

Over certain segments of roadway and freeway facilities, a straddle-bent configuration, as shown on Figure 7-3, consisting of two concrete columns constructed outside of the underlying roadway would be used to support the guide beams and column cap. Typical spans for these structures would range between 65 and 70 feet. A minimum 16.5-foot clearance would be maintained between the underlying roadway and the bottom of the column caps.

Figure 7-3. Typical Monorail Straddle-Bent Cross-Section

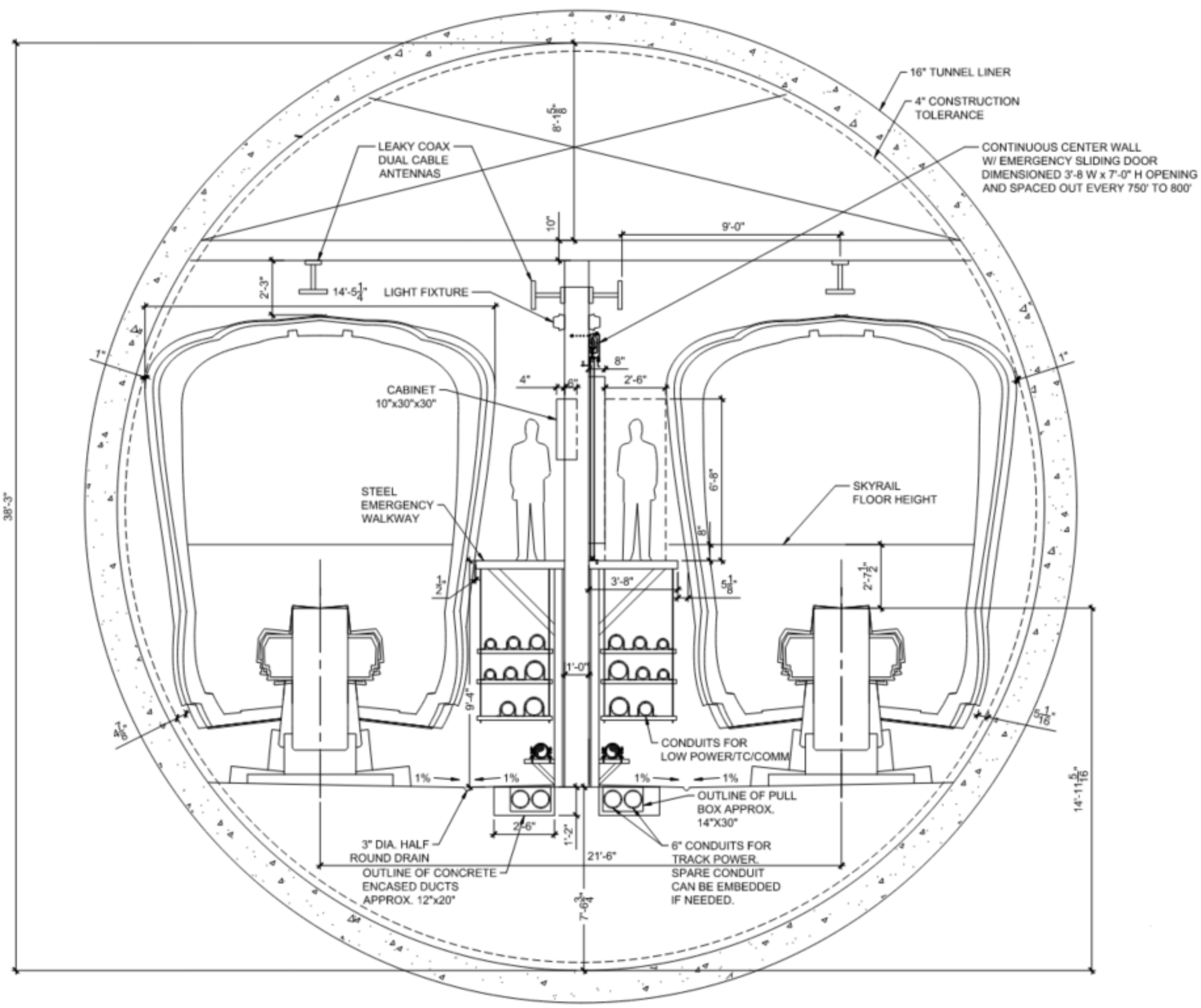


Source: LASRE, 2024

Structural support columns would vary in size and arrangement by alignment location. Columns would be 6 feet in diameter along main alignment segments adjacent to I-405 and be 4 feet wide by 6 feet long in the I-405 median. Straddle-bent columns would be 4 feet wide by 7 feet long. At stations, six rows of dual 5-foot by-8-foot columns would support the aerial guideway. Beam switch locations and long-span structures would also utilize different sized columns, with dual 5-foot columns supporting switch locations and either 9-foot or 10-foot-diameter columns supporting long-span structures. Crash protection barriers would be used to protect the columns. All columns would have a cast-in-drilled-hole (CIDH) pile foundation extending 1 foot in diameter beyond the column width with varying depths for appropriate geotechnical considerations and structural support.

For underground sections, a single 40-foot-diameter tunnel would be needed to accommodate dual-beam configuration. The tunnel would be divided by a 1-foot-thick center wall dividing two compartments with a 14.5-foot-wide space for trains and a 4-foot-wide emergency evacuation walkway. The center wall would include emergency sliding doors placed every 750 to 800 feet. A plenum within the crown of the tunnel, measuring 8 feet tall from the top of the tunnel, would allow for air circulation and ventilation. Figure 7-4 illustrates these components at a typical cross-section of the underground monorail guideway.

Figure 7-4. Typical Underground Monorail Guideway Cross-Section



Source: LASRE, 2024

7.1.1.3 Vehicle Technology

Alternative 3 would utilize straddle-beam monorail technology, which allows the monorail vehicle to straddle a guide beam that both supports and guides the vehicle. Rubber tires would sit both atop and on each side of the guide beam to provide traction and guide the train. Trains would be automated and powered by power rails mounted to the guide beam, with planned peak-period headways of 166 seconds and off-peak-period headways of 5 minutes. Monorail trains could consist of up to eight cars. Alternative 3 would have a maximum operating speed of 56 miles per hour; actual operating speeds would depend on the design of the guideway and distance between stations.

Monorail train cars would be 10.5 feet wide, with two double doors on each side. End cars would be 46.1 feet long with a design capacity of 97 passengers, and intermediate cars would be 35.8 feet long and have a design capacity of 90 passengers.

7.1.1.4 Stations

Alternative 3 would include seven aerial and two underground MRT stations with platforms approximately 320 feet long. Aerial stations would be elevated 50 feet to 75 feet above the ground level, and underground stations would be 80 feet to 110 feet underneath the existing ground level. The Metro E Line Expo/Sepulveda, Santa Monica Boulevard, Ventura Boulevard/Sepulveda Boulevard, Sherman Way, and Van Nuys Metrolink Stations would be center-platform stations where passengers would travel up to a shared platform that would serve both directions of travel. The Wilshire Boulevard/Metro D Line, UCLA Gateway Plaza, Getty Center, and Metro G Line Sepulveda Stations would be side-platform stations where passengers would select and travel up or down to station platforms depending on their direction of travel. Each station, regardless of whether it has side or center platforms, would include a concourse level prior to reaching the train platforms. Each station would have a minimum of two elevators, two escalators, and one stairway from ground level to the concourse.

Aerial station platforms would be approximately 320 feet long and would be supported by six rows of dual 5-foot by- 8-foot columns. The platforms would be covered, but not enclosed. Side-platform stations would be 61.5 feet wide to accommodate two 13-foot-wide station platforms with a 35.5-foot-wide intermediate gap for side-by-side trains. Center-platform stations would be 49 feet wide, with a 25-foot-wide center platform.

Underground side platforms would be 320 feet long and 26 feet wide, separated by a distance of 31.5 feet for side-by-side trains.

Monorail stations would include automatic, bi-parting fixed doors along the edges of station platforms. These doors would be integrated into the automatic train control system and would not open unless a train is stopped at the platform.

The following information describes each station, with relevant entrance, walkway, and transfer information. Bicycle parking would be provided at each station.

Metro E Line Expo/Sepulveda Station

- This aerial station would be located near the existing Metro E Line Expo/Sepulveda Station, just east of I-405 between Pico Boulevard and Exposition Boulevard.
- A transit plaza and station entrance would be located on the east side of the station.
- An off-street passenger pick-up/drop-off loop would be located south of Pico Boulevard west of Cotner Avenue.

- An elevated pedestrian walkway would connect the concourse level of the proposed station to the Metro E Line Expo/Sepulveda Station within the fare paid zone.
- Passengers would be able to park at the existing Metro E Line Expo/Sepulveda Station parking facility, which provides 260 parking spaces. No additional automobile parking would be provided at the proposed station.

Santa Monica Boulevard Station

- This aerial station would be located just south of Santa Monica Boulevard, between the I-405 northbound travel lanes and Cotner Avenue.
- Station entrances would be located on the southeast and southwest corners of Santa Monica Boulevard and Cotner Avenue. The entrance on the southeast corner of the intersection would be connected to the station concourse level via an elevated pedestrian walkway spanning Cotner Avenue.
- No dedicated station parking would be provided at this station.

Wilshire Boulevard/Metro D Line Station

- This underground station would be located under UCLA Lot 36 on the east side of Veteran Avenue north of Wilshire Boulevard.
- A station entrance would be located on the northeast corner of the intersection of Veteran Avenue and Wilshire Boulevard.
- An underground pedestrian walkway would connect the concourse level of the proposed station to the Metro D Line Westwood/UCLA Station using a knock-out panel provided in the Metro D Line Station box. This connection would occur within the fare paid zone.
- No dedicated station parking would be provided at this station.

UCLA Gateway Plaza Station

- This underground station would be located beneath Gateway Plaza.
- Station entrances would be located on the northern end and southeastern end of the plaza.
- No dedicated station parking would be provided at this station.

Getty Center Station

- This aerial station would be located on the west side of I-405 near the Getty Center, approximately 1,000 feet north of the Getty Center tram station.
- An elevated pedestrian walkway would connect the proposed station’s concourse level with the Getty Center tram station. The proposed connection would occur outside the fare paid zone.
- An entrance to the walkway above the Getty Center’s parking lot would be the proposed station’s only entrance.
- No dedicated station parking would be provided at this station.

Ventura Boulevard/Sepulveda Boulevard Station

- This aerial station would be located east of I-405, just south of Ventura Boulevard.

- A transit plaza, including two station entrances, would be located on the east side of the station. The plaza would require the closure of a 0.1-mile segment of Dickens Street between Sepulveda Boulevard and Ventura Boulevard, with a passenger pick-up/drop-off loop and bus stops provided south of the station, off Sepulveda Boulevard.
- No dedicated station parking would be provided at this station.

Metro G Line Sepulveda Station

- This aerial station would be located near the Metro G Line Sepulveda Station, between I-405 and the Metro G Line Busway.
- Entrances to the MRT station would be located on both sides of the new proposed Metro G Line bus rapid transit (BRT) station.
- An elevated pedestrian walkway would connect the concourse level of the proposed station to the proposed new Metro G Line BRT station outside of the fare paid zone.
- Passengers would be able to park at the existing Metro G Line Sepulveda Station parking facility, which has a capacity of 1,205 parking spaces. Currently, only 260 parking spaces are used for transit parking. No additional automobile parking would be provided at the proposed station.

Sherman Way Station

- This aerial station would be located inside the I-405 northbound loop off-ramp to Sherman Way.
- A station entrance would be located on the north side of Sherman Way, directly across the street from the I-405 northbound off-ramp to Sherman Way East.
- An on-street passenger pick-up/drop-off area would be provided on the north side of Sherman Way west of Firmament Avenue.
- No dedicated station parking would be provided at this station.

Van Nuys Metrolink Station

- This aerial station would be located on the east side of Van Nuys Boulevard, just south of the LOSSAN rail corridor, incorporating the site of the current Amtrak ticket office.
- A station entrance would be located on the east side of Van Nuys Boulevard just south of the LOSSAN rail corridor. A second entrance would be located to the north of the LOSSAN rail corridor with an elevated pedestrian walkway connecting to both the concourse level of the proposed station and the platform of the Van Nuys Metrolink/Amtrak Station.
- Existing Metrolink Station parking would be reconfigured, maintaining approximately the same number of spaces, but 180 parking spaces would be relocated north of the LOSSAN rail corridor. Metrolink parking would not be available to Metro transit riders.

7.1.1.5 Station-to-Station Travel Times

Table 7-1 presents the station-to-station distance and travel times for Alternative 3. The travel times includes both running time and dwelling time. The travel times differ between northbound and southbound trips because of grade differentials and operational considerations at end-of-line stations.

Table 7-1. Alternative 3: Station-to-Station Travel Times and Station Dwell Times

From Station	To Station	Distance (miles)	Northbound Station-to-Station Travel Time (seconds)	Southbound Station-to-Station Travel Time (seconds)	Dwell Time (seconds)
Metro E Line Station					*30*
Metro E Line	Santa Monica Boulevard	0.9	123	97	—
Santa Monica Boulevard Station					*30*
Santa Monica Boulevard	Wilshire/Metro D Line	1.1	192	194	—
Wilshire/Metro D Line Station					*30*
Wilshire/Metro D Line	UCLA Gateway Plaza	0.9	138	133	—
UCLA Gateway Plaza Station					*30*
UCLA Gateway Plaza	Getty Center	2.6	295	284	—
Getty Center Station					*30*
Getty Center	Ventura Boulevard	4.7	414	424	—
Ventura Boulevard Station					*30*
Ventura Boulevard	Metro G Line	2.0	179	187	—
Metro G Line Station					*30*
Metro G Line	Sherman Way	1.5	134	133	—
Sherman Way Station					*30*
Sherman Way	Van Nuys Metrolink	2.4	284	279	—
Van Nuys Metrolink Station					*30*

Source: LASRE, 2024

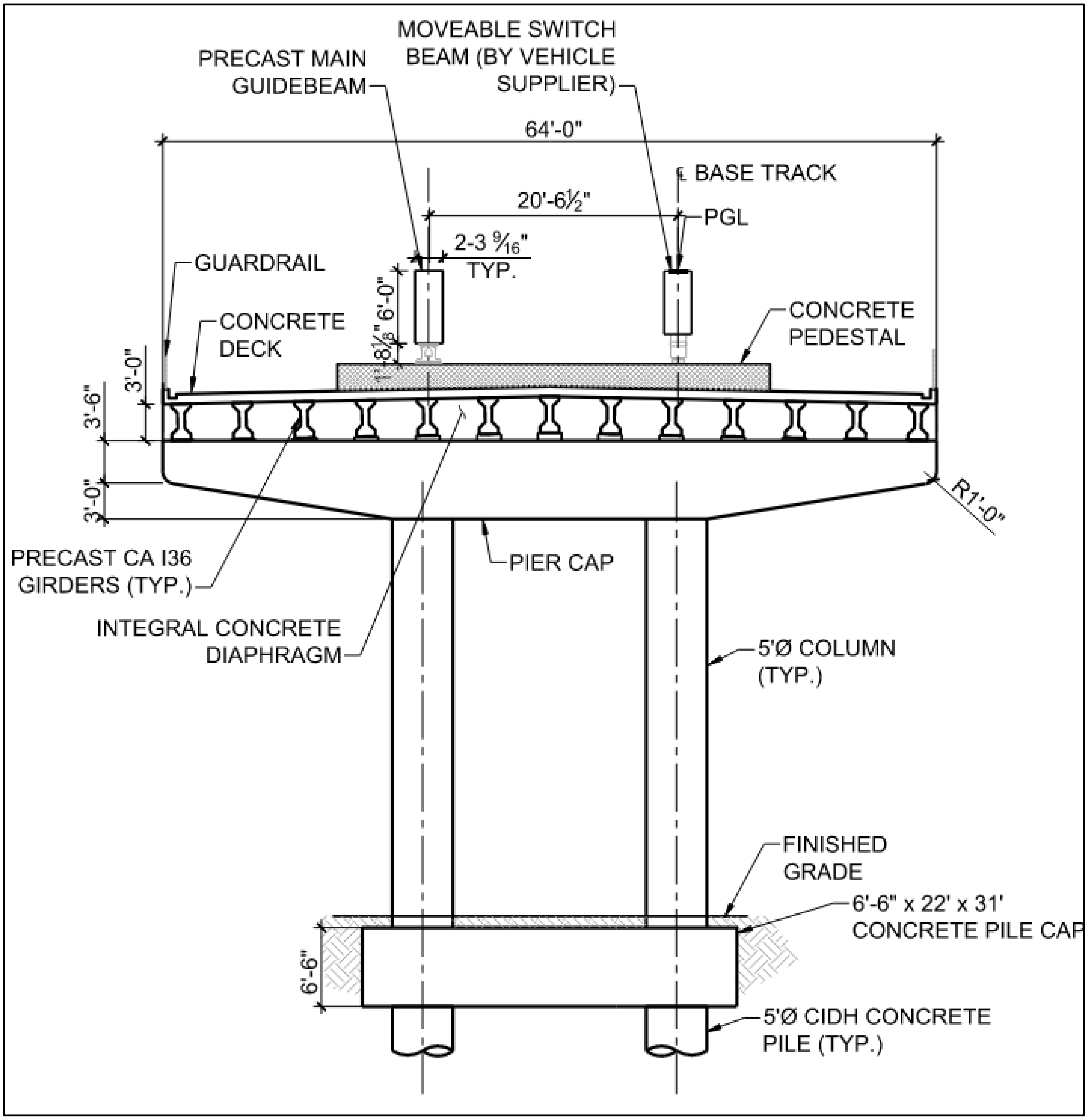
— = no data

7.1.1.6 Special Trackwork

Alternative 3 would include five pairs of beam switches to enable trains to cross over and reverse direction on the opposite beam. All beam switches would be located on aerial portions of the alignment of Alternative 3. From south to north, the first pair of beam switches would be located just north of the Metro E Line Expo/Sepulveda Station. A second pair of beam switches would be located on the west side of I-405, directly adjacent to the VA Hospital site, south of the Wilshire Boulevard/Metro D Line Station. A third pair of beam switches would be located in the Sepulveda Pass just south of Mountaingate Drive and Sepulveda Boulevard. A fourth pair of beam switches would be located south of the Metro G Line Station between the I-405 northbound lanes and the Metro G Line Busway. The final pair would be located near the Van Nuys Metrolink Station.

At beam switch locations, the typical cross-section of the guideway would increase in column and column cap width. The column cap width at these locations would be 64 feet, with dual 5-foot-diameter columns. Underground pile caps for additional structural support would also be required at these locations. Figure 7-5 shows a typical cross-section of the monorail beam switch.

Figure 7-5. Typical Monorail Beam Switch Cross-Section



Source: LASRE, 2024

7.1.1.7 Maintenance and Storage Facility

MSF Base Design

In the maintenance and storage facility (MSF) Base Design for Alternative 3, the MSF would be located on City of Los Angeles Department of Water and Power (LADWP) property east of the Van Nuys Metrolink Station. The MSF Base Design site would be approximately 18 acres and would be designed to accommodate a fleet of 208 monorail vehicles. The site would be bounded by the LOSSAN rail corridor to the north, Saticoy Street to the south, and property lines extending north of Tyrone and Hazeltine Avenues to the east and west, respectively.

Monorail trains would access the site from the main alignment’s northern tail tracks at the northwest corner of the site. Trains would travel parallel to the LOSSAN rail corridor before curving southeast to maintenance facilities and storage tracks. The guideway would remain in an aerial configuration within the MSF Base Design, including within maintenance facilities.

The site would include the following facilities:

- Primary entrance with guard shack
- Primary maintenance building that would include administrative offices, an operations control center, and a maintenance shop and office
- Train car wash building
- Emergency generator
- Traction power substation (TPSS)
- Maintenance-of-way (MOW) building
- Parking area for employees

MSF Design Option 1

In the MSF Design Option 1, the MSF would be located on industrial property, abutting Orion Avenue, south of the LOSSAN rail corridor. The MSF Design Option 1 site would be approximately 26 acres and would be designed to accommodate a fleet of 224 monorail vehicles. The site would be bounded by I-405 to the west, Stagg Street to the south, the LOSSAN rail corridor to the north, and Orion Avenue and Raymer Street to the east. The monorail guideway would travel along the northern edge of the site.

Monorail trains would access the site from the monorail guideway east of Sepulveda Boulevard, requiring additional property east of Sepulveda Boulevard and north of Raymer Street. From the northeast corner of the site, trains would travel parallel to the LOSSAN rail corridor before turning south to maintenance facilities and storage tracks parallel to I-405. The guideway would remain in an aerial configuration within the MSF Design Option 1, including within maintenance facilities.

The site would include the following facilities:

- Primary entrance with guard shack
- Primary maintenance building that would include administrative offices, an operations control center, and a maintenance shop and office
- Train car wash building
- Emergency generator
- TPSS
- MOW building
- Parking area for employees

Figure 7-6 shows the locations of the MSF Base Design and MSF Design Option 1 for Alternative 3.

Figure 7-6. Alternative 3: Maintenance and Storage Facility Options

Source: LASRE, 2024; HTA, 2024

7.1.1.8 Traction Power Substations

TPSSs transform and convert high voltage alternating current supplied from power utility feeders into direct current suitable for transit operation. A TPSS on a site of approximately 8,000 square feet would be located approximately every 1 mile along the alignment. Table 7-2 lists the TPSS locations proposed for Alternative 3.

Figure 7-7 shows the TPSS locations along the Alternative 3 alignment.

Table 7-2. Alternative 3: Traction Power Substation Locations

TPSS No.	TPSS Location Description	Configuration
1	TPSS 1 would be located east of I-405, just south of Exposition Boulevard and the monorail guideway tail tracks.	At-grade
2	TPSS 2 would be located east of I-405 and Sepulveda Boulevard, just north of the Getty Center Station.	At-grade
3	TPSS 3 would be located west of I-405, just east of the intersection between Promontory Road and Sepulveda Boulevard.	At-grade
4	TPSS 4 would be located between I-405 and Sepulveda Boulevard, just north of the Skirball Center Drive Overpass.	At-grade
5	TPSS 5 would be located east of I-405, just south of Ventura Boulevard Station, between Sepulveda Boulevard and Dickens Street.	At-grade
6	TPSS 6 would be located east of I-405, just south of the Metro G Line Sepulveda Station.	At-grade
7	TPSS 7 would be located east of I-405, just east of the Sherman Way Station, inside the I-405 Northbound Loop Off-Ramp to Sherman Way westbound.	At-grade
8	TPSS 8 would be located east of I-405, at the southeast quadrant of the I-405 overcrossing with the LOSSAN rail corridor.	At-grade
9	TPSS 9 would be located east of I-405, at the southeast quadrant of the I-405 overcrossing with the LOSSAN rail corridor.	At-grade (within MSF Design Option)
10	TPSS 10 would be located between Van Nuys Boulevard and Raymer Street, south of the LOSSAN rail corridor.	At-grade
11	TPSS 11 would be located south of the LOSSAN rail corridor, between Tyrone Avenue and Hazeltine Avenue.	At-grade (within MSF Base Design)
12	TPSS 12 would be located southwest of Veteran Avenue at Wellworth Avenue.	Underground
13	TPSS 13 would be located within the Wilshire Boulevard/Metro D Line Station.	Underground (adjacent to station)
14	TPSS 14 would be located underneath UCLA Gateway Plaza.	Underground (adjacent to station)

Source: LASRE, 2024; HTA, 2024

Figure 7-7. Alternative 3: Traction Power Substation Locations

Source: LASRE, 2024; HTA, 2024

7.1.1.9 Roadway Configuration Changes

Table 7-3 lists the roadway changes necessary to accommodate the guideway of Alternative 3. Figure 7-8 shows the location of these roadway changes in the Sepulveda Transit Corridor Project (Project) Study Area, except for the I-405 configuration changes, which occur throughout the corridor.

Table 7-3. Alternative 3: Roadway Changes

Location	From	To	Description of Change
Cotner Avenue	Nebraska Avenue	Santa Monica Boulevard	Roadway realignment to accommodate aerial guideway columns
Beloit Avenue	Massachusetts Avenue	Ohio Avenue	Roadway narrowing to accommodate aerial guideway columns
Sepulveda Boulevard	Getty Center Drive	Not Applicable	Southbound right turn lane to Getty Center Drive shortened to accommodate aerial guideway columns
I-405 Northbound On-Ramp and Off-Ramp at Sepulveda Boulevard near I-405 Exit 59	Sepulveda Boulevard near I-405 Northbound Exit 59	Sepulveda Boulevard/I-405 Undercrossing (near Getty Center)	Ramp realignment to accommodate aerial guideway columns and I-405 widening
Sepulveda Boulevard	I-405 Southbound Skirball Center Drive Ramps (north of Mountaingate Drive)	Skirball Center Drive	Roadway realignment into existing hillside to accommodate aerial guideway columns and I-405 widening
I-405 Northbound On-Ramp at Mulholland Drive	Mulholland Drive	Not Applicable	Roadway realignment into the existing hillside between the Mulholland Drive Bridge pier and abutment to accommodate aerial guideway columns and I-405 widening
Dickens Street	Sepulveda Boulevard	Ventura Boulevard	Permanent removal of street for Ventura Boulevard Station construction Pick-up/drop-off area would be provided along Sepulveda Boulevard at the truncated Dickens Street
Sherman Way	Haskell Avenue	Firmament Avenue	Median improvements, passenger drop-off and pick-up areas, and bus pads within existing travel lanes
Raymer Street	Sepulveda Boulevard	Van Nuys Boulevard	Curb extensions and narrowing of roadway width to accommodate aerial guideway columns
I-405	Sepulveda Boulevard Northbound Off-Ramp (Getty Center Drive interchange)	Sepulveda Boulevard Northbound On-Ramp (Getty Center Drive interchange)	I-405 widening to accommodate aerial guideway columns in the median
I-405	Skirball Center Drive	U.S. Highway 101	I-405 widening to accommodate aerial guideway columns in the median

Source: LASRE, 2024; HTA, 2024

Figure 7-8. Alternative 3: Roadway Changes

Source: LASRE, 2024; HTA, 2024

In addition to the changes made to accommodate the guideway, as listed in Table 7-3, roadways and sidewalks near stations would be reconstructed, which would result in modifications to curb ramps and driveways.

7.1.1.10 Ventilation Facilities

For ventilation of the monorail's underground portion, a plenum within the crown of the tunnel would provide a separate compartment for air circulation and allow multiple trains to operate between stations. Vents would be located at the southern portal near the Federal Building parking lot, Wilshire/Metro D Line Station, UCLA Gateway Plaza Station, and at the northern portal near the Leo Baeck Temple parking lot. Emergency ventilation fans would be located at the UCLA Gateway Plaza Station and at the northern and southern tunnel portals.

7.1.1.11 Fire/Life Safety – Emergency Egress

Continuous emergency evacuation walkways would be provided along the guideway. Walkways along the alignment's aerial portions would typically consist of structural steel frames anchored to the guideway beams to support non-slip walkway panels. The walkways would be located between the two guideway beams for most of the aerial alignment; however, where the beams split apart, such as entering center-platform stations, short portions of the walkway would be located on the outside of the beams. For the underground portion of Alternative 3, 3.5-foot-wide emergency evacuation walkways would be located on both sides of the beams. Access to tunnel segments for first responders would be through stations.

7.1.2 Construction Activities

Construction activities for Alternative 3 would include constructing the aerial guideway and stations, underground tunnel and stations, and ancillary facilities, and widening I-405. Construction of the transit facilities through substantial completion is expected to have a duration of 8½ years. Early works, such as site preparation, demolition, and utility relocation, could start in advance of construction of the transit facilities.

Aerial guideway construction would begin at the southern and northern ends of the alignment and connect in the middle. Constructing the guideway would require a combination of freeway and local street lane closures throughout the working limits to provide sufficient work area. The first stage of I-405 widening would include a narrowing of adjacent freeway lanes to a minimum width of 11 feet (which would eliminate shoulders) and placing K-rail on the outside edge of the travel lanes to create outside work areas. Within these outside work zones, retaining walls, drainage, and outer pavement widenings would be constructed to allow for I-405 widening. The reconstruction of on- and off-ramps would be the final stage of I-405 widening.

A median work zone along I-405 for the length of the alignment would be required for erection of the guideway structure. In the median work zone, demolition of existing median and drainage infrastructure would be followed by the installation of new K-rails and installation of guideway structural components, which would include full directional freeway closures when guideway beams must be transported into the median work areas during late-night hours. Additional night and weekend directional closures would be required for installation of long-span structures over I-405 travel lanes where the guideway would transition from the median.

Aerial station construction is anticipated to last the duration of construction activities for Alternative 3 and would include the following general sequence of construction:

- Site clearing
- Utility relocation
- Construction fencing and rough grading
- CIDH pile drilling and installation
- Elevator pit excavation
- Soil and material removal

- Pile cap and pier column construction
- Concourse level and platform level falsework and cast-in-place structural concrete
- Guideway beam installation
- Elevator and escalator installation
- Completion of remaining concrete elements such as pedestrian bridges
- Architectural finishes and mechanical, electrical, and plumbing installation

Underground stations, including the Wilshire Boulevard/Metro D Line Station and the UCLA Gateway Plaza Station, would use a "cut-and-cover" construction method whereby the station structure would be constructed within a trench excavated from the surface that is covered by a temporary deck and backfilled during the later stages of station construction. Traffic and pedestrian detours would be necessary during underground station excavation until decking is in place and the appropriate safety measures are taken to resume cross traffic.

A tunnel boring machine (TBM) would be used to construct the underground segment of the guideway. The TBM would be launched from a staging area on Veteran Avenue south of Wilshire Boulevard, and head north toward an exit portal location north of Leo Baeck Temple. The southern portion of the tunnel between Wilshire Boulevard and the Bel Air Country Club would be at a depth between 80 to 110 feet from the surface to the top of the tunnel. The UCLA Gateway Plaza Station would be constructed using cut-and-cover methods. Through the Santa Monica Mountains, the tunnel would range between 30 to 300 feet deep.

Alternative 3 would require construction of a concrete casting facility for columns and beams associated with the elevated guideway. A specific site has not been identified; however, it is expected that the facility would be located on industrially zoned land adjacent to a truck route in either the Antelope Valley or Riverside County. When a site is identified, the contractor would obtain all permits and approvals necessary from the relevant jurisdiction, the appropriate air quality management entity, and other regulatory entities.

TPSS construction would require additional lane closures. Large equipment, including transformers, rectifiers, and switchgears would be delivered and installed through prefabricated modules where possible in at-grade TPSSs. The installation of transformers would require temporary lane closures on Exposition Boulevard, Beloit Avenue, and the I-405 northbound on-ramp at Burbank Boulevard.

Table 7-4 and Figure 7-9 show the potential construction staging areas for Alternative 3. Staging areas would provide the necessary space for the following activities:

- Contractors' equipment
- Receiving deliveries
- Storing materials
- Site offices
- Work zone for excavation
- Other construction activities (including parking and change facilities for workers, location of construction office trailers, storage, staging and delivery of construction materials and permanent plant equipment, and maintenance of construction equipment)

Table 7-4. Alternative 3: Construction Staging Locations

No.	Location Description
1	Public Storage between Pico Boulevard and Exposition Boulevard, east of I-405
2	South of Dowlen Drive and east of Greater LA Fisher House
3	Federal Building Parking Lot
4	Kinross Recreation Center and UCLA Lot 36
5	North end of the Leo Baeck Temple Parking Lot (tunnel boring machine retrieval)
6	At 1400 N Sepulveda Boulevard
7	At 1760 N Sepulveda Boulevard
8	East of I-405 and north of Mulholland Drive Bridge
9	Inside of I-405 Northbound to US-101 Northbound Loop Connector, south of US-101
10	ElectroRent Building south of G Line Busway, east of I-405
11	Inside the I-405 Northbound Loop Off-Ramp at Victory Boulevard
12	Along Cabrito Road east of Van Nuys Boulevard

Source: LASRE, 2024; HTA, 2024

Figure 7-9. Alternative 3: Construction Staging Locations

Source: LASRE, 2024; HTA, 2024

7.2 Existing Conditions

This section provides a brief discussion of the types of energy resources that would be consumed by construction and operation of Alternative 3 and how they are produced and distributed to the respective end uses at the state and regional levels. Energy resources involved in the transit system implementation include direct uses, such as transportation fuels for locomotives and electricity use at stations, and indirect uses such as fuel consumed by regional vehicular travel on the roadway network.

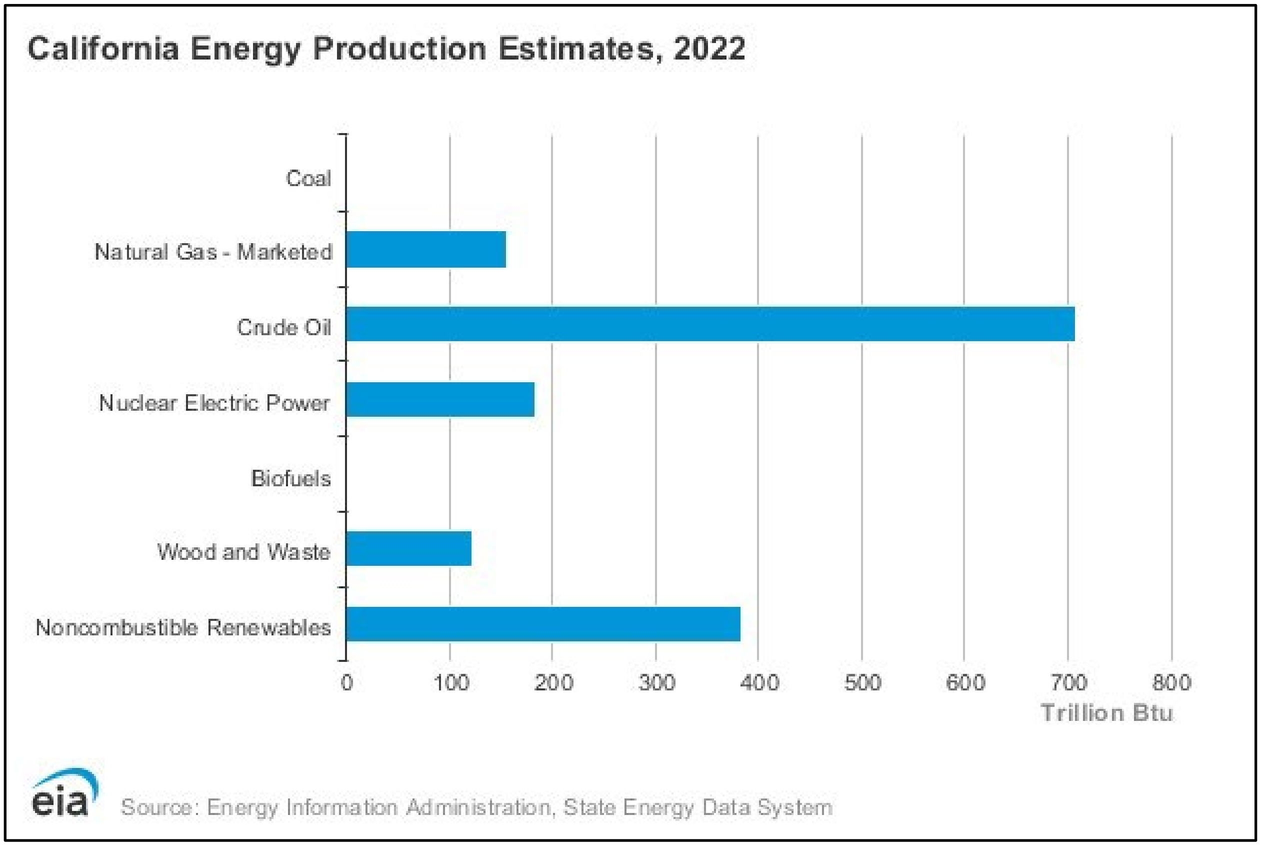
- **Transportation Fuels**. The internal combustion engines of on-road motor vehicles, locomotives, and off-road equipment use fossil fuel (petroleum) energy for propulsion. Gasoline and diesel fuel are formulations of fossil fuels refined for use in various applications. Gasoline is the primary fuel source for most passenger automobiles, and diesel fuel is the primary fuel source for most off-road equipment and medium and heavy-duty trucks. The analyses presented in this report also disclose electricity and natural gas consumption associated with on-road vehicle activity.
- **Electricity**. The production of electricity requires the consumption or conversion of other natural resources, whether it be water (hydroelectric power), wind, oil, gas, coal, or solar energy. The delivery of electricity as a utility involves several system components for distribution and use. Electricity is distributed through a network of transmission and distribution lines referred to as a power grid. Energy capacity, or electrical power, is generally measured in watts (W), while energy use is measured in watt-hours (Wh), which is the integral electricity consumption over a time period of 1 hour. On a utility scale, the capacity of electricity generation and amount of consumption is generally described in megawatt (MW) and megawatt-hours (MWh), respectively. For discussions involving regional scale electricity generation and consumption, units of gigawatt-hours (GWh) are used, which is equivalent to 1,000 MWh.

7.2.1 State Energy Resources

California is the most populous state in the nation, has the largest economy, and is second only to Texas in total energy consumption (U.S. Census Bureau, 2021; BEA, 2019a; EIA, 2024b). California also has the world's fifth-largest economy and leads the nation in both agricultural and manufacturing gross domestic product (BEA, 2019b). Despite California's many energy-intensive industries, the state has one of the lowest per capita energy consumption levels in the United States (EIA, 2023a). California's extensive efforts to increase energy efficiency and implement alternative technologies have slowed growth in energy demand. The state is also rich in energy resources. California is among the nation's top producers of conventional hydroelectric power and is second only to Texas in nonhydroelectric renewable-sourced electricity generation. In addition, California has an abundant supply of crude oil and accounts for one-tenth of the United States crude oil refining capacity.

Energy is produced in California from a diverse portfolio of renewable and non-renewable resources. Figure 7-10 shows that crude oil is the largest source of energy in California, accounting for approximately 708.9 trillion Btu in 2022, which constituted 46 percent of total statewide energy production (EIA, 2024a). To meet state environmental regulations, California refineries are configured to produce cleaner fuels. Refineries in the state often operate at or near maximum capacity because of the high demand for those petroleum products and the lack of interstate pipelines that can deliver them into the state (CEC, 2021b). In 2022, the noncombustible renewable energy resources, including hydroelectric, geothermal, solar, and wind energy, collectively accounted for 383.3 trillion Btu of annual energy production, equal to 24.7 percent of the total statewide resources. Natural gas and nuclear electric power constituted approximately 10 percent and 11.8 percent of statewide production, respectively, and the combination of wood energy and biomass waste energy provided 5.4 percent of production in 2022. Biofuels accounted for 1.5 percent, and coal fueled about 0.1 percent of the in-state, utility-scale net generation, and all of that power was generated at industrial facilities (EIA, 2024b).

Figure 7-10. 2022 Statewide Energy Production Resources



Source: EIA, 2024a

7.2.1.1 Electricity Generation

As of 2022, California is the fourth-largest electricity producer in the nation and accounted for about 5 percent of U.S. utility-scale (1-MW and larger) power generation. Renewable resources, including hydropower and small-scale (less than 1 MW), customer-sited solar photovoltaic (PV) systems, supplied more than half of California's total in-state electricity generation, and natural gas-fired power plants provided approximately two-fifths (EIA, 2023b). Nuclear power's share of state generation in 2022 was less than one-tenth, down from nearly one-fifth in 2011. The decrease resulted from the retirement of the San Onofre nuclear power plant in mid-2013, which left the state with only one operating commercial nuclear power plant—the two-reactor Diablo Canyon facility. Overall, California generated approximately 203.4 million MWh of electricity annually in 2022, and the statewide grid provided a net summer capacity of 85,981 MW.

