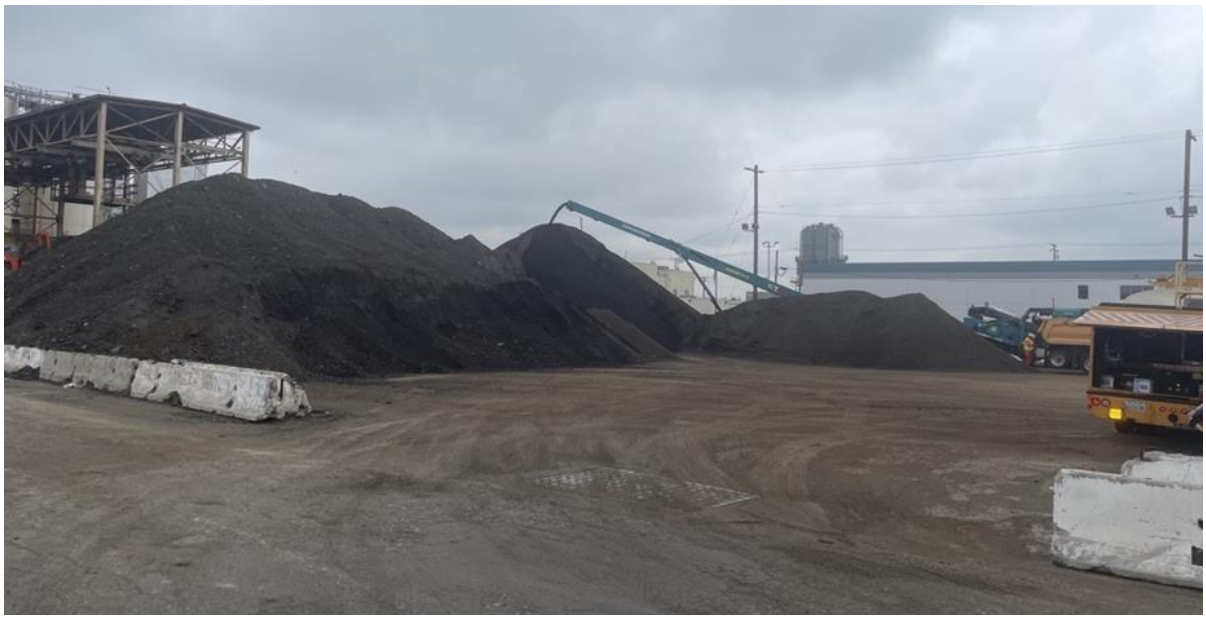

BOE Asphalt Plant No. 1 Phase 2 Project

Energy Study

prepared for

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1 Project Description

1.1 Introduction

This study analyzes the potential energy impacts of the BOE Asphalt Plant No.1 Phase 2 Project ("the project") for the City of Los Angeles Bureau of Engineering (BOE). The purpose of this study is to analyze the energy impacts related to both temporary construction activity and long-term operation of the project. Table 1 provides a summary of project impacts.

Table 1 Summary of Impacts

Issue	Finding
Would the proposed project result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	Less than significant impact
Would the proposed project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	Less than significant impact

1.2 Project Background

1.2.1 Project Location

The project site is located at 2601 East 25th Street, Los Angeles, California 90058, situated in the northeast corner of 25th Street and Harriet Street within Council District 14, Central City North Community Plan Area. The project site encompasses approximately 1.2 acres (52,272 square feet) and includes APNs 5168-055-900 and -901. The two parcels are separated by a 20-foot no-through alley. Figure 1 shows the location of the site in the region and Figure 2 shows the project site in its neighborhood context.

1.2.2 Project Description

The City of Los Angeles BOE is proposing to develop a satellite site at 2601 East 25th Street to store and process recycled asphalt pavement (RAP). The project would be a continuation of the Asphalt Plant No. 1 site improvements, which is located at 2484 East Olympic Boulevard, approximately 1.2 miles from the project site. Asphalt Plant No. 1 was completed and operational in 2019 and is designed to produce up to 700,000 tons of asphalt annually and increase the use of RAP in asphalt from 20 percent to 50 percent. Since the start of its commissioning in 2019, the Asphalt Plant No. 1 has produced between 280,000 to 320,000 tons of hot mix asphalt (HMA) annually. The project site would be able to store and process a maximum of 294,000 tons of RAP annually and enable Asphalt Plant No. 1 to economically produce HMA utilizing 50 percent RAP.

Specifically, this project involves: 1) demolition of an existing concrete platform to enlarge the working area; 2) construction of a 22,600 square-foot, 46-foot-tall, light frame canopy structure to cover the stockpiles of unprocessed and processed RAP and the RAP processing equipment; 3) construction of a new 610 square-foot office space with a break room, electric room, and restroom, provide utility connections including power, water, sewer, and telecommunication infrastructure; and 4) miscellaneous site improvements such as installation of truck weight scales and concrete pavement at the facility entrance and exit, facility lighting and site drainage upgrades, and the

design and installation of new perimeter fencing. Low Impact Development (LID) planter boxes would be installed along the northern, eastern, southern, and partially western sides of the proposed storage room and in the western portion of the project site.

Landscaping

The proposed landscaping would be ornamental in nature and would feature trees, shrubs, and stormwater planters. Street trees would be concentrated along the project's frontage with East 25th Street and Harriet Street. Trees, shrubs, and groundcover would be located at the northwest and southwest corners of the site. In addition, approximately 30-inch Gabion retaining walls filled with RAP rubble would be installed at the northwest and southwest corners of the project site to provide erosion control and enhance landscaping. Prior to the issuance of a building permit, the project applicant would be required to submit final planting and irrigation plans to the City for review and approval.