Table 7-5 provides a summary of the annual in-state electricity generation by supply resource during the decade spanning backwards from 2022–2013 in units of gigawatt-hours (GWh). Key trends observed in the data include the ten-fold expansion of solar generation from 3,813.7 GWh in 2013 to 38,789.4 GWh in 2022, as well as a nearly 70 percent decrease in reliance on coal-powered generation from 823.3 GWh in 2013 to 251.6 GWh in 2022.

Table 7-5. California In-State Electricity Generation Profile 2022–2013 (gigawatt hour(s))

Primary Source	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Battery Storage	-447.6	-154.7	-27.6	-22.6	-22.4	11.5	-4.3	-1.3	-1.1	-1.2
Coal	251.6	294.2	290.3	240.5	281.3	291.1	318.9	297.9	804.8	823.2
Geothermal	11,181.0	11,127.5	11,366.5	10,914.1	11,676.8	11,559.6	11,457.3	11,883.1	12,101.7	12,306.6
Hydroelectric	17,644.1	14,677.6	21,377.5	38,354.8	26,330.7	42,363.1	28,942.1	13,808.5	16,531.3	23,754.6
Natural Gas	96,371.6	97,427.1	92,046.7	85,840.8	89,804.7	88,350.2	97,073.7	116,139.6	120,426.4	119,522.9
Nuclear	17,593.3	16,477.4	16,258.7	16,165.4	18,213.5	17,901.1	18,907.6	18,505.4	16,986.0	17,911.9
Other[a]	643.8	730.6	722.3	787.7	851.1	824.1	670.0	813.0	848.9	817.3
Other Biomass[b]	2,416.6	2,574.4	2,615.1	2,722.6	2,823.8	2,841.0	2,909.9	2,883.7	2,913.3	2,843.2
Other Gas[c]	1,411.5	1,368.9	1,538.0	1,476.2	1,454.0	1,408.3	1,426.8	1,548.6	1,333.0	1,405.7
Petroleum	155.0	77.0	43.9	51.0	68.9	45.8	175.6	84.5	66.3	68.9
Pumped Storage	-155.0	-317.4	-37.1	-30.6	-148.6	407.5	-259.3	112.7	-104.7	196.3
Solar	38,789.4	34,863.9	30,272.6	28,331.5	26,985.2	24,352.9	18,806.7	14,814.4	9,931.8	3,813.7
Wind	14,638.1	15,177.0	13,583.1	13,735.1	14,024.0	12,822.9	13,509.0	12,229.6	12,992.5	12,822.1
Wood	2,890.7	2,841.7	3,033.7	3,217.9	3,122.6	2,967.5	3,029.3	3,584.2	3,977.4	3,792.1
Total Generation	**203,383.9**	**197,165.1**	**193,083.5**	**201,784.2**	**195,465.6**	**206,146.5**	**196,963.2**	**196,703.9**	**198,807.6**	**200,077.1**

Source: EIA, 2024b

[a]"Other" includes non-biogenic municipal solid waste, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, tire-derived fuels, waste heat, and miscellaneous technologies.

[b]"Other Biomass" includes agricultural byproducts, landfill gas, biogenic municipal solid waste, other biomass (solid, liquid, and gas) and sludge waste.

[c]"Other Gas" includes blast furnace gas, and other manufactured and waste gases derived from fossil fuels.

In 2019, California's in-state electricity net generation from all renewable resources combined was greater than that of any other state, including generation from hydroelectric power and from small-scale, customer-sited solar generation. California is the nation's top producer of electricity from solar, geothermal, and biomass energy. In 2019, the state was also the nation's second-largest producer of electricity from conventional hydroelectric power and the fifth largest from wind energy. California's greatest solar resource is in the state's southeastern deserts, where all of its solar thermal facilities and largest solar PV plants are located. However, solar PV facilities are located throughout the state. By 2019, solar supplied 14 percent of the state's utility-scale electricity net generation; and when small-scale solar generation is added, solar energy provided one-fifth of the state's total net generation. By November 2020, California had about 13,000 MW of utility-scale solar power capacity, more than any other state; when small-scale, customer-sited facilities are included, the state had almost 24,000 MWs of solar capacity. California's Renewables Portfolio Standard was enacted in 2002 and has been revised several times since then. It requires that 33 percent of electricity retail sales in California come from eligible renewable resources by 2020, 60 percent by 2030, and 100 percent by 2045.

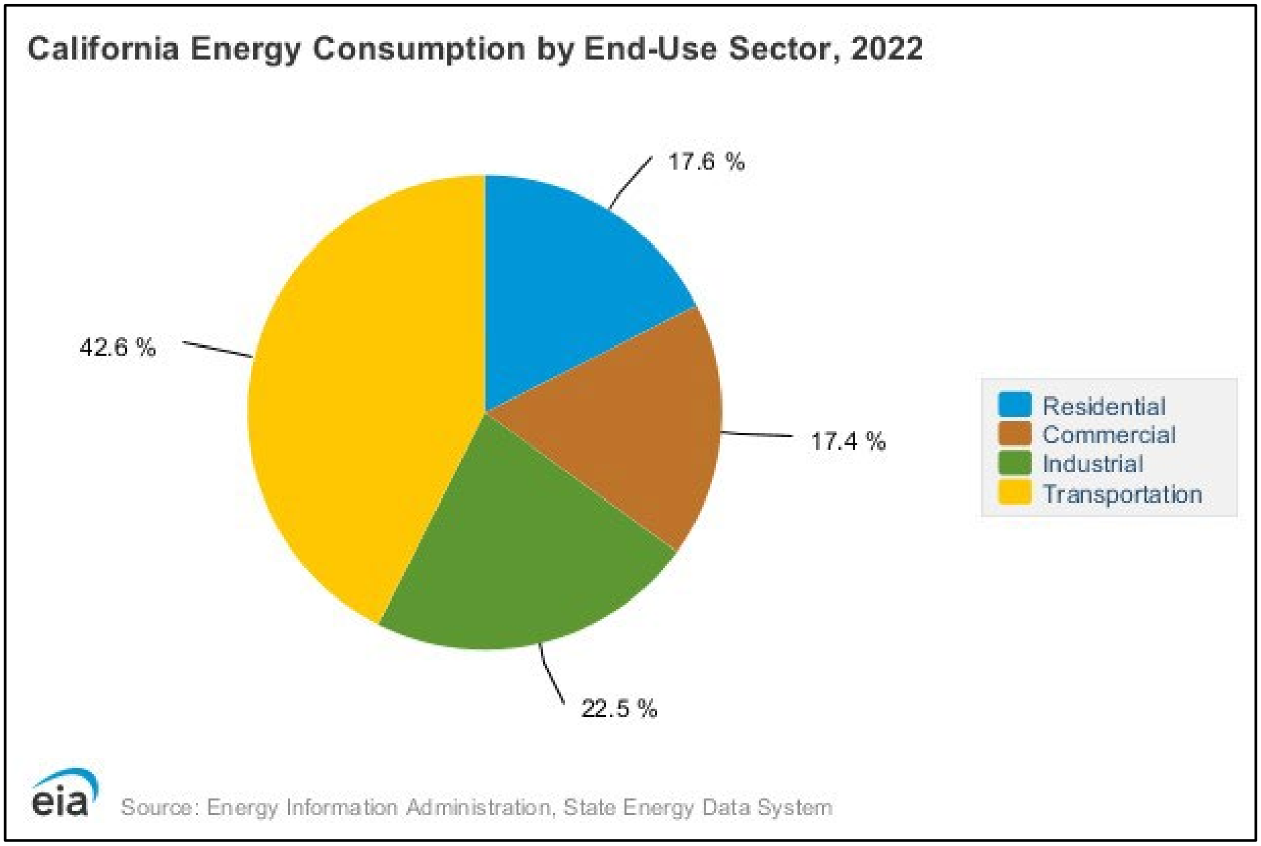
7.2.1.2 Transportation Fuels Supply

As of 2022, California has the sixth-largest share of crude oil reserves among the 50 states and is the seventh-largest crude oil producer (EIA, 2024a). Underground reservoirs along California's Pacific Coast, including in the Los Angeles Basin and those in the state's Central Valley, contain major crude oil reserves. The most prolific oil-producing area in the state is the San Joaquin Basin in the southern half of California's Central Valley. Overall, California's crude oil production has declined steadily since 1985, but the state remains one of the nation's top crude oil producers and accounted for about 4 percent of United States production in 2022 (EIA, 2024a). California ranks third in petroleum refining capacity—after Texas and Louisiana—and accounts for one-tenth of the nation's total. A network of crude oil pipelines connects California's oil production to the state's refining centers, which are located primarily in the Los Angeles area, the San Francisco Bay Area, and the San Joaquin Valley (EIA, 2023b). California refiners also process large volumes of foreign and Alaskan crude oil. As crude oil production in California and Alaska has declined, California refineries have become increasingly dependent on imports from other countries to meet the state's needs. Led by Saudi Arabia, Iraq, Ecuador, and Colombia, foreign suppliers provided more than half of the crude oil refined in California in 2022.

7.2.2 Statewide Use Patterns

Figure 7-11 displays the statewide energy consumption by end use sector for the most recent year of verified data available, 2022 (EIA, 2024b). Overall, the transportation sector accounts for nearly two-fifths of California's end-use energy consumption. Reducing per capita transportation fuels consumption is a pillar of the state’s initiatives to decrease reliance on fossil fuels as the population continues to grow. The industrial sector is the second-largest energy consumer in California and uses almost one-fourth of the state's energy. The commercial sector and the residential sector account for roughly equal amounts of the state's end-use energy consumption, at slightly less than one-fifth each. As previously discussed, California has promulgated a robust regulatory framework to reduce energy consumption across the various end-use sectors.

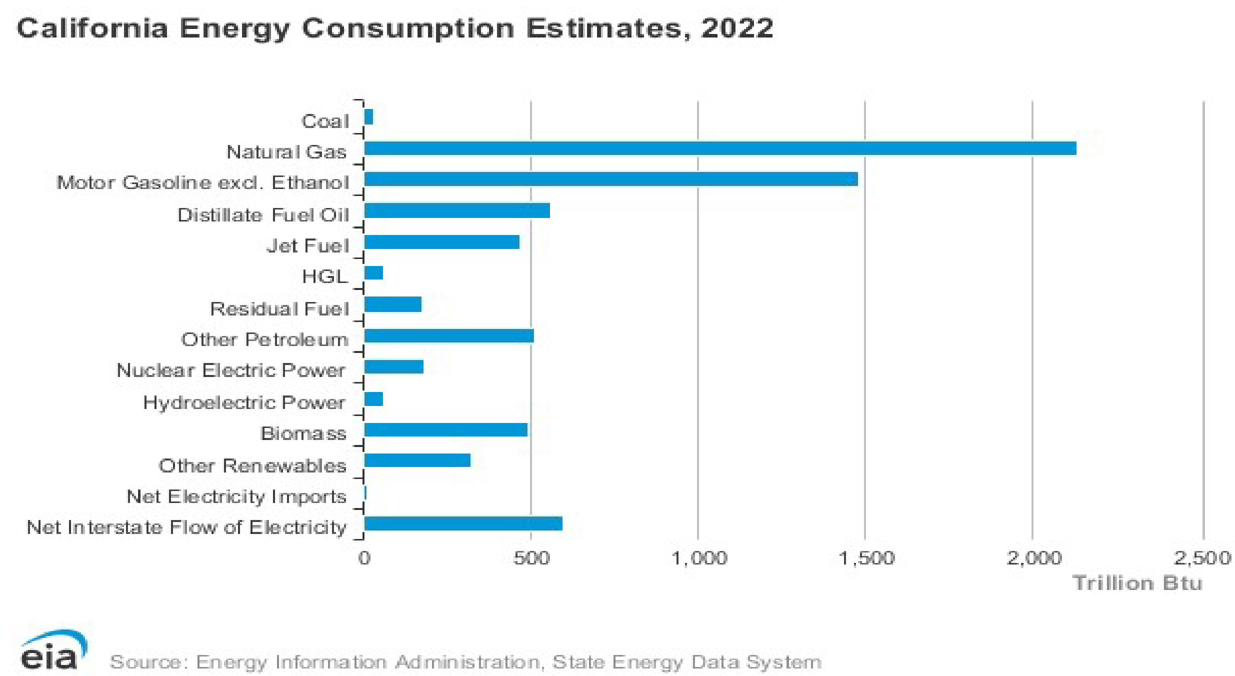
Figure 7-11. Annual Statewide Energy Consumption by End-Use Sector



Source: EIA, 2024b

Figure 7-12 summarizes the 2022 statewide annual energy consumption by resource origin. As mentioned previously, natural gas is the most consumed energy resource in the state, with nearly 10 times as much natural gas used by consumers as is produced by California reserves and processing facilities. Crude oil is refined and distilled to produce motor gasoline, distillate fuel oil, jet fuel, hydrocarbon gas liquids, residual fuel, and other petroleum products. The chart also demonstrates that California has a net import of approximately 600.4 trillion btu of electricity annually.

Figure 7-12. 2022 Annual Statewide Energy Consumption by Source



Source: EIA, 2024b

7.2.2.1 Electricity Consumption

In 2022, California was the nation's largest net importer of electricity from out of state and received about 28 percent of its electricity supply from generating facilities outside the state (EIA, 2024a). California has the second-highest electricity retail sales in the nation, after Texas, but it has the lowest retail sales per capita. The commercial sector accounts for almost half of California's electricity retail sales. The residential sector, where more than one-fourth of California households use electricity for home heating, accounts for more than one-third of sales. Almost all the rest of the state's electricity retail sales are to the industrial sector. A very small amount goes to the transportation sector.

7.2.2.2 Transportation Fuels Consumption

California is the nation’s second-largest consumer of petroleum products, after Texas, and accounts for 10 percent of the nation's total consumption. The state is the largest United States consumer of motor gasoline and jet fuel, and 85 percent of the petroleum consumed in California is used in the transportation sector. The industrial sector, the second-largest petroleum-consuming sector, uses 12 percent of the petroleum consumed in the state. The commercial sector accounts for more than 2 percent, and the residential sector consumes less than 1 percent (EIA, 2023a).

7.2.3 Local Energy Resources

The discussion of local energy resources focuses on electricity, natural gas, and petroleum-based transportation fuels (motor gasoline and diesel fuel) supplied to Los Angeles County and the Project Area. This section also summarizes Metro’s existing systemwide energy consumption using the most recently published data available (Metro, 2019b).

7.2.3.1 Electricity

The LADWP power system serves approximately 4 million people and is the nation's largest municipal utility. Its service territory area covers the City of Los Angeles and many areas of the Owens Valley, with annual sales exceeding 26 million MWh. LADWP is a "vertically integrated" utility, both owning and operating the majority of its generation, transmission, and distribution systems. LADWP strives to be self-sufficient in providing electricity to its customers and does so by maintaining generation resources that are equal to or greater than its customers' electrical needs. LADWP's operations are financed solely through sales of water and electric services.

LADWP obtains electricity from various generating resources that utilize coal, nuclear, natural gas, hydroelectric, and renewable resources to generate power. LADWP obtains power from four municipally owned power plants within the Los Angeles Basin, LADWP Hydrogenerators on the Los Angeles Aqueduct, shared ownership generating facilities in the Southwest, and also power purchased from the Southwest and Pacific Northwest. LADWP has a power infrastructure comprising a total of 34 generation plants and approximately 3,636 miles of overhead transmission lines spanning five western states. LADWP also purchases excess power, as it is available, from self-generators interconnected with the LADWP within the City of Los Angeles.

According to LADWP's 2022 Power Content Label submitted to the California Energy Commission (CEC), LADWP has a net dependable generation capacity greater than 8,000 MW (LADWP, 2021). On August 31, 2017, LADWP's power system experienced a record instantaneous peak demand of 6,502 MW. As of 2019, approximately 34 percent of LADWP's delivered power mix to customers was derived from renewable resources, which meets and exceeds the statewide target of 33 percent renewably sourced electricity generation by 2020, pending verification by the CEC (LADWP, 2021). The annual LADWP electricity sale to customers for 2019 was approximately 23,402.7 GWh (CEC, 2019).

7.2.3.2 Transportation Fuels

As previously discussed, transportation accounts for nearly 40 percent of the total statewide energy consumption, and petroleum-based fuels currently account for 90 percent of California's transportation energy sources (CEC, 2020a). However, the state is now working on developing flexible strategies to reduce petroleum use, as evidenced by the robust regulatory framework promulgated to enhance energy efficiency and decrease reliance on passenger vehicles and non-renewable resources in general. The CEC predicts that the demand for gasoline will continue to decrease over the next decade, and there will be an increase in the use of alternative fuels, such as natural gas, biofuels, and electricity (CEC, 2018). On September 23, 2020, Governor Gavin Newsom signed Executive Order N-79-20, setting a 100 percent zero emission vehicle (ZEV) target for new passenger vehicle sales by 2035 and a 100 percent zero-emission vehicle operations target for medium- and heavy-duty vehicles in the state by 2045 (CEC, 2021b).

According to CEC fuel sales data, Los Angeles County contained approximately 2,063 transportation fueling stations in 2019 (CEC, 2020b). In the same year, countywide fuel sales comprised approximately 3,559 million gallons of gasoline and 276 million gallons of diesel fuel. By volume, Los Angeles County accounted for approximately 23.2 percent of statewide gasoline sales and approximately 15.7 percent of statewide diesel fuel sales. Despite substantial increases in population (from approximately 9.8 million in 2010 to 10.0 million in 2019), total countywide gasoline fuel sales have remained relatively constant over the course of the past decade, as the CEC estimates approximately 3,658 million gallons of gasoline were sold within Los Angeles County in 2010.

7.2.4 Metro Energy Inventory

Metro's contribution to regional energy consumption includes on-road vehicle fuel use (primarily compressed natural gas) and electricity for rail vehicle propulsion and maintenance and administrative facility operation. The *2019 Energy and Resource Report* examined Metro's energy use for the 2019 calendar year and refined estimates prepared by previous analysis (Metro, 2019b).

Table 7-6 presents an overview of the Metro system energy consumption by end use between 2015 and 2019. As of 2019, the Metro system comprised 124,695,827 revenue miles consuming approximately 5,357.3 million megajoules (MJ) of energy per revenue mile, for a total of 6,667.1 million MJ. Overall, Metro system energy consumption has decreased by 6.9 percent during the period from 2015 to 2019. Metro has prioritized generating system energy from alternative fuels in recent years. As of 2019, approximately 30 percent of Metro's electricity is generated by renewable sources. Metro plans to phase out all directly operated natural gas buses by 2030 to be replaced by ZEVs.

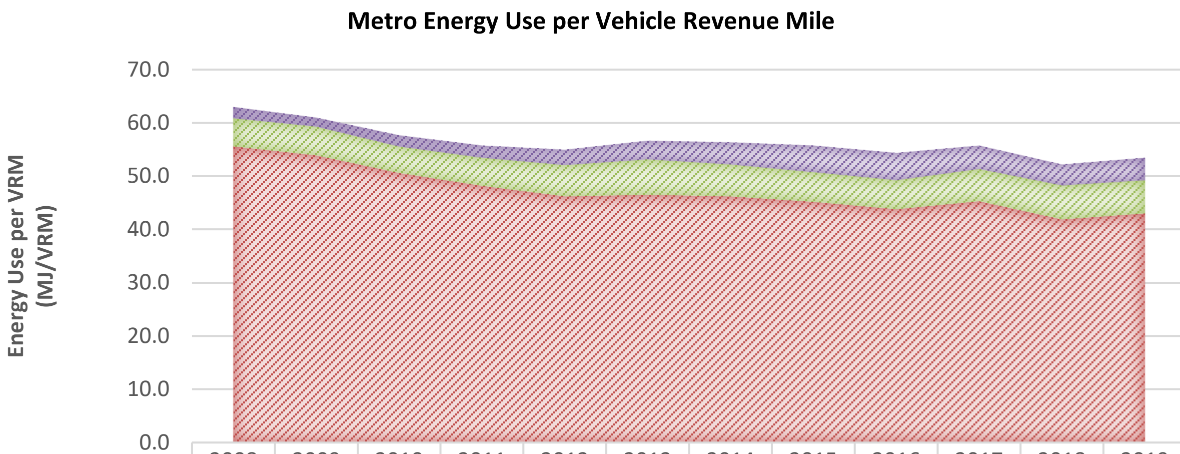
Table 7-6. Metro Operations Annual Energy Consumption (in Megajoules)

End Use	2015	2016	2017	2018	2019
Vehicle Fuel	5,796,786,075	5,644,897,527	5,787,683,879	5,317,489,842	5,357,290,785
Rail Propulsion	719,276,609	711,196,744	775,022,735	817,378,502	781,571,203
Facilities	642,626,521	660,898,312	564,325,336	491,666,179	528,225,942
Total	7,158,689,205	7,016,992,583	7,127,031,949	6,626,534,523	6,667,087,930

Source: Metro, 2019b

The *2019 Energy and Resource Report's* technical appendix also includes data describing Metro system energy use per vehicle revenue mile (VRM) (Metro, 2019b). Examining this data can provide insight as to how Metro is managing its energy resource consumption in relation to the expansion of its service network. Figure 7-13 presents a chart that shows the trend in Metro energy use per VRM over the past 12 years (2008–2019) since the reporting program began. As shown on Figure 7-13, total energy use per VRM decreased from 63.0 MJ/VRM in 2008 to 53.5 MJ/VRM in 2019, representing a 15 percent reduction over the 12-year period. The data demonstrates the efficacy of Metro's energy efficiency programs to deliver high quality transit options that meet regional growth demands while also conserving energy where possible.

Figure 7-13. Metro Systemwide Energy Use per Vehicle Revenue Mile



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Facilities	2.1	1.7	2.1	2.3	2.9	3.5	4.2	5.0	5.1	4.4	3.9	4.2
Rail Propulsion	5.3	5.4	5.0	5.3	5.9	6.7	6.0	5.6	5.5	6.1	6.4	6.3
Vehicle Fuel	55.6	53.9	50.6	48.2	46.2	46.5	46.2	45.2	43.8	45.3	41.9	43.0

Year

Source: Metro, 2019b

Includes mixed commercial and industrial land uses within the Project Study Area.

7.3 Impact Evaluation

7.3.1 Impact ENG-1: Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

7.3.1.1 Construction Impacts

Alternative 3 would require petroleum-based transportation fuels and electricity to construct the transit system. Construction activities would comply with Metro’s GCP and construction equipment would be maintained in accordance with manufacturers’ specifications. Construction would result in a one-time expenditure of approximately 7,563,002 gallons of diesel fuel, 533,406 gallons of gasoline, and 536,969 megawatt-hours (MWh) of electricity. Construction activities may include lighting for security and safety in construction zones. Nighttime construction would be limited; lighting would be sparse and would not require additional capacity provided at the local or regional level. Table 7-7 provides a summary of the energy consumption estimated for construction of Alternative 3.

Table 7-7. Alternative 3: Construction Fuel and Electricity Consumption

Source Type	Fuel Consumption (gal)	Electricity Consumption (MWh)
Mobile Source Fuel Consumption		
Off-Road Equipment (Diesel)	5,331,054	NA
Worker Vehicles (Gasoline)	533,406	NA
Vendor Trucks (Diesel)	203,735	NA
Haul Trucks (Diesel)	2,028,213	NA
Electricity Consumption		
TBM	NA	536,668
Onsite Portable Offices	NA	301
Summary		
Total Gasoline (gal):	**533,406**	**NA**
Total Diesel (gal):	**7,563,002**	**NA**
Total Electricity (MWh):	**NA**	**536,969**

Source: Metro, 2024c

gal = gallons
MWh = megawatt-hour
NA = not applicable
TBM = tunnel boring machine

All equipment and vehicles used in construction activities would comply with applicable California Air Resources Board regulations, Low Carbon Fuel Standards, and the Corporate Average Fuel Economy (CAFE) Standards. Construction would not place an undue burden on available energy resources. The one-time expenditure of energy associated with diesel fuel consumption would be offset by operations within approximately 7.5 years through transportation mode shift, and the one-time expenditure of energy associated with gasoline consumption would be offset by operations within 1 year. The temporary additional transportation fuels consumption does not require additional capacity provided at the local or regional level. CEC transportation energy demand forecasts indicate that gasoline and diesel fuel production is anticipated to increase between 2021 and 2035, while demand for both gasoline and diesel transportation fuels is projected to decrease over the same time period (CEC, 2021b). Construction vehicles and equipment activities would not place an undue burden on available petroleum fuel resources during construction of Alternative 3.

The GCP requires and commits project contractors to using newer engines for off-road diesel-powered construction equipment that are more fuel efficient than older models. All equipment and vehicles would be maintained in accordance with manufacturer specifications and would be subject to idling limits. As required by the California Green Building Standards (CALGreen) Code Tier 2, at least 80 percent of the nonhazardous construction debris generated by demolition activities will be diverted from landfills. Also, CALGreen includes the mandatory requirement to reuse or recycle all clean soil that would be displaced during construction of Alternative 3, which would result in reduced energy consumption from hauling trucks. Furthermore, the Metro 2020 Moving Beyond Sustainability Strategic Plan and the Metro Design Criteria and Standards require and commit contractors to using high-efficiency lighting as opposed to less energy-efficient lighting sources in alignment with Leadership in Energy and Environmental Design (LEED) sustainability energy standards.

Based on the substantiation previously described, construction would not result in wasteful, inefficient, or unnecessary consumption of energy resources. Therefore, Alternative 3 would result in a less-than-significant impact related to construction activities.

7.3.1.2 Operational Impacts

As described in the Methodology section, future operations involved under Alternative 3 would consume energy resources in the forms of electricity (at TPSSs for monorail propulsion, MSF operations, at stations for lighting, accessibility features, and parking facilities, and as power for a fraction of vehicle miles traveled (VMT) by electric and plug-in hybrid vehicles), petroleum fuels (gasoline for Metro employee trips and a fraction of regional VMT, and diesel fuel for emergency generators at the MSF and underground stations and a fraction of regional VMT), and natural gas (a small fraction of regional VMT by vehicles powered by natural gas). End uses that comprise direct energy resource consumption associated with Alternative 3 operations include TPSSs, electric buses, MSFs, stations and parking, and Metro employee trips. End uses comprising indirect energy consumption include the changes in regional vehicle trips and VMT patterns that would result under the new transit system. Table 7-8 presents a summary of the annual energy consumption by resource attributable to Alternative 3 operations in the horizon year of 2045 and compares the consumption to the 2045 Without Project Conditions.

Table 7-8. Alternative 3: Operations Annual Energy Consumption Relative to the 2045 Without Project Conditions (Horizon Year 2045)

End Use	Electricity (MWh)	Gasoline (gal)	Diesel (gal)	Natural Gas (DGE)
Alternative 3				
Main Line Traction Power	81,428	—	—	—
Stations and Parking[a]	12,749	—	8,841	—
MSF[a]	6,110	—	4,421	—
Metro Employee Trips	234	91,473	22,900	903
Regional On-Road VMT	13,331,473	5,202,344,891	1,302,376,124	51,333,143
Alternative 3 Total Annual Consumption[b]	**13,431,994**	**5,202,436,364**	**1,302,412,286**	**51,334,046**
2045 Without Project Conditions				
Regional On-Road VMT	13,342,059	5,206,475,771	1,303,410,265	51,373,904
Net Change in Annual Resource Consumption	**89,935**	**-4,039,407**	**-997,980**	**-39,858**
Conversion Factor	3,412 kBtu/MWh	125.0 kBtu/gal	138.7 kBtu/gal	138.7 kBtu/gal
Net Change in Annual Energy Consumption (MMBtu)	***306,858***	***-504,926***	***-138,420***	***-5,528***
Net Change in Energy Consumption (MMBtu)	**-342,016**			

Source: LASRE, 2024; HTA, 2024; BTS, 2024

[a]Diesel fuel consumption at the MSF and Stations is attributed to emergency generators.
[b]Values may not sum exactly due to rounding.

— = no data
DGE = diesel gallon equivalent
gal = gallon
kBtu = thousand British thermal units
MMBtu = million British thermal units
MWh = megawatt-hour
VMT = vehicle miles traveled

As shown in Table 7-8, operation of Alternative 3 in the horizon year of 2045 would result in a net annual increase in regional electricity demand of 89,935 MWh, and would result in a net annual reduction of 4,039,407 gallons of gasoline, 997,980 gallons of diesel fuel, and 39,858 diesel gallon equivalent (DGE) of natural gas relative to 2045 Without Project Conditions. Converting each of these quantities to standardized units of MMBtu, Alternative 3 operations would result in a net decrease of 342,016 MMBtu annually as compared with 2045 Without Project Conditions. This amount of energy savings is equivalent to 2,736,830 gallons of motor gasoline per year. The electricity consumption would be more than offset by the energy savings in the forms of petroleum fuels and natural gas, and the consumption would power a mass transit system that would contribute to regional efforts to enhance energy efficiency and reduce reliance on nonrenewable resources. Therefore, Alternative 3 would result in a substantial decrease in overall regional energy consumption, and this impact would be less than significant.

Table 7-9 summarizes the Alternative 3 annual energy consumption for each resource compared to Existing Conditions (2021). This is presented for informational purposes only. As shown in Table 7-9, Alternative 3 operations would result in a net increase of 12,096,074 MWh of electricity and 215,548,548 gallons of diesel fuel and would result in a net decrease of 1,060,656,950 gallons of gasoline and 67,418,745 DGE of natural gas relative to Existing Conditions (2021). When standardized in units of MMBtu, operation of Alternative 3 in 2045 would consume approximately 70,764,711 MMBtu less of collective energy resources on an annual basis than Existing Conditions in the baseline year of 2021. This amount of energy is equivalent to 566,262,859 gallons of motor gasoline per year.

Table 7-9. Alternative 3: Operations Annual Energy Consumption (Horizon Year 2045) Relative to Existing Conditions (Baseline Year 2021)

End Use	Electricity (MWh)	Gasoline (gal)	Diesel (gal)	Natural Gas (DGE)
Alternative 3 (2045)				
Traction Power	81,428	—	—	—
Stations & Parking[a]	12,749	—	8,841	—
MSF[a]	6,110	—	4,421	—
Metro Employee Trips	234	91,473	22,900	903
Regional On-Road VMT	13,331,473	5,202,344,891	1,302,376,124	51,333,143
Alternative 3 Total Annual Consumption[b]	**13,431,994**	**5,202,436,364**	**1,302,412,286**	**51,334,046**
Existing Conditions (2021)				
Regional On-Road VMT	1,335,920	6,263,093,314	1,086,863,738	118,752,791
Net Change in Annual Resource Consumption	**12,096,074**	**-1,060,656,950**	**215,548,548**	**-67,418,745**
Conversion Factor	3,412 kBtu/MWh	125.0 kBtu/gal	138.7 kBtu/gal	138.7 kBtu/gal
Net Change in Annual Energy Consumption (MMBtu)	***41,271,804***	***-132,852,119***	***29,896,584***	***-9,350,980***
Net Change in Energy Consumption (MMBtu)	**-70,764,711**			

Source: LASRE, 2024; HTA, 2024; BTS, 2024

[a]Diesel fuel consumption at the MSF and stations is attributed to emergency generators.
[b]Values may not add up exactly due to rounding.

— = no data
DGE = diesel gallon equivalent
gal = gallon
kBtu = thousand British thermal units
MMBtu = million British thermal units
MWh = megawatt-hour

VMT = vehicle miles traveled

7.3.1.3 Maintenance and Storage Facilities

MSF Base Design

As shown in Table 7-8 and Table 7-9, operation of the MSF Base Design in the horizon year of 2045 would result in an annual increase in regional electricity demand of 6,110 MWh and 4,421 gallons of diesel fuel. As discussed in Section 7.3.1.2, Alternative 3 operations collectively would result in a net decrease of 342,016 MMBtu annually in 2045. Construction of the MSF Base Design would require petroleum-based transportation fuels and electricity. Construction activities would comply with Metro's GCP and adhere to Metro's policy for aligning with LEED Silver sustainable certification. The required energy demand to construct and operate the MSF Base Design would be more than offset by the energy savings in the forms of petroleum fuels and natural gas, and the consumption would support a mass transit system that would contribute to regional efforts to enhance energy efficiency and reduce reliance on nonrenewable resources. Construction and operation of the MSF Base Design would not result in wasteful, inefficient, or unnecessary consumption of energy resources and the MSF Base Design would result in a less than significant impact.

MSF Design Option 1

The MSF Design Option 1 would locate the MSF at a different address than the MSF Base Design. Energy use would be similar as presented for the MSF Base Design. Like the MSF Base Design, the required energy demand to construct and operate the MSF Design Option 1 would be more than offset by the energy savings in the forms of petroleum fuels and natural gas, and the consumption would support a mass transit system that would contribute to regional efforts to enhance energy efficiency and reduce reliance on nonrenewable resources. Furthermore, MSF Design Option 1 would adhere to Metro's policy for aligning with LEED Silver sustainable certification. Therefore, construction and operation would not result in wasteful, inefficient, or unnecessary consumption of energy resources and MSF Design Option 1 would result in a less than significant impact.

7.3.2 Impact ENG-2: Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

7.3.2.1 Construction Impacts

Alternative 3 would require petroleum-based transportation fuels and electricity to construct the transit system. Construction would result in a one-time expenditure of approximately 7,563,002 gallons of diesel fuel, 533,406 gallons of gasoline, and 536,969 MWh of electricity. Alternative 3 would be consistent with state and local energy plans and policies to reduce energy consumption as activities would comply with Metro's GCP, CALGreen Code, Title 24, and LEED Version 4 Building and Design Construction (LEED v4 BD+C) Level Silver certification. The GCP requires and commits project contractors to using newer engines for off-road diesel-powered construction equipment that are more fuel efficient than older models. Compliance with GCP would limit excess petroleum fuels consumption. The CALGreen Code requires reduction, disposal, and recycling of at least 80 percent of nonhazardous construction materials and requires demolition debris to be recycled and/or salvaged, which would ultimately result in reductions of indirect energy use associated with waste disposal and storage. Alternative 3 would comply with state and local plans for energy efficiency in construction activities. Therefore, Alternative 3 would result in a less-than-significant impact related to construction activities.

7.3.2.2 Operational Impacts

Alternative 3 would be a high capacity fixed guideway transit system providing energy efficient mass transit to a region in need of enhanced accessibility options. It reduces auto passenger vehicle trips and reduces reliance on petroleum-based transportation fuels. Alternative 3 qualifies as a “sustainable transportation project” as defined by the California Office of Planning and Research, because it encourages the use of transit and zero emission vehicles and reduces on-road VMT (OPR, 2018). The benefits of Alternative 3 are consistent with the goals, objectives, and policies of SCAG and the City of Los Angeles, as outlined in the local regulatory framework previously described. As the renewable energy portfolios of Metro and local jurisdictions expand over time, natural resources consumption to provide the electricity required for operations would become more energy efficient. Alternative 3 would not conflict with any adopted plan or regulation to enhance energy efficiency or reduce transportation fuels consumption and would support the initiatives of the MBSSP. In addition, Alternative 3 would not interfere with renewable portfolio targets and would not result in a wasteful or inefficient expenditure of energy resources. Alternative 3 would positively contribute to statewide, regional, and local efforts to create a more efficient and sustainable transportation infrastructure network. Therefore, Alternative 3 would result in a less than significant impact related to operational activities.

7.3.2.3 Maintenance and Storage Facilities

MSF Base Design

The MSF Base Design would support Alternative 3 operations, providing energy efficient mass transit to the region and reducing auto passenger vehicle trips. The benefits of Alternative 3 are consistent with the goals, objectives, and policies of SCAG and the City of Los Angeles. In addition, the MSF Base Design would achieve a minimum of LEED Version 4 Building and Design Construction (LEED v4 BD+C) Level Silver certification and Envision Version 3 certification if LEED is not applicable. The MSF base design would meet Tier 2 of the CALGreen Code (LASRE, 2024). The MSF Base Design would not conflict with any adopted plan or regulation to enhance energy efficiency or reduce transportation fuels consumption and would support the initiatives of the MBSSP. In addition, MSF Base Design would not interfere with renewable portfolio targets and would not result in a wasteful or inefficient expenditure of energy resources. The MSF Base Design would positively contribute to statewide, regional, and local efforts to create a more efficient and sustainable transportation infrastructure network. Therefore, the MSF Base Design would result in a less than significant impact.

MSF Design Option 1

MSF Design Option 1 would locate the MSF at a different address than the MSF Base Design. Energy use would be similar as presented for the MSF Base Design. Like the MSF Base Design, MSF Design Option 1 would be designed to achieve a minimum of LEED Version 4 Building and Design Construction (LEED v4 BD+C) Level Silver certification—and Envision Version 3 certification if LEED is not applicable—and would be designed to meet Tier 2 of the CALGreen Code (LASRE, 2024). The MSF Design Option 1 would positively contribute to statewide, regional, and local efforts to create a more efficient and sustainable transportation infrastructure network. Therefore, the MSF Design Option 1 would result in a less than significant impact.

7.4 Mitigation Measures

7.4.1 Construction Impacts

No mitigation measures are required.

7.4.2 Operational Impacts

No mitigation measures are required.

7.4.3 Impacts After Mitigation

No mitigation measures are required; impacts are less than significant.

8 ALTERNATIVE 4

8.1 Alternative Description

Alternative 4 is a heavy rail transit (HRT) system with a hybrid underground and aerial guideway track configuration that would include four underground stations and four aerial stations. This alternative would provide transfers to five high-frequency fixed guideway transit and commuter rail lines, including the Los Angeles County Metropolitan Transportation Authority's (Metro) E, Metro D, and Metro G Lines, the East San Fernando Valley Light Rail Transit Line, and the Metrolink Ventura County Line. The length of the alignment between the terminus stations would be approximately 13.9 miles, with 5.7 miles of aerial guideway and 8.2 miles of underground configuration.

The four underground and four aerial HRT stations would be as follows:

1. Metro E Line Expo/Sepulveda Station (underground)
2. Santa Monica Boulevard Station (underground)
3. Wilshire Boulevard/Metro D Line Station (underground)
4. UCLA Gateway Plaza Station (underground)
5. Ventura Boulevard/Sepulveda Boulevard Station (aerial)
6. Metro G Line Sepulveda Station (aerial)
7. Sherman Way Station (aerial)
8. Van Nuys Metrolink Station (aerial)

8.1.1 Operating Characteristics

8.1.1.1 Alignment

As shown on Figure 8-1, from its southern terminus station at the Metro E Line Expo/Sepulveda Station, the alignment of Alternative 4 would run underground north through the Westside of Los Angeles (Westside) and the Santa Monica Mountains to a tunnel portal south of Ventura Boulevard in the San Fernando Valley (Valley). At the tunnel portal, the alignment would transition to an aerial guideway that would generally run above Sepulveda Boulevard before curving eastward along the south side of the Los Angeles-San Diego-San Luis Obispo (LOSSAN) rail corridor to the northern terminus station adjacent to the Van Nuys Metrolink/Amtrak Station.

The proposed southern terminus station would be located underground east of Sepulveda Boulevard between the existing elevated Metro E Line tracks and Pico Boulevard. Tail tracks for vehicle storage would extend underground south of National Boulevard east of Sepulveda Boulevard. The alignment would continue north beneath Bentley Avenue before curving northwest to an underground station at the southeast corner of Santa Monica Boulevard and Sepulveda Boulevard. From the Santa Monica Boulevard Station, the alignment would continue and curve eastward toward the Wilshire Boulevard/Metro D Line Station beneath the Metro D Line Westwood/UCLA Station, which is currently under construction as part of the Metro D Line Extension Project. From there, the underground alignment would curve slightly to the northeast and continue beneath Westwood Boulevard before reaching the UCLA Gateway Plaza Station.