Construction

Based on the information provided by the project manager, the project is anticipated to be constructed over a period of approximately two years. For purposes of analysis, construction is assumed to commence in October 2024 and finish in September 2026. Construction would occur in five phases: demolition, site preparation, building construction, paving, and architectural coating. Demolition and site clearing activities are forecasted to begin in October 2024 and last approximately two months; this phase would produce approximately 6,200 cubic yards (cy) of demolition debris and other aggregate materials for off-site disposal. Construction of the office, canopy structure, and utility connections would begin in March 2025 and last for approximately one year, with up to 27 construction personnel on-site. Finally, site improvements (i.e., concrete pouring, lighting and drainage, and landscaping) would begin in March 2026 following the completion of the building structures and last for approximately six months, requiring up to 23 construction personnel on-site.

Construction of the proposed project would occur up to eight hours per day, five days per week. Construction would occur between 7:00 a.m. and 9:00 p.m. Mondays through Fridays. No construction would occur on Saturdays, Sundays, or public holidays.

Operation

As mentioned previously, the facility would supply up to 294,000 tons of RAP annually to Asphalt Plant No. 1. The unprocessed RAP would be trucked in from various street improvement sites. The unprocessed RAP would be held in one of the concrete container bins that is covered under the proposed canopy structure. Based on the production requirements, the unprocessed RAP would be crushed and screened through the RAP processing equipment and stored in the other concrete bin. The proposed concrete container box could hold 24,000 tons of RAP, which is roughly twelve days of RAP needed to meet production volume. The processed RAP would be loaded onto trucks and transported to the Asphalt Plant No. 1 site at 2484 East Olympic Boulevard. Depending on weather conditions, one container may have more material than the other.

Based on the design capacity, the project would generate 14,700 truck trips annually with an average of 59 truck trips per day to Asphalt Plant No. 1. However, based on the average annual production, the facility would generate 6,300 truck trips annually with an average of 25 truck trips per day to Asphalt Plant No. 1. On-site equipment would include one portable crusher/screener, loaders, and a water truck.

Operation hours on the site would occur from 5:00 a.m. to 2:30 p.m. Monday through Friday, with night and weekend work. The project site would be staffed with three employees who would be operating the loader and RAP processing equipment.

2 Background

2.1 Overview of Energy

California is one of the lowest per capita energy users in the United States, ranked 50th in the nation, due to its energy efficiency programs and mild climate. California consumed 280,738 gigawatt-hours (GWh) of electricity and 11,923 million therms of natural gas in 2021 (California Energy Commission [CEC] 2022a). The single largest end-use sector for energy consumption in California is transportation (34 percent), followed by industry (25 percent), residential (22 percent), and commercial (20 percent) (United States Energy Information System [U.S. EIA] 2020). Most of California's electricity is generated in-state with approximately 30 percent imported from the northwest and southwest in 2021. In addition, approximately 34 percent of California's electricity supply comes from renewable energy sources, such as wind, solar photovoltaic, geothermal, and biomass (CEC 2022b).

To reduce statewide vehicle emissions, California requires that all motorists use California Reformulated Gasoline, which is sourced almost exclusively from in-state refineries. Gasoline is the most used transportation fuel in California with 13.8 billion gallons sold in 2021 and is used by light-duty cars, pickup trucks, and sport utility vehicles (U.S. EIA 2022a). Diesel is the second most-used fuel in California with 1.6 billion gallons sold in 2020 and is used primarily by heavy duty-trucks, delivery vehicles, buses, trains, ships, boats and barges, farm equipment, and heavy-duty construction and military vehicles (CEC 2022c). Both gasoline and diesel are primarily petroleum-based, and their consumption releases greenhouse gas (GHG) emissions, including CO_2 and N_2O. The transportation sector is the single largest source of GHG emissions in California, accounting for 40 percent of all inventoried emissions in 2019 (California Air Resources Board [CARB] 2021).

2.2 Regional and Local Energy Setting

Energy use relates directly to environmental quality because energy use can adversely affect air quality and can generate GHG emissions that contribute to climate change. Fossil fuels are burned to create electricity that powers residences, heats and cools buildings, and powers vehicles. Transportation energy use corresponds to the fuel efficiency of cars, trucks, and public transportation; the different travel modes such as single-passenger automobile, carpool, and public transit; and the miles traveled using these modes.

2.2.1 Energy Supply

Petroleum

California is one of the top producers of petroleum in the nation with drilling operations occurring throughout the state but concentrated primarily in Kern and Los Angeles counties. A network of crude oil pipelines connects production areas to oil refineries in the Los Angeles area, the San Francisco Bay area, and the Central Valley. California oil refineries also process Alaskan and foreign crude oil received at ports in Los Angeles, Long Beach, and the San Francisco Bay area. Crude oil production in California and Alaska is in decline, and California refineries depend increasingly on foreign imports (CEC 2022d). According to the U.S. EIA, California's field production of crude oil totaled 134.6 million barrels in 2021 (U.S. EIA 2022b).

City of Los Angeles Petroleum Infrastructure

Southern California is in Petroleum Administration for Defense District 5 (PADD 5). PADDs are geographic groupings of the United States that assists the U.S. Energy Information Administration in assessing regional petroleum product supplies and their movements throughout the nation. Demand in PADD 5 includes in-region consumption, transfers of fuels to other parts of the United States (other PADDs) and to other regional markets within PADD 5, and exports to the global market. Supply in PADD 5 includes in-region refinery production, receipts of fuels produced in other regions and other PADD 5 regional markets, and imports (EIA 2015). There are four petroleum refineries located in the City of Los Angeles: Marathon Petroleum, Phillips 66, Valero Energy, and Valero Wilmington Asphalt Refinery. The petroleum refineries in the city consume a total of approximately 593,300 barrels per day (CEC 2021). As discussed below, the other petroleum refineries near are the Lunday-Thagard Co. Refinery and World Oil Refining Refinery, both located in the City of South Gate, adjacent to the southeastern boundary of the Southeast Los Angeles community. In general, individual users, such as residents and employees, purchase petroleum fuels. There are hundreds of gasoline stations (GasBuddy 2023). According to the California Department of Conservation (DOC) Division of Oil, Gas, and Geothermal Resources (DOGGR), there are hundreds of plugged oil and gas wells and about 30 wells still active in the Playa del Rey area of Los Angeles (DOGGR 2023).