Figure 8-1. Alternative 4: Alignment

Source: STCP, 2024; HTA, 2024

From the UCLA Gateway Plaza Station, the alignment would turn to the northwest beneath the Santa Monica Mountains to the east of Interstate 405 (I-405). South of Mulholland Drive, the alignment would curve to the north to reach a tunnel portal at Del Gado Drive, just east of I-405 and south of Sepulveda Boulevard.

The alignment would transition from an underground configuration to an aerial guideway structure after exiting the tunnel portal and would continue northeast to the Ventura Boulevard/Sepulveda Boulevard

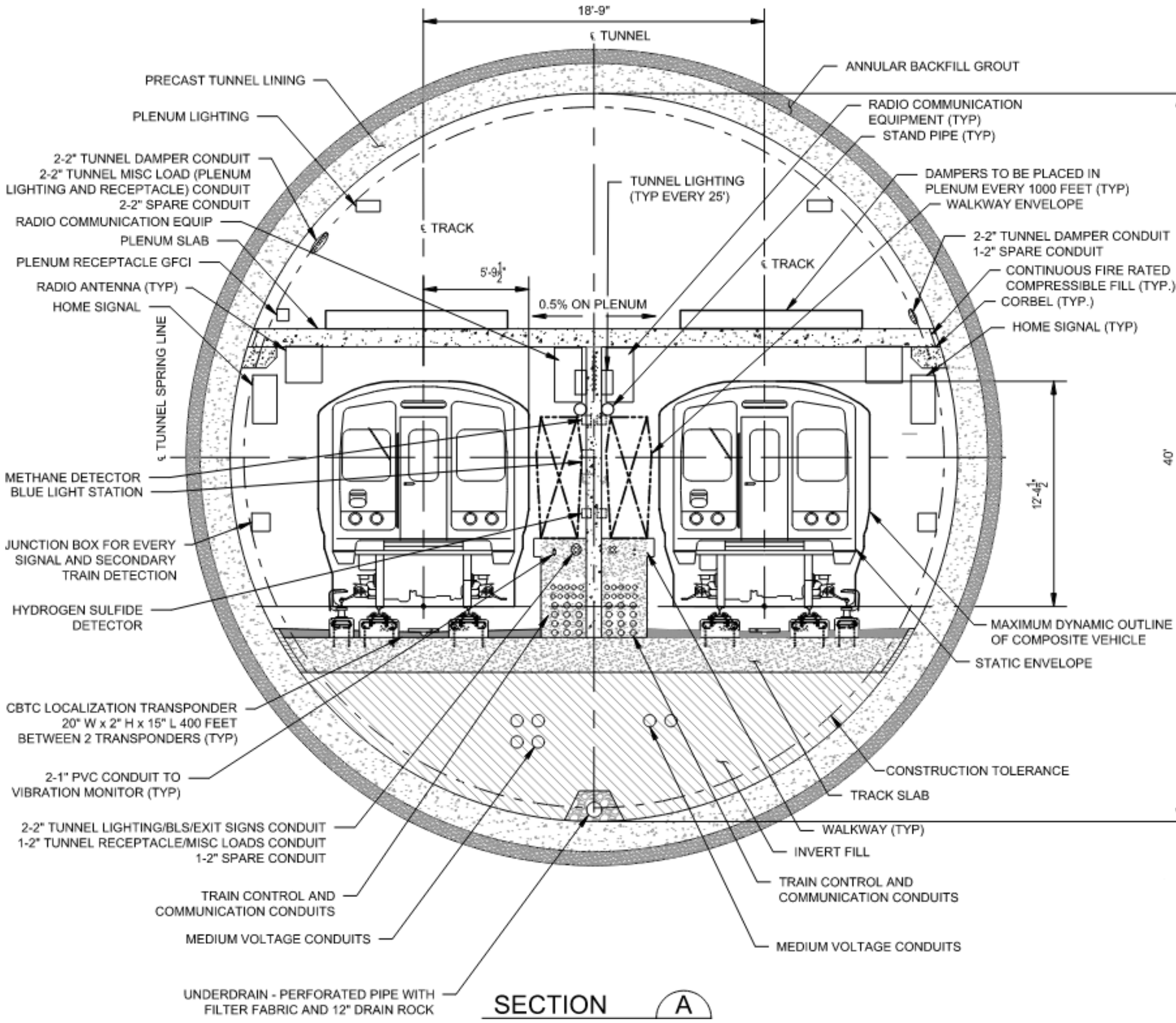
Station located over Dickens Street, immediately west of the Sepulveda Boulevard and Dickens Street intersection. North of the station, the aerial guideway would transition to the center median of Sepulveda Boulevard. The aerial guideway would continue north on Sepulveda Boulevard and cross over U.S. Highway 101 (US-101) and the Los Angeles River before continuing to the Metro G Line Sepulveda Station, immediately south of the Metro G Line Busway. Overhead utilities along Sepulveda Boulevard in the Valley would be undergrounded where they would conflict with the guideway or its supporting columns.

The aerial guideway would continue north above Sepulveda Boulevard where it would reach the Sherman Way Station just south of Sherman Way. After leaving the Sherman Way Station, the alignment would continue north before curving to the southeast to parallel the LOSSAN rail corridor on the south side of the existing tracks. Parallel to the LOSSAN rail corridor, the guideway would conflict with the existing Willis Avenue Pedestrian Bridge, which would be demolished. The alignment would follow the LOSSAN rail corridor before reaching the proposed northern terminus Van Nuys Metrolink Station located adjacent to the existing Metrolink/Amtrak Station. Tail tracks and yard lead tracks would descend to a proposed at-grade maintenance and storage facility (MSF) east of the northern terminus station. Modifications to the existing pedestrian underpass to the Metrolink platforms to accommodate these tracks would result in reconfiguration of an existing rail spur serving City of Los Angeles Department of Water and Power (LADWP) property.

8.1.1.2 Guideway Characteristics

Alternative 4 would utilize a single-bore tunnel configuration for underground tunnel sections, with an outside diameter of approximately 43.5 feet. The tunnel would include two parallel tracks with 18.75-foot track spacing in tangent sections separated by a continuous central dividing wall throughout the tunnel. Inner walkways would be constructed adjacent to the two tracks. Inner and outer walkways would be constructed within tunnel sections near the track crossovers. At the crown of tunnel, a dedicated air plenum would be provided by constructing a concrete slab above the railway corridor. The air plenum would allow for ventilation throughout the underground portion of the alignment. Figure 8-2 illustrates these components at a typical cross-section of the underground guideway.

Figure 8-2. Typical Underground Guideway Cross-Section

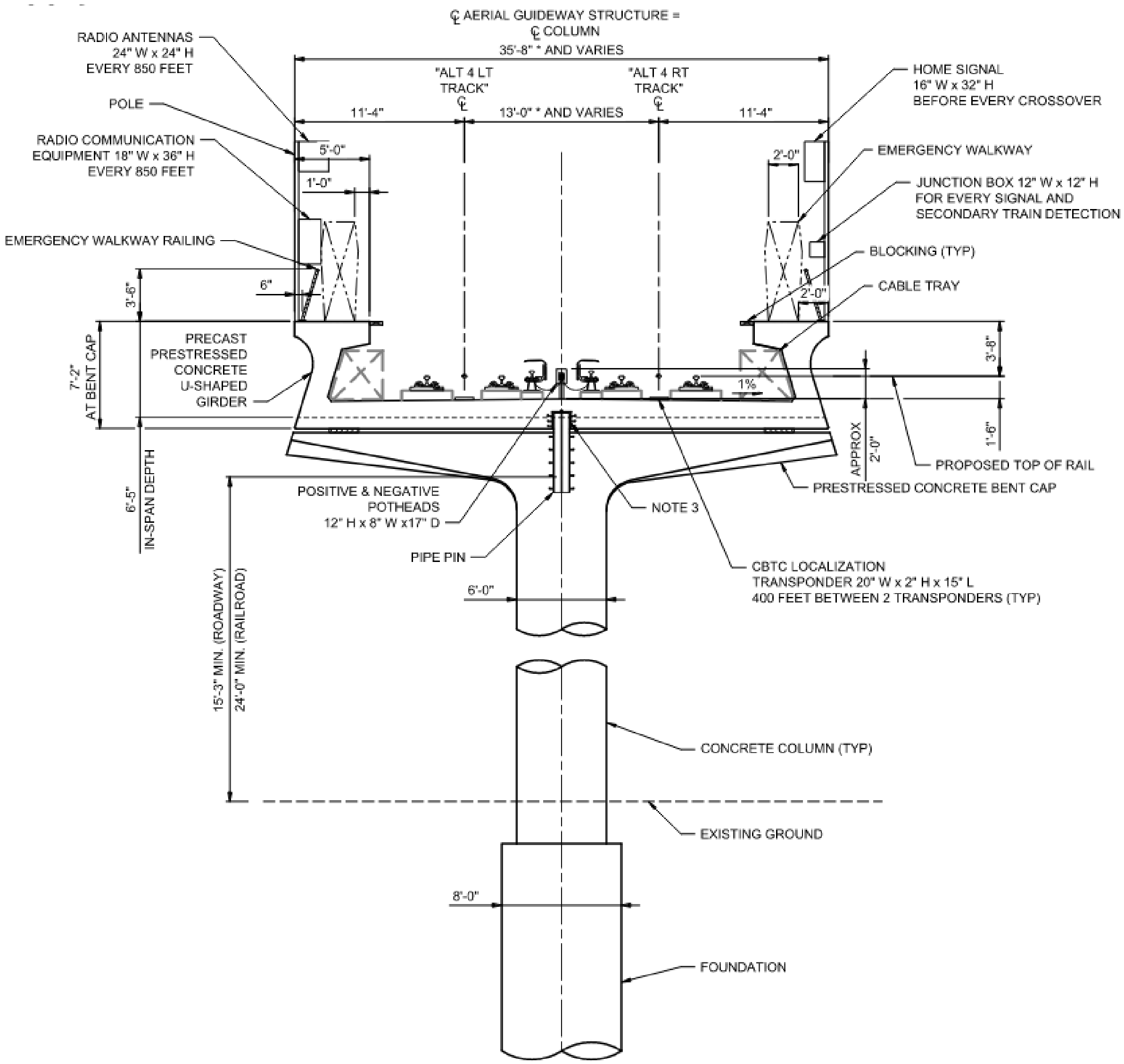


Source: STCP, 2024

In aerial sections, the guideway would be supported by either single columns or straddle-bents. Both types of structures would support a U-shaped concrete girder and the HRT track. The aerial guideway would be approximately 36 feet wide. The track would be constructed on the concrete girders with direct fixation and would maintain a minimum of 13 feet between the centerlines of the two tracks. On the outer side of the tracks, emergency walkways would be constructed with a minimum width of 2 feet.

The single-column pier would be the primary aerial structure throughout the aerial portion of the alignment. Crash protection barriers would be used to protect columns located in the median of Sepulveda Boulevard in the Valley. Figure 8-3 shows a typical cross-section of the single-column aerial guideway.

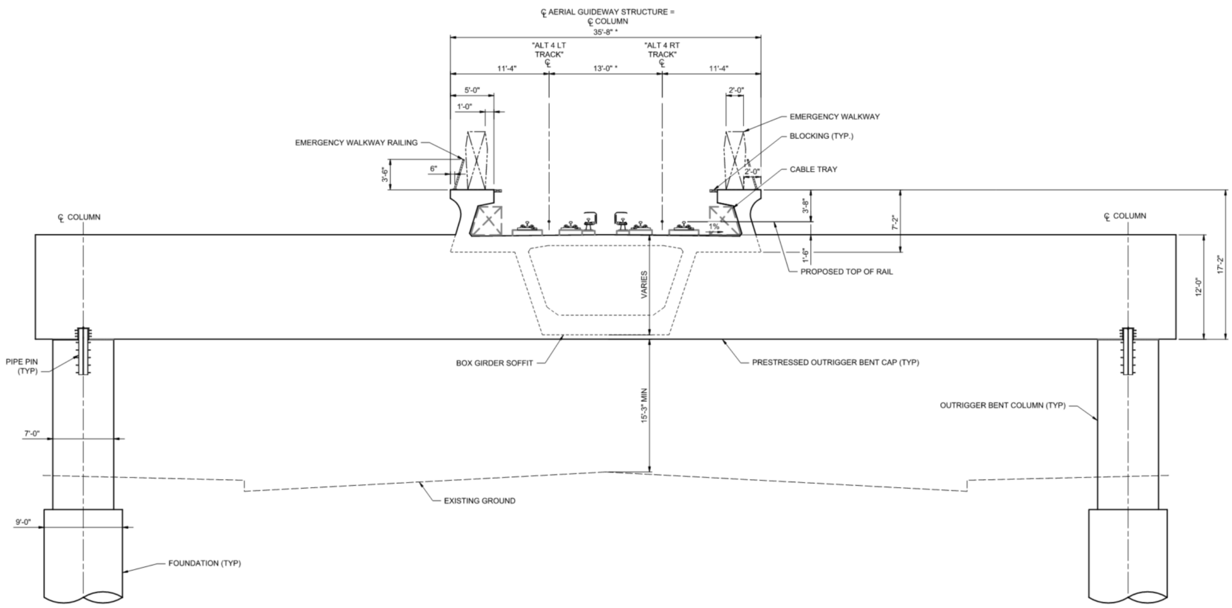
Figure 8-3. Typical Aerial Guideway Cross-Section



Source: STCP, 2024

In order to span intersections and maintain existing turn movements, sections of the aerial guideway would be supported by straddle bents, a concrete straddle-beam placed atop two concrete columns constructed outside of the underlying roadway. Figure 8-4 illustrates a typical straddle-bent configuration.

Figure 8-4. Typical Aerial Straddle-Bent Cross-Section



Source: STCP, 2024

8.1.1.3 Vehicle Technology

Alternative 4 would utilize steel-wheel HRT trains, with automated train operations and planned peak-period headways of 2.5 minutes and off-peak-period headways ranging from 4 to 6 minutes. Each train could consist of three or four cars with open gangways between cars. The HRT vehicle would have a maximum operating speed of 70 miles per hour; actual operating speeds would depend on the design of the guideway and distance between stations. Train cars would be approximately 10 feet wide with three double doors on each side. Each car would be approximately 72 feet long with capacity for 170 passengers. Trains would be powered by a third rail.

8.1.1.4 Stations

Alternative 4 would include four underground stations and four aerial stations with station platforms measuring 280 feet long for both station configurations. The aerial stations would be constructed a minimum of 15.25 feet above ground level, supported by rows of dual columns with 8-foot diameters. The southern terminus station would be adjacent to the Metro E Line Expo/Sepulveda Station, and the northern terminus station would be adjacent to the Van Nuys Metrolink/Amtrak Station.

All stations would be side-platform stations where passengers would select and travel to station platforms depending on their direction of travel. All stations would include 20-foot-wide side platforms separated by 30 feet for side-by-side trains. Aerial station platforms would be covered, but not enclosed. Each underground station would include an upper and lower concourse level prior to reaching the train platforms. Each aerial station, except for the Sherman Way Station, would include a mezzanine level prior to reaching the station platforms. At the Sherman Way Station, separate entrances on opposite sides of the street would provide access to either the northbound or southbound platform with an overhead pedestrian walkway providing additional connectivity across platforms. Each station would have a minimum of two elevators, two escalators, and one stairway from the ground level to the concourse or mezzanine.

Stations would include automatic, bi-parting fixed doors along the edges of station platforms. These platform screen doors would be integrated into the automatic train control system and would not open unless a train is stopped at the platform.

The following information describes each station, with relevant entrance, walkway, and transfer information. Bicycle parking would be provided at each station.

Metro E Line Expo/Sepulveda Station

- This underground station would be located just north of the existing Metro E Line Expo/Sepulveda Station, on the east side of Sepulveda Boulevard.
- A station entrance would be located on the east side of Sepulveda Boulevard north of the Metro E Line.
- A walkway to transfer to the Metro E Line would be provided at street level within the fare paid zone.
- A 126-space parking lot would be located immediately north of the station entrance, east of Sepulveda Boulevard. Passengers would also be able to park at the existing Metro E Line Expo/Sepulveda Station parking facility, which provides 260 parking spaces.

Santa Monica Boulevard Station

- This underground station would be located under the southeast corner of Santa Monica Boulevard and Sepulveda Boulevard.
- The station entrance would be located on the south side of Santa Monica Boulevard between Sepulveda Boulevard and Bentley Avenue.
- No dedicated station parking would be provided at this station.

Wilshire Boulevard/Metro D Line Station

- This underground station would be located beneath the Metro D Line tracks and platform under Gayley Avenue between Wilshire Boulevard and Lindbrook Drive.
- Station entrances would be provided on the northeast corner of Wilshire Boulevard and Gayley Avenue and on the northeast corner of Lindbrook Drive and Gayley Avenue. Passengers would also be able to use the Metro D Line Westwood/UCLA Station entrances to access the station platform.
- A direct internal station transfer to the Metro D Line would be provided at the south end of the station.
- No dedicated station parking would be provided at this station.

UCLA Gateway Plaza Station

- This underground station would be located underneath Gateway Plaza on the University of California, Los Angeles (UCLA) campus.
- Station entrances would be provided on the north side of Gateway Plaza and on the east side of Westwood Boulevard across from Strathmore Place.
- No dedicated station parking would be provided at this station.

Ventura Boulevard/Sepulveda Boulevard Station

- This aerial station would be located west of Sepulveda Boulevard spanning over Dickens Street.

- A station entrance would be provided on the west side of Sepulveda Boulevard south of Dickens Street.
- A 52-space parking lot would be located adjacent to the station entrance on the southwest corner of the Sepulveda Boulevard and Dickens Street intersection, and an additional 40-space parking lot would be located on the northwest corner of the same intersection.

Metro G Line Sepulveda Station

- This aerial station would be located over Sepulveda Boulevard immediately south of the Metro G Line Busway.
- A station entrance would be provided on the west side of Sepulveda Boulevard south of the Metro G Line Busway.
- An elevated pedestrian walkway would connect the platform level of the proposed station to the planned aerial Metro G Line Busway platforms within the fare paid zone.
- Passengers would be able to park at the existing Metro G Line Sepulveda Station parking facility, which has a capacity of 1,205 parking spaces. Currently, only 260 parking spaces are used for transit parking. No additional automobile parking would be provided at the proposed station.

Sherman Way Station

- This aerial station would be located over Sepulveda Boulevard between Sherman Way and Gault Street.
- Station entrances would be provided on either side of Sepulveda Boulevard south of Sherman Way.
- A 46-space parking lot would be located on the northwest corner of the Sepulveda Boulevard and Gault Street intersection, and an additional 76-space parking lot would be located west of the station along Sherman Way.

Van Nuys Metrolink Station

- This aerial station would span Van Nuys Boulevard, just south of the LOSSAN rail corridor.
- The primary station entrance would be located on the east side of Van Nuys Boulevard just south of the LOSSAN rail corridor. A secondary station entrance would be located between Raymer Street and Van Nuys Boulevard.
- An underground pedestrian walkway would connect the station plaza to the existing pedestrian underpass to the Metrolink/Amtrak platform outside the fare paid zone.
- Existing Metrolink Station parking would be reconfigured, maintaining approximately the same number of spaces, but 66 parking spaces would be relocated west of Van Nuys Boulevard. Metrolink parking would not be available to Metro transit riders.

8.1.1.5 Station-To-Station Travel Times

Table 8-1 presents the station-to-station distance and travel times at peak period for Alternative 4. The travel times include both run time and dwell time. Dwell time is 30 seconds for transfer stations and 20 seconds for other stations. Northbound and southbound travel times vary slightly because of grade differentials and operational considerations at end-of-line stations.

Table 8-1. Alternative 4: Station-to-Station Travel Times and Station Dwell Times

From Station	To Station	Distance (miles)	Northbound Station-to- Station Travel Time (seconds)	Southbound Station-to-Station Travel Time (seconds)	Dwell Time (seconds)
Metro E Line Station					*30*
Metro E Line	Santa Monica Boulevard	0.9	89	86	—
Santa Monica Boulevard Station					*20*
Santa Monica Boulevard	Wilshire/Metro D Line	0.9	91	92	—
Wilshire/Metro D Line Station					*30*
Wilshire/Metro D Line	UCLA Gateway Plaza	0.7	75	68	—
UCLA Gateway Plaza Station					*20*
UCLA Gateway Plaza	Ventura Boulevard	6.1	376	366	—
Ventura Boulevard Station					*20*
Ventura Boulevard	Metro G Line	1.9	149	149	—
Metro G Line Station					*30*
Metro G Line	Sherman Way	1.4	110	109	—
Sherman Way Station					*20*
Sherman Way	Van Nuys Metrolink	1.9	182	180	—
Van Nuys Metrolink Station					*30*

Source: STCP, 2024

— = no data

8.1.1.6 Special Trackwork

Alternative 4 would include 10 double crossovers throughout the alignment, enabling trains to cross over to the parallel track. Each terminus station would include a double crossover immediately north and south of the station. Except for the Santa Monica Boulevard Station, each station would have a double crossover immediately south of the station. The remaining crossovers would be located along the alignment midway between the UCLA Gateway Plaza Station and the Ventura Boulevard Station.

8.1.1.7 Maintenance and Storage Facility

The MSF for Alternative 4 would be located east of the Van Nuys Metrolink Station and would encompass approximately 46 acres. The MSF would be designed to accommodate 184 rail cars and would be bounded by single-family residences to the south, the LOSSAN rail corridor to the north, Woodman Avenue on the east, and Hazeltine Avenue and industrial manufacturing enterprises to the west. Trains would access the site from the fixed guideway's tail tracks at the northwest corner of the site. Trains would then travel southeast to maintenance facilities and storage tracks.

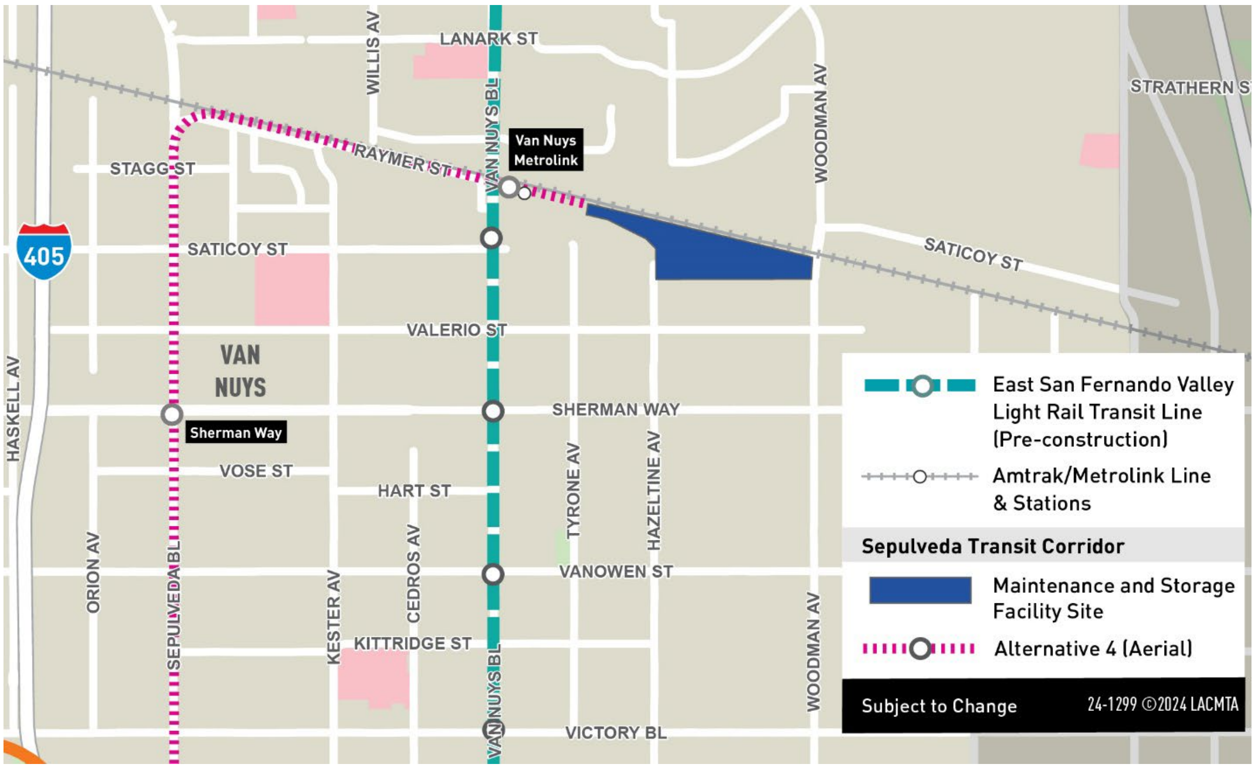
The site would include the following facilities:

- Two entrance gates with guard shacks
- Main shop building
- Maintenance-of-way building
- Storage tracks
- Carwash building
- Cleaning and inspections platforms
- Material storage building
- Hazmat storage locker

- Traction power substation (TPSS) located on the west end of the MSF to serve the mainline
- TPSS located on the east end of the MSF to serve the yard and shops
- Parking area for employees
- Grade separated access roadway (over the HRT tracks at the east end of the facility, and necessary drainage)

Figure 8-5 shows the location of the MSF site for Alternative 4.

Figure 8-5. Alternative 4: Maintenance and Storage Facility Site



Source: STCP, 2024; HTA, 2024

8.1.1.8 Traction Power Substations

TPSSs transform and convert high voltage alternating current supplied from power utility feeders into direct current suitable for transit operation. Twelve TPSS facilities would be located along the alignment and would be spaced approximately 0.5 to 2.5 miles apart. TPSS facilities would generally be located within the stations, adjacent to the tunnel through the Santa Monica Mountains, or within the MSF. TPSSs would be approximately 2,000 to 3,000 square feet. Table 8-2 lists the TPSS locations for Alternative 4.

Figure 8-6 shows the TPSS locations along the Alternative 4 alignment.

Table 8-2. Alternative 4: Traction Power Substation Locations

TPSS No.	Location Description	Configuration
1	TPSS 1 would be located east of Sepulveda Boulevard and north of the Metro E Line.	Underground (within station)

TPSS No.	Location Description	Configuration
2	TPSS 2 would be located south of Santa Monica Boulevard between Sepulveda Boulevard and Bentley Avenue.	Underground (within station)
3	TPSS 3 would be located at the southeast corner of UCLA Gateway Plaza.	Underground (within station)
4	TPSS 4 would be located south of Bellagio Road and west of Stone Canyon Road.	Underground (adjacent to tunnel)
5	TPSS 5 would be located west of Roscomare Road between Donella Circle and Linda Flora Drive.	Underground (adjacent to tunnel)
6	TPSS 6 would be located east of Loom Place between Longbow Drive and Vista Haven Road.	Underground (adjacent to tunnel)
7	TPSS 7 would be located west of Sepulveda Boulevard between the I-405 Northbound On-Ramp and Dickens Street.	At-grade (within station)
8	TPSS 8 would be located west of Sepulveda Boulevard between the Metro G Line Busway and Oxnard Street.	At-grade (within station)
9	TPSS 9 would be located at the southwest corner of Sepulveda Boulevard and Sherman Way.	At-grade (within station)
10	TPSS 10 would be located south of the LOSSAN rail corridor and north of Raymer Street and Kester Avenue.	At-grade
11	TPSS 11 would be located south of the LOSSAN rail corridor and east of the Van Nuys Metrolink Station.	At-grade (within MSF)
12	TPSS 12 would be located south of the LOSSAN rail corridor and east of Hazeltine Avenue.	At-grade (within MSF)

Source: STCP, 2024; HTA, 2024

Figure 8-6. Alternative 4: Traction Power Substation Locations

Source: STCP, 2024; HTA, 2024

8.1.1.9 Roadway Configuration Changes

Table 8-3 lists the roadway changes necessary to accommodate the guideway of Alternative 4. Figure 8-7 shows the location of roadway changes in the Sepulveda Transit Corridor Project (Project) Study Area, and Figure 8-8 shows detail of the street vacation at Del Gado Drive.

In addition to the changes made to accommodate the guideway, as listed in Table 8-3, roadways and sidewalks near stations would be reconstructed, resulting in modifications to curb ramps and driveways.

Table 8-3. Alternative 4: Roadway Changes

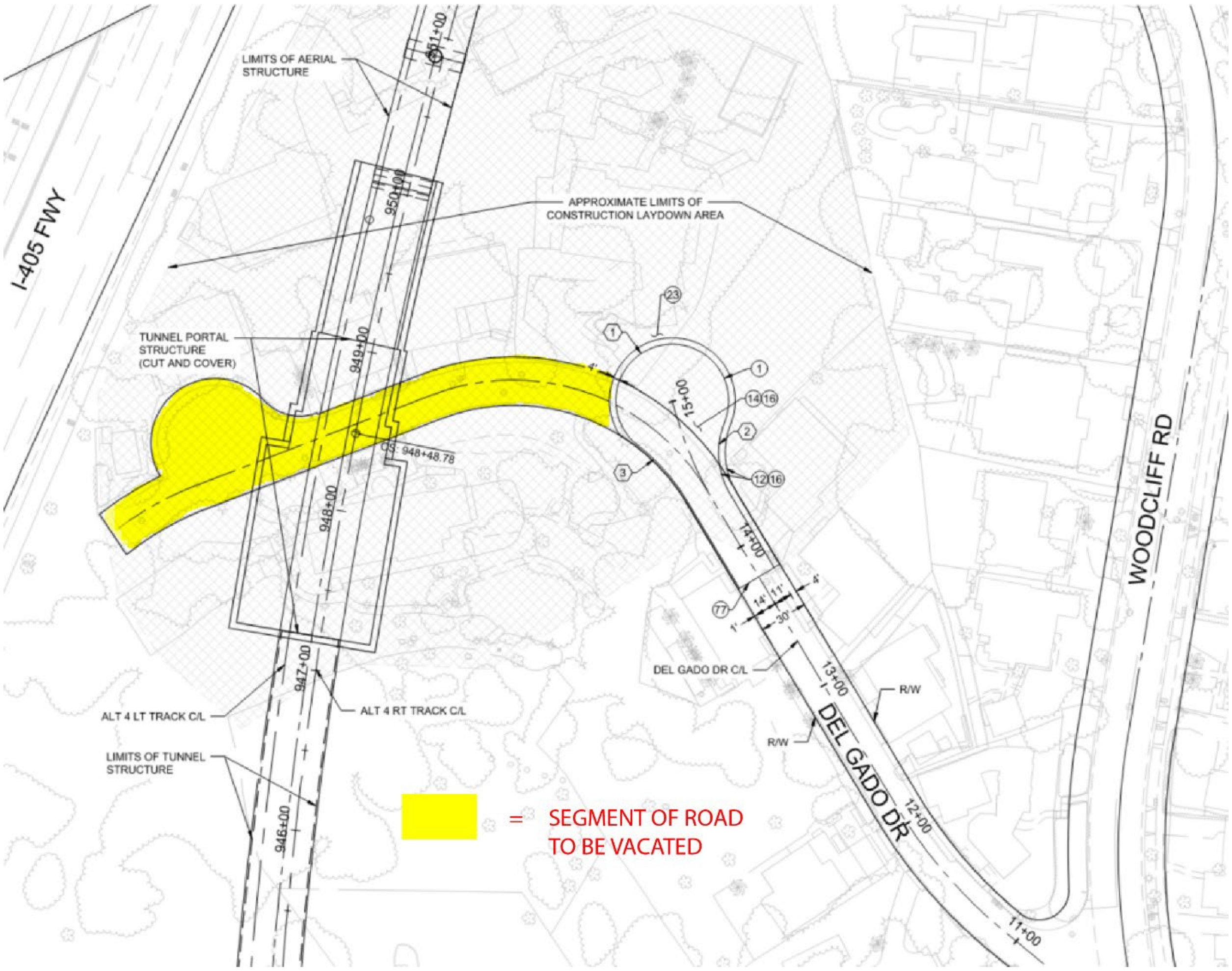
Location	From	To	Description of Change
Del Gado Drive	Woodcliff Road	Not Applicable	Vacation of approximately 325 feet of Del Gado Drive east of I-405 to accommodate tunnel portal
Sepulveda Boulevard	Ventura Boulevard	Raymer Street	Construction of raised median and removal of all on-street parking on the southbound side of the street and some on-street parking on the northbound side of the street to accommodate aerial guideway columns
Sepulveda Boulevard	La Maida Street	Not Applicable	Prohibition of left turns to accommodate aerial guideway columns
Sepulveda Boulevard	Valleyheart Drive South, Hesby Street, Hartsook Street, Archwood Street, Hart Street, Leadwell Street, Covello Street	Not Applicable	Prohibition of left turns to accommodate aerial guideway columns
Raymer Street	Kester Avenue	Keswick Street	Reconstruction resulting in narrowing of width and removal of parking on the westbound side of the street to accommodate aerial guideway columns

Source: STCP, 2024; HTA, 2024

Figure 8-7. Alternative 4: Roadway Changes

Source: STCP, 2024; HTA, 2024

Figure 8-8. Alternative 4: Street Vacation at Del Gado Drive



Source: STCP, 2024; HTA, 2024

8.1.1.10 Ventilation Facilities

For ventilation of the alignment’s underground portion, a plenum within the crown of the tunnel would provide a separate compartment for air circulation and allow multiple trains to operate between stations. Each underground station would include a fan room with additional ventilation facilities. Alternative 4 would also include a stand-alone ventilation facility at the tunnel portal on the northern end of the tunnel segment, located east of I-405 and south of Del Gado Drive. Within this facility, ventilation fan rooms would provide both emergency ventilation, in case of a tunnel fire, and regular ventilation, during non-revenue hours. The facility would also house sump pump rooms to collect water from various sources, including storm water; wash water (from tunnel cleaning); and water from a fire-fighting incident, system testing, or pipe leaks.

8.1.1.11 Fire/Life Safety – Emergency Egress

Within the tunnel segment, emergency walkways would be provided between the center dividing wall and each track. Sliding doors would be located in the central dividing wall at required intervals to connect the two sides of the railway with a continuous walkway to allow for safe egress to a point of safety (typically at a station) during an emergency. Similarly, the aerial guideway would include two emergency walkways with safety railing located on the outer side of the tracks. Access to tunnel segments for first responders would be through stations and the portal.

8.1.2 Construction Activities

Temporary construction activities for Alternative 4 would occur within project work zones at permanent facility locations, construction staging and laydown areas, and construction office areas. Construction of the transit facilities through substantial completion is expected to have a duration of 8 ¼ years. Early works, such as site preparation, demolition, and utility relocation, could start in advance of construction of the transit facilities.

For the guideway, Alternative 4 would consist of a single-bore tunnel through the Westside and Santa Monica Mountains. The tunnel would be comprised of two separate segments, one running north from the southern terminus to the UCLA Gateway Plaza Station (Westside segment), and the other running south from the portal in the San Fernando Valley to the UCLA Gateway Plaza Station (Santa Monica Mountains segment). Two tunnel boring machines (TBM) with approximately 45-foot-diameter cutting faces would be used to construct the two tunnel segments underground. For the Westside segment, the TBM would be launched from Staging Area No. 1 in Table 8-4 at Sepulveda Boulevard and National Boulevard. For the Santa Monica Mountains segment, the TBM would be launched from Staging Area No. 4 in the San Fernando Valley. Both TBMs would be extracted from the UCLA Gateway Plaza Station Staging Area No. 3 in Table 8-4. Figure 8-9 shows the location of construction staging locations along the Alternative 4 alignment.

Table 8-4. Alternative 4: On-Site Construction Staging Locations

No.	Location Description
1	Commercial properties on southeast corner of Sepulveda Boulevard and National Boulevard
2	North side of Wilshire Boulevard between Veteran Avenue and Gayley Avenue
3	UCLA Gateway Plaza
4	Residential properties on both sides of Del Gado Drive and south side of Sepulveda Boulevard adjacent to I-405
5	West of Sepulveda Boulevard between Valley Vista Boulevard and Sutton Street
6	West of Sepulveda Boulevard between US-101 and Sherman Oaks Castle Park
7	Lot behind Los Angeles Fire Department Station 88
8	Commercial property on southeast corner of Sepulveda Boulevard and Raymer Street
9	South of the LOSSAN rail corridor east of Van Nuys Metrolink Station, west of Woodman Avenue

Source: STCP, 2024; HTA, 2024

Figure 8-9. Alternative 4: On-Site Construction Staging Locations

Source: STCP, 2024; HTA, 2024

The distance from the surface to the top of the tunnel for the Westside tunnel segment would vary from approximately 40 feet to 90 feet depending on the depth needed to construct the underground stations. The depth of the Santa Monica Mountains tunnel segment would vary from approximately 470 feet as it passes under the Santa Monica Mountains to 50 feet near UCLA. The tunnel segment through the Westside would be excavated in soft ground, while the tunnel through the Santa Monica Mountains would be excavated primarily in hard ground or rock as geotechnical conditions transition from soft to hard ground near the UCLA Gateway Plaza Station.

The aerial guideway viaduct would be primarily situated in the center of Sepulveda Boulevard in the San Fernando Valley, with guideway columns located in both the center and outside of the right-of-way of Sepulveda Boulevard. This would result in a linear work zone spanning the full width of Sepulveda Boulevard along the length of the aerial guideway. Three to five main phases would be required to construct the aerial guideway. A phased approach would allow travel lanes along Sepulveda Boulevard to remain open as construction individually occupies either the center, left, or right side of the roadway via the use of lateral lane shifts. Additional lane closures on side streets may be required along with appropriate detour routing.

The aerial guideway would comprise a mix of simple spans and longer balanced cantilever spans ranging from 80 to 250 feet in length. The repetitive simple spans would be utilized when guideway bent is located within the center median of Sepulveda Boulevard and would be constructed using Accelerated Bridge Construction (ABC) segmental span-by-span technology. Longer balanced cantilever spans would be provided at locations such as freeways, arterials, or street crossings, and would be constructed using ABC segmental balance cantilever technology. Foundations would consist of cast-in-drilled-hole (CIDH) shafts with both precast and cast-in-place structural elements. During construction of the aerial guideway, multiple crews would work on components of the guideway simultaneously.

Construction work zones would also be co-located with future MSF and station locations. All work zones would comprise the permanent facility footprint with additional temporary construction easements from adjoining properties.

The Metro E Line, Santa Monica Boulevard, Wilshire Boulevard/Metro D Line, and UCLA Gateway Plaza Stations would be constructed using a "cut-and-cover" method whereby the station structure would be constructed within a trench excavated from the surface with a portion or all being covered by a temporary deck and backfilled during the later stages of station construction. Traffic and pedestrian detours would be necessary during underground station excavation until decking is in place and the appropriate safety measures are taken to resume cross traffic. Constructing the Ventura Boulevard/Sepulveda Boulevard, Metro G Line Sepulveda, Sherman Way, and Van Nuys Metrolink Stations would include construction of CIDH elevated viaduct with two parallel side platforms supported by outrigger bents.

In addition to work zones, Alternative 4 would require construction staging and laydown areas at multiple locations along the alignment as well as off-site staging areas. Construction staging areas would provide the necessary space for the following activities:

- Contractors' equipment
- Receiving deliveries
- Testing of soils for minerals or hazards
- Storing materials
- Site offices
- Work zone for excavation
- Other construction activities (including parking and change facilities for workers, location of construction office trailers, storage, staging and delivery of construction materials and permanent plant equipment, and maintenance of construction equipment)

A larger, off-site staging area would be used for temporary storage of excavated material from both tunneling and station cut-and-cover excavation activities. Table 8-4 and Figure 8-9 present potential construction staging areas along the alignment for Alternative 4. Table 8-5 and Figure 8-10 present candidate sites for off-site staging and laydown areas.