Alternative Fuels

A variety of alternative fuels are used to reduce petroleum-based fuel demand. Their use is encouraged through various statewide regulations and plans, such as the Low Carbon Fuel Standard and Senate Bill (SB) 32. Conventional gasoline and diesel may be replaced, depending on the capability of the vehicle, with alternative fuels such as hydrogen, biodiesel, and electricity. Currently, 54 hydrogen and 35 biodiesel refueling stations are located in California. Ten hydrogen refueling stations are located in Los Angeles. Over one hundred vehicle charging stations exist in the city (U.S. DOE n.d.).

Electricity

In 2021, California's overall electric generation (including imported energy from throughout the northwestern and southwestern United States) totaled 280,738 GWh (CEC 2022b). Primary fuel sources for the state's power mix in 2021 included the following (CEC 2022b):

- Natural gas (37.9 percent)
- Large hydroelectric (9.2 percent)
- Solar (14.2 percent)
- Nuclear (9.3 percent)
- Wind (11.4 percent)
- Geothermal (4.8 percent)
- Small hydroelectric (1.0 percent)
- Biomass (2.3 percent)
- Coal (3.0 percent)
- Petroleum coke (<1 percent)
- Waste heat (<1 percent)
- Oil (<1 percent)
- Other Unspecified (6.8 percent)

According to the 2018 Integrated Energy Policy Report, California's electric grid relies increasingly on clean sources of energy such as solar, wind, geothermal, hydroelectricity, and biomass (CEC 2018). As this transition advances, the grid is also expanding to serve new sectors including electric vehicles, rail, and space and water heating. California has installed more renewable energy than any other state in the United States with 67,461 GW of generation (CEC 2022b).

City of Los Angeles Electric Power Infrastructure

The Los Angeles Department of Water and Power (LADWP) transmits and delivers electricity to residents and businesses in the city. There are 20 natural gas power plants, three biomass plants, 25 solar farms, and no petroleum power plants in Los Angeles (U.S. EIA 2022d). Additionally, Los Angeles is served by a number of electricity substations.

2.2.2 Energy Demand

Petroleum

State

In 2020, transportation accounted for 34 percent of California's total energy demand, amounting to approximately 2,356 trillion British thermal units (Btu) (U.S. EIA 2020). According to the CEC, California's 2020 fuel sales totaled 11.2 billion gallons of gasoline and 1.6 billion gallons of diesel (CEC 2022c).

Los Angeles County

Los Angeles County fuel sales are compared to statewide sales herein to provide regional and statewide context for fuel consumption. As shown in Table 2, Los Angeles County consumed an estimated 3.06 billion gallons of gasoline and 224 million gallons of diesel fuel in 2021, which was approximately 22.2 percent of statewide gasoline consumption and approximately 11.9 percent of statewide diesel fuel consumption (CEC 2022c).

Table 2 2021 Annual Gasoline and Diesel Consumption

Natural Gas	Los Angeles County (millions of gallons)	California (millions of gallons)	Proportion of Statewide Consumption
Gasoline	3,061	13,818	22.2%
Diesel	224	1,883	11.9%

Source: CEC 2022c

Electricity

State

California consumed approximately 280,738 GWh in 2021. Residential electricity demand accounted for approximately 36 percent of California's electricity consumption in 2020, and non-residential demand accounted for approximately 64 percent (CEC 2022a).

Los Angeles County

Electricity consumption in Los Angeles County is compared to statewide consumption herein to provide regional and statewide context. As shown in Table 3, Los Angeles County consumed approximately 65,376 GWh in 2021 (CEC 2022a), approximately 23 percent of statewide electricity consumption (CEC 2022a).

Table 3 2021 Electricity Consumption

Energy Type	Los Angeles County (GWh)	LA DWP (GWh)	California (GWh)	L.A. County Proportion of Statewide Consumption	L.A. DWP Proportion of Statewide Consumption
Electricity	65,376	20,891	280,738	23%	7.4%

Source: CEC 2022a

2.2.3 Regulatory Setting

Federal

Energy Independence and Security Act of 2007

The Energy Independence and Security Act, enacted by Congress in 2007, is designed to improve vehicle fuel economy and help reduce the United States' dependence on foreign oil. It expands the production of renewable fuels, reducing dependence on oil, and confronting climate change. Specifically, it does the following:

- Increases the supply of alternative fuel sources by setting a mandatory Renewable Fuel Standard, requiring fuel producers to use at least 36 billion gallons of biofuel in 2022, which represents a nearly five-fold increase over 2007 levels
- Reduces U.S. demand for oil by setting a national fuel economy standard of 35 miles per gallon (mpg) by 2020 – an increase in fuel economy standards of 40 percent relative to 2007 levels

The Energy Independence and Security Act of 2007 also set energy efficiency standards for lighting (specifically light bulbs) and appliances. Development would also be required to install photosensors and energy-efficient lighting fixtures consistent with the requirements of 42 USC Section 17001 et seq.

Energy Policy and Conservation Act

Enacted in 1975, the Energy Policy and Conservation Act established fuel economy standards for new light-duty vehicles sold in the United States. The law placed responsibility on the National Highway Traffic and Safety Administration (NHTSA), a part of the United States Department of Transportation (U.S. DOT), for establishing and regularly updating vehicle standards. The United States Environmental Protection Agency (U.S. EPA) administers the Corporate Average Fuel Economy (CAFE) program, which determines vehicle manufacturers' compliance with existing fuel economy standards.