Table 8-5. Alternative 4: Potential Off-Site Construction Staging Locations

No.	Location Description
S1	East of Santa Monica Airport Runway
S2	Ralph’s Parking Lot in Westwood Village
N1	West of Sepulveda Basin Sports Complex, south of the Los Angeles River
N2	West of Sepulveda Basin Sports Complex, north of the Los Angeles River
N3	Metro G Line Sepulveda Station park & ride lot
N4	North of Roscoe Boulevard and Hayvenhurst Avenue
N5	LADWP property south of the LOSSAN rail corridor, east of Van Nuys Metrolink Station

Source: STCP, 2024; HTA, 2024

Figure 8-10. Alternative 4: Potential Off-Site Construction Staging Locations

Source: STCP, 2024; HTA, 2024

Construction of the HRT guideway between the Van Nuys Metrolink Station and the MSF would require reconfiguration of an existing rail spur serving LADWP property. The new location of the rail spur would require modification to the existing pedestrian undercrossing at the Van Nuys Metrolink Station.

Alternative 4 would require construction of a concrete casting facility for tunnel lining segments because no existing commercial fabricator capable of producing tunnel lining segments for a large-diameter tunnel exists within a practical distance of the Project Study Area. The site of the MSF would initially be used for this casting facility. The casting facility would include casting beds and associated casting equipment, storage areas for cement and aggregate, and a field quality control facility, which would need to be constructed on-site. When a more detailed design of the facility is completed, the contractor would obtain all permits and approvals necessary from the City of Los Angeles, the South Coast Air Quality Management District, and other regulatory entities.

As areas of the MSF site begin to become available following completion of pre-casting operations, construction of permanent facilities for the MSF would begin, including construction of surface buildings such as maintenance shops, administrative offices, train control, traction power and systems facilities. Some of the yard storage track would also be constructed at this time to allow delivery and inspection of passenger vehicles that would be fabricated elsewhere. Additional activities occurring at the MSF during the final phase of construction would include staging of trackwork and welding of guideway rail.

8.2 Existing Conditions

This section provides a brief discussion of the types of energy resources that would be consumed by construction and operation of Alternative 4 and how they are produced and distributed to the respective end uses at the state and regional levels. Energy resources involved in the transit system implementation include direct uses, such as transportation fuels for locomotives and electricity use at stations, and indirect uses such as fuel consumed by regional vehicular travel on the roadway network.

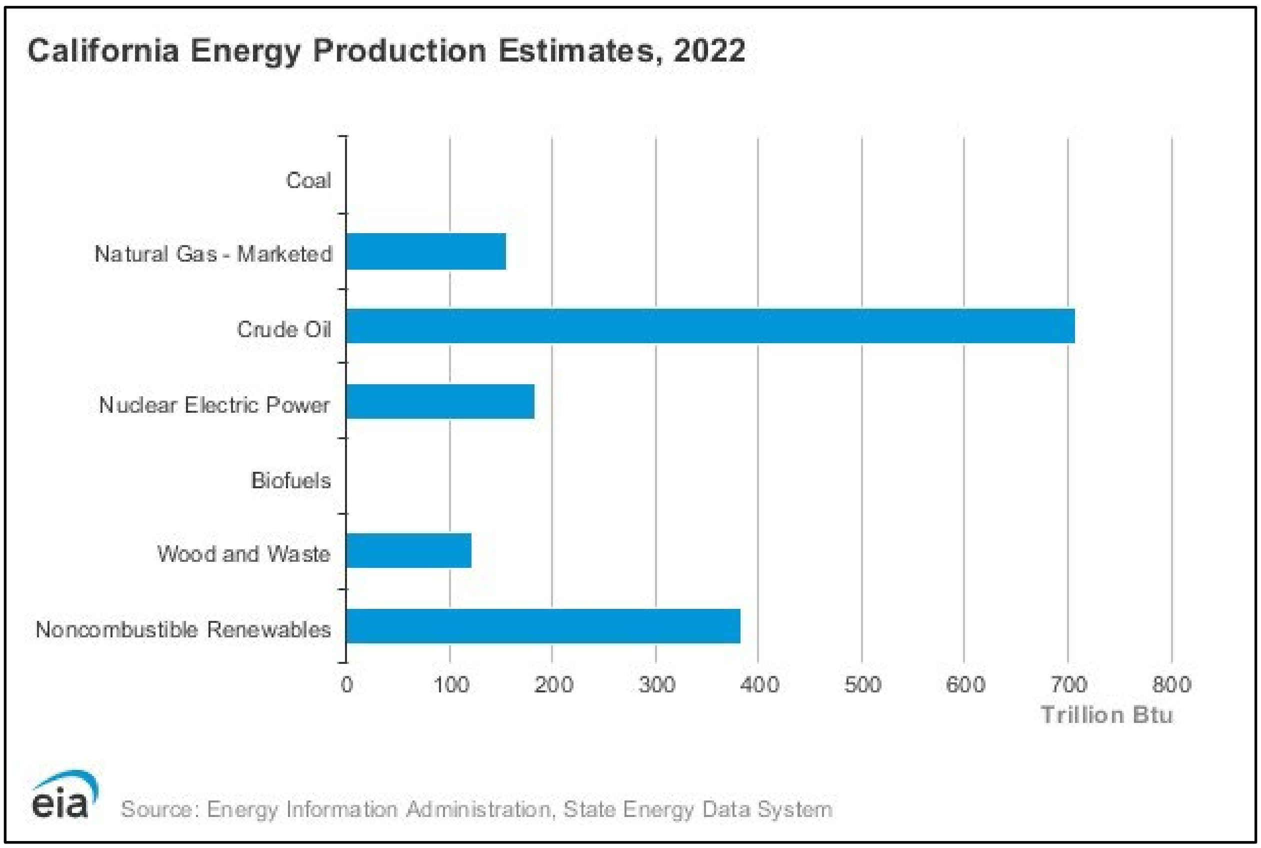
- **Transportation Fuels**. The internal combustion engines of on-road motor vehicles, locomotives, and off-road equipment use fossil fuel (petroleum) energy for propulsion. Gasoline and diesel fuel are formulations of fossil fuels refined for use in various applications. Gasoline is the primary fuel source for most passenger automobiles, and diesel fuel is the primary fuel source for most off-road equipment and medium and heavy-duty trucks. The analyses presented in this report also disclose electricity and natural gas consumption associated with on-road vehicle activity.
- **Electricity**. The production of electricity requires the consumption or conversion of other natural resources, whether it be water (hydroelectric power), wind, oil, gas, coal, or solar energy. The delivery of electricity as a utility involves several system components for distribution and use. Electricity is distributed through a network of transmission and distribution lines referred to as a power grid. Instantaneous energy capacity, or electrical power, is generally measured in watts (W), while energy use is measured in watt-hours (Wh), which is the integral electricity consumption over a time period of 1 hour. On a utility scale, the capacity of electricity generation and amount of consumption is generally described in megawatt (MW) and megawatt-hours (MWh), respectively. For discussions involving regional scale electricity generation and consumption, units of gigawatt-hours (GWh) are used, which is equivalent to 1,000 MWh.

8.2.1 State Energy Resources

California is the most populous state in the nation, has the largest economy, and is second only to Texas in total energy consumption (U.S. Census Bureau, 2021; BEA, 2019a; EIA, 2024b). California also has the world's fifth-largest economy and leads the nation in both agricultural and manufacturing gross domestic product (BEA, 2019b). Despite California's many energy-intensive industries, the state has one of the lowest per capita energy consumption levels in the United States (EIA, 2023a). California's extensive efforts to increase energy efficiency and implement alternative technologies have slowed growth in energy demand. The state is also rich in energy resources. California is among the nation's top producers of conventional hydroelectric power and is second only to Texas in nonhydroelectric renewable-sourced electricity generation. In addition, California has an abundant supply of crude oil and accounts for one-tenth of the United States crude oil refining capacity.

Energy is produced in California from a diverse portfolio of renewable and non-renewable resources. Figure 8-11 shows that crude oil is the largest source of energy in California, accounting for approximately 708.9 trillion Btu in 2022, which constituted 46 percent of total statewide energy production (EIA, 2024a). To meet state environmental regulations, California refineries are configured to produce cleaner fuels. Refineries in the state often operate at or near maximum capacity because of the high demand for those petroleum products and the lack of interstate pipelines that can deliver them into the state (CEC, 2021b). In 2022, the noncombustible renewable energy resources, including hydroelectric, geothermal, solar, and wind energy, collectively accounted for 383.3 trillion Btu of annual energy production, equal to 24.7 percent of the total statewide resources. Natural gas and nuclear electric power constituted approximately 10 percent and 11.8 percent of statewide production, respectively, and the combination of wood energy and biomass waste energy provided 5.4 percent of production in 2022. Biofuels accounted for 1.5 percent, and coal fueled about 0.1 percent of the in-state, utility-scale net generation, and all of that power was generated at industrial facilities (EIA, 2024b).

Figure 8-11. 2022 Statewide Energy Production Resources



Source: EIA, 2024a

8.2.1.1 Electricity Generation

As of 2022, California is the fourth-largest electricity producer in the nation and accounted for about 5 percent of U.S. utility-scale (1-MW and larger) power generation. Renewable resources, including hydropower and small-scale (less than 1 MW), customer-sited solar photovoltaic (PV) systems, supplied more than half of California's total in-state electricity generation, and natural gas-fired power plants provided approximately two-fifths (EIA, 2023b). Nuclear power's share of state generation in 2022 was less than one-tenth, down from nearly one-fifth in 2011. The decrease resulted from the retirement of the San Onofre nuclear power plant in mid-2013, which left the state with only one operating commercial nuclear power plant—the two-reactor Diablo Canyon facility. Overall, California generated approximately 203.4 million MWh of electricity annually in 2022, and the statewide grid provided a net summer capacity of 85,981 MW.

Table 8-6 provides a summary of the annual in-state electricity generation by supply resource during the decade spanning backwards from 2022–2013 in units of gigawatt-hours (GWh). Key trends observed in the data include the ten-fold expansion of solar generation from 3,813.7 GWh in 2013 to 38,789.4 GWh in 2022, as well as a nearly 70 percent decrease in reliance on coal-powered generation from 823.3 GWh in 2013 to 251.6 GWh in 2022.

Table 8-6. California In-State Electricity Generation Profile 2022–2013 (gigawatt hour(s))

Primary Source	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Battery Storage	-447.6	-154.7	-27.6	-22.6	-22.4	11.5	-4.3	-1.3	-1.1	-1.2
Coal	251.6	294.2	290.3	240.5	281.3	291.1	318.9	297.9	804.8	823.2
Geothermal	11,181.0	11,127.5	11,366.5	10,914.1	11,676.8	11,559.6	11,457.3	11,883.1	12,101.7	12,306.6
Hydroelectric	17,644.1	14,677.6	21,377.5	38,354.8	26,330.7	42,363.1	28,942.1	13,808.5	16,531.3	23,754.6
Natural Gas	96,371.6	97,427.1	92,046.7	85,840.8	89,804.7	88,350.2	97,073.7	116,139.6	120,426.4	119,522.9
Nuclear	17,593.3	16,477.4	16,258.7	16,165.4	18,213.5	17,901.1	18,907.6	18,505.4	16,986.0	17,911.9
Other[a]	643.8	730.6	722.3	787.7	851.1	824.1	670.0	813.0	848.9	817.3
Other Biomass[b]	2,416.6	2,574.4	2,615.1	2,722.6	2,823.8	2,841.0	2,909.9	2,883.7	2,913.3	2,843.2
Other Gas[c]	1,411.5	1,368.9	1,538.0	1,476.2	1,454.0	1,408.3	1,426.8	1,548.6	1,333.0	1,405.7
Petroleum	155.0	77.0	43.9	51.0	68.9	45.8	175.6	84.5	66.3	68.9
Pumped Storage	-155.0	-317.4	-37.1	-30.6	-148.6	407.5	-259.3	112.7	-104.7	196.3
Solar	38,789.4	34,863.9	30,272.6	28,331.5	26,985.2	24,352.9	18,806.7	14,814.4	9,931.8	3,813.7
Wind	14,638.1	15,177.0	13,583.1	13,735.1	14,024.0	12,822.9	13,509.0	12,229.6	12,992.5	12,822.1
Wood	2,890.7	2,841.7	3,033.7	3,217.9	3,122.6	2,967.5	3,029.3	3,584.2	3,977.4	3,792.1
Total Generation	**203,383.9**	**197,165.1**	**193,083.5**	**201,784.2**	**195,465.6**	**206,146.5**	**196,963.2**	**196,703.9**	**198,807.6**	**200,077.1**

Source: EIA, 2024b

[a]"Other" includes non-biogenic municipal solid waste, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, tire-derived fuels, waste heat, and miscellaneous technologies.

[b]"Other Biomass" includes agricultural byproducts, landfill gas, biogenic municipal solid waste, other biomass (solid, liquid, and gas) and sludge waste.

[c]"Other Gas" includes blast furnace gas, and other manufactured and waste gases derived from fossil fuels.

In 2019, California's in-state electricity net generation from all renewable resources combined was greater than that of any other state, including generation from hydroelectric power and from small-scale, customer-sited solar generation. California is the nation's top producer of electricity from solar, geothermal, and biomass energy. In 2019, the state was also the nation's second-largest producer of electricity from conventional hydroelectric power and the fifth largest from wind energy. California's greatest solar resource is in the state's southeastern deserts, where all of its solar thermal facilities and largest solar PV plants are located. However, solar PV facilities are located throughout the state. By 2019, solar supplied 14 percent of the state's utility-scale electricity net generation; and when small-scale solar generation is added, solar energy provided one-fifth of the state's total net generation. By November 2020, California had about 13,000 MW of utility-scale solar power capacity, more than any other state; when small-scale, customer-sited facilities are included, the state had almost 24,000 MWs of solar capacity. California's Renewables Portfolio Standard was enacted in 2002 and has been revised several times since then. It requires that 33 percent of electricity retail sales in California come from eligible renewable resources by 2020, 60 percent by 2030, and 100 percent by 2045.

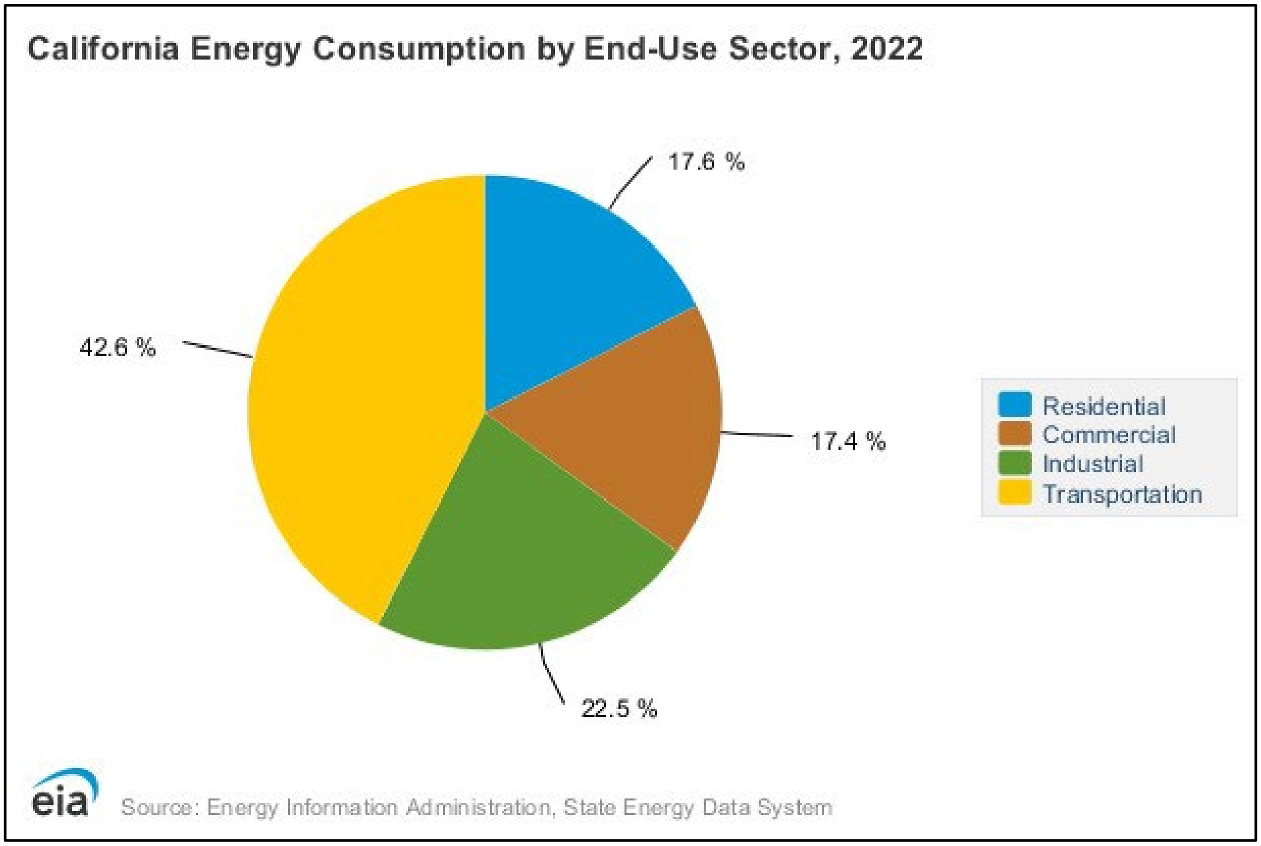
8.2.1.2 Transportation Fuels Supply

As of 2022, California has the sixth-largest share of crude oil reserves among the 50 states and is the seventh-largest crude oil producer (EIA, 2024a). Underground reservoirs along California's Pacific Coast, including in the Los Angeles Basin and those in the state's Central Valley, contain major crude oil reserves. The most prolific oil-producing area in the state is the San Joaquin Basin in the southern half of California's Central Valley. Overall, California's crude oil production has declined steadily since 1985, but the state remains one of the nation's top crude oil producers and accounted for about 4 percent of United States production in 2022 (EIA, 2024a). California ranks third in petroleum refining capacity—after Texas and Louisiana—and accounts for one-tenth of the nation's total. A network of crude oil pipelines connects California's oil production to the state's refining centers, which are located primarily in the Los Angeles area, the San Francisco Bay Area, and the San Joaquin Valley (EIA, 2023b). California refiners also process large volumes of foreign and Alaskan crude oil. As crude oil production in California and Alaska has declined, California refineries have become increasingly dependent on imports from other countries to meet the state's needs. Led by Saudi Arabia, Iraq, Ecuador, and Colombia, foreign suppliers provided more than half of the crude oil refined in California in 2022.

8.2.2 Statewide Use Patterns

Figure 8-12 displays the statewide energy consumption by end use sector for the most recent year of verified data available, 2022 (EIA, 2024b). Overall, the transportation sector accounts for nearly two-fifths of California's end-use energy consumption. Reducing per capita transportation fuels consumption is a pillar of the state’s initiatives to decrease reliance on fossil fuels as the population continues to grow. The industrial sector is the second-largest energy consumer in California and uses almost one-fourth of the State's energy. The commercial sector and the residential sector account for roughly equal amounts of the State's end-use energy consumption, at slightly less than one-fifth each. As previously discussed, California has promulgated a robust regulatory framework to reduce energy consumption across the various end-use sectors.

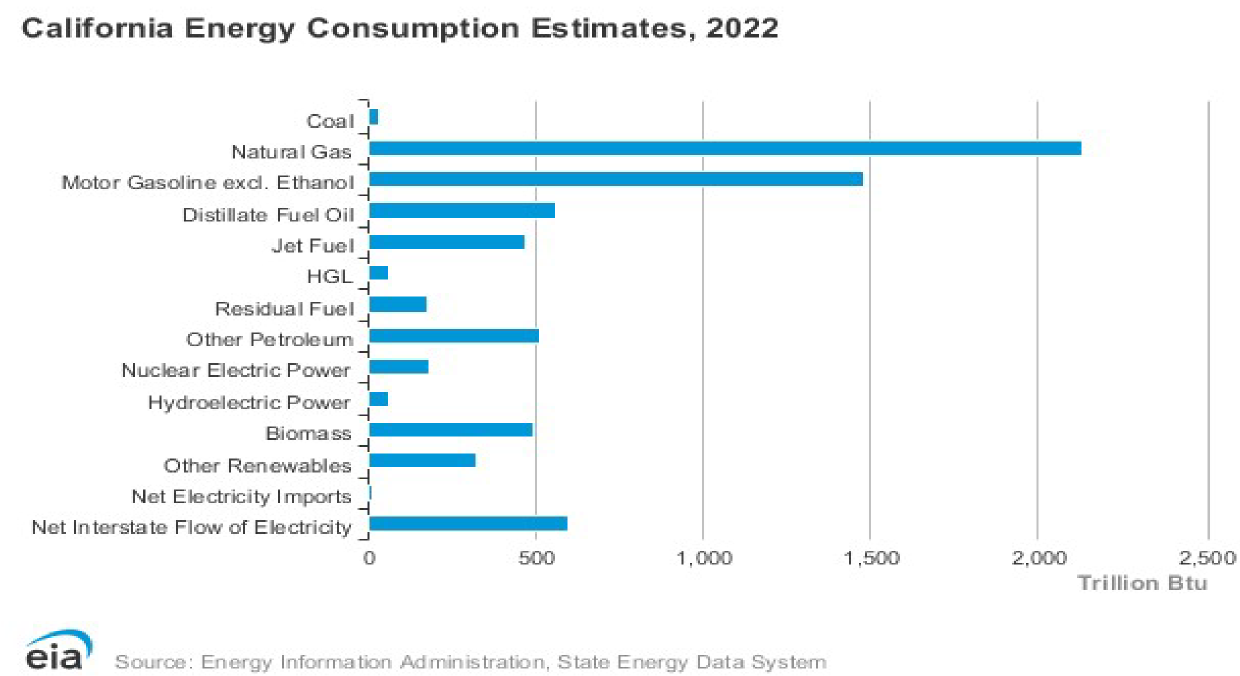
Figure 8-12. Annual Statewide Energy Consumption by End-Use Sector



Source: EIA, 2024b

Figure 8-13 summarizes the 2022 statewide annual energy consumption by resource origin. As mentioned previously, natural gas is the most consumed energy resource in the state, with nearly 10 times as much natural gas used by consumers as is produced by California reserves and processing facilities. Crude oil is refined and distilled to produce motor gasoline, distillate fuel oil, jet fuel, hydrocarbon gas liquids, residual fuel, and other petroleum products. The chart also demonstrates that California has a net import of approximately 600.4 trillion btu of electricity annually.

Figure 8-13. 2022 Annual Statewide Energy Consumption by Source



Source: EIA, 2024b

8.2.2.1 Electricity Consumption

In 2022, California was the nation's largest net importer of electricity from out of state and received about 28 percent of its electricity supply from generating facilities outside the state (EIA, 2024a). California has the second-highest electricity retail sales in the nation, after Texas, but it has the lowest retail sales per capita. The commercial sector accounts for almost half of California's electricity retail sales. The residential sector, where more than one-fourth of California households use electricity for home heating, accounts for more than one-third of sales. Almost all the rest of the state's electricity retail sales are to the industrial sector. A very small amount goes to the transportation sector.

8.2.2.2 Transportation Fuels Consumption

California is the nation’s second-largest consumer of petroleum products, after Texas, and accounts for 10 percent of the nation's total consumption. The state is the largest United States consumer of motor gasoline and jet fuel, and 85 percent of the petroleum consumed in California is used in the transportation sector. The industrial sector, the second-largest petroleum-consuming sector, uses 12 percent of the petroleum consumed in the state. The commercial sector accounts for more than 2 percent, and the residential sector consumes less than 1 percent (EIA, 2023a).

8.2.3 Local Energy Resources

The discussion of local energy resources focuses on electricity, natural gas, and petroleum-based transportation fuels (motor gasoline and diesel fuel) supplied to Los Angeles County and the Project Area. This section also summarizes Metro’s existing systemwide energy consumption using the most recently published data available (Metro, 2019b).

8.2.3.1 Electricity

The LADWP power system serves approximately 4 million people and is the nation's largest municipal utility. Its service territory area covers the City of Los Angeles and many areas of the Owens Valley, with annual sales exceeding 26 million MWh. LADWP is a "vertically integrated" utility, both owning and operating the majority of its generation, transmission, and distribution systems. LADWP strives to be self-sufficient in providing electricity to its customers and does so by maintaining generation resources that are equal to or greater than its customers' electrical needs. LADWP's operations are financed solely through sales of water and electric services.

LADWP obtains electricity from various generating resources that utilize coal, nuclear, natural gas, hydroelectric, and renewable resources to generate power. LADWP obtains power from four municipally owned power plants within the Los Angeles Basin, LADWP Hydrogenerators on the Los Angeles Aqueduct, shared ownership generating facilities in the Southwest, and also power purchased from the Southwest and Pacific Northwest. LADWP has a power infrastructure comprising a total of 34 generation plants and approximately 3,636 miles of overhead transmission lines spanning five western states. LADWP also purchases excess power, as it is available, from self-generators interconnected with the LADWP within the City of Los Angeles.

According to LADWP's 2022 Power Content Label submitted to the California Energy Commission (CEC), LADWP has a net dependable generation capacity greater than 8,000 MW (LADWP, 2021). On August 31, 2017, LADWP's power system experienced a record instantaneous peak demand of 6,502 MW. As of 2019, approximately 34 percent of LADWP's delivered power mix to customers was derived from renewable resources, which meets and exceeds the statewide target of 33 percent renewably sourced electricity generation by 2020, pending verification by the CEC (LADWP, 2021). The annual LADWP electricity sale to customers for 2019 was approximately 23,402.7 GWh (CEC, 2019).

8.2.3.2 Transportation Fuels

As previously discussed, transportation accounts for nearly 40 percent of the total statewide energy consumption, and petroleum-based fuels currently account for 90 percent of California's transportation energy sources (CEC, 2020a). However, the state is now working on developing flexible strategies to reduce petroleum use, as evidenced by the robust regulatory framework promulgated to enhance energy efficiency and decrease reliance on passenger vehicles and non-renewable resources in general. The CEC predicts that the demand for gasoline will continue to decrease over the next decade, and there will be an increase in the use of alternative fuels, such as natural gas, biofuels, and electricity (CEC, 2018). On September 23, 2020, Governor Gavin Newsom signed Executive Order N-79-20, setting a 100 percent zero emission vehicle (ZEV) target for new passenger vehicle sales by 2035 and a 100 percent zero-emission vehicle operations target for medium- and heavy-duty vehicles in the state by 2045 (CEC, 2021).

According to CEC fuel sales data, Los Angeles County contained approximately 2,063 transportation fueling stations in 2019 (CEC, 2020b). In the same year, countywide fuel sales comprised approximately 3,559 million gallons of gasoline and 276 million gallons of diesel fuel. By volume, Los Angeles County accounted for approximately 23.2 percent of statewide gasoline sales and approximately 15.7 percent of statewide diesel fuel sales. Despite substantial increases in population (from approximately 9.8 million in 2010 to 10.0 million in 2019), total countywide gasoline fuel sales have remained relatively constant over the course of the past decade, as the CEC estimates approximately 3,658 million gallons of gasoline were sold within Los Angeles County in 2010.

8.2.4 Metro Energy Inventory

Metro's contribution to regional energy consumption includes on-road vehicle fuel use (primarily compressed natural gas) and electricity for rail vehicle propulsion and maintenance and administrative facility operation. The *2019 Energy and Resource Report* examined Metro's energy use for the 2019 calendar year and refined estimates prepared by previous analysis (Metro, 2019b).

Table 8-7 presents an overview of the Metro system energy consumption by end use between 2015 and 2019. As of 2019, the Metro system comprised 124,695,827 revenue miles consuming approximately 5,357.3 million megajoules (MJ) of energy per revenue mile, for a total of 6,667.1 million MJ. Overall, Metro system energy consumption has decreased by 6.9 percent during the period from 2015 to 2019. Metro has prioritized generating system energy from alternative fuels in recent years. As of 2019, approximately 30 percent of Metro's electricity is generated by renewable sources. Metro plans to phase out all directly operated natural gas buses by 2030 to be replaced by ZEVs.

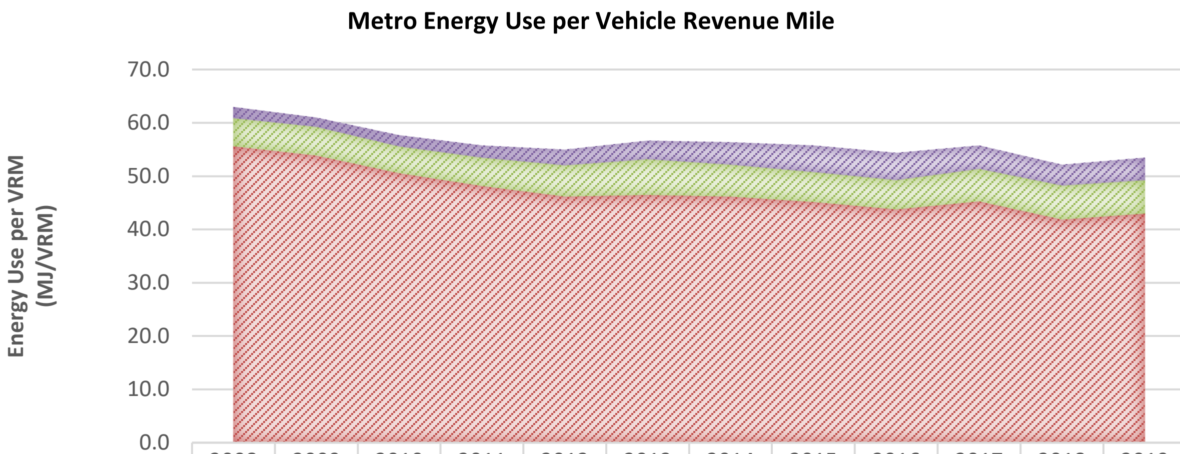
Table 8-7. Metro Operations Annual Energy Consumption (in Megajoules)

End Use	2015	2016	2017	2018	2019
Vehicle Fuel	5,796,786,075	5,644,897,527	5,787,683,879	5,317,489,842	5,357,290,785
Rail Propulsion	719,276,609	711,196,744	775,022,735	817,378,502	781,571,203
Facilities	642,626,521	660,898,312	564,325,336	491,666,179	528,225,942
Total	7,158,689,205	7,016,992,583	7,127,031,949	6,626,534,523	6,667,087,930

Source: Metro, 2019b

The *2019 Energy and Resource Report's* technical appendix also includes data describing Metro system energy use per vehicle revenue mile (VRM) (Metro, 2019b). Examining this data can provide insight as to how Metro is managing its energy resource consumption in relation to the expansion of its service network. Figure 8-14 presents a chart that shows the trend in Metro energy use per VRM over the past 12 years (2008–2019) since the reporting program began. As shown on Figure 8-14, total energy use per VRM decreased from 63.0 MJ/VRM in 2008 to 53.5 MJ/VRM in 2019, representing a 15 percent reduction over the 12-year period. The data demonstrates the efficacy of Metro's energy efficiency programs to deliver high quality transit options that meet regional growth demands while also conserving energy where possible.

Figure 8-14. Metro Systemwide Energy Use per Vehicle Revenue Mile



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Facilities	2.1	1.7	2.1	2.3	2.9	3.5	4.2	5.0	5.1	4.4	3.9	4.2
Rail Propulsion	5.3	5.4	5.0	5.3	5.9	6.7	6.0	5.6	5.5	6.1	6.4	6.3
Vehicle Fuel	55.6	53.9	50.6	48.2	46.2	46.5	46.2	45.2	43.8	45.3	41.9	43.0

Year

Source: Metro, 2019b

Includes mixed commercial and industrial land uses within the Project Study Area.

8.3 Impact Evaluation

8.3.1 Impact ENG-1: Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

8.3.1.1 Construction Impacts

Alternative 4 would require petroleum-based transportation fuels and electricity to construct the transit system. Construction activities would comply with Metro's GCP and construction equipment would be maintained in accordance with manufacturers' specifications. Construction would result in a one-time expenditure of approximately 16,198,435 gallons of diesel fuel, 1,106,877 gallons of gasoline, and 393,824 megawatt-hours (MWh) of electricity. Table 8-8 provides a summary of the energy consumption estimated for construction of Alternative 4.

Table 8-8. Alternative 4: Construction Fuel and Electricity Consumption

Source Type	Fuel Consumption (gal)	Electricity Consumption (MWh)
Mobile Source Fuel Consumption		
Off-Road Equipment (Diesel)	9,180,785	NA
Worker Vehicles (Gasoline)	1,106,877	NA
Vendor Trucks (Diesel)	336,469	NA
Haul Trucks (Diesel)	6,681,181	NA
Electricity Consumption		
Tunnel boring machine	NA	393,480

Source Type	Fuel Consumption (gal)	Electricity Consumption (MWh)
Onsite Portable Offices	NA	344
Summary		
Total Gasoline (gal):	**1,106,877**	**NA**
Total Diesel (gal):	**16,198,435**	**NA**
Total Electricity (MWh):	**NA**	**393,824**

Source: Metro, 2024c

gal = gallons
MWh = megawatt-hour
NA = not applicable

All equipment and vehicles used in construction activities would comply with applicable California Air Resources Board regulations, Low Carbon Fuel Standards, and the Corporate Average Fuel Economy (CAFE) Standards. Construction would not place an undue burden on available energy resources. The one-time expenditure of energy associated with diesel fuel consumption would be offset by operations within approximately 9 years through transportation mode shift, and the one-time expenditure of energy associated with gasoline consumption would be offset by operations within 1 year. The temporary additional transportation fuels consumption does not require additional capacity provided at the local or regional level. CEC transportation energy demand forecasts indicate that gasoline and diesel fuel production is anticipated to increase between 2021 and 2035, while demand for both gasoline and diesel transportation fuels is projected to decrease over the same time period (CEC, 2021b). Construction vehicles and equipment activities would not place an undue burden on available petroleum fuel resources during construction of Alternative 4.

Construction activities may include lighting for security and safety in construction zones. Nighttime construction would be limited; lighting would be sparse and would not require additional capacity provided at the local or regional level.

The GCP requires and commits project contractors to using newer engines for off-road diesel-powered construction equipment that are more fuel efficient than older models. All equipment and vehicles would be maintained in accordance with manufacturer specifications and would be subject to idling limits. As required by the California Green Building Standards (CALGreen) Code Tier 2, at least 80 percent of the nonhazardous construction debris generated by demolition activities will be diverted from landfills. Also, CALGreen includes the mandatory requirement to reuse or recycle all clean soil that would be displaced during construction of Alternative 4, which would result in reduced energy consumption from hauling trucks. Furthermore, the Metro 2020 Moving Beyond Sustainability Strategic Plan and the Metro Design Criteria and Standards require and commit contractors to using high-efficiency lighting as opposed to less energy-efficient lighting sources in alignment with Leadership in Energy and Environmental Design (LEED) sustainability energy standards.

Based on the substantiation previously described, construction would not result in wasteful, inefficient, or unnecessary consumption of energy resources. Therefore, Alternative 4 would result in a less-than-significant impact related to construction activities.

8.3.1.2 Operational Impacts

As described in the Methodology Section, future operations involved under Alternative 4 would consume energy resources in the forms of electricity (at TPSSs for rail propulsion, for MSF operations, at stations for lighting, accessibility features, and parking facilities, and as power for a fraction of regional vehicle miles traveled (VMT) by electric and plug-in hybrid vehicles), petroleum fuels (gasoline for employee trips and a fraction of regional VMT, and diesel fuel for an emergency generator at the MSF and a fraction of regional VMT), and natural gas (a small fraction of regional VMT by vehicles powered by natural gas). End uses that comprise direct energy resource consumption associated with Alternative 4 operations include TPSSs, the MSF, stations and parking facilities, and MSF employee trips; End uses comprising indirect energy consumption include the changes in vehicle trips and VMT patterns that would result under the new transit system. Table 8-9 presents a summary of the annual energy consumption by resource attributable to Alternative 4 operations in the horizon year of 2045 and compares the consumption to the 2045 Without Project Conditions.

Table 8-9. Alternative 4: Operations Annual Energy Consumption Relative to the 2045 Without Project Conditions (Horizon Year 2045)

End Use	Electricity (MWh)	Gasoline (gal)	Diesel (gal)	Natural Gas (DGE)
Alternative 4				
Main Line Traction Power	71,062	—	—	—
Stations and Parking	39,294	—	—	—
MSF[a]	24,110	—	4,421	—
MSF Employee Commuting Trips	127	49,657	12,431	490
Regional On-Road VMT	13,324,042	5,199,444,759	1,301,650,094	51,304,527
Alternative 4 Total Annual Consumption[b]	**13,458,635**	**5,199,494,416**	**1,301,666,945**	**51,305,017**
2045 Without Project Conditions				
Regional On-Road VMT	13,342,059	5,206,475,771	1,303,410,265	51,373,904
Net Change in Annual Resource Consumption	**116,576**	**-6,981,355**	**-1,743,320**	**-68,887**
Conversion Factor	3,412 kBtu/MWh	125.0 kBtu/gal	138.7 kBtu/gal	138.7 kBtu/gal
Net Change in Energy Consumption (MMBtu)	***397,757***	***-872,669***	***-241,798***	***-9,555***
Total Net Change in Energy Consumption (MMBtu)	**-726,265**			

Source: STCP, 2024; HTA, 2024; BTS, 2024

[a]Diesel fuel consumption at the MSF is attributed to emergency generators.
[b]Values may not sum exactly due to rounding.

— = no data
DGE = diesel gallon equivalent
gal = gallon
kBtu = thousand British thermal units
MMBtu = million British thermal units
MWh = megawatt-hour
VMT = vehicle miles traveled

As shown in Table 8-9, operation of Alternative 4 in the horizon year of 2045 would result in a net annual increase in regional electricity demand of 116,576 MWh, and would result in a net annual reduction of 6,981,355 gallons of gasoline, 1,743,320 gallons of diesel fuel, and 68,887 diesel gallon equivalent (DGE) of natural gas when compared to 2045 Without Project Conditions. Converting each of these quantities to standardized units of MMBtu, Alternative 4 operations would result in a net decrease of 726,265 MMBtu annually in 2045. This amount of energy savings is equivalent to 5,811,610 gallons of motor gasoline per year. The electricity consumption would be more than offset by the energy savings in the forms of petroleum fuels and natural gas, and the consumption would power a mass transit system that would contribute to regional efforts to enhance energy efficiency and reduce reliance on nonrenewable resources. Therefore, Alternative 4 would result in a substantial decrease in overall regional energy consumption when compared to 2045 Without Project Conditions, and this impact would be less than significant.

Table 8-10 summarizes the Alternative 4 annual energy consumption for each resource in the operational year of 2045 compared to Existing Conditions (2021). This is presented for informational purposes only. As shown in Table 8-10, Alternative 4 operations would result in a net increase of 12,122,715 MWh of electricity and 214,803,208 gallons of diesel fuel and would result in a net decrease of 1,063,598,898 gallons of gasoline and 67,447,774 DGE of natural gas. When standardized in units of MMBtu, operation of Alternative 4 in 2045 would consume approximately 71,148,960 MMBtu less of collective energy resources on an annual basis than Existing Conditions in the baseline year of 2021. This amount of energy is equivalent to 569,337,639 gallons of motor gasoline per year.

Table 8-10. Alternative 4: Operations Annual Energy Consumption (Horizon Year 2045) Relative to Existing Conditions (Baseline Year 2021)

End Use	Electricity (MWh)	Gasoline (gal)	Diesel (gal)	Natural Gas (DGE)
Alternative 4 (2045)				
Traction Power	71,062	—	—	—
Stations and Parking	39,294	—	—	—
MSF[a]	24,110	—	4,421	—
MSF Employee Commuting Trips	127	49,657	12,431	490
Regional On-Road VMT	13,324,042	5,199,444,759	1,301,650,094	51,304,527
Alternative 4 Total Annual Consumption[b]	**13,458,635**	**5,199,494,416**	**1,301,666,945**	**51,305,017**
Existing Conditions (2021)				
Regional On-Road VMT	1,335,920	6,263,093,314	1,086,863,738	118,752,791
Net Change in Annual Resource Consumption	**12,122,715**	**-1,063,598,898**	**214,803,208**	**-67,447,774**
Conversion Factor	3,412 kBtu/MWh	125.0 kBtu/gal	138.7 kBtu/gal	138.7kBtu/gal
Net Change in Energy Consumption (MMBtu)	**-71,148,960**			

Source: STCP, 2024; HTA, 2024; BTS, 2024

[a]Diesel fuel consumption at the maintenance and storage facility is attributed to emergency generators.
[b]Values may not sum exactly due to rounding.

— = no data
DGE = diesel gallon equivalent
gal = gallon
kBtu = thousand British thermal units
MMBtu = million British thermal units
MWh = megawatt-hour
VMT = vehicle miles traveled

8.3.1.3 Maintenance and Storage Facility

As shown in Table 8-9 and Table 8-10, operation of the MSF in the horizon year of 2045 would result in an annual increase in regional electricity demand of 24,110 MWh and 4,421 gallons of diesel fuel. As discussed in Section 8.3.1.2, Alternative 4 operations collectively would result in a net decrease of 726,265 MMBtu annually relative to 2045 Without Project Conditions. Construction of the MSF would require petroleum-based transportation fuels and electricity. Construction activities would comply with Metro's GCP and adhere to Metro's policy for aligning with LEED Silver sustainable certification. The required energy demand to construct and operate the MSF would be more than offset by the energy savings in the forms of petroleum fuels and natural gas, and the consumption would support a mass transit system that would contribute to regional efforts to enhance energy efficiency and reduce reliance on nonrenewable resources. Construction and operation of the MSF would not result in wasteful, inefficient, or unnecessary consumption of energy resources and the MSF would result in a less than significant impact.

8.3.2 Impact ENG-2: Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

8.3.2.1 Construction Impacts

Alternative 4 would require petroleum-based transportation fuels and electricity to construct the transit system. Construction would result in a one-time expenditure of approximately 16,198,435 gallons of diesel fuel, 1,106,877 gallons of gasoline, and 393,824 MWh of electricity. Alternative 4 would be consistent with state and local energy plans and policies to reduce energy consumption as activities would comply with Metro's GCP, CALGreen Code, Title 24, and LEED Version 4 Building and Design Construction (LEED v4 BD+C) Level Silver certification. The GCP requires and commits project contractors to using newer engines for off-road diesel-powered construction equipment that are more fuel efficient than older models. Compliance with GCP would limit excess petroleum fuels consumption. The CALGreen Code requires reduction, disposal, and recycling of at least 80 percent of nonhazardous construction materials and requires demolition debris to be recycled and/or salvaged, which would ultimately result in reductions of indirect energy use associated with waste disposal and storage. Alternative 4 would comply with state and local plans for energy efficiency in construction activities. Therefore, Alternative 4 would result in a less-than-significant impact related to construction activities.

8.3.2.2 Operational Impacts

Alternative 4 would be a high-capacity rail transit system providing energy efficient mass transit to a region in need of enhanced accessibility options. It reduces auto passenger vehicle trips and reduces reliance on petroleum-based transportation fuels. Alternative 4 qualifies as a "sustainable transportation project" as defined by the California Office of Planning and Research, because it encourages the use of transit and zero emission vehicles and reduces on-road VMT (OPR, 2018). The benefits of Alternative 4 are consistent with the goals, objectives, and land use and transportation policies of SCAG and the City of Los Angeles, as outlined in the local regulatory framework previously described. As the renewable energy portfolios of Metro and local jurisdictions expand over time, natural resources consumption to provide the electricity required for operations would become more energy efficient. Alternative 4 would not conflict with any adopted plan or regulation to enhance energy efficiency or reduce transportation fuels consumption and would support the initiatives of the MBSSP. In addition, Alternative 4 would not interfere with renewable portfolio targets and would not result in a wasteful or inefficient expenditure of energy resources. Alternative 4 would positively contribute to statewide, regional, and local efforts to create a more efficient and sustainable transportation infrastructure network. Therefore, Alternative 4 would result in a less than significant impact related to operational activities.

8.3.2.3 Maintenance and Storage Facility

The MSF would support Alternative 4 operations, providing energy efficient mass transit to the region and reducing auto passenger vehicle trips. The benefits of Alternative 4 are consistent with the goals, objectives, and policies of SCAG and the City of Los Angeles. The MSF would be designed to meet the LEED Version 4 Building and Design Construction (LEED v4 BD+C) Level Silver certification—Envision Version 3 certification if LEED is not applicable—and Tier 2 of the California Green Building Standards Code (STCP, 2024). There is no potential for construction or operations of the MSF to conflict with or obstruct a state or local plan for renewable energy or energy efficiency. The MSF would not conflict with any adopted plan or regulation to enhance energy efficiency or reduce transportation fuels consumption and would support the initiatives of the MBSSP. In addition, the MSF would not interfere with renewable portfolio targets and would not result in a wasteful or inefficient expenditure of energy resources. The MSF would positively contribute to statewide, regional, and local efforts to create a more efficient and sustainable transportation infrastructure network. Therefore, the MSF would result in a less than significant impact.

8.4 Mitigation Measures

8.4.1 Construction Impacts

No mitigation measures are required.

8.4.2 Operational Impacts

No mitigation measures are required.

8.4.3 Impacts After Mitigation

No mitigation measures are required; impacts are less than significant.

9 ALTERNATIVE 5

Alternative 5 consists of a heavy rail transit (HRT) system with a primarily underground guideway track configuration, including seven underground stations and one aerial station. This alternative would include five transfers to high-frequency fixed guideway transit and commuter rail lines, including the Los Angeles County Metropolitan Transportation Authority's (Metro) E, Metro D, and Metro G Lines, East San Fernando Valley Light Rail Transit Line, and the Metrolink Ventura County Line. The length of the alignment between the terminus stations would be approximately 13.8 miles, with 0.7 miles of aerial guideway and 13.1 miles of underground configuration.

The seven underground and one aerial HRT stations would be as follows:

1. Metro E Line Expo/Sepulveda Station (underground)
2. Santa Monica Boulevard Station (underground)
3. Wilshire Boulevard/Metro D Line Station (underground)
4. UCLA Gateway Plaza Station (underground)
5. Ventura Boulevard/Sepulveda Boulevard Station (underground)
6. Metro G Line Sepulveda Station (underground)
7. Sherman Way Station (underground)
8. Van Nuys Metrolink Station (aerial)

9.1.1 Operating Characteristics

9.1.1.1 Alignment

As shown on Figure 9-1, from its southern terminus station at the Metro E Line Expo/Sepulveda Station, the alignment of Alternative 5 would run underground north through the Westside of Los Angeles (Westside), the Santa Monica Mountains, and the San Fernando Valley (Valley) to a tunnel portal east of Sepulveda Boulevard and south of Raymer Street. As it approaches the tunnel portal, the alignment would curve eastward and begin to transition to an aerial guideway along the south side of the Los Angeles-San Diego-San Luis Obispo (LOSSAN) rail corridor that would continue to the northern terminus station adjacent to the Van Nuys Metrolink/Amtrak Station.

The proposed southern terminus station would be located underground east of Sepulveda Boulevard between the existing elevated Metro E Line tracks and Pico Boulevard. Tail tracks for vehicle storage would extend underground south of National Boulevard east of Sepulveda Boulevard. The alignment would continue north beneath Bentley Avenue before curving northwest to an underground station at the southeast corner of Santa Monica Boulevard and Sepulveda Boulevard. From the Santa Monica Boulevard Station, the alignment would continue and curve eastward to the Wilshire Boulevard/Metro D Line Station beneath the Metro D Line Westwood/UCLA Station, which is currently under construction as part of the Metro D Line Extension Project. From there, the underground alignment would curve slightly to the northeast and continue beneath Westwood Boulevard before reaching the UCLA Gateway Plaza Station.

Figure 9-1. Alternative 5: Alignment

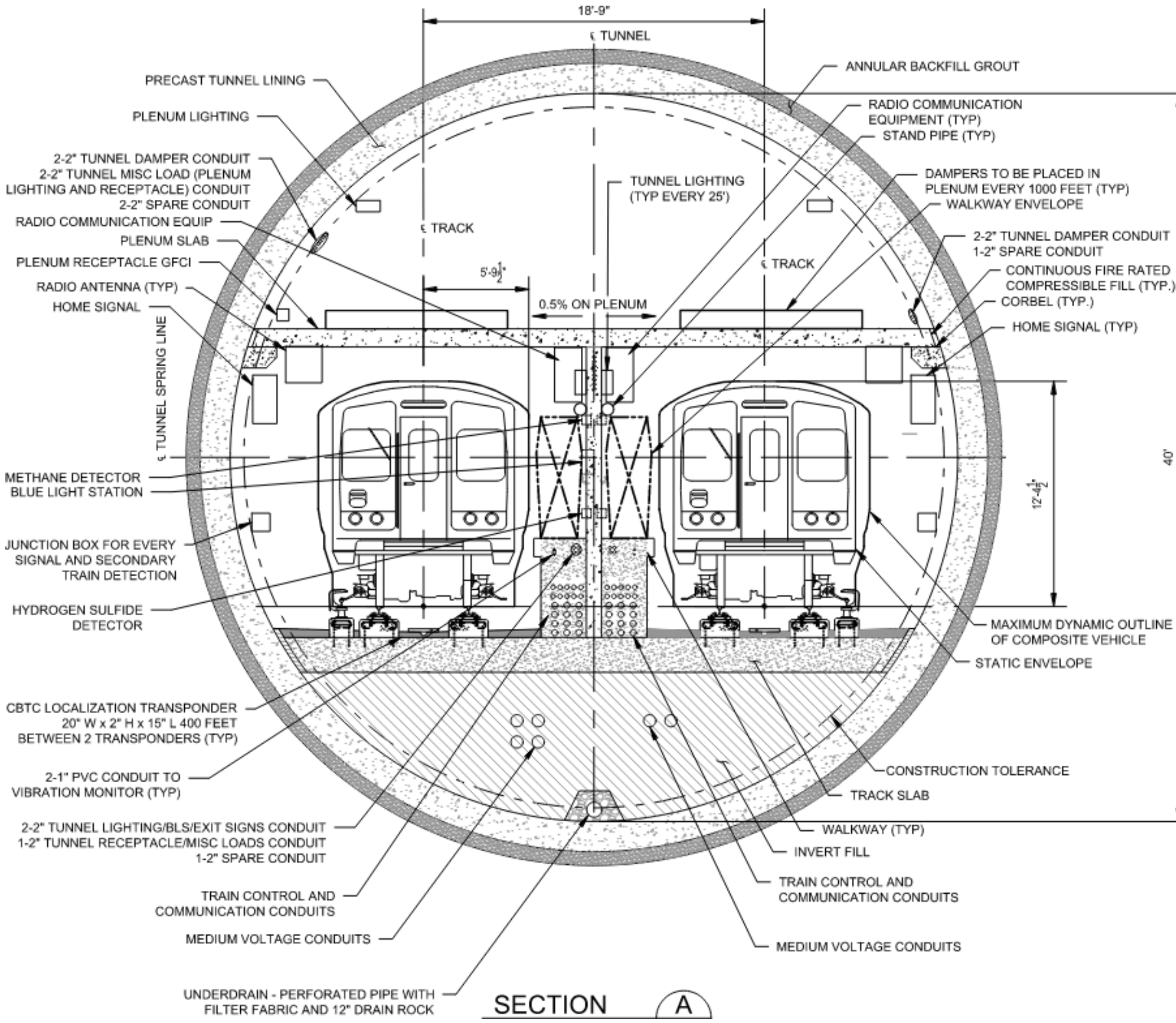
Source: STCP, 2024; HTA, 2024

From the UCLA Gateway Plaza Station, the alignment would turn to the northwest beneath the Santa Monica Mountains to the east of Interstate 405 (I-405). South of Mulholland Drive, the alignment would curve to the north, aligning with Saugus Avenue south of Valley Vista Boulevard. The Ventura Boulevard Station would be located under Saugus Avenue between Greenleaf Street and Dickens Street. The alignment would then continue north beneath Sepulveda Boulevard to the Metro G Line Sepulveda Station immediately south of the Metro G Line Busway. After leaving the Metro G Line Sepulveda Station, the alignment would continue beneath Sepulveda Boulevard to reach the Sherman Way Station, the final underground station along the alignment, immediately south of Sherman Way. From the Sherman Way Station, the alignment would continue north before curving slightly to the northeast to the tunnel portal south of Raymer Street. The alignment would then transition from an underground configuration to an aerial guideway structure after exiting the tunnel portal. East of the tunnel portal, the alignment would transition to a cut-and-cover U-structure segment followed by a trench segment before transitioning to an aerial guideway that would run east along the south side of the LOSSAN rail corridor. Parallel to the LOSSAN rail corridor, the guideway would conflict with the existing Willis Avenue Pedestrian Bridge which would be demolished. The alignment would follow the LOSSAN rail corridor before reaching the proposed northern terminus Van Nuys Metrolink Station located adjacent to the existing Metrolink/Amtrak Station. The tail tracks and yard lead tracks would descend to the proposed at-grade maintenance and storage facility (MSF) east of the proposed northern terminus station. Modifications to the existing pedestrian underpass to the Metrolink platforms to accommodate these tracks would result in reconfiguration of an existing rail spur serving City of Los Angeles Department of Water and Power (LADWP) property.

9.1.1.2 Guideway Characteristics

For underground sections, Alternative 5 would utilize a single-bore tunnel configuration with an outside diameter of approximately 43.5 feet. The tunnel would include two parallel tracks at 18.75-foot spacing in tangent sections separated by a continuous central dividing wall throughout the tunnel. Inner walkways would be constructed adjacent to the two tracks. Inner and outer walkways would be constructed within tunnel sections near the track crossovers. At the crown of tunnel, a dedicated air plenum would be provided by constructing a concrete slab above the railway corridor. The air plenum would allow for ventilation throughout the underground portion of the alignment. Figure 9-2 illustrates these components at a typical cross-section of the underground guideway.

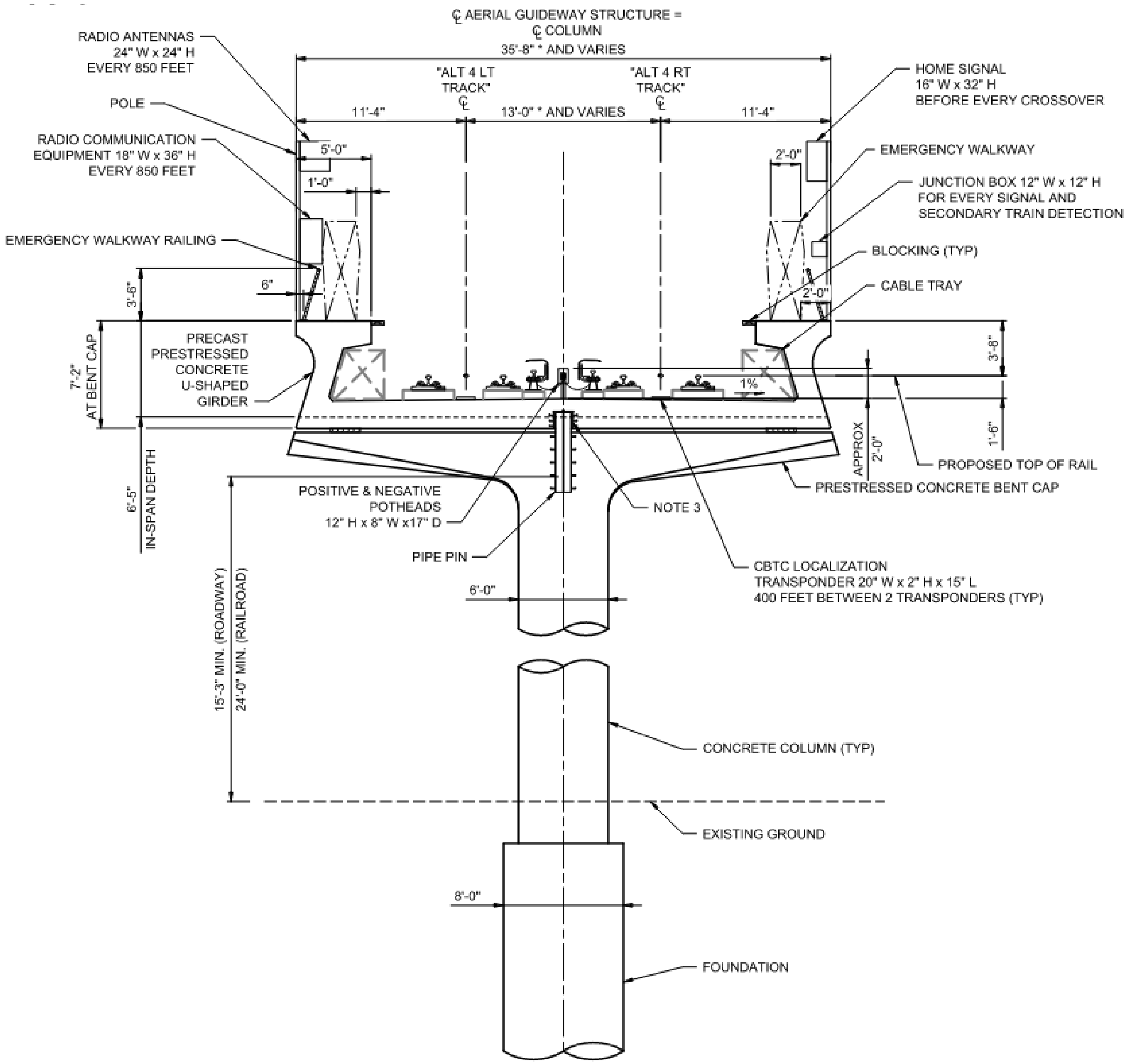
Figure 9-2. Typical Underground Guideway Cross-Section



Source: STCP, 2024

In aerial sections adjacent to Raymer Street and the LOSSAN rail corridor, the guideway would consist of single-column spans. The single-column spans would include a U-shaped concrete girder structure that supports the railway track atop a series of individual columns. The single-column aerial guideway would be approximately 36 feet wide. The track would be constructed on the concrete girders with direct fixation and would maintain a minimum of 13 feet between the two-track centerlines. On the outer side of the tracks, emergency walkways would be constructed with a minimum width of 2 feet. The single-column aerial guideway would be the primary aerial structure throughout the aerial portion of the alignment. Figure 9-3 shows a typical cross-section of the single-column aerial guideway.

Figure 9-3. Typical Aerial Guideway Cross-Section



Source: STCP, 2024

9.1.1.3 Vehicle Technology

Alternative 5 would utilize steel-wheel HRT trains, with automated train operations and planned peak-period headways of 2.5 minutes and off-peak-period headways ranging from 4 to 6 minutes. Each train could consist of three or four cars with open gangways between cars. The HRT vehicle would have a maximum operating speed of 70 miles per hour; actual operating speeds would depend on the design of the guideway and distance between stations. Train cars would be approximately 10 feet wide with three double doors on each side. Each car would be approximately 72 feet long with capacity for 170 passengers. Trains would be powered by a third rail.

9.1.1.4 Stations

Alternative 5 would include seven underground stations and one aerial station with station platforms measuring 280 feet long for both station configurations. The aerial station would be constructed a minimum of 15.25 feet above ground level, supported by rows of dual columns with 8-foot diameters. The southern terminus station would be adjacent to the Metro E Line Expo/Sepulveda Station, and the northern terminus station would be adjacent to the Van Nuys Metrolink/Amtrak Station.

All stations would be side-platform stations where passengers would select and travel up to station platforms depending on their direction of travel. All stations would include 20-foot-wide side platforms separated by 30 feet for side-by-side trains. Each underground station would include an upper and lower concourse level prior to reaching the train platforms. The Van Nuys Metrolink Station would include a mezzanine level prior to reaching the station platforms. Each station would have a minimum of two elevators, two escalators, and one stairway from ground level to the concourse or mezzanine.

Stations would include automatic, bi-parting fixed doors along the edges of station platforms. These platform screen doors would be integrated into the automatic train control system and would not open unless a train is stopped at the platform.

The following information describes each station, with relevant entrance, walkway, and transfer information. Bicycle parking would be provided at each station.

Metro E Line Expo/Sepulveda Station

- This underground station would be located just north of the existing Metro E Line Expo/Sepulveda Station, on the east side of Sepulveda Boulevard.
- A station entrance would be located on the east side of Sepulveda Boulevard north of the Metro E Line.
- A direct internal transfer to the Metro E Line would be provided at street level within the fare paid zone.
- A 126-space parking lot would be located immediately north of the station entrance, east of Sepulveda Boulevard. Passengers would also be able to park at the existing Metro E Line Expo/Sepulveda Station parking facility, which provides 260 parking spaces.

Santa Monica Boulevard Station

- This underground station would be located under the southeast corner of Santa Monica Boulevard and Sepulveda Boulevard.
- The station entrance would be located on the south side of Santa Monica Boulevard between Sepulveda Boulevard and Bentley Avenue.
- No dedicated station parking would be provided at this station.

Wilshire Boulevard/Metro D Line Station

- This underground station would be located beneath the Metro D Line tracks and platform under Gayley Avenue between Wilshire Boulevard and Lindbrook Drive.
- Station entrances would be provided on the northeast corner of Wilshire Boulevard and Gayley Avenue and on the northeast corner of Lindbrook Drive and Gayley Avenue. Passengers would also be able to use the Metro D Line Westwood/UCLA Station entrances to access the station platform.

- A direct internal station transfer to the Metro D Line would be provided at the south end of the station.
- No dedicated station parking would be provided at this station.

UCLA Gateway Plaza Station

- This underground station would be located underneath Gateway Plaza on the University of California, Los Angeles (UCLA) campus.
- Station entrances would be provided on the north side of Gateway Plaza and on the east side of Westwood Boulevard across from Strathmore Place.
- No dedicated station parking would be provided at this station.

Ventura Boulevard/Sepulveda Boulevard Station

- This underground station would be located under Saugus Avenue between Greenleaf Street and Dickens Street.
- A station entrance would be located on the southeast corner of Saugus Avenue and Dickens Street.
- Approximately 92 parking spaces would be supplied at this station west of Sepulveda Boulevard between Dickens Street and the U.S. Highway 101 (US-101) On-Ramp.

Metro G Line Sepulveda Station

- This underground station would be located under Sepulveda Boulevard immediately south of the Metro G Line Busway.
- A station entrance would be provided on the west side of Sepulveda Boulevard south of the Metro G Line Busway.
- Passengers would be able to park at the existing Metro G Line Sepulveda Station parking facility, which has a capacity of 1,205 parking spaces. Currently, only 260 parking spaces are currently used for transit parking. No new parking would be constructed.

Sherman Way Station

- This underground station would be located below Sepulveda Boulevard between Sherman Way and Gault Street.
- The station entrance would be located near the southwest corner of Sepulveda Boulevard and Sherman Way.
- Approximately 122 parking spaces would be supplied at this station on the west side of Sepulveda Boulevard with vehicle access from Sherman Way.

Van Nuys Metrolink Station

- This aerial station would span Van Nuys Boulevard, just south of the LOSSAN rail corridor.
- The primary station entrance would be located on the east side of Van Nuys Boulevard just south of the LOSSAN rail corridor. A secondary station entrance would be located between Raymer Street and Van Nuys Boulevard.
- An underground pedestrian walkway would connect the station plaza to the existing pedestrian underpass to the Metrolink/Amtrak platform outside the fare paid zone.

- Existing Metrolink Station parking would be reconfigured, maintaining approximately the same number of spaces, but 66 parking spaces would be relocated west of Van Nuys Boulevard. Metrolink parking would not be available to Metro transit riders.

9.1.1.5 Station-to-Station Travel Times

Table 9-1 presents the station-to-station distance and travel times at peak period for Alternative 5. The travel times include both run time and dwell time. Dwell time is 30 seconds for transfer stations and 20 seconds for other stations. Northbound and southbound travel times vary slightly because of grade differentials and operational considerations at end-of-line stations.

Table 9-1 Alternative 5: Station-to-Station Travel Times and Station Dwell Times

From Station	To Station	Distance (miles)	Northbound Station-to-Station Travel Time (seconds)	Southbound Station-to-Station Travel Time (seconds)	Dwell Time (seconds)
Metro E Line Station					*30*
Metro E Line	Santa Monica Boulevard	0.9	89	86	—
Santa Monica Boulevard Station					*20*
Santa Monica Boulevard	Wilshire/Metro D Line	0.9	91	92	—
Wilshire/Metro D Line Station					*30*
Wilshire/Metro D Line	UCLA Gateway Plaza	0.7	75	69	—
UCLA Gateway Plaza Station					*20*
UCLA Gateway Plaza	Ventura Boulevard	6.0	368	359	—
Ventura Boulevard Station					*20*
Ventura Boulevard	Metro G Line	2.0	137	138	—
Metro G Line Station					*30*
Metro G Line	Sherman Way	1.4	113	109	—
Sherman Way Station					*20*
Sherman Way	Van Nuys Metrolink	1.9	166	162	—
Van Nuys Metrolink Station					*30*

Source: STCP, 2024

— = no data

9.1.1.6 Special Trackwork

Alternative 5 would include 10 double crossovers throughout the alignment enabling trains to cross over to the parallel track. Each terminus station would include a double crossover immediately north and south of the station. Except for the Santa Monica Boulevard Station, each station would have a double crossover immediately south of the station. The remaining crossover would be located along the alignment midway between the UCLA Gateway Plaza Station and the Ventura Boulevard Station.

9.1.1.7 Maintenance and Storage Facility

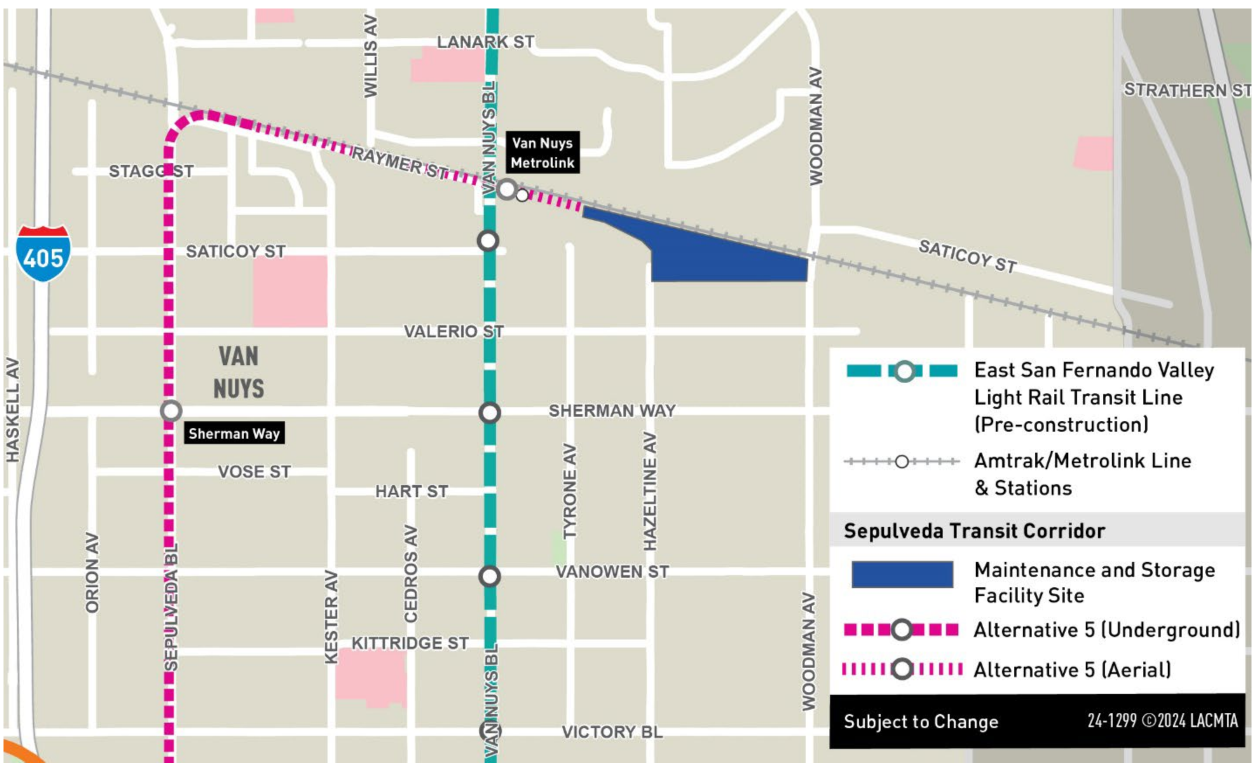
The MSF for Alternative 5 would be located east of the Van Nuys Metrolink Station and would encompass approximately 46 acres. The MSF would be designed to accommodate 184 rail cars and would be bounded by single-family residences to the south, the LOSSAN rail corridor to the north, Woodman Avenue on the east, and Hazeltine Avenue and industrial manufacturing enterprises to the west. Trains would access the site from the fixed guideway’s tail tracks at the northwest corner of the site. Trains would then travel southeast to maintenance facilities and storage tracks.

The site would include the following facilities:

- Two entrance gates with guard shacks
- Main shop building
- Maintenance-of-way building
- Storage tracks
- Carwash building
- Cleaning and inspections platforms
- Material storage building
- Hazmat storage locker
- Traction power substation (TPSS) located on the west end of the MSF to serve the mainline
- TPSS located on the east end of the MSF to serve the yard and shops
- Parking area for employees
- Grade separated access roadway (over the HRT tracks at the east end of the facility) and necessary drainage

Figure 9-4 shows the location of the MSF site for Alternative 5.

Figure 9-4. Alternative 5: Maintenance and Storage Facility Site



Source: STCP, 2024; HTA, 2024

9.1.1.8 Traction Power Substations

TPSSs transform and convert high voltage alternating current supplied from power utility feeders into direct current suitable for transit operation. Twelve TPSS facilities would be located along the alignment and would be spaced approximately 0.5 to 2.5 miles apart. All TPSS facilities would be located within the stations, adjacent to the tunnel through the Santa Monica Mountains, or within the MSF. Table 9-2 lists the TPSS locations for Alternative 5.

Figure 9-5 shows the TPSS locations along the Alternative 5 alignment.

Table 9-2. Alternative 5: Traction Power Substation Locations

TPSS No.	TPSS Location Description	Configuration
1	TPSS 1 would be located east of Sepulveda Boulevard and north of the Metro E Line.	Underground (within station)
2	TPSS 2 would be located south of Santa Monica Boulevard between Sepulveda Boulevard and Bentley Avenue.	Underground (within station)
3	TPSS 3 would be located at the southeast corner of UCLA Gateway Plaza.	Underground (within station)
4	TPSS 4 would be located south of Bellagio Road and west of Stone Canyon Road.	Underground (adjacent to tunnel)
5	TPSS 5 would be located west of Roscomare Road between Donella Circle and Linda Flora Drive.	Underground (adjacent to tunnel)
6	TPSS 6 would be located east of Loom Place between Longbow Drive and Vista Haven Road.	Underground (adjacent to tunnel)
7	TPSS 7 would be located west of Sepulveda Boulevard between the I-405 Northbound On-Ramp and Dickens Street.	Underground (within station)
8	TPSS 8 would be located west of Sepulveda Boulevard between the Metro G Line Busway and Oxnard Street.	Underground (within station)
9	TPSS 9 would be located at the southwest corner of Sepulveda Boulevard and Sherman Way.	Underground (within station)
10	TPSS 10 would be located south of the LOSSAN rail corridor and north of Raymer Street and Kester Avenue.	At-grade
11	TPSS 11 would be located south of the LOSSAN rail corridor and east of the Van Nuys Metrolink Station.	At-grade (within MSF)
12	TPSS 12 would be located south of the LOSSAN rail corridor and east of Hazeltine Avenue.	At-grade (within MSF)

Source: STCP, 2024; HTA, 2024

Note: Sepulveda Transit Corridor Partners (STCP) has stated that Alternative 5 TPSS locations are derived from and assumed to be similar to the Alternative 4 TPSS locations.

Figure 9-5. Alternative 5: Traction Power Substation Locations

Source: STCP, 2024; HTA, 2024

9.1.1.9 Roadway Configuration Changes

Table 9-3 lists the roadway changes necessary to accommodate the guideway of Alternative 5. Figure 9-6 shows the location of the roadway changes within the Sepulveda Transit Corridor Project (Project) Study Area. In addition to the changes made to accommodate the guideway, as listed in Table 9-3, roadways and sidewalks near stations would be reconstructed, resulting in modifications to curb ramps and driveways.

Table 9-3. Alternative 5: Roadway Changes

Location	From	To	Description of Change
Raymer Street	Kester Avenue	Keswick Street	Reconstruction resulting in narrowing of width and removal of parking on the westbound side of the street to accommodate aerial guideway columns.
Cabrito Road	Raymer Street	Marson Street	Closure of Cabrito Road at the LOSSAN rail corridor at-grade crossing. A new segment of Cabrito Road would be constructed from Noble Avenue and Marson Street to provide access to extra space storage from the north.

Source: STCP, 2024; HTA, 2024

Figure 9-6. Alternative 5: Roadway Changes

Source: STCP, 2024; HTA, 2024

9.1.1.10 Ventilation Facilities

For ventilation, a plenum within the crown of the tunnel would provide a separate compartment for air circulation and allow multiple trains to operate between stations. Each underground station would include a fan room with additional ventilation facilities. Alternative 5 would also include a stand-alone ventilation facility at the tunnel portal on the northern end of the tunnel segment, located east of Sepulveda Boulevard and south of Raymer Street. Within this facility, ventilation fan rooms would provide both emergency ventilation, in case of a tunnel fire, and regular ventilation, during non-revenue hours. The facility would also house sump pump rooms to collect water from various sources, including storm water; wash-water (from tunnel cleaning); and water from a fire-fighting incident, system testing, or pipe leaks.

9.1.1.11 Fire/Life Safety – Emergency Egress

Within the tunnel segment, emergency walkways would be provided between the center dividing wall and each track. Sliding doors would be located in the central dividing wall at required intervals to connect the two sides of the railway with a continuous walkway to allow for safe egress to a point of safety (typically at a station) during an emergency. Similarly, the aerial guideway near the LOSSAN rail corridor would include two emergency walkways with safety railing located on the outer side of the tracks. Access to tunnel segments for first responders would be through stations and the portal.

9.1.2 Construction Activities

Temporary construction activities for Alternative 5 would include project work zones at permanent facility locations, construction staging and laydown areas, and construction office areas. Construction of the transit facilities through substantial completion is expected to have a duration of 8 ¼ years. Early works, such as site preparation, demolition, and utility relocation, could start in advance of construction of the transit facilities.

For the guideway, Alternative 5 would consist of a single-bore tunnel through the Westside, Valley, and Santa Monica Mountains. The tunnel would comprise three separate segments, one running north from the southern terminus to the UCLA Gateway Plaza Station (Westside segment), one running south from the Ventura Boulevard Station to the UCLA Gateway Plaza Station (Santa Monica Mountains segment), and one running north from the Ventura Boulevard Station to the portal near Raymer Street (Valley segment). Tunnel boring machines (TBM) with approximately 45-foot-diameter cutting faces would be used to construct the tunnel segments underground. For the Westside segment, the TBM would be launched from Staging Area No. 1 in Table 9-4 at Sepulveda Boulevard and National Boulevard. For the Santa Monica Mountains segment, the TBMs would be launched from the Ventura Boulevard Station. Both TBMs would be extracted from the UCLA Gateway Plaza Station Staging Area No. 3 in Table 9-4. For the Valley segment, the TBM would be launched from Staging Area No. 8 as shown in Table 9-4 and extracted from the Ventura Boulevard Station. Figure 9-7 shows the location of construction staging locations along the Alternative 5 alignment.

Table 9-4. Alternative 5: On-Site Construction Staging Locations

No.	Location Description
1	Commercial properties on southeast corner of Sepulveda Boulevard and National Boulevard
2	North side of Wilshire Boulevard between Veteran Avenue and Gayley Avenue
3	UCLA Gateway Plaza
4	Commercial property on southwest corner of Sepulveda Boulevard and Dickens Street
5	West of Sepulveda Boulevard between US-101 and Sherman Oaks Castle Park
6	Lot behind Los Angeles Fire Department Station 88
7	Property on the west side of Sepulveda Boulevard between Sherman Way and Gault Street
8	Industrial property on both sides of Raymer Street, west of Burnet Avenue
9	South of the LOSSAN rail corridor east of Van Nuys Metrolink Station, west of Woodman Avenue

Source: STCP, 2024; HTA, 2024

Figure 9-7. Alternative 5: On-Site Construction Staging Locations

Source: STCP, 2024; HTA, 2024

The distance from the surface to the top of the tunnel for the Westside tunnel would vary from approximately 40 feet to 90 feet depending on the depth needed to construct the underground stations. The depth of the Santa Monica Mountains tunnel segment varies greatly from approximately 470 feet as it passes under the Santa Monica Mountains to 50 feet near UCLA. The depth of the Valley segment would vary from approximately 40 feet near the Ventura Boulevard/Sepulveda Station and north of the Metro G Line Sepulveda Station to 150 feet near Weddington Street. The tunnel segments through the Westside and Valley would be excavated in soft ground while the tunnel through the Santa Monica Mountains would be excavated primarily in hard ground or rock as geotechnical conditions transition from soft to hard ground near the UCLA Gateway Plaza Station.

Construction work zones would also be co-located with future MSF and station locations. All work zones would comprise the permanent facility footprint with additional temporary construction easements from adjoining properties.

All underground stations would be constructed using a “cut-and-cover” method whereby the underground station structure would be constructed within a trench excavated from the surface with a portion or all being covered by a temporary deck and backfilled during the later stages of station construction. Traffic and pedestrian detours would be necessary during underground station excavation until decking is in place and the appropriate safety measures are taken to resume cross traffic.

In addition to work zones, Alternative 5 would include construction staging and laydown areas at multiple locations along the alignment as well as off-site staging areas. Construction staging areas would provide the necessary space for the following activities:

- Contractors’ equipment
- Receiving deliveries
- Testing of soils for minerals or hazards
- Storing materials
- Site offices
- Work zone for excavation
- Other construction activities (including parking and change facilities for workers, location of construction office trailers, storage, staging and delivery of construction materials and permanent plant equipment, and maintenance of construction equipment).

A larger, off-site staging area would be used for temporary storage of excavated material from both tunneling and station cut-and-cover excavation activities. Table 9-4 and Figure 9-7 present the potential construction staging areas along the alignment for Alternative 5. Table 9-5 and Figure 9-8 present candidate sites for off-site staging and laydown areas.

Table 9-5. Alternative 5: Potential Off-Site Construction Staging Locations

No.	Location Description
S1	East of Santa Monica Airport Runway
S2	Ralph’s Parking Lot in Westwood Village
N1	West of Sepulveda Basin Sports Complex, south of the Los Angeles River
N2	West of Sepulveda Basin Sports Complex, north of the Los Angeles River
N3	Metro G Line Sepulveda Station park & ride lot
N4	North of Roscoe Boulevard and Hayvenhurst Avenue
N5	LADWP property south of the LOSSAN rail corridor, east of Van Nuys Metrolink Station

Source: STCP, 2024; HTA, 2024

Figure 9-8. Alternative 5: Potential Off-Site Construction Staging Locations

Source: STCP, 2024; HTA, 2024

Construction of the HRT guideway between the Van Nuys Metrolink Station and the MSF would require reconfiguration of an existing rail spur serving LADWP property. The new location of the rail spur would require modification to the existing pedestrian undercrossing at the Van Nuys Metrolink Station.