Corporate Average Fuel Economy Standards

The Corporate Average Fuel Economy (CAFE) standards are federal rules established by the NHTSA that set fuel economy and GHG emissions standards for all new passenger cars and light trucks sold in the United States. The CAFE standards generally become more stringent with time, reaching an estimated 38.3 miles per gallon for the combined industry-wide fleet for model year 2020 (77 Federal Register 62624 et seq. [October 15, 2012, Table I-1). It is, however, legally infeasible for individual municipalities to adopt more stringent fuel efficiency standards. The CAA (42 United States Code [USC] Section 7543[a]) states that "no state or any political subdivision therefore shall adopt or attempt to enforce any standard relating to the control of emissions from new motor

vehicles or new motor vehicle engines subject to this part." In August 2016, the U.S. EPA and NHTSA announced the adoption of the phase two programs related to the fuel economy and GHG standards for medium- and heavy-duty trucks. The phase two program will apply to vehicles with model year 2018 through 2027 for certain trailers, and model years 2021 through 2027 for semi-trucks, large pickup trucks, vans, and all types and sizes of buses and work trucks. The final standards are expected to lower CO_2 emissions by approximately 1.1 billion MT of CO_2 and reduce oil consumption by up to two billion barrels over the lifetime of the vehicles sold under the program (NHSTA 2019).

As of September 2018, NHSTA and U.S. EPA were undergoing the rulemaking process to establish the Safer Affordable Fuel Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks (SAFE Vehicles Rule). The SAFE Vehicles Rule would amend the existing CAFE standards such that the requirements for model years 2021 through 2026 are lowered to the 2020 standards of 43.7 miles per gallon (mpg) and 204 grams of CO_2 per mile for passenger cars and 31.3 mpg and 284 grams of CO_2 per mile for light duty trucks (U.S. EPA 2018). In September 2019, the U.S. EPA and NHTSA published a final action, the SAFE Vehicles Rule Part One: One National Program, in the Federal Register. The action withdraws California's waiver for its GHG and zero-emission vehicles programs under the Clean Air Act and clarifies federal authority to preempt other state programs related to fuel economy standards. The joint action officially took effect November 26, 2019. In April 2021, the Biden administration, USEPA, and Department of Transportation began the process of dropping limitations on California's waiver. In December 2021, NHTSA issued a repealing of the SAFE Vehicle Rule Part One. In March 2022, USEPA did the same, thereby reinstating California's waiver and the ability of other states to adopt the California standards (Center for Climate and Energy Solutions [C2ES] 2022).

Construction Equipment Fuel Efficiency Standard

The U.S. EPA sets emission standards for construction equipment. The first federal standards (Tier 1) were adopted in 1994 for all off-road engines over 50 horsepower (hp) and were phased in by 2000. A new standard was adopted in 1998 that introduced Tier 1 for all equipment below 50 hp and established the Tier 2 and Tier 3 standards. The Tier 2 and Tier 3 standards were phased in by 2008 for all equipment. The current iteration of emissions standards for construction equipment are the Tier 4 efficiency requirements are contained in 40 Code of Federal Regulations Parts 1039, 1065, and 1068 (originally adopted in 69 Federal Register 38958 [June 29, 2004], and most recently updated in 2014 [79 Federal Register 46356]). Emissions requirements for new off-road Tier 4 vehicles were completely phased in by the end of 2015.

State

California Energy Plan

The CEC is responsible for preparing the California Energy Plan, which identifies emerging trends related to energy supply, demand, conservation, public health and safety, and the maintenance of a healthy economy. The 2008 California Energy Plan calls for the state to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies several strategies, including assistance to public agencies and fleet operators in implementing incentive programs for zero-emission vehicles and addressing their infrastructure needs, as well as encouragement of urban designs that reduce vehicle miles traveled and accommodate pedestrian and bicycle access.

Reducing California's Petroleum Dependence (Assembly Bill 2076)

Pursuant to Assembly Bill (AB) 2076 (Chapter 936, Statutes of 2000), the CEC and CARB prepared and adopted a joint-agency report, *Reducing California's Petroleum Dependence,* in 2003. 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. One of the performance-based goals of AB 2076 is to reduce petroleum demand to 15 percent below 2003 demand. Furthermore, in response to the CEC's 2003 and 2005 *Integrated Energy Policy Reports*, the Governor directed the CEC to take the lead in developing a long-term plan to increase alternative fuel use.

Integrated Energy Policy Report

Senate Bill 1389 (Chapter 568, Statutes of 2002) required the CEC to conduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices. The CEC uses these assessments and forecasts to develop energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the state's economy, and protect public health and safety. The most recent assessment, the *2018 Integrated Energy Policy Report*, contains two volumes. Volume I highlights the implementation of California's innovative policies and the role they have played in establishing a clean energy economy. Volume II, adopted February 20, 2019, provides more detail on several key energy policies, including decarbonizing buildings, increasing energy efficiency savings, and integrating more renewable energy into the electricity system (CEC 2018 and 2019).

California Renewable Portfolio Standard and Senate Bill 100

Established in 2002 under SB 1078, and accelerated by SB 107 (2006), SB X 1-2 (2011), and SB 100 (2018), California's Renewable Portfolio Standard (RPS) obligates investor-owned utilities, energy service providers, and community choice aggregators to procure 33 percent total retail sales of electricity from renewable energy sources by 2020, 60 percent by 2030, and 100 percent by 2045. SB 100 also states "that it is the policy of the state that eligible renewable energy resources and zero-carbon resources supply 100 percent of retail sales of electricity to California end-use customers and 100 percent of electricity procured to serve all state agencies by December 31, 2045." The California Public Utilities Commission and the CEC are jointly responsible for implementing the program.

Pavley Standards (Assembly Bill 1493)

AB 1493 (Chapter 200, Statutes of 2002), known as the Pavley bill, amended Health and Safety Code sections 42823 and 43018.5, thereby requiring CARB to develop and adopt regulations that achieve maximum feasible and cost-effective reduction of GHG emissions from passenger vehicles, light-duty trucks, and other vehicles used for noncommercial personal transportation in California.

Implementation of new regulations prescribed by AB 1493 required that the state apply for a waiver under the federal Clean Air Act. Although the U.S. EPA initially denied the waiver in 2008, the U.S. EPA approved a waiver in June 2009, and in September 2009, CARB approved amendments to its initially adopted regulations to apply the Pavley standards that reduce GHG emissions to new passenger vehicles in model years 2009 through 2016. According to CARB, implementation of the Pavley regulations is expected to reduce fuel consumption while also reducing GHG emissions.

Energy Action Plan

In the October 2005, the CEC and California Public Utilities Commission updated their energy policy vision by adding some important dimensions to the policy areas included in the original Energy Action Plan, such as the emerging importance of climate change, transportation-related energy issues. and research and development activities. The CEC adopted an update to the Energy Action Plan II in February 2008 that supplements the earlier energy action plans and examines the state's ongoing actions in the context of global climate change.

State Alternative Fuels Plan (Assembly Bill 1007)

AB 1007 (Chapter 371, Statutes of 2005) required the CEC to prepare a plan to increase the use of alternative fuels in California. The CEC prepared the State Alternative Fuels Plan in partnership with CARB and in consultation with other federal, state, and local agencies. The Alternative Fuels Plan presents strategies and actions California must take to increase the use of alternative non-petroleum fuels in a manner that minimizes costs to California and maximizes the economic benefits of in-state production. The Alternative Fuels Plan assessed various alternative fuels and developed fuel portfolios to meet California's goals to reduce petroleum consumption, increase alternative fuels use, reduce GHG emissions, and increase in-state production of biofuels without causing a significant degradation of public health and environmental quality.

Bioenergy Action Plan (Executive Order S-06-06)

Executive Order (EO) S-06-06 establishes targets for the use and production of biofuels and biopower and directs state agencies to work together to advance biomass programs in California while providing environmental protection and mitigation. The EO establishes the following targets to increase the production and use of bioenergy, including ethanol and biodiesel fuels made from renewable resources: produce a minimum of 20 percent of its biofuels in California by 2010, 40 percent by 2020, and 75 percent by 2050. EO S-06-06 also calls for the state to meet a target for use of biomass electricity. The 2011 Bioenergy Action Plan identifies those barriers and recommends actions to address them so that the state can meet its clean energy, waste reduction, and climate protection goals. The 2012 Bioenergy Action Plan updated the 2011 Plan and provided a more detailed action plan to achieve the following goals:

- Increase environmentally and economically sustainable energy production from organic waste
- Encourage development of diverse bioenergy technologies that increase local electricity generation, combined heat and power facilities, renewable natural gas, and renewable liquid fuels for transportation and fuel cell applications
- Create jobs and stimulate economic development, especially in rural regions of the state
- Reduce fire danger, improve air and water quality, and reduce waste

Title 24, California Code of Regulations

The California Code of Regulations (CCR), Title 24, is referred to as the California Building Code, or CBC. It consists of a compilation of several distinct standards and codes related to building construction including plumbing, electrical, interior acoustics, energy efficiency, handicap accessibility, and so on. The CBC's energy efficiency and green building standards are outlined below.

PART 6 – BUILDING ENERGY EFFICIENCY STANDARDS/ENERGY CODE

CCR Title 24, Part 6 is the Building Energy Efficiency Standards or California Energy Code. This code, originally enacted in 1978, establishes energy-efficiency standards for residential and non-residential buildings in order to reduce California's energy demand. New construction and major renovations must demonstrate their compliance with the current Energy Code through submittal and approval of a Title 24 Compliance Report to the local building permit review authority and the California Energy Commission (CEC).

PART 11 – CALIFORNIA GREEN BUILDING STANDARDS

The California Green Building Standards Code, referred to as CALGreen, was added to Title 24 as Part 11, first in 2009 as a voluntary code, which then became mandatory effective on January 1, 2011 (as part of the 2010 California Building Standards Code). The 2022 CALGreen includes mandatory minimum environmental performance standards for all ground-up new construction of residential and non-residential structures. It also includes voluntary tiers with stricter environmental performance standards for these same categories of residential and non-residential buildings. Local jurisdictions must enforce the minimum mandatory CALGreen standards and may adopt additional amendments for stricter requirements.

The mandatory standards applicable to energy require:

- Minimum 20 percent reduction in indoor water use relative to specified baseline levels;[1]
- Waste Reduction:
  - Minimum 65 percent non-hazardous construction/demolition waste diverted from landfills;
  - Non-residential and Multifamily dwellings with 5 or more units shall provide readily accessible areas identified for the depositing, storage and collection of nonhazardous materials for recycling including (at a minimum) paper, corrugated cardboard, glass, plastic, organic waste, and metals;
  - Nonresidential: 100 percent of trees, stumps, rocks and associated vegetation soils resulting from primary land clearing shall be reused or recycled.
- Inspections of energy systems to ensure optimal working efficiency;
- Low-pollutant emitting exterior and interior finish materials such as paints, carpets, vinyl flooring, and particleboards; and
- Electric Vehicle (EV) Charging for New Construction[2]:
  - Non-residential land uses shall comply with the following EV charging requirements based on the number of passenger vehicle parking spaces:
    - 0-9: no EV capable spaces or charging stations required;
    - 10 – 25: 4 EV capable spaces but no charging stations required;
    - 26 – 50: 8 EV capable spaces of which 2 must be equipped with charging stations;

[1] Similar to the compliance reporting procedure for demonstrating Energy Code compliance in new buildings and major renovations, compliance with the CALGreen water reduction requirements must be demonstrated through completion of water use reporting forms. Buildings must demonstrate a 20 percent reduction in indoor water use by either showing a 20 percent reduction in the overall baseline water use as identified in CALGreen or a reduced per-plumbing-fixture water use rate.

[2] EV Capable = a vehicle space with electrical panel space and load capacity to support a branch circuit and necessary raceways to support EV charging. EV Ready = a vehicle space which is provided with a branch circuit and any necessary raceways to accommodate EV charging stations including a receptacle for future installation of a charger. See 2022 California Green Building Standard Code, Title 24 Part 11 for full explanation of mandatory measures including exceptions.