Alternative 5 would require construction of a concrete casting facility for tunnel lining segments because no existing commercial fabricator capable of producing tunnel lining segments for a large-diameter tunnel exists within a practical distance of the Project Study Area. The site of the MSF would initially be used for this casting facility. The casting facility would include casting beds and associated casting equipment, storage areas for cement and aggregate, and a field quality control facility, which would need to be constructed on-site. When a more detailed design of the facility is completed, the contractor would obtain all permits and approvals necessary from the City of Los Angeles, the South Coast Air Quality Management District, and other regulatory entities.

As areas of the MSF site begin to become available following completion of pre-casting operations, construction of permanent facilities for the MSF would begin, including construction of surface buildings such as maintenance shops, administrative offices, train control, traction power, and systems facilities. Some of the yard storage track would also be constructed at this time to allow delivery and inspection of passenger vehicles that would be fabricated elsewhere. Additional activities occurring at the MSF during the final phase of construction would include staging of trackwork and welding of guideway rail.

9.2 Existing Conditions

This section provides a brief discussion of the types of energy resources that would be consumed by construction and operation of Alternative 5 and how they are produced and distributed to the respective end uses at the state and regional levels. Energy resources involved in the transit system implementation include direct uses such as transportation fuels for locomotives and electricity use at stations and indirect uses such as fuel consumed by regional vehicular travel on the roadway network.

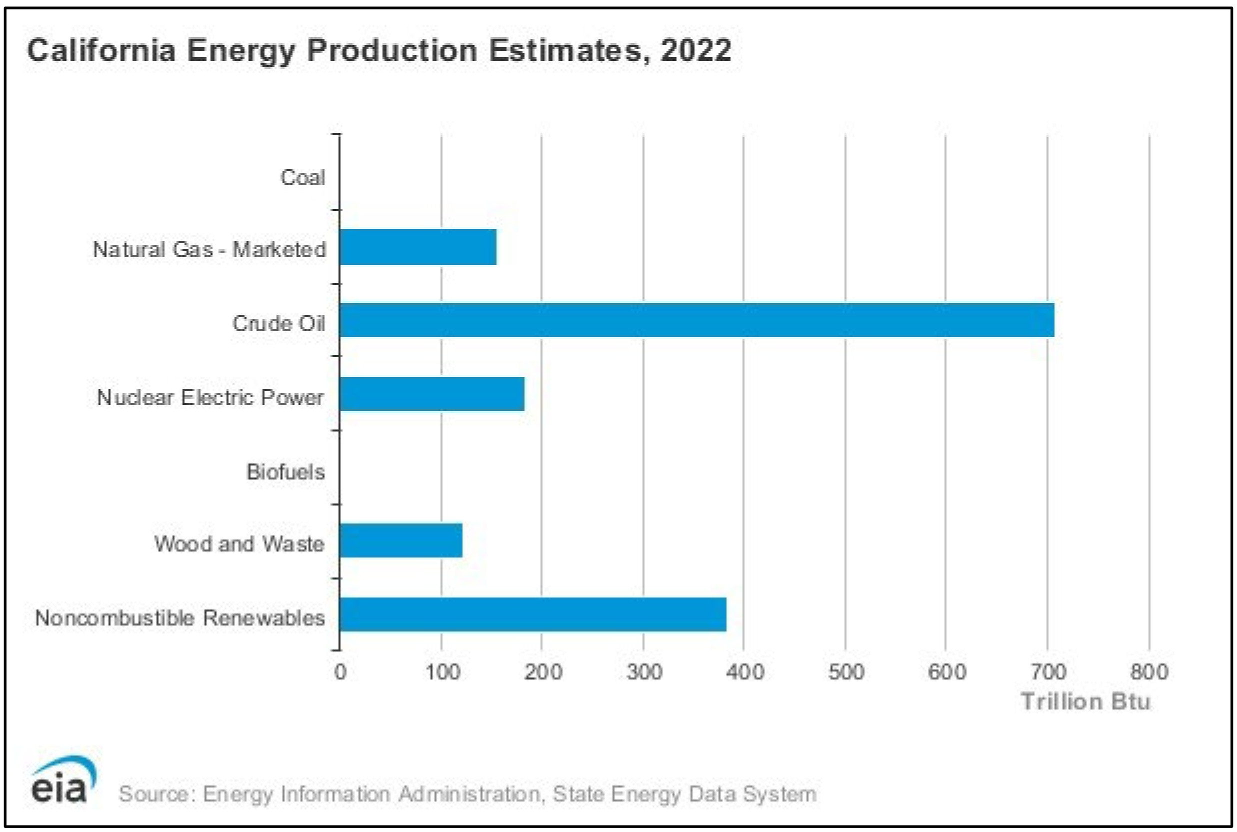
- **Transportation Fuels**. The internal combustion engines of on-road motor vehicles, locomotives, and off-road equipment use fossil fuel (petroleum) energy for propulsion. Gasoline and diesel fuel are formulations of fossil fuels refined for use in various applications. Gasoline is the primary fuel source for most passenger automobiles, and diesel fuel is the primary fuel source for most off-road equipment and medium and heavy-duty trucks. The analyses presented in this report also disclose electricity and natural gas consumption associated with on-road vehicle activity.
- **Electricity**. The production of electricity requires the consumption or conversion of other natural resources, whether it be water (hydroelectric power), wind, oil, gas, coal, or solar energy. The delivery of electricity as a utility involves several system components for distribution and use. Electricity is distributed through a network of transmission and distribution lines referred to as a power grid. Energy capacity, or electrical power, is generally measured in watts (W), while energy use is measured in watt-hours (Wh), which is the integral electricity consumption over a time period of 1 hour. On a utility scale, the capacity of electricity generation and amount of consumption is generally described in megawatt (MW) and megawatt-hours (MWh), respectively. For discussions involving regional scale electricity generation and consumption, units of gigawatt-hours (GWh) are used, which is equivalent to 1,000 MWh.

9.2.1 State Energy Resources

California is the most populous state in the nation, has the largest economy, and is second only to Texas in total energy consumption (U.S. Census Bureau, 2021; BEA, 2019a; EIA, 2024b). California also has the world's fifth-largest economy and leads the nation in both agricultural and manufacturing gross domestic product (BEA, 2019b). Despite California's many energy-intensive industries, the state has one of the lowest per capita energy consumption levels in the United States (EIA, 2023a). California's extensive efforts to increase energy efficiency and implement alternative technologies have slowed growth in energy demand. The state is also rich in energy resources. California is among the nation's top producers of conventional hydroelectric power and is second only to Texas in nonhydroelectric renewable-sourced electricity generation. In addition, California has an abundant supply of crude oil and accounts for one-tenth of the United States crude oil refining capacity.

Energy is produced in California from a diverse portfolio of renewable and non-renewable resources. Figure 9-9 shows that crude oil is the largest source of energy in California, accounting for approximately 708.9 trillion Btu in 2022, which constituted 46 percent of total statewide energy production (EIA, 2024a). To meet state environmental regulations, California refineries are configured to produce cleaner fuels. Refineries in the state often operate at or near maximum capacity because of the high demand for those petroleum products and the lack of interstate pipelines that can deliver them into the state (CEC, 2021b). In 2022, the noncombustible renewable energy resources, including hydroelectric, geothermal, solar, and wind energy, collectively accounted for 383.3 trillion Btu of annual energy production, equal to 24.7 percent of the total statewide resources. Natural gas and nuclear electric power constituted approximately 10 percent and 11.8 percent of statewide production, respectively, and the combination of wood energy and biomass waste energy provided 5.4 percent of production in 2022. Biofuels accounted for 1.5 percent, and coal fueled about 0.1 percent of the in-state, utility-scale net generation, and all of that power was generated at industrial facilities (EIA, 2024b).

Figure 9-9. 2022 Statewide Energy Production Resources



Source: EIA, 2024a

9.2.1.1 Electricity Generation

As of 2022, California is the fourth-largest electricity producer in the nation and accounted for about 5 percent of U.S. utility-scale (1-MW and larger) power generation. Renewable resources, including hydropower and small-scale (less than 1 MW), customer-sited solar photovoltaic (PV) systems, supplied more than half of California's total in-state electricity generation, and natural gas-fired power plants provided approximately two-fifths (EIA, 2023b). Nuclear power's share of state generation in 2022 was less than one-tenth, down from nearly one-fifth in 2011. The decrease resulted from the retirement of the San Onofre nuclear power plant in mid-2013, which left the state with only one operating commercial nuclear power plant—the two-reactor Diablo Canyon facility. Overall, California generated approximately 203.4 million MWh of electricity annually in 2022, and the statewide grid provided a net summer capacity of 85,981 MW.

Table 9-6 provides a summary of the annual in-state electricity generation by supply resource during the decade spanning backwards from 2022–2013 in units of gigawatt-hours (GWh). Key trends observed in the data include the ten-fold expansion of solar generation from 3,813.7 GWh in 2013 to 38,789.4 GWh in 2022, as well as a nearly 70 percent decrease in reliance on coal-powered generation from 823.3 GWh in 2013 to 251.6 GWh in 2022.

Table 9-6. California In-State Electricity Generation Profile 2022–2013 (gigawatt hour(s))

Primary Source	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Battery Storage	-447.6	-154.7	-27.6	-22.6	-22.4	11.5	-4.3	-1.3	-1.1	-1.2
Coal	251.6	294.2	290.3	240.5	281.3	291.1	318.9	297.9	804.8	823.2
Geothermal	11,181.0	11,127.5	11,366.5	10,914.1	11,676.8	11,559.6	11,457.3	11,883.1	12,101.7	12,306.6
Hydroelectric	17,644.1	14,677.6	21,377.5	38,354.8	26,330.7	42,363.1	28,942.1	13,808.5	16,531.3	23,754.6
Natural Gas	96,371.6	97,427.1	92,046.7	85,840.8	89,804.7	88,350.2	97,073.7	116,139.6	120,426.4	119,522.9
Nuclear	17,593.3	16,477.4	16,258.7	16,165.4	18,213.5	17,901.1	18,907.6	18,505.4	16,986.0	17,911.9
Other[a]	643.8	730.6	722.3	787.7	851.1	824.1	670.0	813.0	848.9	817.3
Other Biomass[b]	2,416.6	2,574.4	2,615.1	2,722.6	2,823.8	2,841.0	2,909.9	2,883.7	2,913.3	2,843.2
Other Gas[c]	1,411.5	1,368.9	1,538.0	1,476.2	1,454.0	1,408.3	1,426.8	1,548.6	1,333.0	1,405.7
Petroleum	155.0	77.0	43.9	51.0	68.9	45.8	175.6	84.5	66.3	68.9
Pumped Storage	-155.0	-317.4	-37.1	-30.6	-148.6	407.5	-259.3	112.7	-104.7	196.3
Solar	38,789.4	34,863.9	30,272.6	28,331.5	26,985.2	24,352.9	18,806.7	14,814.4	9,931.8	3,813.7
Wind	14,638.1	15,177.0	13,583.1	13,735.1	14,024.0	12,822.9	13,509.0	12,229.6	12,992.5	12,822.1
Wood	2,890.7	2,841.7	3,033.7	3,217.9	3,122.6	2,967.5	3,029.3	3,584.2	3,977.4	3,792.1
Total Generation	**203,383.9**	**197,165.1**	**193,083.5**	**201,784.2**	**195,465.6**	**206,146.5**	**196,963.2**	**196,703.9**	**198,807.6**	**200,077.1**

Source: EIA, 2024b

[a]"Other" includes non-biogenic municipal solid waste, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, tire-derived fuels, waste heat, and miscellaneous technologies.

[b]"Other Biomass" includes agricultural byproducts, landfill gas, biogenic municipal solid waste, other biomass (solid, liquid, and gas) and sludge waste.

[c]"Other Gas" includes blast furnace gas, and other manufactured and waste gases derived from fossil fuels.

In 2019, California's in-state electricity net generation from all renewable resources combined was greater than that of any other state, including generation from hydroelectric power and from small-scale, customer-sited solar generation. California is the nation's top producer of electricity from solar, geothermal, and biomass energy. In 2019, the state was also the nation's second-largest producer of electricity from conventional hydroelectric power and the fifth largest from wind energy. California's greatest solar resource is in the state's southeastern deserts, where all of its solar thermal facilities and largest solar PV plants are located. However, solar PV facilities are located throughout the state. By 2019, solar supplied 14 percent of the state's utility-scale electricity net generation; and when small-scale solar generation is added, solar energy provided one-fifth of the state's total net generation. By November 2020, California had about 13,000 MW of utility-scale solar power capacity, more than any other state; when small-scale, customer-sited facilities are included, the state had almost 24,000 MWs of solar capacity. California's Renewables Portfolio Standard was enacted in 2002 and has been revised several times since then. It requires that 33 percent of electricity retail sales in California come from eligible renewable resources by 2020, 60 percent by 2030, and 100 percent by 2045.

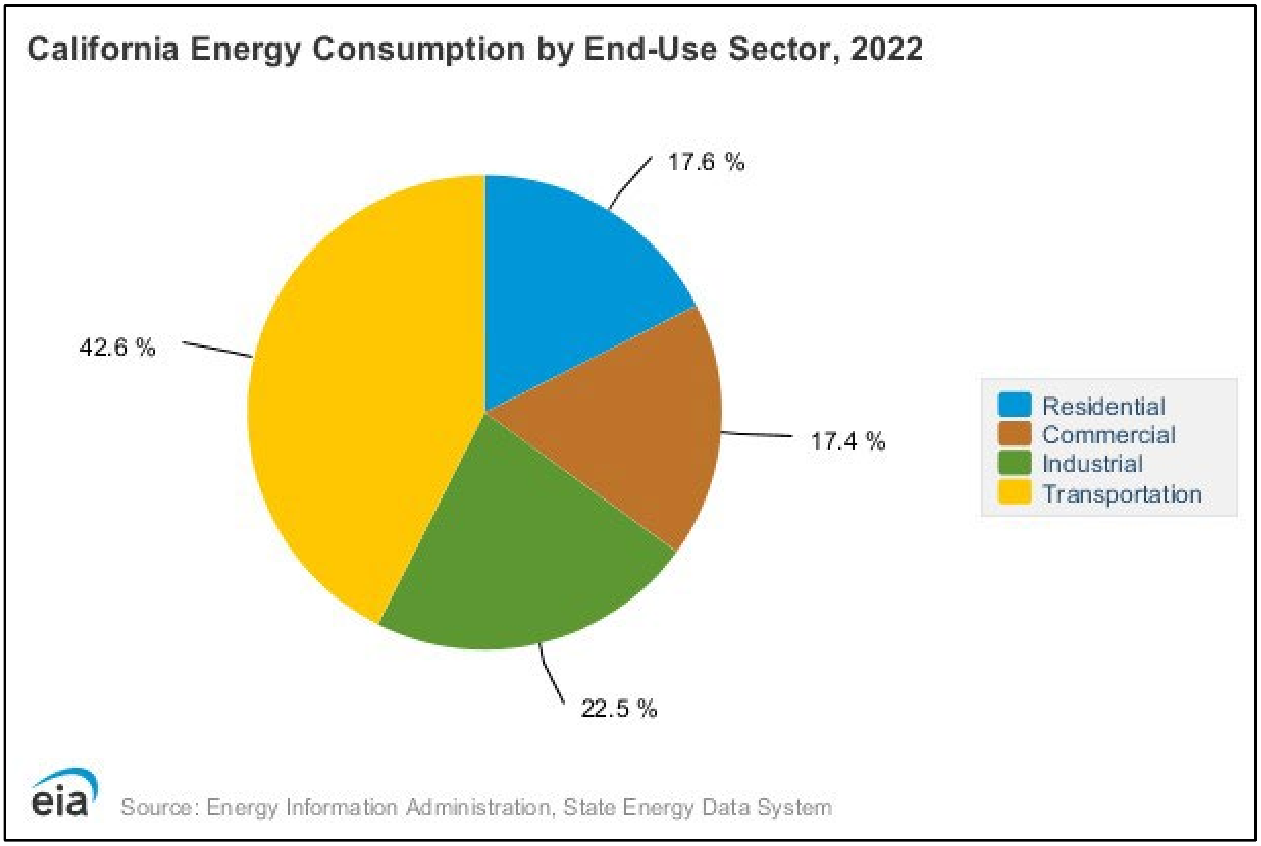
9.2.1.2 Transportation Fuels Supply

As of 2022, California has the sixth-largest share of crude oil reserves among the 50 states and is the seventh-largest crude oil producer (EIA, 2024a). Underground reservoirs along California's Pacific Coast, including in the Los Angeles Basin and those in the state's Central Valley, contain major crude oil reserves. The most prolific oil-producing area in the state is the San Joaquin Basin in the southern half of California's Central Valley. Overall, California's crude oil production has declined steadily since 1985, but the state remains one of the nation's top crude oil producers and accounted for about 4 percent of United States production in 2022 (EIA, 2024a). California ranks third in petroleum refining capacity—after Texas and Louisiana—and accounts for one-tenth of the nation's total. A network of crude oil pipelines connects California's oil production to the state's refining centers, which are located primarily in the Los Angeles area, the San Francisco Bay Area, and the San Joaquin Valley (EIA, 2023b). California refiners also process large volumes of foreign and Alaskan crude oil. As crude oil production in California and Alaska has declined, California refineries have become increasingly dependent on imports from other countries to meet the state's needs. Led by Saudi Arabia, Iraq, Ecuador, and Colombia, foreign suppliers provided more than half of the crude oil refined in California in 2022.

9.2.2 Statewide Use Patterns

Figure 9-10 displays the statewide energy consumption by end use sector for the most recent year of verified data available, 2022 (EIA, 2024b). Overall, the transportation sector accounts for nearly two-fifths of California's end-use energy consumption. Reducing per capita transportation fuels consumption is a pillar of the state’s initiatives to decrease reliance on fossil fuels as the population continues to grow. The industrial sector is the second-largest energy consumer in California and uses almost one-fourth of the state's energy. The commercial sector and the residential sector account for roughly equal amounts of the state's end-use energy consumption, at slightly less than one-fifth each. As previoiusly discussed, California has promulgated a robust regulatory framework to reduce energy consumption across the various end-use sectors.

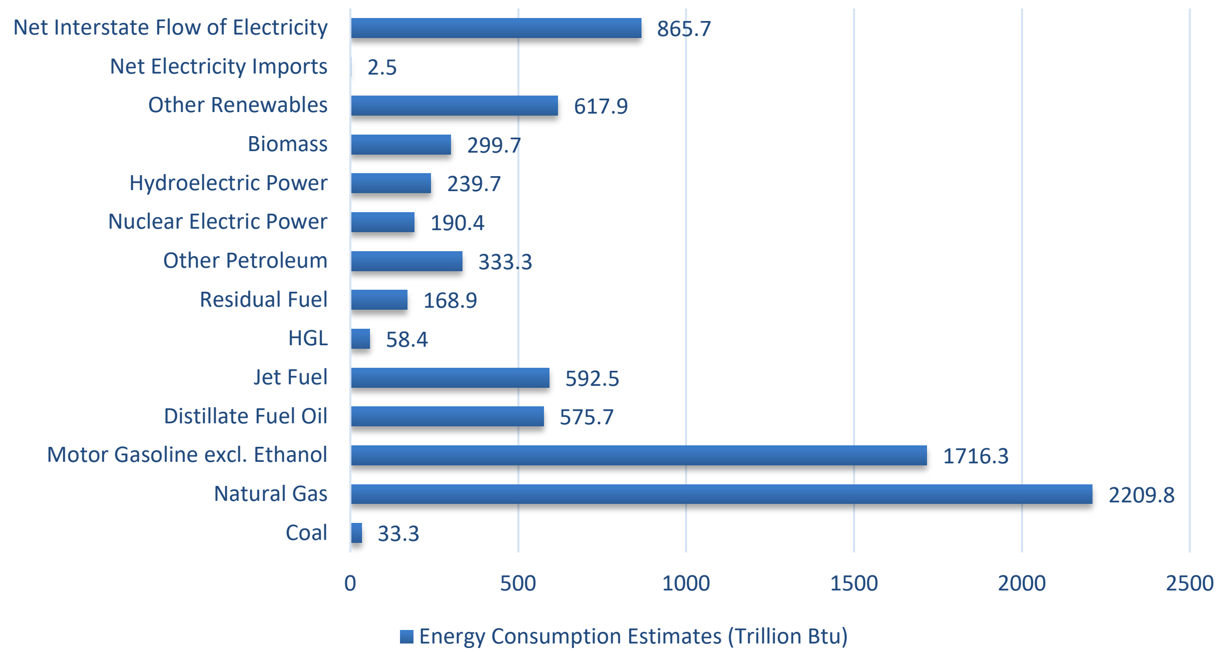
Figure 9-10. Annual Statewide Energy Consumption by End-Use Sector



Source: EIA, 2024b

Figure 9-11 summarizes the 2022 statewide annual energy consumption by resource origin. As mentioned previously, natural gas is the most consumed energy resource in the state, with nearly 10 times as much natural gas used by consumers as is produced by California reserves and processing facilities. Crude oil is refined and distilled to produce motor gasoline, distillate fuel oil, jet fuel, hydrocarbon gas liquids, residual fuel, and other petroleum products. The chart also demonstrates that California has a net import of approximately 600.4 trillion btu of electricity annually.

Figure 9-11. 2022 Annual Statewide Energy Consumption by Source



Source: EIA, 2024b

9.2.2.1 Electricity Consumption

In 2022, California was the nation's largest net importer of electricity from out of state and received about 28 percent of its electricity supply from generating facilities outside the state (EIA, 2024a). California has the second-highest electricity retail sales in the nation, after Texas, but it has the lowest retail sales per capita. The commercial sector accounts for almost half of California's electricity retail sales. The residential sector, where more than one-fourth of California households use electricity for home heating, accounts for more than one-third of sales. Almost all the rest of the state's electricity retail sales are to the industrial sector. A very small amount goes to the transportation sector.

9.2.2.2 Transportation Fuels Consumption

California is the nation’s second-largest consumer of petroleum products, after Texas, and accounts for 10 percent of the nation's total consumption. The state is the largest United States consumer of motor gasoline and jet fuel, and 85 percent of the petroleum consumed in California is used in the transportation sector. The industrial sector, the second-largest petroleum-consuming sector, uses 12 percent of the petroleum consumed in the state. The commercial sector accounts for more than 2 percent, and the residential sector consumes less than 1 percent (EIA, 2023a).

9.2.3 Local Energy Resources

The discussion of local energy resources focuses on electricity, natural gas, and petroleum-based transportation fuels (motor gasoline and diesel fuel) supplied to Los Angeles County and the Project Area. This section also summarizes Metro’s existing systemwide energy consumption using the most recently published data available (Metro, 2019b).

9.2.3.1 Electricity

The LADWP power system serves approximately 4 million people and is the nation's largest municipal utility. Its service territory area covers the City of Los Angeles and many areas of the Owens Valley, with annual sales exceeding 26 million MWh. LADWP is a "vertically integrated" utility, both owning and operating the majority of its generation, transmission, and distribution systems. LADWP strives to be self-sufficient in providing electricity to its customers and does so by maintaining generation resources that are equal to or greater than its customers' electrical needs. LADWP's operations are financed solely through sales of water and electric services.

LADWP obtains electricity from various generating resources that utilize coal, nuclear, natural gas, hydroelectric, and renewable resources to generate power. LADWP obtains power from four municipally owned power plants within the Los Angeles Basin, LADWP Hydrogenerators on the Los Angeles Aqueduct, shared ownership generating facilities in the Southwest, and also power purchased from the Southwest and Pacific Northwest. LADWP has a power infrastructure comprising a total of 34 generation plants and approximately 3,636 miles of overhead transmission lines spanning five western states. LADWP also purchases excess power, as it is available, from self-generators interconnected with the LADWP within the City of Los Angeles.

According to LADWP's 2022 Power Content Label submitted to the California Energy Commission (CEC), LADWP has a net dependable generation capacity greater than 8,000 MW (LADWP, 2021). On August 31, 2017, LADWP's power system experienced a record instantaneous peak demand of 6,502 MW. As of 2019, approximately 34 percent of LADWP's delivered power mix to customers was derived from renewable resources, which meets and exceeds the statewide target of 33 percent renewably sourced electricity generation by 2020, pending verification by the CEC (LADWP, 2021). The annual LADWP electricity sale to customers for 2019 was approximately 23,402.7 GWh (CEC, 2019).

9.2.3.2 Transportation Fuels

As previously discussed, transportation accounts for nearly 40 percent of the total statewide energy consumption, and petroleum-based fuels currently account for 90 percent of California's transportation energy sources (CEC, 2020a). However, the state is now working on developing flexible strategies to reduce petroleum use, as evidenced by the robust regulatory framework promulgated to enhance energy efficiency and decrease reliance on passenger vehicles and non-renewable resources in general. The CEC predicts that the demand for gasoline will continue to decrease over the next decade, and there will be an increase in the use of alternative fuels, such as natural gas, biofuels, and electricity (CEC, 2018). On September 23, 2020, Governor Gavin Newsom signed Executive Order N-79-20, setting a 100 percent zero emission vehicle (ZEV) target for new passenger vehicle sales by 2035 and a 100 percent zero-emission vehicle operations target for medium- and heavy-duty vehicles in the state by 2045 (CEC, 2021b).

According to CEC fuel sales data, Los Angeles County contained approximately 2,063 transportation fueling stations in 2019 (CEC, 2020b). In the same year, countywide fuel sales comprised approximately 3,559 million gallons of gasoline and 276 million gallons of diesel fuel. By volume, Los Angeles County accounted for approximately 23.2 percent of statewide gasoline sales and approximately 15.7 percent of statewide diesel fuel sales. Despite substantial increases in population (from approximately 9.8 million in 2010 to 10.0 million in 2019), total countywide gasoline fuel sales have remained relatively constant over the course of the past decade, as the CEC estimates approximately 3,658 million gallons of gasoline were sold within Los Angeles County in 2010.

9.2.4 Metro Energy Inventory

Metro's contribution to regional energy consumption includes on-road vehicle fuel use (primarily compressed natural gas) and electricity for rail vehicle propulsion and maintenance and administrative facility operation. The *2019 Energy and Resource Report* examined Metro's energy use for the 2019 calendar year and refined estimates prepared by previous analysis (Metro, 2019b).

Table 9-7 presents an overview of the Metro system energy consumption by end use between 2015 and 2019. As of 2019, the Metro system comprised 124,695,827 revenue miles consuming approximately 5,357.3 million megajoules (MJ) of energy per revenue mile, for a total of 6,667.1 million MJ. Overall, Metro system energy consumption has decreased by 6.9 percent during the period from 2015 to 2019. Metro has prioritized generating system energy from alternative fuels in recent years. As of 2019, approximately 30 percent of Metro's electricity is generated by renewable sources. Metro plans to phase out all directly operated natural gas buses by 2030 to be replaced by ZEVs.

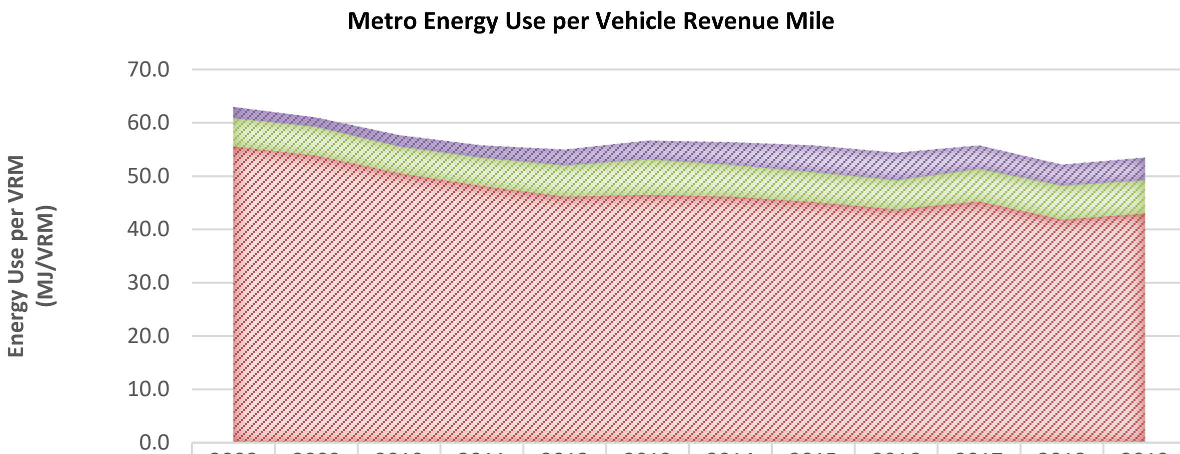
Table 9-7. Metro Operations Annual Energy Consumption (in Megajoules)

End Use	2015	2016	2017	2018	2019
Vehicle Fuel	5,796,786,075	5,644,897,527	5,787,683,879	5,317,489,842	5,357,290,785
Rail Propulsion	719,276,609	711,196,744	775,022,735	817,378,502	781,571,203
Facilities	642,626,521	660,898,312	564,325,336	491,666,179	528,225,942
Total	7,158,689,205	7,016,992,583	7,127,031,949	6,626,534,523	6,667,087,930

Source: Metro, 2019b

The *2019 Energy and Resource Report's* technical appendix also includes data describing Metro system energy use per vehicle revenue mile (VRM) (Metro, 2019b). Examining this data can provide insight as to how Metro is managing its energy resource consumption in relation to the expansion of its service network. Figure 9-12 presents a chart that shows the trend in Metro energy use per VRM over the past 12 years (2008–2019) since the reporting program began. As shown on Figure 9-12, total energy use per VRM decreased from 63.0 MJ/VRM in 2008 to 53.5 MJ/VRM in 2019, representing a 15 percent reduction over the 12-year period. The data demonstrates the efficacy of Metro's energy efficiency programs to deliver high quality transit options that meet regional growth demands while also conserving energy where possible.

Figure 9-12. Metro Systemwide Energy Use per Vehicle Revenue Mile



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Facilities	2.1	1.7	2.1	2.3	2.9	3.5	4.2	5.0	5.1	4.4	3.9	4.2
Rail Propulsion	5.3	5.4	5.0	5.3	5.9	6.7	6.0	5.6	5.5	6.1	6.4	6.3
Vehicle Fuel	55.6	53.9	50.6	48.2	46.2	46.5	46.2	45.2	43.8	45.3	41.9	43.0

Year

Source: Metro, 2019b

Includes mixed commercial and industrial land uses within the Project Study Area.

9.3 Impact Evaluation

9.3.1 Impact ENG-1: Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

9.3.1.1 Construction Impacts

Alternative 5 would require petroleum-based transportation fuels and electricity to construct the transit system. Construction activities would comply with Metro's GCP and construction equipment would be maintained in accordance with manufacturers' specifications. Construction would result in a one-time expenditure of approximately 19,369,362 gallons of diesel fuel, 1,182,417 gallons of gasoline, and 605,367 megawatt-hours (MWh) of electricity. Table 9-8 provides a summary of the energy consumption estimated for construction of Alternative 5.

Table 9-8. Alternative 5: Construction Fuel and Electricity Consumption

Source Type	Fuel Consumption (gal)	Electricity Consumption (MWh)
Mobile Source Fuel Consumption		
Off-Road Equipment (Diesel)	9,212,396	NA
Worker Vehicles (Gasoline)	1,182,417	NA
Vendor Trucks (Diesel)	485,939	NA
Haul Trucks (Diesel)	9,671,026	NA
Electricity Consumption		
TBM	NA	604,980

Source Type	Fuel Consumption (gal)	Electricity Consumption (MWh)
Onsite Portable Offices	NA	387
Summary		
Total Gasoline (gal):	**1,182,417**	**NA**
Total Diesel (gal):	**19,369,362**	**NA**
Total Electricity (MWh):	**NA**	**605,367**

Source: Metro, 2024c

gal = gallons
MWh = megawatt-hours
NA = not applicable
TBM = tunnel boring machine

All equipment and vehicles used in construction activities would comply with applicable California Air Resources Board regulations, Low Carbon Fuel Standards, and the Corporate Average Fuel Economy (CAFE) Standards. Construction would not place an undue burden on available energy resources. The one-time expenditure of energy associated with diesel fuel consumption would be offset by operations within approximately 11 years through transportation mode shift, and the one-time expenditure of energy associated with gasoline consumption would be offset by operations within 1 year. The temporary additional transportation fuels consumption does not require additional capacity provided at the local or regional level. CEC transportation energy demand forecasts indicate that gasoline and diesel fuel production is anticipated to increase between 2021 and 2035, while demand for both gasoline and diesel transportation fuels is projected to decrease over the same time period (CEC, 2021b). Construction vehicles and equipment activities would not place an undue burden on available petroleum fuel resources during construction of Alternative 5.

Construction activities may include lighting for security and safety in construction zones. Nighttime construction would be limited, and lighting would be sparse and would not require additional capacity provided at the local or regional level.

The GCP requires and commits project contractors to using newer engines for off-road diesel-powered construction equipment that are more fuel efficient than older models. All equipment and vehicles would be maintained in accordance with manufacturer specifications and would be subject to idling limits. As required by the California Green Building Standards (CALGreen) Code Tier 2, at least 80 percent of the nonhazardous construction debris generated by demolition activities will be diverted from landfills. Also, CALGreen includes the mandatory requirement to reuse or recycle all clean soil that would be displaced during construction of Alternative 5, which would result in reduced energy consumption from hauling trucks. Furthermore, the Metro 2020 Moving Beyond Sustainability Strategic Plan and the Metro Design Criteria and Standards require and commit contractors to using high-efficiency lighting as opposed to less energy-efficient lighting sources in alignment with Leadership in Energy and Environmental Design (LEED) sustainability energy standards.

Based on the substantiation previously described, construction would not result in wasteful, inefficient, or unnecessary consumption of energy resources. Therefore, Alternative 5 would result in a less-than-significant impact related to construction activities.

9.3.1.2 Operational Impacts

As described in the Methodology Section, future operations involved under Alternative 5 would consume energy resources in the forms of electricity (at TPSSs for rail propulsion, for MSF operations, at stations for lighting, accessibility features, and parking facilities, and as power for a fraction of vehicle miles traveled (VMT) by electric and plug-in hybrid vehicles), petroleum fuels (gasoline for employee trips and a fraction of regional VMT, and diesel fuel for an emergency generator at the MSF and a fraction of regional VMT), and natural gas (a small fraction of regional VMT by vehicles powered by natural gas). End uses that comprise direct energy resource consumption associated with Alternative 5 operations include TPSSs, the MSF, stations and parking facilities, and MSF employee trips. End uses comprising indirect energy consumption include the changes in regional vehicle trips and VMT patterns that would result under the new transit system. Table 9-9 presents a summary of the annual energy consumption by resource attributable to Alternative 5 operations in the horizon year of 2045 and compares the consumption to the 2045 Without Project Conditions.

Table 9-9. Alternative 5: Operations Annual Energy Consumption Relative to the 2045 Without Project Conditions (Horizon Year 2045)

End Use	Electricity (MWh)	Gasoline (gal)	Diesel (gal)	Natural Gas (DGE)
Alternative 5				
Traction Power	71,062	—	—	—
Stations and Parking	55,893	—	—	—
MSF[a]	24,110	—	4,421	—
MSF Employee Commuting Trips	127	49,657	12,431	490
Regional On-Road VMT	13,323,870	5,199,377,911	1,301,633,358	51,303,867
Alternative 5 Total Annual Consumption[b]	**13,475,063**	**5,199,427,567**	**1,301,650,210**	**51,304,357**
2045 Without Project Conditions				
Regional On-Road VMT	13,342,059	5,206,475,771	1,303,410,265	51,373,904
Net Change in Annual Resource Consumption	**133,004**	**-7,048,203**	**-1,760,055**	**-69,547**
Conversion Factor	3,412 kBtu/MWh	125.0 kBtu/gal	138.7 kBtu/gal	138.7 kBtu/gal
Net Change in Annual Energy Consumption (MMBtu)	***453,810***	***-881,026***	***-244,120***	***-9,646***
Net Change in Energy Consumption (MMBtu)	**-680,982**			

Source: STCP, 2024; HTA, 2024; BTS, 2024

[a]Diesel fuel consumption at the MSF is attributed to emergency generators.
[b]Values may not sum exactly due to rounding.

— = no data
DGE = diesel gallon equivalent
gal = gallon
kBtu = thousand British thermal units
MMBtu = million British thermal units
MWh = megawatt-hour
VMT = vehicle miles traveled

As shown in Table 9-9, operation of Alternative 5 in the horizon year of 2045 would result in a net annual increase in regional electricity demand of 133,004 MWh and would result in a net annual reduction of 7,048,203 gallons of gasoline, 1,760,055 gallons of diesel fuel, and 69,547 diesel gallon equivalent (DGE) of natural gas. Converting each of these quantities to standardized units of MMBtu, Alternative 5 operations would result in a net decrease of 680,982 MMBtu annually when compared to 2045 Without Project Conditions. This amount of energy savings is equivalent to 5,449,253 gallons of motor gasoline per year. The electricity consumption would be more than offset by the energy savings in the forms of petroleum fuels and natural gas, and the consumption would power a mass transit system that would contribute to regional efforts to enhance energy efficiency and reduce reliance on nonrenewable resources. Therefore, Alternative 5 would result in a substantial decrease in overall regional energy consumption when compared to 2045 Without Project Conditions, and this impact would be less than significant.

Table 9-10 summarizes the Alternative 5 annual energy consumption for each resource compared to Existing Conditions (2021). This is presented for informational purposes only. As shown in Table 9-10, Alternative 5 operations would result in a net increase of 12,139,143 MWh of electricity and 214,786,473 gallons of diesel fuel and would result in a net decrease of 1,063,665,746 gallons of gasoline and 67,448,434 DGE of natural gas. When standardized in units of MMBtu, operation of Alternative 5 in 2045 would consume approximately 71,103,677 MMBtu less of collective energy resources on an annual basis than Existing Conditions in the baseline year of 2021. This amount of energy is equivalent to a savings of 568,975,282 gallons of motor gasoline per year.

Table 9-10. Alternative 5: Operations Annual Energy Consumption (Horizon Year 2045) Relative to Existing Conditions (Baseline Year 2021)

End Use	Electricity (MWh)	Gasoline (gal)	Diesel (gal)	Natural Gas (DGE)
Alternative 5 (2045)				
Traction Power	71,062	—	—	—
Stations and Parking	55,893	—	—	—
MSF[a]	24,110	—	4,421	—
MSF Employee Commuting Trips	127	49,657	12,431	490
Regional On-Road VMT	13,323,870	5,199,377,911	1,301,633,358	51,303,867
Alternative 5 Total Annual Consumption[b]	**13,475,063**	**5,199,427,567**	**1,301,650,210**	**51,304,357**
Existing Conditions (2021)				
Regional On-Road VMT	1,335,920	6,263,093,314	1,086,863,738	118,752,791
Net Change in Annual Resource Consumption	**12,139,143**	**-1,063,665,746**	**214,786,473**	**-67,448,434**
Conversion Factor	3,412 kBtu/MWh	125.0 kBtu/gal	138.7 kBtu/gal	138.7 kBtu/gal
Net Change in Annual Energy Consumption (MMBtu)	***41,418,756***	***-132,958,218***	***29,790,884***	***-9,355,098***
Net Change in Energy Consumption (MMBtu)	**-71,103,677**			

Source: STCP, 2024; HTA, 2024; BTS, 2024

[a]Diesel fuel consumption at the maintenance and storage facility is attributed to emergency generators.
[b]Values may not sum exactly due to rounding.