  - 51 – 75: 13 EV capable spaces of which 3 must be equipped with charging stations;
  - 76 – 100: 17 EV capable spaces of which 4 must be equipped with charging stations;
  - 101 – 150: 25 EV capable spaces of which 6 must be equipped with charging stations;
  - 151 – 200: 35 EV capable spaces of which 9 must be equipped with charging stations;
  - >200: 20 percent of the total available parking spaces of which 25 percent must be equipped with charging stations;

- Non-residential land uses shall comply with the following EV charging requirements for medium-duty and heavy-duty vehicles: Warehouses, grocery stores, and retail stores with planned off-street loading spaces shall install EV supply and distribution equipment, spare raceway(s) or busway(s) and adequate capacity for transformer(s), service panel(s), or subpanel(s) at the time of construction based on the number of off-street loading spaces as indicated in Table 5.106.5.4.1 of the California Green Building Standards

- Bicycle Parking:
  - Non-residential short term bicycle parking for projects anticipated to generate visitor traffic: permanently anchored bicycle racks within 200 feet of visitor entrance for 5 percent of new visitor motorized vehicle parking spaces with a minimum of one two-bike capacity rack.
  - Non-residential buildings with tenant spaces of 10 or more employees/tenant-occupants: Secure bicycle parking for 5 percent of the employee/tenant-occupant vehicle parking spaces with a minimum of one bicycle parking facility.
- Shade Trees (Non-Residential):
  - Surface parking: Minimum No.10 container size or equal shall be installed to provide shade over 50 percent of the parking within 15 years (unless parking area covered by appropriate shade structures and/or solar);
  - Landscape areas: Minimum No. 10 container size or equal shall be installed to provide shade of 20 percent of the landscape area within 15 years;
  - Hardscape areas: Minimum No. 10 container size or equal shall be installed to provide shade of 20 percent of the landscape area within 15 years (unless covered by applicable shade structures and/or solar or the marked area is for organized sports activities);

The voluntary standards:

- Deconstruct existing buildings and reuse applicable salvaged materials;
- Tier I:
  - Stricter energy efficiency requirements;
  - Stricter water conservation requirements for specific fixtures;
  - minimum 65 percent reduction in construction waste with third-party verification, Minimum 10 percent recycled content for building materials;
  - Minimum 20 percent permeable paving;
  - Minimum 20 percent cement reduction;
- Tier II:
  - Stricter energy efficiency requirements,
  - Stricter water conservation requirements for specific fixtures;

- Minimum 75 percent reduction in construction waste with third-party verification,
- Minimum 15 percent recycled content for building materials;
- Minimum 30 percent permeable paving;
- Minimum 25 percent cement reduction;

Local

City of Los Angeles General Plan

The Air Quality Element of the City's General Plan includes a goal (Goal 5) that aims to increase energy efficiency through land use and transportation planning; the use of renewable resources and less-polluting fuels; and the implementation of conservation measures including passive methods such as site orientation and tree planting (Los Angeles 2003). Additionally, Section 19: Resource Management (Fossil Fuels) of the Conservation Element of the General Plan includes Policy 1, which aims to continue to encourage energy conservation and petroleum product reuse (Los Angeles 2001).

City of Los Angeles Green Building Code

The following types of projects are subject to the Los Angeles Green Building Code:

- All new buildings (residential and non-residential)
- All additions (residential and non-residential)
- Alterations with building valuations over $200,000 (residential and non-residential)

The Los Angeles Green Building Code is based on the 2016 CALGreen Standards. The program addresses five key areas: (1) Site: location, site planning, landscaping, storm water management, construction and demolition recycling; (2) Water Efficiency: efficient fixtures, wastewater reuse, and efficient irrigation; (3) Energy & Atmosphere: energy efficiency, and clean/renewable energy; (4) Materials & Resources: materials reuse, efficient building systems, and use of recycled and rapidly renewable materials; and (5) Indoor Environmental Quality: improved indoor air quality, increased natural lighting, and improved thermal comfort/control. Specifically, the Los Angeles Green Building Code requires all non-residential buildings to be constructed such that they are solar ready, while all residential buildings three stories and under must include solar photovoltaic systems. Likewise, all residential buildings greater than three stories must be solar ready.

Los Angeles Green New Deal: Sustainable City Plan 2019

The City of Los Angeles adopted its climate action plan, Green LA: An Action Plan to Lead the Nation in Fighting Global Warming (Green LA), in May 2007. Green LA set the goal of reducing the City's GHG emissions to 35 percent below 1990 levels by 2030. The action plan outlines several actions in the fields of energy, water, waste, and transportation. These actions include improved transportation centered around mobility for people rather than cars, increasing recycling to 70 percent diversion, meeting all additional water use through reclaimed water, and increasing renewable energy to 35 percent by 2020. The action plan also outlines goals to help residents become "energy misers" by distributing compact fluorescent lamps (CFL's) and increasing rebates for energy efficient appliances and retrofits.

In addition to Green LA, the City released its first Sustainable City pLAn in 2019, which is a roadmap for a Los Angeles that is environmentally healthy, economically prosperous, and equitable in

opportunity for all — now and over the next 20 years. The pLAn focuses on both short-term results and long-term goals that will transform our City. L.A.'s Green New Deal is an expanded vision of the pLAn—securing clean air and water and a stable climate, improving community resilience, expanding access to healthy food and open space, and promoting justice for all (Los Angeles 2019).

3 Impact Analysis

3.1 Methodology

Energy consumption is analyzed herein in terms of construction and operational energy use. Construction energy demand accounts for anticipated energy consumption during project construction, such as fuel consumed by construction equipment and construction workers' vehicles traveling to and from the project site. Operational energy demand accounts for the anticipated energy consumption during project operation, such as electricity consumed for operation of residential buildings including, but not limited to lighting, water conveyance, and air conditioning, as well as fuel consumed by passenger vehicles.

3.1.1 Construction

Construction-related energy demand was estimated using outputs from the California Emissions Estimator Model (CalEEMod) version 2022.1 based on project data provided by the BOE project manager, locally-appropriate industry-standard assumptions, and CalEEMod default values for projects in Los Angeles. The CalEEMod modeling was completed as part of the Air Quality and Greenhouse Gas Assessment prepared for the project by Terry A. Hayes Associates Inc. in July 2023 (Terry A. Hayes Associates Inc. 2023). See Appendix A for energy calculation sheet.

Project construction would also use building materials that contain embodied energy (i.e., energy used during the manufacturing and/or procurement of that material); however, as Section 15126.2(b) of the *CEQA Guidelines* states, "This [energy] analysis is subject to the rule of reason and shall focus on energy use that is caused by the project." In addition, it is reasonable to assume that manufacturers of building materials such as concrete, steel, and lumber would employ energy conservation practices in the interest of minimizing the cost of doing business. It also is reasonable to assume that non-custom building materials, such as drywall and standard-shaped structural elements, would have been manufactured regardless of the proposed project and, if not used for the project, would be used in a different project. Therefore, energy consumption required for the manufacturing and/or procurement of each building and construction material is not considered within the scope of this analysis.

3.1.2 Operation

Operational energy demand was estimated primarily based on project land use, including the anticipated maximum load, equipment specifications, and number of residents. Energy demand for the treatment and transport of water and wastewater was calculated using the estimated water demand from the CalEEMod output files contained in the Air Quality and Greenhouse Gas Assessment (Terry A. Hayes Associates Inc. 2023).

Electricity used to treat and convey water and wastewater for the proposed project was calculated in accordance with the methodology used for the air pollutant and GHG emission modeling in CalEEMod (California Air Pollution Control Officers Association [CAPCOA] 2021). The estimated amount of water consumed annually by the proposed project was multiplied by the number of pounds in one gallon of water (8.34 pounds = 1 gallon of water) to determine the total annual amount of Btu consumed for water and wastewater treatment. Btu is the amount of energy that is

required to raise the temperature of one pound of water by 1 degree Fahrenheit. It is conservatively assumed that all water consumed would be discharged to the wastewater treatment system.

Fuel consumption by vehicle trips to and from the project site was estimated using the vehicle miles traveled and vehicle fleet mix provided in the CalEEMod output files contained in the Air Quality and Greenhouse Gas Assessment (Terry A. Hayes Associates Inc. 2023). See Appendix A for energy calculation sheet.

3.2 Significance Thresholds

To determine whether a project would have a significant energy impact, Appendix G to the *CEQA Guidelines* requires consideration of whether a project would:

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

3.2.1 Wasteful, Inefficient, and Unnecessary Consumption of Energy

There are no formally adopted criteria signifying the relative efficiency of a project during its construction phase. Therefore, this analysis takes into consideration the equipment and processes employed during project construction to qualitatively determine whether energy consumed during construction would be wasteful, inefficient, or unnecessary.

The analysis of operational energy demand uses both quantitative and qualitative approaches to determine whether energy consumed during operation would be wasteful, inefficient, or unnecessary.

Furthermore, the analysis qualitatively considers the potential for inefficient, wasteful, or unnecessary energy consumption by the treatment and conveyance of water and wastewater and vehicle trips associated with project operation.

3.2.2 Consistency with Renewable Energy and Energy Efficiency Plans

The project's consistency with state and local plans for renewable energy and energy efficiency is evaluated qualitatively. A project is considered consistent with the provisions of these documents if it meets the general intent in advancing energy efficiency and increasing renewable energy in order to facilitate the achievement of City- and state-adopted goals and does not impede attainment of those goals. A given project need not be in perfect conformity with each and every planning policy or goals to be consistent. A project would be consistent if it would further the objectives and not obstruct their attainment. The following plans for renewable energy and energy efficiency would be applicable to the proposed project:

- Senate Bill (SB) 100, which mandates 100 percent renewable energy for California by 2045.
- Title 24 California Code of Regulations, which contains the state's Building Energy Efficiency Standards and CALGreen requirements.
- Los Angeles General Plan, which includes goals and policies relevant to maximizing the use of renewable resources and implementing energy conservation measures.

- Sustainable City pLAn, an implementation document describing enforceable GHG reduction requirements and mechanisms to monitor and evaluate progress.
- Los Angeles Green Building Program, which consists of a Standard of Sustainability and Standard of Sustainable Excellence to reduce the use of natural resources, create healthier living environments and minimize impacts on local, regional, and global ecosystems.

3.3 Impact Analysis

Issue 1:	Would the proposed project result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Construction

Project construction would require energy resources primarily in the form of fuel consumption to operate heavy equipment, light-duty vehicles, machinery, and generators. Temporary power may also be provided for construction trailers and electric construction equipment.

Energy use during construction would be temporary in nature and construction equipment used would be typical of similar-sized construction projects in the region. In addition, construction contractors would be required to comply with the provisions of CCR Title 13 Sections 2449 and 2485, which prohibit diesel-fueled commercial motor vehicles and off-road diesel vehicles from idling for more than five minutes and would minimize unnecessary fuel consumption. Table 4 summarizes estimated construction fuel consumption for the proposed project.

Table 4 Estimated Project Construction Fuel Consumption

	Energy Consumption[1]	
	Gasoline (gallons)	Diesel (gallons)
Construction	17,873	103,258
See Appendix A for Energy Calculations		

Electrical power would be consumed to construct the project, and the demand, to the extent required, would be supplied from existing electrical infrastructure in the area. Construction activities would require minimal electricity consumption and would not be expected to have any adverse impact on available electricity supplies or infrastructure. In addition, per applicable regulatory requirements such as the CALGreen standards, the project would comply with construction waste management practices to divert a minimum of 65 percent of construction and demolition debris. These practices would result in efficient use of energy necessary to construct the project. Furthermore, in the interest of cost-efficiency, construction contractors would not utilize fuel in a manner that is wasteful or unnecessary, such as scheduling unnecessary deliveries of materials or operating diesel-fueled equipment while not in use. Therefore, project construction would not result in potentially significant environmental effects due to the wasteful, inefficient, or unnecessary consumption of energy, and construction impacts would be less than significant.

Operation

Energy demand from project operation would include electricity consumed by building operations as well as gasoline fuel consumed by passenger vehicles of employees. Energy consumption is analyzed by fuel type in the following subsections.

Electricity Consumption

The energy consumption of the project was quantified and is estimated to consume 115 MWh of electricity annually. This estimate of electricity usage includes, but is not limited to, electricity to power indoor appliances, lighting, water conveyance, and air conditioning. Table 5 summarizes estimated annual operational electricity consumption for the proposed project.