— = no data
DGE = diesel gallon equivalent
gal = gallon
kBtu= thousand British thermal units
MMBtu = million British thermal units
MWh = megawatt-hour
VMT = vehicle miles traveled

9.3.1.3 Maintenance and Storage Facilities

As shown in Table 9-9 and Table 9-10, operation of the MSF in the horizon year of 2045 would result in an annual increase in regional electricity demand of 24,110 MWh and 4,421 gallons of diesel fuel. As discussed in Section 9.3.1.2, Alternative 5 operations collectively would result in a net decrease of 680,982 MMBtu annually when compared to 2045 Without Project Conditions. Construction of the MSF would require petroleum-based transportation fuels and electricity. Construction activities would comply with Metro's GCP and adhere to Metro's policy for aligning with LEED Silver sustainable certification. The required energy demand to construct and operate the MSF would be more than offset by the energy savings in the forms of petroleum fuels and natural gas, and the consumption would support a mass transit system that would contribute to regional efforts to enhance energy efficiency and reduce reliance on nonrenewable resources. Construction and operation of the MSF would not result in wasteful, inefficient, or unnecessary consumption of energy resources, and the MSF would result in a less than significant impact.

9.3.2 Impact ENG-2: Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

9.3.2.1 Construction Impacts

Alternative 5 would require petroleum-based transportation fuels and electricity to construct the transit system. Construction would result in a one-time expenditure of approximately 19,369,362 gallons of diesel fuel, 1,182,417 gallons of gasoline, and 605,367 MWh of electricity. Alternative 5 would be consistent with state and local energy plans and policies to reduce energy consumption as activities would comply with Metro's GCP, CALGreen Code, Title 24, and LEED Version 4 Building and Design Construction (LEED v4 BD+C) Level Silver certification. The GCP requires and commits project contractors to using newer engines for off-road diesel-powered construction equipment that are more fuel efficient than older models. Compliance with GCP would limit excess petroleum fuels consumption. The CALGreen Code requires reduction, disposal, and recycling of at least 80 percent of nonhazardous construction materials and requires demolition debris to be recycled and/or salvaged, which would ultimately result in reductions of indirect energy use associated with waste disposal and storage. Alternative 5 would comply with state and local plans for energy efficiency in construction activities. Therefore, Alternative 5 would result in a less-than-significant impact related to construction activities.

9.3.2.2 Operational Impacts

Alternative 5 would be a high-capacity rail transit system providing energy efficient mass transit to a region in need of enhanced accessibility options. It reduces auto passenger vehicle trips and reduces reliance on petroleum-based transportation fuels. Alternative 5 qualifies as a "sustainable transportation project" as defined by the California Office of Planning and Research, because it encourages the use of transit and zero emission vehicles and reduces on-road VMT (OPR, 2018). The benefits of Alternative 5 are consistent with the goals, objectives, and land use and transportation planning policies of SCAG and the City of Los Angeles as outlined in the local regulatory framework previously described. As the renewable energy portfolios of Metro and local jurisdictions expand over time, natural resources consumption to provide the electricity required for operations would become more energy efficient. Alternative 5 would not conflict with any adopted plan or regulation to enhance energy efficiency or reduce transportation fuels consumption and would support the initiatives of the MBSSP. In addition, Alternative 5 would not interfere with renewable portfolio targets and would not result in a wasteful or inefficient expenditure of energy resources. Alternative 5 would positively contribute to statewide, regional, and local efforts to create a more efficient and sustainable transportation infrastructure network. Therefore, Alternative 5 would result in a less than significant impact related to operational activities.

9.3.2.3 Maintenance and Storage Facility

The MSF would support Alternative 5 operations, providing energy efficient mass transit to the region and reducing auto passenger vehicle trips. The benefits of Alternative 5 are consistent with the goals, objectives, and land use and transportation planning policies of SCAG and the City of Los Angeles. The MSF would be designed to meet the LEED Version 4 Building and Design Construction (LEED v4 BD+C) Level Silver certification—and Envision Version 3 certification if LEED is not applicable—and Tier 2 of the CALGreen Code (STCP, 2024). There is no potential for construction or operations of the MSF to conflict with or obstruct a state or local plan for renewable energy or energy efficiency. The MSF would not conflict with any adopted plan or regulation to enhance energy efficiency or reduce transportation fuels consumption and would support the initiatives of the MBSSP. In addition, the MSF would not interfere with renewable portfolio targets and would not result in a wasteful or inefficient expenditure of energy resources. The MSF would positively contribute to statewide, regional, and local efforts to create a more efficient and sustainable transportation infrastructure network. Therefore, construction and operation of the Baseline MSF would result in a less than significant impact.

9.4 Mitigation Measures

9.4.1 Construction Impacts

No mitigation measures are required.

9.4.2 Operational Impacts

No mitigation measures are required.

9.4.3 Impacts After Mitigation

No mitigation measures are required; impacts are less than significant.

10 ALTERNATIVE 6

10.1 Alternative Description

Alternative 6 is a heavy rail transit (HRT) system with an underground track configuration. This alternative would provide transfers to five high-frequency fixed guideway transit and commuter rail lines, including the Los Angeles County Metropolitan Transportation Authority's (Metro) E, Metro D, and Metro G Lines, East San Fernando Valley Light Rail Transit Line, and the Metrolink Ventura County Line. The length of the alignment between the terminus stations would be approximately 12.9 miles.

The seven underground HRT stations would be as follows:

1. Metro E Line Expo/Bundy Station (underground)
2. Santa Monica Boulevard Station (underground)
3. Wilshire Boulevard/Metro D Line Station (underground)
4. UCLA Gateway Plaza Station (underground)
5. Ventura Boulevard/Van Nuys Boulevard Station (underground)
6. Metro G Line Van Nuys Station (underground)
7. Van Nuys Metrolink Station (underground)

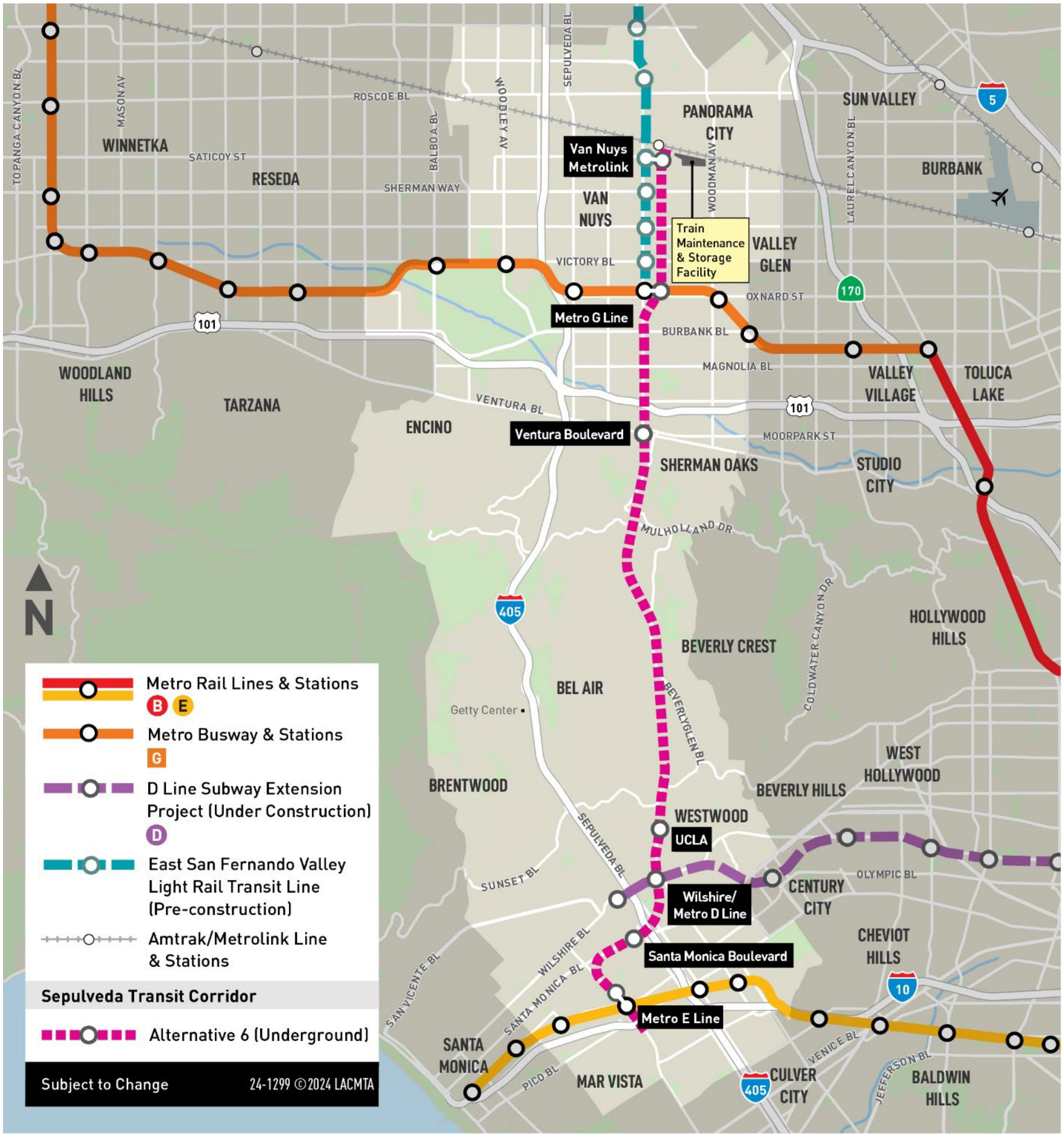
10.1.1 Operating Characteristics

10.1.1.1 Alignment

As shown on Figure 10-1, from its southern terminus station at the Metro E Line Expo/Bundy Station, the alignment of Alternative 6 would run underground through the Westside of Los Angeles (Westside), the Santa Monica Mountains, and the San Fernando Valley (Valley) to the alignment's northern terminus adjacent to the Van Nuys Metrolink/Amtrak Station.

The proposed southern terminus station would be located beneath the Bundy Drive and Olympic Boulevard intersection. Tail tracks for vehicle storage would extend underground south of the station along Bundy Drive for approximately 1,500 feet, terminating just north of Pearl Street. The alignment would continue north beneath Bundy Drive before turning to the east near Iowa Avenue to run beneath Santa Monica Boulevard. The Santa Monica Boulevard Station would be located between Barrington Avenue and Federal Avenue. After leaving the Santa Monica Boulevard Station, the alignment would turn to the northeast and pass under Interstate 405 (I-405) before reaching the Wilshire Boulevard/Metro D Line Station beneath the Metro D Line Westwood/UCLA Station, which is currently under construction as part of the Metro D Line Extension Project. From there, the underground alignment would curve slightly to the northeast and continue beneath Westwood Boulevard before reaching the UCLA Gateway Plaza Station.

Figure 10-1. Alternative 6: Alignment



Source: HTA, 2024

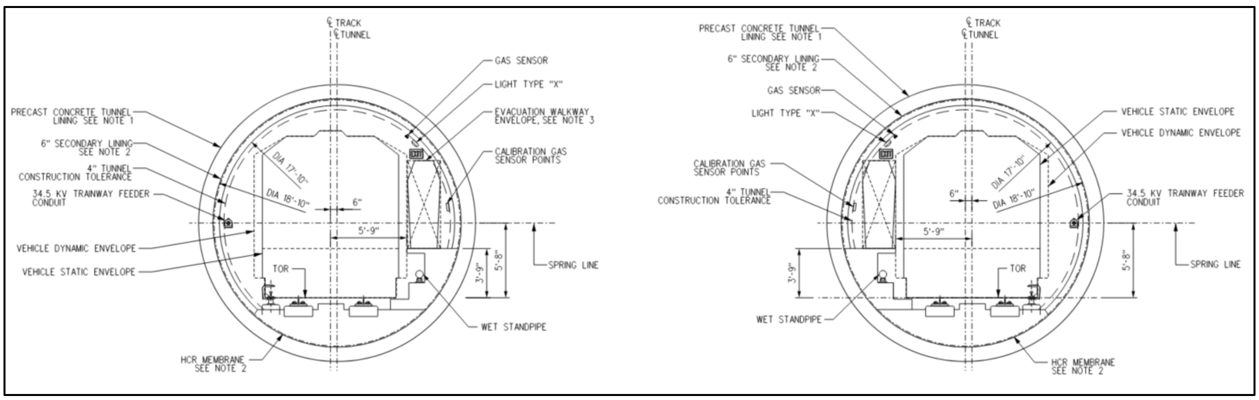
After leaving the UCLA Gateway Plaza Station, the alignment would continue to the north and travel under the Santa Monica Mountains. While still under the mountains, the alignment would shift slightly to the west to travel under the City of Los Angeles Department of Water and Power (LADWP) Stone Canyon Reservoir property to facilitate placement of a ventilation shaft on that property east of the reservoir. The alignment would then continue to the northeast to align with Van Nuys Boulevard at Ventura Boulevard as it enters the San Fernando Valley. The Ventura Boulevard Station would be beneath Van Nuys Boulevard at Moorpark Street. The alignment would then continue under Van Nuys

Boulevard before reaching the Metro G Line Van Nuys Station just south of Oxnard Street. North of the Metro G Line Van Nuys Station, the alignment would continue under Van Nuys Boulevard until reaching Sherman Way, where it would shift slightly to the east and run parallel to Van Nuys Boulevard before entering the Van Nuys Metrolink Station. The Van Nuys Metrolink Station would serve as the northern terminus station and would be located between Saticoy Street and Keswick Street. North of the station, a yard lead would turn sharply to the southeast and transition to an at-grade configuration and continue to the proposed maintenance and storage facility (MSF) east of the Van Nuys Metrolink Station.

10.1.1.2 Guideway Characteristics

The alignment of Alternative 6 would be underground using Metro's standard twin-bore tunnel design. Figure 10-2 shows a typical cross-section of the underground guideway. Cross-passages would be constructed at regular intervals in accordance with *Metro Rail Design Criteria* (MRDC). Each of the tunnels would have a diameter of 19 feet (not including the thickness of wall). Each tunnel would include an emergency walkway that measures a minimum of 2.5 feet wide for evacuation.

Figure 10-2. Typical Underground Guideway Cross-Section



Source: HTA, 2024

10.1.1.3 Vehicle Technology

Alternative 6 would utilize driver-operated steel-wheel HRT trains, as used on the Metro B and D Lines, with planned peak headways of 4 minutes and off-peak-period headways ranging from 8 to 20 minutes. Trains would consist of four or six cars and are expected to consist of six cars during the peak period. The HRT vehicle would have a maximum operating speed of 67 miles per hour; actual operating speeds would depend on the design of the guideway and distance between stations. Train cars would be 10.3 feet wide with three double doors on each side. Each car would be approximately 75 feet long with capacity for 133 passengers. Trains would be powered by a third rail.

10.1.1.4 Stations

Alternative 6 would include seven underground stations with station platforms measuring 450 feet long. The southern terminus underground station would be adjacent to the existing Metro E Line Expo/Bundy Station, and the northern terminus underground station would be located south of the existing Van Nuys Metrolink/Amtrak Station. Except for the Wilshire Boulevard/Metro D Line, UCLA Gateway Plaza, and Metro G Line Van Nuys Stations, all stations would have a 30-foot-wide center platform. The Wilshire/Metro D Line Station would have a 32-foot-wide platform to accommodate the anticipated passenger transfer volumes, and the UCLA Gateway Plaza Station would have a 28-foot-wide platform because of the width constraint between the existing buildings. At the Metro G Line Van Nuys Station, the track separation would increase significantly in order to straddle the future East San Fernando Valley Light Rail Transit Line Station piles. The platform width at this station would increase to 58 feet.

The following information describes each station, with relevant entrance, walkway, and transfer information. Bicycle parking would be provided at each station.

Metro E Line Expo/Bundy Station

- This underground station would be located under Bundy Drive at Olympic Boulevard.
- Station entrances would be located on either side of Bundy Drive between the Metro E Line and Olympic Boulevard, as well as on the northeast corner of Bundy Drive and Mississippi Avenue.
- At the existing Metro E Line Expo/Bundy Station, escalators from the plaza to the platform level would be added to improve inter-station transfers.
- An 80-space parking lot would be constructed east of Bundy Drive and north of Mississippi Avenue. Passengers would also be able to park at the existing Metro E Line Expo/Bundy Station parking facility, which provides 217 parking spaces.

Santa Monica Boulevard Station

- This underground station would be located under Santa Monica Boulevard between Barrington Avenue and Federal Avenue.
- Station entrances would be located on the southwest corner of Santa Monica Boulevard and Barrington Avenue and on the southeast corner of Santa Monica Boulevard and Federal Avenue.
- No dedicated station parking would be provided at this station.

Wilshire Boulevard/Metro D Line Station

- This underground station would be located under Gayley Avenue between Wilshire Boulevard and Lindbrook Drive.
- A station entrance would be provided on the northwest corner of Midvale Avenue and Ashton Avenue. Passengers would also be able to use the Metro D Line Westwood/UCLA Station entrances to access the station platform.
- Direct internal station transfers to the Metro D Line would be provided at the south end of the station.
- No dedicated station parking would be provided at this station.

UCLA Gateway Plaza Station

- This underground station would be located underneath Gateway Plaza on the University of California, Los Angeles (UCLA) campus.
- Station entrances would be provided on the north side of Gateway Plaza, north of the Luskin Conference Center, and on the east side of Westwood Boulevard across from Strathmore Place.
- No dedicated station parking would be provided at this station.

Ventura Boulevard/Van Nuys Boulevard Station

- This underground station would be located under Van Nuys Boulevard at Moorpark Street.
- The station entrance would be located on the northwest corner of Van Nuys Boulevard and Ventura Boulevard.
- Two parking lots with a total of 185 parking spaces would be provided on the west side of Van Nuys Boulevard between Ventura Boulevard and Moorpark Street.

Metro G Line Van Nuys Station

- This underground station would be located under Van Nuys Boulevard south of Oxnard Street.
- The station entrance would be located on the southeast corner of Van Nuys Boulevard and Oxnard Street.
- Passengers would be able to park at the existing Metro G Line Van Nuys Station parking facility, which provides 307 parking spaces. No additional automobile parking would be provided at the proposed station.

Van Nuys Metrolink Station

- This underground station would be located immediately east of Van Nuys Boulevard between Saticoy Street and Keswick Street.
- Station entrances would be located on the northeast corner of Van Nuys Boulevard and Saticoy Street and on the east side of Van Nuys Boulevard just south of the Los Angeles-San Diego-San Luis Obispo (LOSSAN) rail corridor.
- Existing Metrolink Station parking would be reconfigured, maintaining approximately the same number of spaces. Metrolink parking would not be available to Metro transit riders.

10.1.1.5 Station-to-Station Travel Times

Table 10-1 presents the station-to-station distance and travel times for Alternative 6. The travel times include both run time and dwell time. Dwell time is 30 seconds for stations anticipated to have higher passenger volumes and 20 seconds for other stations. Northbound and southbound travel times vary slightly because of grade differentials and operational considerations at end-of-line stations.

Table 10-1. Alternative 6: Station-to-Station Travel Times and Station Dwell Times

From Station	To Station	Distance (miles)	Northbound Station-to-Station Travel Time (seconds)	Southbound Station-to-Station Travel Time (seconds)	Dwell Time (seconds)
Metro E Line Station					*20*
Metro E Line	Santa Monica Boulevard	1.1	111	121	—
Santa Monica Boulevard Station					*20*
Santa Monica Boulevard	Wilshire/Metro D Line	1.3	103	108	—
Wilshire/Metro D Line Station					*30*
Wilshire/Metro D Line	UCLA Gateway Plaza	0.7	69	71	—
UCLA Gateway Plaza Station					*30*
UCLA Gateway Plaza	Ventura Boulevard	5.9	358	358	—
Ventura Boulevard Station					*20*
Ventura Boulevard	Metro G Line	1.8	135	131	—
Metro G Line Station					*30*
Metro G Line	Van Nuys Metrolink	2.1	211	164	—
Van Nuys Metrolink Station					*30*

Source: HTA, 2024

— = no data

10.1.1.6 Special Trackwork

Alternative 6 would include seven double crossovers within the revenue service alignment, enabling trains to cross over to the parallel track with terminal stations having an additional double crossover beyond the end of the platform.

10.1.1.7 Maintenance and Storage Facility

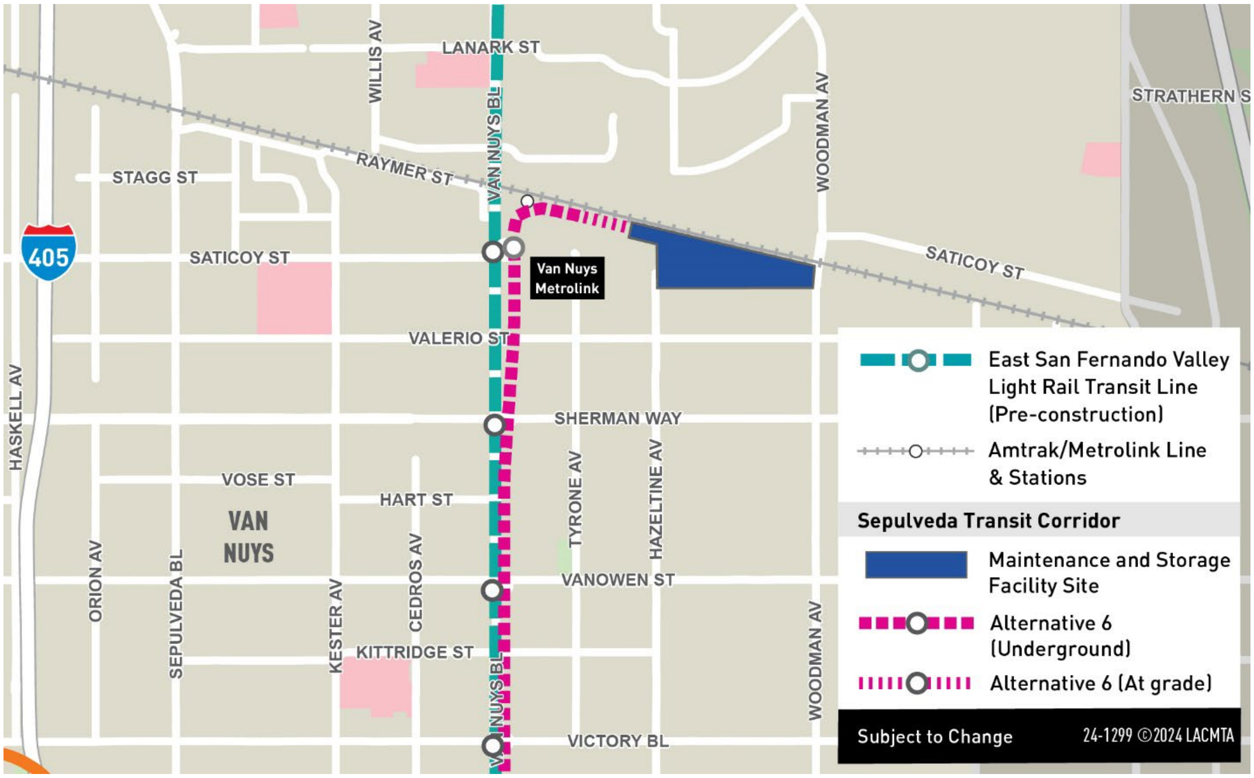
The MSF for Alternative 6 would **be** located east of the Van Nuys Metrolink Station and would encompass approximately 41 acres. The MSF would be designed to accommodate 94 vehicles and would be bounded by single-family residences to the south, the LOSSAN rail corridor to the north, Woodman Avenue to the east, and Hazeltine Avenue and industrial manufacturing enterprises to the west. Heavy rail trains would transition from underground to an at-grade configuration near the MSF, the northwest corner of the site. Trains would then travel southeast to maintenance facilities and storage tracks.

The site would include the following facilities:

- Two entrance gates with guard shacks
- Maintenance facility building
- Maintenance-of-way facility
- Storage tracks
- Carwash
- Cleaning platform
- Administrative offices
- Pedestrian bridge connecting the administrative offices to employee parking
- Two traction power substations (TPSS)

Figure 10-3 shows the location of the MSF for Alternative 6.

Figure 10-3. Alternative 6: Maintenance and Storage Facility Site



Source: HTA, 2024

10.1.1.8 Traction Power Substations

TPSSs transform and convert high voltage alternating current supplied from power utility feeders into direct current suitable for transit operation. Twenty-two TPSS facilities would be located along the alignment and would be spaced approximately 1 mile apart except within the Santa Monica Mountains. Each at-grade TPSS along the alignment would be approximately 5,000 square feet. Table 10-2 lists the TPSS locations for Alternative 6.

Figure 10-4 shows the TPSS locations along the Alternative 6 alignment.

Table 10-2. Alternative 6: Traction Power Substation Locations

TPSS No.	TPSS Location Description	Configuration
1 and 2	TPSSs 1 and 2 would be located immediately north of the Bundy Drive and Mississippi Avenue intersection.	Underground (within station)
3 and 4	TPSSs 3 and 4 would be located east of the Santa Monica Boulevard and Stoner Avenue intersection.	Underground (within station)
5 and 6	TPSSs 5 and 6 would be located southeast of the Kinross Avenue and Gayley Avenue intersection.	Underground (within station)
7 and 8	TPSSs 7 and 8 would be located at the north end of the UCLA Gateway Plaza Station.	Underground (within station)
9 and 10	TPSSs 9 and 10 would be located east of Stone Canyon Reservoir on LADWP property.	At-grade
11 and 12	TPSSs 11 and 12 would be located at the Van Nuys Boulevard and Ventura Boulevard intersection.	Underground (within station)
13 and 14	TPSSs 13 and 14 would be located immediately south of Magnolia Boulevard and west of Van Nuys Boulevard.	At-grade
15 and 16	TPSSs 15 and 16 would be located along Van Nuys Boulevard between Emelita Street and Califa Street.	Underground (within station)
17 and 18	TPSSs 17 and 18 would be located east of Van Nuys Boulevard and immediately north of Vanowen Street.	At-grade
19 and 20	TPSSs 19 and 20 would be located east of Van Nuys Boulevard between Saticoy Street and Keswick Street.	Underground (within station)
21 and 22	TPSSs 21 and 22 would be located south of the Metrolink tracks and east of Hazeltine Avenue.	At-grade (within MSF)

Source: HTA, 2024

Figure 10-4. Alternative 6: Traction Power Substation Locations

Source: HTA, 2024

10.1.1.9 Roadway Configuration Changes

In addition to the access road described in the following section, Alternative 6 would require reconstruction of roadways and sidewalks near stations.

10.1.1.10 Ventilation Facilities

Tunnel ventilation for Alternative 6 would be similar to existing Metro ventilation systems for light and heavy rail underground subways. In case of emergency, smoke would be directed away from trains and extracted through the use of emergency ventilation fans installed at underground stations and crossover locations adjacent to the stations. In addition, a mid-mountain facility located on LADWP property east of Stone Canyon Reservoir in the Santa Monica Mountains would include a ventilation shaft for the extraction of air, along with two TPSSs. An access road from the Stone Canyon Reservoir access road would be constructed to the location of the shaft, requiring grading of the hillside along its route.

10.1.1.11 Fire/Life Safety – Emergency Egress

Each tunnel would include an emergency walkway that measures a minimum of 2.5 feet wide for evacuation. Cross-passages would be provided at regular intervals to connect the two tunnels to allow for safe egress to a point of safety (typically at a station) during an emergency. Access to tunnel segments for first responders would be through stations.

10.1.2 Construction Activities

Temporary construction activities for Alternative 6 would include construction of ancillary facilities, as well as guideway and station construction and construction staging and laydown areas, which would be co-located with future MSF and station locations. Construction of the transit facilities through substantial completion is expected to have a duration of 7½ years. Early works, such as site preparation, demolition, and utility relocation, could start in advance of construction of the transit facilities.

For the guideway, twin-bore tunnels would be constructed using two tunnel boring machines (TBM). The tunnel alignment would be constructed over three segments—including the Westside, Santa Monica Mountains, and Valley—using a different pair of TBMs for each segment. For the Westside segment, the TBMs would be launched from the Metro E Line Station and retrieved at the UCLA Gateway Plaza Station. For the Santa Monica Mountains segment, the TBMs would operate from the Ventura Boulevard Station in a southerly direction for retrieval from UCLA Gateway Plaza Station. In the Valley, TBMs would be launched from the Van Nuys Metrolink Station and retrieved at the Ventura Boulevard Station.

The distance from the surface to the top of the tunnels would vary from approximately 50 feet to 130 feet in the Westside, between 120 feet and 730 feet in the Santa Monica Mountains, and between 40 feet and 75 feet in the Valley.

Construction work zones would also be co-located with future MSF and station locations. All work zones would comprise the permanent facility footprint with additional temporary construction easements from adjoining properties. In addition to permanent facility locations, TBM launch at the Metro E Line Station would require the closure of I-10 westbound off-ramps at Bundy Drive for the duration of the Sepulveda Transit Corridor Project (Project) construction.

Alternative 6 would include seven underground stations. All stations would be constructed using a “cut-and-cover” method whereby the station structure would be constructed within a trench excavated from the surface that is covered by a temporary deck and backfilled during the later stages of station construction. Traffic and pedestrian detours would be necessary during underground station excavation until decking is in place and the appropriate safety measures have been taken to resume cross traffic. In addition, portions of the Wilshire Boulevard/Metro D Line Station crossing underneath the Metro D Line Westwood/UCLA Station and underneath a mixed-use building at the north end of the station would be constructed using sequential excavation method as it would not be possible to excavate the station from the surface.

Construction of the MSF site would begin with demolition of existing structures, followed by earthwork and grading. Building foundations and structures would be constructed, followed by yard improvements and trackwork, including paving, parking lots, walkways, fencing, landscaping, lighting, and security systems. Finally, building mechanical, electrical, and plumbing systems, finishes, and equipment would be installed. The MSF site would also be used as a staging site.

Station and MSF sites would be used for construction staging areas. A construction staging area, shown on Figure 10-5, would also be located off Stone Canyon Road northeast of the Upper Stone Canyon Reservoir. In addition, temporary construction easements outside of the station and MSF footprints would be required along Bundy Drive, Santa Monica Boulevard, Wilshire Boulevard, and Van Nuys Boulevard. The westbound to southbound loop off-ramp of the I-10 interchange at Bundy Drive would also be used as a staging area and would require extended ramp closure. Construction staging areas would provide the necessary space for the following activities:

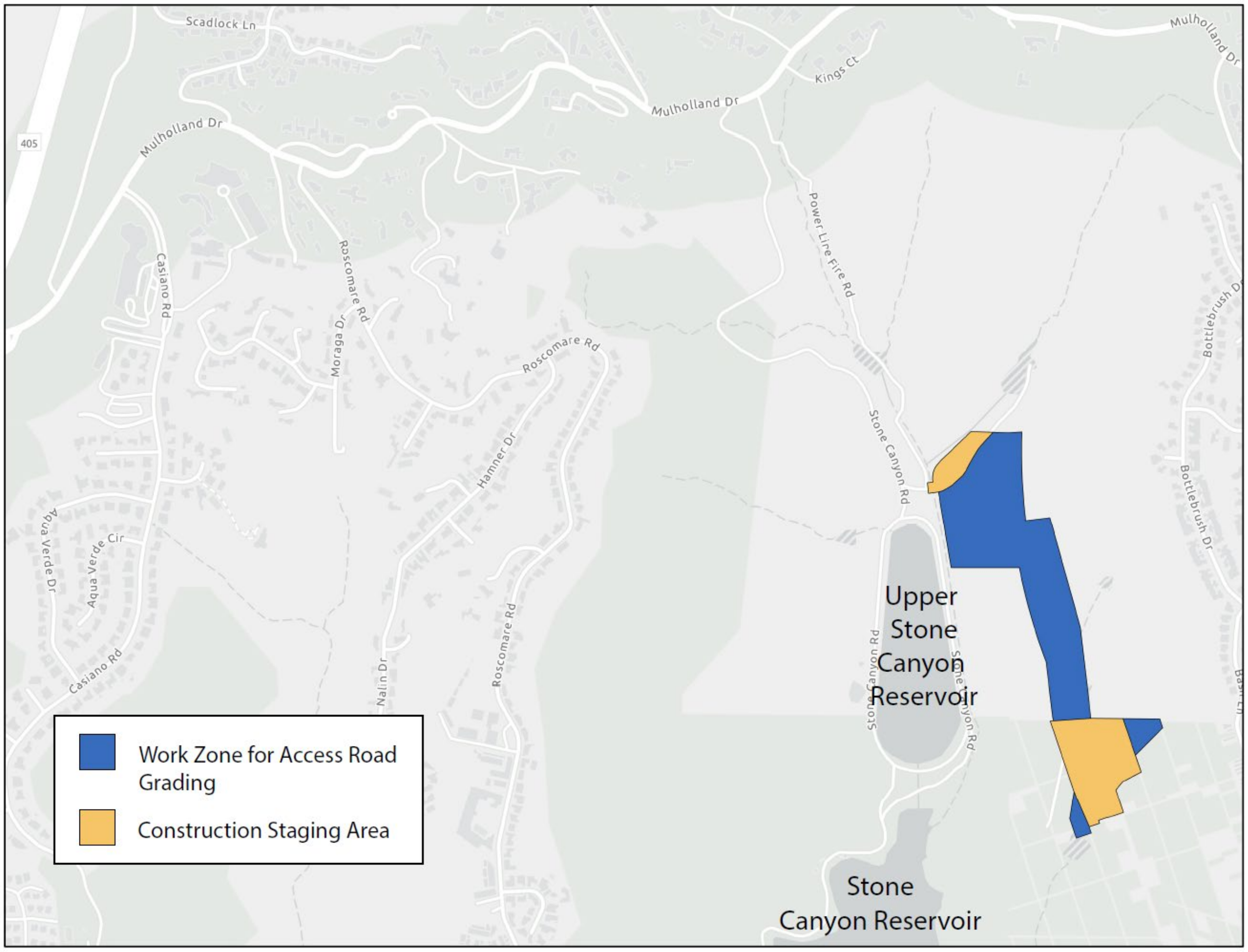
- Contractors’ equipment
- Receiving deliveries
- Testing of soils for minerals or hazards
- Storing materials
- Site offices
- Work zone for excavation
- Other construction activities (including parking and change facilities for workers, location of construction office trailers, storage, staging and delivery of construction materials and permanent plant equipment, and maintenance of construction equipment)

The size of proposed construction staging areas for each station would depend on the level of work to be performed for a specific station and considerations for tunneling, such as TBM launch or extraction. Staging areas required for TBM launching would include areas for launch and access shafts, cranes, material and equipment, precast concrete segmental liner storage, truck wash areas, mechanical and electrical shops, temporary services, temporary power, ventilation, cooling tower, plants, temporary construction driveways, storage for spoils, and space for field offices.

Alternative 6 would also include several ancillary facilities and structures, including TPSS structures, a deep vent shaft structure at Stone Canyon Reservoir, as well as additional vent shafts at stations and crossovers. TPSSs would be co-located with MSF and station locations, except for two TPSSs at the Stone Canyon Reservoir vent shaft and four along Van Nuys Boulevard in the Valley. The Stone Canyon Reservoir vent shaft would be constructed using a vertical shaft sinking machine that uses mechanized shaft sinking equipment to bore a vertical hole down into the ground. Operation of the machine would be controlled and monitored from the surface. The ventilation shaft and two TPSSs in the Santa Monica Mountains would require an access road within the LADWP property at Stone Canyon Reservoir. Construction of the access road would require grading east of the reservoir. Construction of all mid-mountain facilities would take place within the footprint shown on Figure 10-5.

Additional vent shafts would be located at each station with one potential intermediate vent shaft where stations are spaced apart. These vent shafts would be constructed using the typical cut-and-cover method, with lateral bracing as the excavation proceeds. During station construction, the shafts would likely be used for construction crew, material, and equipment access.

Figure 10-5. Alternative 6: Mid-Mountain Construction Staging Site



Source: HTA, 2024

Alternative 6 would utilize precast tunnel lining segments in the construction of the transit tunnels. These tunnel lining segments would be similar to those used in recent Metro underground transit projects. Therefore, it is expected that the tunnel lining segments would be obtained from an existing casting facility in Los Angeles County and no additional permits or approvals would be necessary specific to the facility.

10.2 Existing Conditions

This section provides a brief discussion of the types of energy resources that would be consumed by construction and operation of Alternative 6 and how they are produced and distributed to the respective end uses at the state and regional levels. Energy resources involved in the transit system implementation include direct uses such as transportation fuels for locomotives and electricity use at stations and indirect uses such as fuel consumed by regional vehicular travel on the roadway network.

- **Transportation Fuels**. The internal combustion engines of on-road motor vehicles, locomotives, and off-road equipment use fossil fuel (petroleum) energy for propulsion. Gasoline and diesel fuel are formulations of fossil fuels refined for use in various applications. Gasoline is the primary fuel source for most passenger automobiles, and diesel fuel is the primary fuel source for most off-road equipment and medium and heavy-duty trucks. The analyses presented in this report also disclose electricity and natural gas consumption associated with on-road vehicle activity.

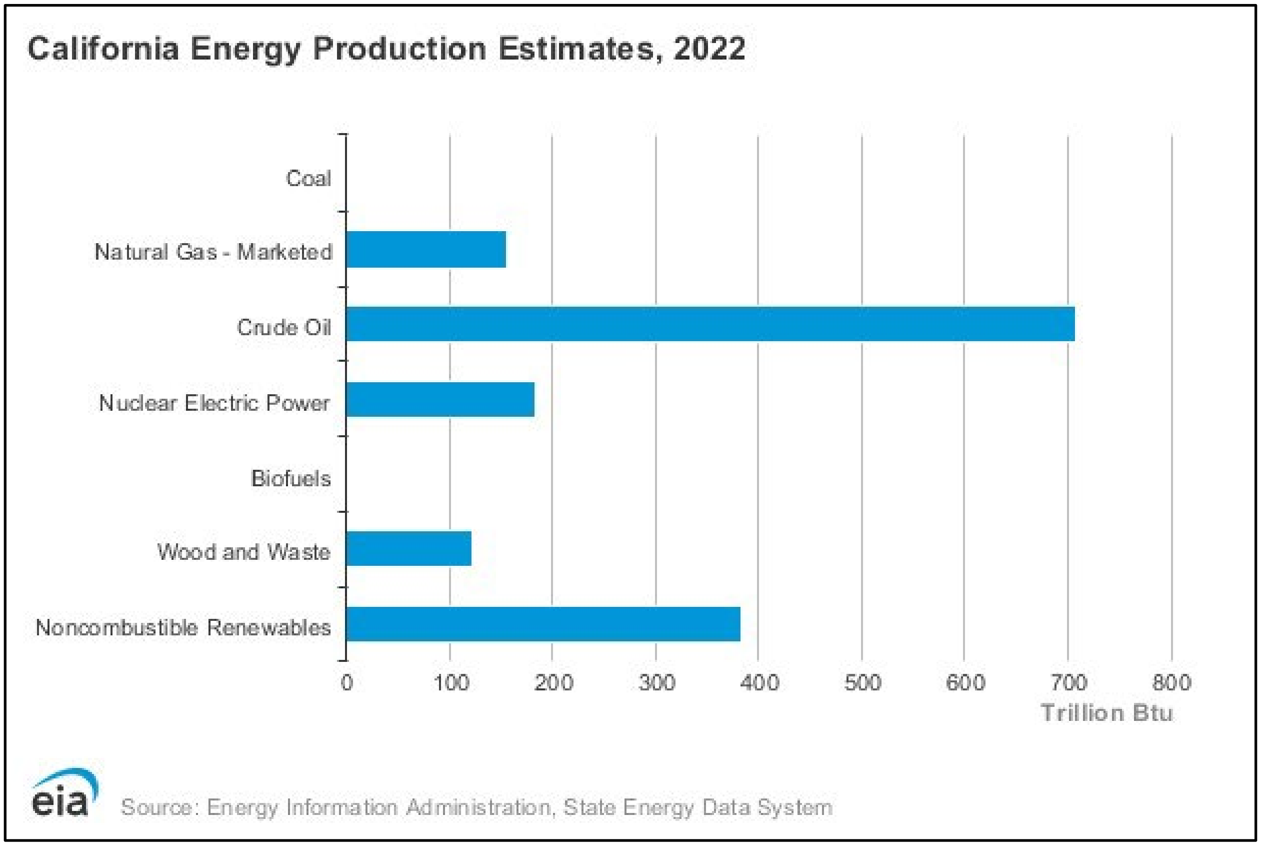
- **Electricity**. The production of electricity requires the consumption or conversion of other natural resources, whether it be water (hydroelectric power), wind, oil, gas, coal, or solar energy. The delivery of electricity as a utility involves several system components for distribution and use. Electricity is distributed through a network of transmission and distribution lines referred to as a power grid. Energy capacity, or electrical power, is generally measured in watts (W), while energy use is measured in watt-hours (Wh), which is the integral electricity consumption over a time period of 1 hour. On a utility scale, the capacity of electricity generation and amount of consumption is generally described in megawatt (MW) and megawatt-hours (MWh), respectively. For discussions involving regional scale electricity generation and consumption, units of gigawatt-hours (GWh) are used, which is equivalent to 1,000 MWh.

10.2.1 State Energy Resources

California is the most populous state in the nation, has the largest economy, and is second only to Texas in total energy consumption (U.S. Census Bureau, 2021; BEA, 2019a; EIA, 2024b). California also has the world's fifth-largest economy and leads the nation in both agricultural and manufacturing gross domestic product (BEA, 2024b). Despite California's many energy-intensive industries, the state has one of the lowest per capita energy consumption levels in the United States (EIA, 2023a). California's extensive efforts to increase energy efficiency and implement alternative technologies have slowed growth in energy demand. The state is also rich in energy resources. California is among the nation's top producers of conventional hydroelectric power and is second only to Texas in nonhydroelectric renewable-sourced electricity generation. In addition, California has an abundant supply of crude oil and accounts for one-tenth of the United States crude oil refining capacity.

Energy is produced in California from a diverse portfolio of renewable and non-renewable resources. Figure 10-6 shows that crude oil is the largest source of energy in California, accounting for approximately 708.9 trillion Btu in 2022, which constituted 46 percent of total statewide energy production (EIA, 2024a). To meet state environmental regulations, California refineries are configured to produce cleaner fuels. Refineries in the state often operate at or near maximum capacity because of the high demand for those petroleum products and the lack of interstate pipelines that can deliver them into the state (CEC, 2021b). In 2022, the noncombustible renewable energy resources, including hydroelectric, geothermal, solar, and wind energy, collectively accounted for 383.3 trillion Btu of annual energy production, equal to 24.7 percent of the total statewide resources. Natural gas and nuclear electric power constituted approximately 10 percent and 11.8 percent of statewide production, respectively, and the combination of wood energy and biomass waste energy provided 5.4 percent of production in 2022. Biofuels accounted for 1.5 percent, and coal fueled about 0.1 percent of the in-state utility-scale net generation, and all of that power was generated at industrial facilities (EIA, 2024b).

Figure 10-6. 2022 Statewide Energy Production Resources



Source: EIA, 2024a

10.2.1.1 Electricity Generation

As of 2022, California is the fourth-largest electricity producer in the nation and accounted for about 5 percent of U.S. utility-scale (1-MW and larger) power generation. Renewable resources, including hydropower and small-scale (less than 1 MW), customer-sited solar photovoltaic (PV) systems, supplied more than half of California's total in-state electricity generation, and natural gas-fired power plants provided approximately two-fifths (EIA, 2023b). Nuclear power's share of state generation in 2022 was less than one-tenth, down from nearly one-fifth in 2011. The decrease resulted from the retirement of the San Onofre nuclear power plant in mid-2013, which left the state with only one operating commercial nuclear power plant—the two-reactor Diablo Canyon facility. Overall, California generated approximately 203.4 million MWh of electricity annually in 2022, and the statewide grid provided a net summer capacity of 85,981 MW.

Table 10-3 provides a summary of the annual in-state electricity generation by supply resource during the decade spanning backwards from 2022–2013 in units of gigawatt-hours (GWh). Key trends observed in the data include the ten-fold expansion of solar generation from 3,813.7 GWh in 2013 to 38,789.4 GWh in 2022, as well as a nearly 70 percent decrease in reliance on coal-powered generation from 823.3 GWh in 2013 to 251.6 GWh in 2022.

Table 10-3. California In-State Electricity Generation Profile 2022–2013 (gigawatt hour(s))

Primary Source	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Battery Storage	-447.6	-154.7	-27.6	-22.6	-22.4	11.5	-4.3	-1.3	-1.1	-1.2
Coal	251.6	294.2	290.3	240.5	281.3	291.1	318.9	297.9	804.8	823.2
Geothermal	11,181.0	11,127.5	11,366.5	10,914.1	11,676.8	11,559.6	11,457.3	11,883.1	12,101.7	12,306.6
Hydroelectric	17,644.1	14,677.6	21,377.5	38,354.8	26,330.7	42,363.1	28,942.1	13,808.5	16,531.3	23,754.6
Natural Gas	96,371.6	97,427.1	92,046.7	85,840.8	89,804.7	88,350.2	97,073.7	116,139.6	120,426.4	119,522.9
Nuclear	17,593.3	16,477.4	16,258.7	16,165.4	18,213.5	17,901.1	18,907.6	18,505.4	16,986.0	17,911.9
Other[a]	643.8	730.6	722.3	787.7	851.1	824.1	670.0	813.0	848.9	817.3
Other Biomass[b]	2,416.6	2,574.4	2,615.1	2,722.6	2,823.8	2,841.0	2,909.9	2,883.7	2,913.3	2,843.2
Other Gas[c]	1,411.5	1,368.9	1,538.0	1,476.2	1,454.0	1,408.3	1,426.8	1,548.6	1,333.0	1,405.7
Petroleum	155.0	77.0	43.9	51.0	68.9	45.8	175.6	84.5	66.3	68.9
Pumped Storage	-155.0	-317.4	-37.1	-30.6	-148.6	407.5	-259.3	112.7	-104.7	196.3
Solar	38,789.4	34,863.9	30,272.6	28,331.5	26,985.2	24,352.9	18,806.7	14,814.4	9,931.8	3,813.7
Wind	14,638.1	15,177.0	13,583.1	13,735.1	14,024.0	12,822.9	13,509.0	12,229.6	12,992.5	12,822.1
Wood	2,890.7	2,841.7	3,033.7	3,217.9	3,122.6	2,967.5	3,029.3	3,584.2	3,977.4	3,792.1
Total Generation	**203,383.9**	**197,165.1**	**193,083.5**	**201,784.2**	**195,465.6**	**206,146.5**	**196,963.2**	**196,703.9**	**198,807.6**	**200,077.1**

Source: EIA, 2024b

[a]"Other" includes non-biogenic municipal solid waste, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, tire-derived fuels, waste heat, and miscellaneous technologies.

[b]"Other Biomass" includes agricultural byproducts, landfill gas, biogenic municipal solid waste, other biomass (solid, liquid, and gas) and sludge waste.

[c]"Other Gas" includes blast furnace gas, and other manufactured and waste gases derived from fossil fuels.

In 2019, California's in-state electricity net generation from all renewable resources combined was greater than that of any other state, including generation from hydroelectric power and from small-scale, customer-sited solar generation. California is the nation's top producer of electricity from solar, geothermal, and biomass energy. In 2019, the state was also the nation's second-largest producer of electricity from conventional hydroelectric power and the fifth largest from wind energy. California's greatest solar resource is in the state's southeastern deserts, where all of its solar thermal facilities and largest solar PV plants are located. However, solar PV facilities are located throughout the state. By 2019, solar supplied 14 percent of the state's utility-scale electricity net generation; and when small-scale solar generation is added, solar energy provided one-fifth of the state's total net generation. By November 2020, California had about 13,000 MW of utility-scale solar power capacity, more than any other state; when small-scale, customer-sited facilities are included, the state had almost 24,000 MWs of solar capacity. California's Renewables Portfolio Standard was enacted in 2002 and has been revised several times since then. It requires that 33 percent of electricity retail sales in California come from eligible renewable resources by 2020, 60 percent by 2030, and 100 percent by 2045.

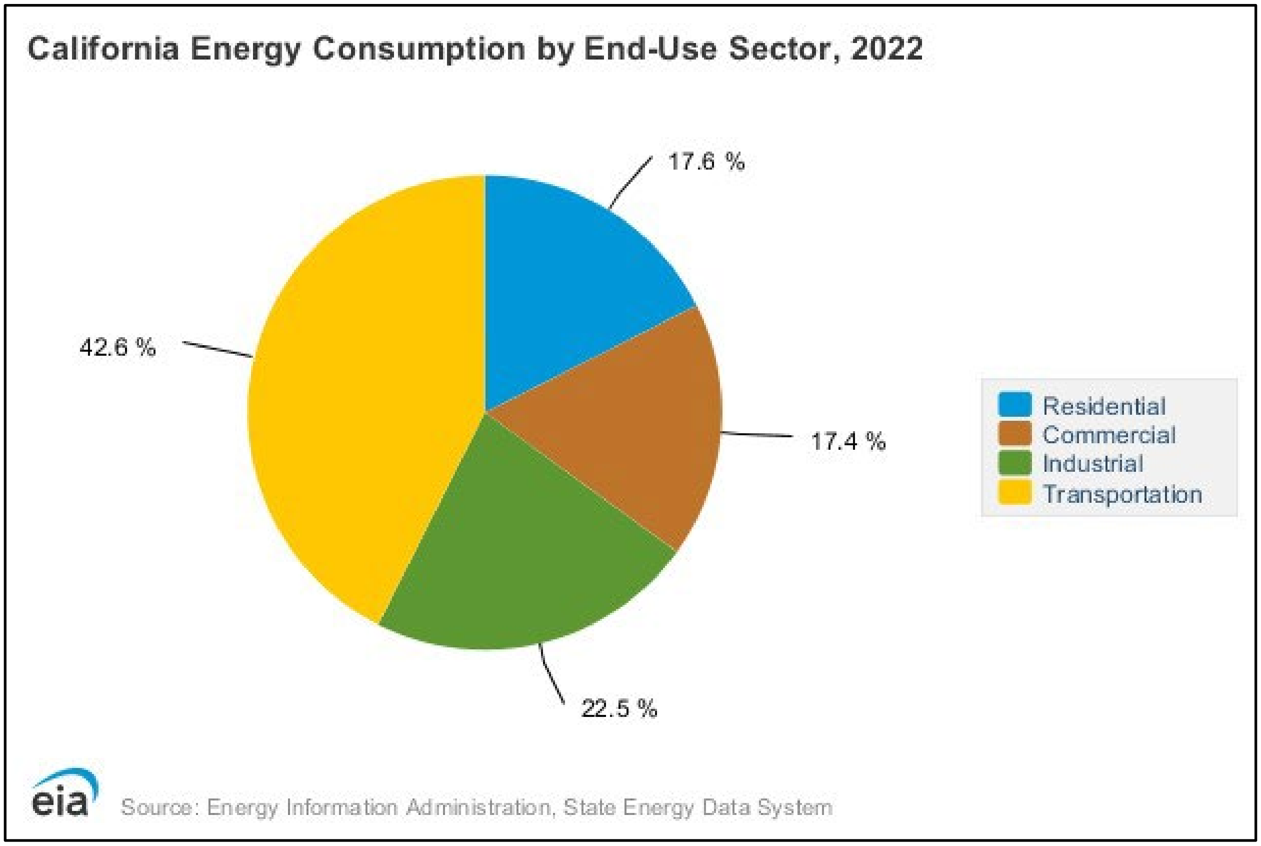
10.2.1.2 Transportation Fuels Supply

As of 2022, California has the sixth-largest share of crude oil reserves among the 50 states and is the seventh-largest crude oil producer (EIA, 2024a). Underground reservoirs along California's Pacific Coast, including in the Los Angeles Basin and those in the state's Central Valley, contain major crude oil reserves. The most prolific oil-producing area in the state is the San Joaquin Basin in the southern half of California's Central Valley. Overall, California's crude oil production has declined steadily since 1985, but the state remains one of the nation's top crude oil producers and accounted for about 4 percent of United States production in 2022 (EIA, 2024a). California ranks third in petroleum refining capacity—after Texas and Louisiana—and accounts for one-tenth of the nation's total. A network of crude oil pipelines connects California's oil production to the state's refining centers, which are located primarily in the Los Angeles area, the San Francisco Bay Area, and the San Joaquin Valley (EIA, 2023b). California refiners also process large volumes of foreign and Alaskan crude oil. As crude oil production in California and Alaska has declined, California refineries have become increasingly dependent on imports from other countries to meet the state's needs. Led by Saudi Arabia, Iraq, Ecuador, and Colombia, foreign suppliers provided more than half of the crude oil refined in California in 2022.

10.2.2 Statewide Use Patterns

Figure 10-7 displays the statewide energy consumption by end use sector for the most recent year of verified data available, 2022 (EIA, 2024b). Overall, the transportation sector accounts for nearly two-fifths of California's end-use energy consumption. Reducing per capita transportation fuels consumption is a pillar of the state’s initiatives to decrease reliance on fossil fuels as the population continues to grow. The industrial sector is the second-largest energy consumer in California and uses almost one-fourth of the state's energy. The commercial sector and the residential sector account for roughly equal amounts of the state's end-use energy consumption, at slightly less than one-fifth each. As previously discussed, California has promulgated a robust regulatory framework to reduce energy consumption across the various end-use sectors.

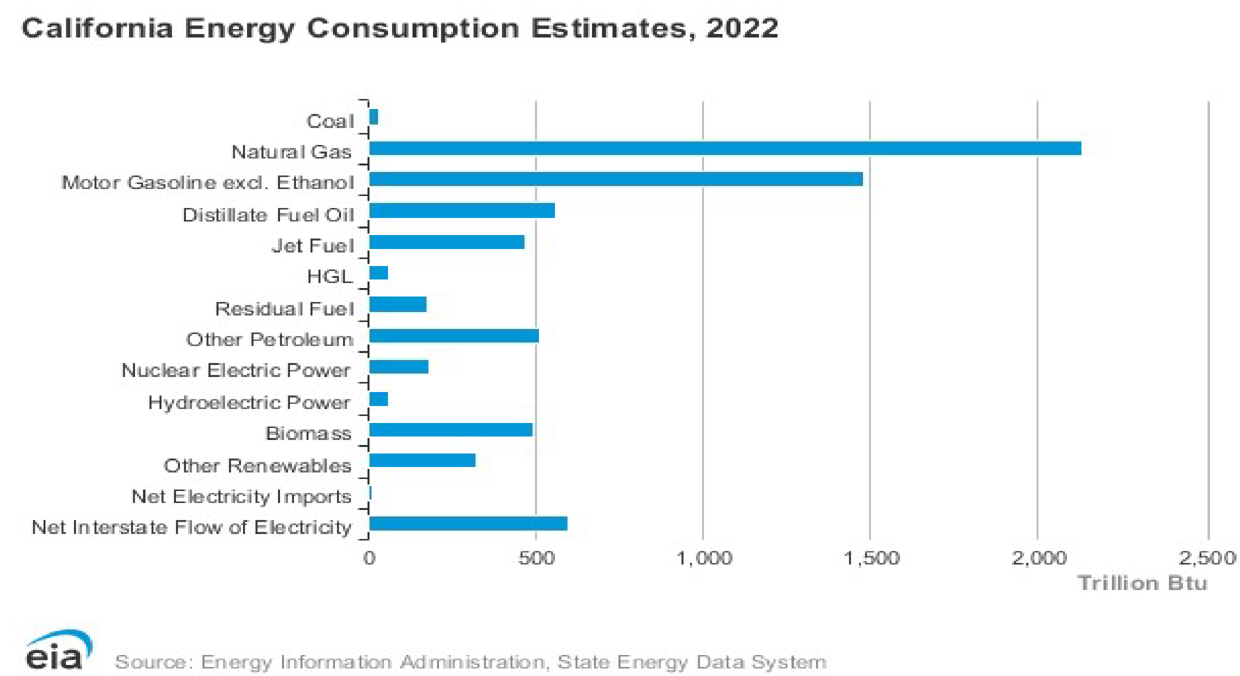
Figure 10-7. Annual Statewide Energy Consumption by End-Use Sector



Source: EIA, 2024b

Figure 10-8 summarizes the 2022 statewide annual energy consumption by resource origin. As mentioned previously, natural gas is the most consumed energy resource in the state, with nearly 10 times as much natural gas used by consumers as is produced by California reserves and processing facilities. Crude oil is refined and distilled to produce motor gasoline, distillate fuel oil, jet fuel, hydrocarbon gas liquids, residual fuel, and other petroleum products. The chart also demonstrates that California has a net import of approximately 600.4 trillion btu of electricity annually.

Figure 10-8. 2022 Annual Statewide Energy Consumption by Source



Source: EIA, 2024b

10.2.2.1 Electricity Consumption

In 2022, California was the nation's largest net importer of electricity from out of state and received about 28 percent of its electricity supply from generating facilities outside the state (EIA, 2024a). California has the second-highest electricity retail sales in the nation, after Texas, but it has the lowest retail sales per capita. The commercial sector accounts for almost half of California's electricity retail sales. The residential sector, where more than one-fourth of California households use electricity for home heating, accounts for more than one-third of sales. Almost all the rest of the state's electricity retail sales are to the industrial sector. A very small amount goes to the transportation sector.

10.2.2.2 Transportation Fuels Consumption

California is the nation's second-largest consumer of petroleum products, after Texas, and accounts for 10 percent of the nation's total consumption. The state is the largest United States consumer of motor gasoline and jet fuel, and 85 percent of the petroleum consumed in California is used in the transportation sector. The industrial sector, the second-largest petroleum-consuming sector, uses 12 percent of the petroleum consumed in the state. The commercial sector accounts for more than 2 percent, and the residential sector consumes less than 1 percent (EIA, 2023a).

10.2.3 Local Energy Resources

The discussion of local energy resources focuses on electricity, natural gas, and petroleum-based transportation fuels (motor gasoline and diesel fuel) supplied to Los Angeles County and the Project Area. This section also summarizes Metro's existing systemwide energy consumption using the most recently published data available (Metro, 2019b).

10.2.3.1 Electricity

The LADWP power system serves approximately 4 million people and is the nation's largest municipal utility. Its service territory area covers the City of Los Angeles and many areas of the Owens Valley, with annual sales exceeding 26 million MWh. LADWP is a "vertically integrated" utility, both owning and operating the majority of its generation, transmission, and distribution systems. LADWP strives to be self-sufficient in providing electricity to its customers and does so by maintaining generation resources that are equal to or greater than its customers' electrical needs. LADWP's operations are financed solely through sales of water and electric services.

LADWP obtains electricity from various generating resources that utilize coal, nuclear, natural gas, hydroelectric, and renewable resources to generate power. LADWP obtains power from four municipally owned power plants within the Los Angeles Basin, LADWP Hydrogenerators on the Los Angeles Aqueduct, shared ownership generating facilities in the Southwest, and also power purchased from the Southwest and Pacific Northwest. LADWP has a power infrastructure comprising a total of 34 generation plants and approximately 3,636 miles of overhead transmission lines spanning five western states. LADWP also purchases excess power, as it is available, from self-generators interconnected with the LADWP within the City of Los Angeles.

According to LADWP's 2022 Power Content Label submitted to the California Energy Commission (CEC), LADWP has a net dependable generation capacity greater than 8,000 MW (LADWP, 2021). On August 31, 2017, LADWP's power system experienced a record instantaneous peak demand of 6,502 MW. As of 2019, approximately 34 percent of LADWP's delivered power mix to customers was derived from renewable resources, which meets and exceeds the statewide target of 33 percent renewably sourced electricity generation by 2020, pending verification by the CEC (LADWP, 2021). The annual LADWP electricity sale to customers for 2019 was approximately 23,402.7 GWh (CEC, 2019).

10.2.3.2 Transportation Fuels

As previously discussed, transportation accounts for nearly 40 percent of the total statewide energy consumption, and petroleum-based fuels currently account for 90 percent of California's transportation energy sources (CEC, 2024a). However, the state is now working on developing flexible strategies to reduce petroleum use, as evidenced by the robust regulatory framework promulgated to enhance energy efficiency and decrease reliance on passenger vehicles and non-renewable resources in general. The CEC predicts that the demand for gasoline will continue to decrease over the next decade, and there will be an increase in the use of alternative fuels, such as natural gas, biofuels, and electricity (CEC, 2018). On September 23, 2020, Governor Gavin Newsom signed Executive Order N-79-20, setting a 100 percent zero emission vehicle (ZEV) target for new passenger vehicle sales by 2035 and a 100 percent zero-emission vehicle operations target for medium- and heavy-duty vehicles in the state by 2045 (CEC, 2021b).

According to CEC fuel sales data, Los Angeles County contained approximately 2,063 transportation fueling stations in 2019 (CEC, 2020b). In the same year, countywide fuel sales comprised approximately 3,559 million gallons of gasoline and 276 million gallons of diesel fuel. By volume, Los Angeles County accounted for approximately 23.2 percent of statewide gasoline sales and approximately 15.7 percent of statewide diesel fuel sales. Despite substantial increases in population (from approximately 9.8 million in 2010 to 10.0 million in 2019), total countywide gasoline fuel sales have remained relatively constant over the course of the past decade, as the CEC estimates approximately 3,658 million gallons of gasoline were sold within Los Angeles County in 2010.

10.2.4 Metro Energy Inventory

Metro’s contribution to regional energy consumption includes on-road vehicle fuel use (primarily compressed natural gas) and electricity for rail vehicle propulsion and maintenance and administrative facility operation. The *2019 Energy and Resource Report* examined Metro’s energy use for the 2019 calendar year and refined estimates prepared by previous analysis (Metro, 2019b).

Table 10-4 presents an overview of the Metro system energy consumption by end use between 2015 and 2019. As of 2019, the Metro system comprised 124,695,827 revenue miles consuming approximately 5,357.3 million megajoules (MJ) of energy per revenue mile, for a total of 6,667.1 million MJ. Overall, Metro system energy consumption has decreased by 6.9 percent during the period from 2015 to 2019. Metro has prioritized generating system energy from alternative fuels in recent years. Approximately 30 percent of Metro’s electricity is generated by renewable sources. Metro plans to phase out all directly operated natural gas buses by 2030 to be replaced by ZEVs.

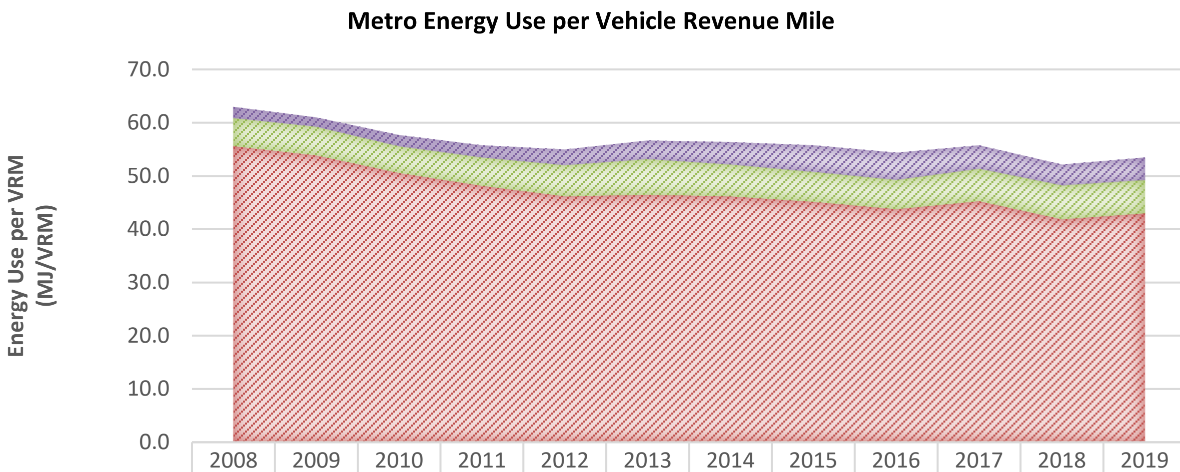
Table 10-4. Metro Operations Annual Energy Consumption (in Megajoules)

End Use	2015	2016	2017	2018	2019
Vehicle Fuel	5,796,786,075	5,644,897,527	5,787,683,879	5,317,489,842	5,357,290,785
Rail Propulsion	719,276,609	711,196,744	775,022,735	817,378,502	781,571,203
Facilities	642,626,521	660,898,312	564,325,336	491,666,179	528,225,942
Total	7,158,689,205	7,016,992,583	7,127,031,949	6,626,534,523	6,667,087,930

Source: Metro, 2019b

The *2019 Energy and Resource Report's* technical appendix also includes data describing Metro system energy use per vehicle revenue mile (VRM) (Metro, 2019b). Examining this data can provide insight as to how Metro is managing its energy resource consumption in relation to the expansion of its service network. Figure 10-9 presents a chart that shows the trend in Metro energy use per VRM over the past 12 years (2008–2019) since the reporting program began. As shown on Figure 10-9, total energy use per VRM decreased from 63.0 MJ/VRM in 2008 to 53.5 MJ/VRM in 2019, representing a 15 percent reduction over the 12-year period. The data demonstrates the efficacy of Metro’s energy efficiency programs to deliver high quality transit options that meet regional growth demands while also conserving energy where possible.

Figure 10-9. Metro Systemwide Energy Use per Vehicle Revenue Mile



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Facilities	2.1	1.7	2.1	2.3	2.9	3.5	4.2	5.0	5.1	4.4	3.9	4.2
Rail Propulsion	5.3	5.4	5.0	5.3	5.9	6.7	6.0	5.6	5.5	6.1	6.4	6.3
Vehicle Fuel	55.6	53.9	50.6	48.2	46.2	46.5	46.2	45.2	43.8	45.3	41.9	43.0

Source: Metro, 2019b

Includes mixed commercial and industrial land uses within the Project Study Area.

10.3 Impact Evaluation

10.3.1 Impact ENG-1: Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

10.3.1.1 Construction Impacts

Alternative 6 would require petroleum-based transportation fuels and electricity to construct the transit system. Construction activities would comply with Metro's Green Construction Policy (GCP) and construction equipment would be maintained in accordance with manufacturers' specifications. Construction would result in a one-time expenditure of approximately 7,803,150 gallons of diesel fuel, 1,324,088 gallons of gasoline, and 471,395 megawatt-hours (MWh) of electricity. Table 10-5 provides a summary of the energy consumption estimated for construction of Alternative 6.

Table 10-5. Alternative 6: Construction Fuel and Electricity Consumption

Source Type	Fuel Consumption (gal)	Electricity Consumption (MWh)
Mobile Source Fuel Consumption		
Off-Road Equipment (Diesel)	4,430,397	NA
Worker Vehicles (Gasoline)	1,324,088	NA
Vendor Trucks (Diesel)	710,776	NA
Haul Trucks (Diesel)	2,667,977	NA
Electricity Consumption		
TBM	NA	471,120

Source Type	Fuel Consumption (gal)	Electricity Consumption (MWh)
Onsite Portable Offices	NA	275
Summary		
Total Gasoline (gal):	**1,324,088**	**NA**
Total Diesel (gal):	**7,803,150**	**NA**
Total Electricity (MWh):	**NA**	**471,395**

Source: Metro, 2024c

gal = gallons
MWh = megawatt hour
NA = not applicable
TBM = tunnel boring machine

All equipment and vehicles used in construction activities would comply with applicable California Air Resources Board regulations, Low Carbon Fuel Standards, and the Corporate Average Fuel Economy (CAFE) Standards. Construction would not place an undue burden on available energy resources. The one-time expenditure of energy associated with diesel fuel consumption would be offset by operations within approximately 5 years through transportation mode shift, and the one-time expenditure of energy associated with gasoline consumption would be offset by operations within 1 year. The temporary additional transportation fuels consumption does not require additional capacity provided at the local or regional level. CEC transportation energy demand forecasts indicate that gasoline and diesel fuel production is anticipated to increase between 2021 and 2035, while demand for both gasoline and diesel transportation fuels is projected to decrease over the same time period (CEC, 2021b). Construction vehicles and equipment activities would not place an undue burden on available petroleum fuel resources during construction of Alternative 6.

Construction activities may include lighting for security and safety in construction zones. Nighttime construction would be limited, and lighting would be sparse and would not require additional capacity provided at the local or regional level.

The GCP requires and commits project contractors to using newer engines for off-road diesel-powered construction equipment that are more fuel efficient than older models. All equipment and vehicles would be maintained in accordance with manufacturer specifications and would be subject to idling limits. As required by the California Green Building Standards (CALGreen) Code Tier 2, at least 80 percent of the nonhazardous construction debris generated by demolition activities will be diverted from landfills. Also, CALGreen includes the mandatory requirement to reuse or recycle all clean soil that would be displaced during construction of Alternative 6, which would result in reduced energy consumption from hauling trucks. Furthermore, the Metro 2020 Moving Beyond Sustainability Strategic Plan (MBSSP) and the Metro Design Criteria and Standards require and commit contractors to using high-efficiency lighting as opposed to less energy-efficient lighting sources in alignment with Leadership in Energy and Environmental Design (LEED) sustainability energy standards.

Based on the substantiation previously described, construction would not result in wasteful, inefficient, or unnecessary consumption of energy resources. Therefore, Alternative 6 would result in a less-than-significant impact related to construction activities.

10.3.1.2 Operational Impacts

As described in the Methodology Section, future operations involved under Alternative 6 would consume energy resources in the forms of electricity (at TPSSs for rail propulsion, for MSF operations, at stations for lighting, accessibility features, and parking facilities, and as power for a fraction of regional vehicle miles traveled (VMT) by electric and plug-in hybrid vehicles), petroleum fuels (gasoline for Metro employee trips and a fraction of regional VMT, and diesel fuel for an emergency generator at the MSF and a fraction of regional VMT), and natural gas (a small fraction of regional VMT by vehicles powered by natural gas). End uses that comprise direct energy resource consumption associated with Alternative 6 operations include TPSSs, the MSF, stations and parking facilities, and Metro employee trips. End uses comprising indirect energy consumption include the changes in regional vehicle trips and VMT patterns that would result from the new transit system. Table 10-6 presents a summary of the annual energy consumption by resource attributable to Alternative 6 operations in the horizon year of 2045 and compares the consumption to the 2045 Without Project Conditions.

Table 10-6. Alternative 6: Operations Annual Energy Consumption Relative to the 2045 Without Project Conditions (Horizon Year 2045)

End Use	Electricity (MWh)	Gasoline (gal)	Diesel (gal)	Natural Gas (DGE)
Alternative 6				
Main Line Traction Power	44,803	—	—	—
Stations and Parking	15,810	—	—	—
MSF Onsite Operations	2,255	—	—	—
Metro Employee Commuting Trips	352	137,209	34,349	1,354
Regional On-Road VMT	13,325,741	5,200,107,751	1,301,816,070	51,311,069
Alternative 6 Total Annual Consumption[a]	**13,388,960**	**5,200,244,960**	**1,301,850,419**	**51,312,422**
2045 Without Project Conditions				
Regional On-Road VMT	13,342,059	5,206,475,771	1,303,410,265	51,373,904
Net Change in Annual Resource Consumption	**46,901**	**-6,230,810**	**-1,559,846**	**-61,481**
Conversion Factor	3,412 kBtu/MWh	125.0 kBtu/gal	138.7 kBtu/gal	138.7 kBtu/gal
Net Change in Annual Energy Consumption (MMBtu)	***160,026***	***-778,851***	***-216,351***	***-8,528***
Total Net Change in Energy Consumption (MMBtu)	**-843,703**			

Source: HTA, 2024; BTS, 2024

[a]Values may not sum exactly due to rounding.

— = no data
DGE = diesel gallon equivalent
gal = gallon
kBtu = thousand British thermal units
MMBtu = million British thermal units
MWh = megawatt-hour
VMT = vehicle miles traveled

As shown in Table 10-6, operation of Alternative 6 in the horizon year of 2045 would result in a net annual increase in regional electricity demand of 46,901 MWh, and would result in a net annual reduction of 6,230,810 gallons of gasoline, 1,559,846 gallons of diesel fuel, and 61,481 diesel gallon equivalent (DGE) of natural gas. Converting each of these quantities to standardized units of MMBtu, Alternative 6 operations would result in a net decrease of 843,703 MMBtu annually compared to 2045 Without Project Conditions. This amount of energy savings is equivalent to 6,751,355 gallons of motor gasoline per year. The electricity consumption would be more than offset by the energy savings in the forms of petroleum fuels and natural gas, and the consumption would power a mass transit system that would contribute to regional efforts to enhance energy efficiency and reduce reliance on nonrenewable resources. Therefore, Alternative 6 would result in a substantial decrease in overall regional energy consumption, and this impact would be less than significant.

Table 10-7 summarizes the Alternative 6 annual energy consumption for each resource compared to Existing Conditions (2021). This is presented for informational purposes only. As shown in Table 10-7, Alternative 6 operations would result in a net increase of 12,053,040 MWh of electricity and 214,986,682 gallons of diesel fuel and would result in a net decrease of 1,062,848,353 gallons of gasoline and 67,440,369 DGE of natural gas. When standardized in units of MMBtu, operation of Alternative 6 in 2045 would consume approximately 71,266,398 MMBtu less collective energy resources on an annual basis than Existing Conditions in the baseline year of 2021. This amount of energy is equivalent to 570,277,384 gallons of motor gasoline per year.

Table 10-7. Alternative 6: Operations Annual Energy Consumption (Horizon Year 2045) Relative to Existing Conditions (Baseline Year 2021)

End Use	Electricity (MWh)	Gasoline (gal)	Diesel (gal)	Natural Gas (DGE)
Alternative 6 (2045)				
Traction Power	44,803	—	—	—
Stations and Parking	15,810	—	—	—
MSF Onsite Operations	2,255	—	—	—
Metro Employee Commuting Trips	352	137,209	34,349	1,354
Regional On-Road VMT	13,325,741	5,200,107,751	1,301,816,070	51,311,069
Alternative 6 Total Annual Consumption[a]	**13,388,960**	**5,200,244,960**	**1,301,850,419**	**51,312,422**
Existing Conditions (2021)				
Regional On-Road VMT	1,335,920	6,263,093,314	1,086,863,738	118,752,791
Net Change in Annual Resource Consumption	**12,053,040**	**-1,062,848,353**	**214,986,682**	**-67,440,369**
Conversion Factor	3,412 kBtu/MWh	125.0 kBtu/gal	138.7 kBtu/gal	138.7 kBtu/gal
Net Change in Annual Energy Consumption (MMBtu)	***41,124,972***	***-132,856,044***	***29,818,653***	***-9,353,979***
Total Net Change in Energy Consumption (MMBtu)	**-71,266,398**			

Source: HTA, 2024; BTS, 2024

[a]Values may not sum exactly due to rounding.

— = no data
DGE = diesel gallon equivalent
gal = gallon
kBtu = thousand British thermal units
MMBtu = million British thermal units
MWh = megawatt-hour
VMT = vehicle miles traveled

10.3.1.3 Maintenance and Storage Facility

As shown in Table 10-6 and Table 10-7, operation of the MSF in the horizon year of 2045 would result in an annual increase in regional electricity demand of 2,255 MWh. As discussed in Section 10.3.1.2, Alternative 6 operations collectively would result in a net decrease of 812,192 MMBtu annually in 2045. Construction of the MSF would require petroleum-based transportation fuels and electricity. Construction activities would comply with Metro's GCP and adhere to Metro's policy for aligning with LEED Silver sustainable certification. The required energy demand to construct and operate the MSF would be more than offset by the energy savings in the forms of petroleum fuels and natural gas, and the consumption would support a mass transit system that would contribute to regional efforts to enhance energy efficiency and reduce reliance on nonrenewable resources. Construction and operation of the MSF would not result in wasteful, inefficient, or unnecessary consumption of energy resources and the MSF would result in a less than significant impact.

10.3.2 Impact ENG-2: Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

10.3.2.1 Construction Impacts

Alternative 6 would require petroleum-based transportation fuels and electricity to construct the transit system. Construction would result in a one-time expenditure of approximately 7,809,150 gallons of diesel fuel, 1,324,088 gallons of gasoline, and 471,395 MWh of electricity. Alternative 6 would be consistent with state and local energy plans and policies to reduce energy consumption as activities would comply with Metro's GCP, CALGreen Code, and Title 24. The GCP requires and commits project contractors to using newer engines for off-road diesel-powered construction equipment that are more fuel efficient than older models. Compliance with GCP would limit excess petroleum fuels consumption. The CALGreen Code requires reduction, disposal, and recycling of at least 80 percent of nonhazardous construction materials and requires demolition debris to be recycled and/or salvaged, which would ultimately result in reductions of indirect energy use associated with waste disposal and storage. Alternative 6 would comply with state and local plans for energy efficiency in construction activities. Therefore, Alternative 6 would result in a less-than-significant impact related to construction activities.

10.3.2.2 Operational Impacts

Alternative 6 would be a high-capacity rail transit system providing energy efficient mass transit to a region in need of enhanced accessibility options. It reduces auto passenger vehicle trips and reduces reliance on petroleum-based transportation fuels. Alternative 6 qualifies as a "sustainable transportation project" as defined by the California Office of Planning and Research, because it encourages the use of transit and zero emission vehicles and reduces on-road VMT (OPR, 2018). The benefits of Alternative 6 are consistent with the goals, objectives, and land use and transportation planning policies of SCAG and the City of Los Angeles as outlined in the local regulatory framework previously described. As the renewable energy portfolios of Metro and local jurisdictions expand over time, natural resources consumption to provide the electricity required for operations would become more energy efficient. Alternative 6 would not conflict with any adopted plan or regulation to enhance energy efficiency or reduce transportation fuels consumption and would support the initiatives of the MBSSP. In addition, Alternative 6 would not interfere with renewable portfolio targets and would not result in a wasteful or inefficient expenditure of energy resources. Alternative 6 would positively contribute to statewide, regional, and local efforts to create a more efficient and sustainable transportation infrastructure network. Therefore, Alternative 6 would result in a less than significant impact related to operational activities.

10.3.2.3 Maintenance and Storage Facility

The MSF would support Alternative 6 operations, providing energy efficient mass transit to the region and reducing auto passenger vehicle trips. The benefits of Alternative 6 are consistent with the goals, objectives, and land use and transportation planning policies of SCAG and the City of Los Angeles. Additionally, Alternative 6 would comply with design requirements for components outlined in the MBSSP, such as achieving LEED Version 4 Building and Design Construction (LEED v4 BD+C) Level Silver certification—and Envision Version 3 certification if LEED is not applicable—and Tier 2 of the CALGreen Code. There is no potential for construction or operations of the MSF to conflict with or obstruct a state or local plan for renewable energy or energy efficiency. The MSF would not conflict with any adopted plan or regulation to enhance energy efficiency or reduce transportation fuels consumption and would support the initiatives of the MBSSP. In addition, the MSF would not interfere with renewable portfolio targets and would not result in a wasteful or inefficient expenditure of energy resources. The MSF would positively contribute to statewide, regional, and local efforts to create a more efficient and sustainable transportation infrastructure network. Therefore, the MSF would result in a less than significant impact.

10.4 Mitigation Measures

10.4.1 Construction Impacts

No mitigation measures are required.

10.4.2 Operational Impacts

No mitigation measures are required.

10.4.3 Impacts After Mitigation

No mitigation measures are required; impacts are less than significant.

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