Table 5 Estimated Project Annual Operational Electrical Consumption

	Energy Consumption[1]	
Electricity	**MWh**	**MMBtu**
Proposed	114.66	391.24

MMBtu = million metric British thermal units; MWh = megawatt-hours

[1] Energy consumption is converted to MMBtu

Numbers may not add up due to rounding.

Source: Terry A. Hayes Associates Inc. 2023.

Electricity would be provided by the LADWP. As of 2021, LADWP had a renewable energy procurement portfolio of 37 percent, which would reduce the amount of nonrenewable fuels consumed to supply electricity development facilitated by the project (LADWP 2022). Development facilitated by the project would comply with the 2022 California Building Energy Efficiency Standards for Residential Buildings and CALGreen (CCR Title 24, Parts 6 and 11) or later versions. The standards require the provision of electric vehicle charging equipment, recycling services, solar-ready development, and other energy efficiency measures that would reduce the potential for inefficient use of energy.

Day-to-day project operation would consume electricity to treat and transport water and wastewater to and from the project site. According to the CalEEMod output files and project-specific water consumption detailed in the Air Quality and Greenhouse Gas Study (Terry A. Hayes Associates Inc. 2023), the project would require approximately 5.5 million gallons of water per year, which would consume approximately 13.4[3] MWh per year for treatment and transport to and from the project site. The proposed project would incorporate higher-efficiency plumbing fixtures in accordance with the latest Title 24 requirements, which would reduce the potential for the inefficient or wasteful consumption of energy related to water and wastewater.

Given the aforementioned, project operations would not result in the wasteful, inefficient, or unnecessary consumption of electricity. Operation-related energy impacts from electricity consumption in the buildings themselves would be less than significant.

Natural Gas, Gasoline, and Diesel Fuel Consumption

Project operation would result in the consumption of gasoline and diesel fuels by vehicle trips and diesel delivery trucks. Based on anticipated vehicle miles traveled and the anticipated fleet mix in

[3] 5,454,422 gallons of water multiply by 8.33 pounds (Btu)/gallon water, divided by 3,400 Btu/1,000 MWh

the CalEEMod output, Table 6 shows operational vehicle trips would consume approximately 29,767 gallons of gasoline per year and approximately 4,738 gallons of diesel fuel annually (see Appendix A of this report for energy calculation sheet). This analysis does not account for factors that would facilitate use of active or public transportation. Therefore, fuel consumption by passenger vehicle trips would not be wasteful, inefficient, or unnecessary.

Table 6 Estimated Project Annual Operational Fuel Consumption

	Energy Consumption[1]	
Transportation	**Gasoline (gallons)**	**Diesel (gallons)**
Proposed	29,767	4,738
See Appendix A for Energy Calculations		

Overall Operational Energy Usage

As discussed in the preceding subsections, project operation would consume electricity as well as gasoline and diesel fuels. However, because of project design features that would maximize energy efficiency and conservation, overall project operation would not result in wasteful, inefficient, or unnecessary consumption of energy resources. Therefore, operational energy impacts would be less than significant.

Issue 2: Would the proposed project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

State Plans

As mentioned above, SB 100 mandates 100 percent clean electricity for California by 2045. Because development facilitated by the proposed project would be powered by the existing electricity grid, the project would be powered by renewable energy mandated by SB 100 and would not conflict with this statewide plan. Furthermore, the project would comply with all applicable Title 24 requirements pertaining to energy efficiency and renewable energy. As such, the project would not conflict with or obstruct implementation of state plans for renewable energy or energy efficiency.

Local Plans

As discussed in Section 2.3, the City's General Plan and Sustainable City pLAn include several goals and policies related to renewable energy and energy efficiency. The proposed project, located in LADWP's service area, would not conflict with renewable energy targets and energy efficiency plans of the LA DWP. In addition, the project's office use would be constructed to be consistent with Title 24 standards that are included in local plans. Therefore, potential impacts associated with renewable energy and energy efficiency would be less than significant.

The proposed project would also be consistent with the City of Los Angeles General Plan Air Quality and Conservation Elements, which encourages the use of renewable energy, energy conservation and energy efficiency techniques in all new building design, orientation and construction and support of alternative transportation and fuels. In summary, the proposed project would not result in an increased reliance on fossil fuels, and a decreased reliance on renewable energy sources and is consistent with applicable policies regarding energy conservation and renewable energy. Therefore, energy impacts would be less than significant.

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Appendix A

Project Assumptions and Calculations

BOE Asphalt Plant No. 1 Phase 2

Operational Fuel Consumption

Last Updated: 8/3/2023

Populate one of the following tables (Leave the other blank):

Annual VMT		OR	Daily Vehicle Trips	
Annual VMT:	678,900		Daily Vehicle Trips:	
			Average Trip Distance:	

Fleet Class	Fleet Mix
Light Duty Auto (LDA)	0.551902
Light Duty Truck 1 (LDT1)	0.058132
Light Duty Truck 2 (LDT2)	0.189202
Medium Duty Vehicle (MDV)	0.121798
Light Heavy Duty 1 (LHD1)	0.023507
Light Heavy Duty 2 (LHD2)	0.005520
Medium Heavy Duty (MHD)	0.010395
Heavy Heavy Duty (HHD)	0.007494
Other Bus (OBUS)	0.001030
Urban Bus (UBUS)	0.000592
Motorcycle (MCY)	0.026623
School Bus (SBUS)	0.000817
Motorhome (MH)	0.002988

Fuel Economy (MPG) [1]	
Passenger Vehicles	24.4
Light-Med Duty Trucks	17.9
Heavy Trucks/Other	7.5
Motorcycles	44

Fleet Mix

Vehicle Type	Percent	Fuel Type	Annual VMT: VMT	Vehicle Trips: VMT	Fuel Consumption (Gallons)
Passenger Vehicles	*55.19%*	*Gasoline*	374686	0.00	15355.99
Light-Medium Duty Trucks	*36.91%*	*Gasoline*	250604	0.00	14000.21
Heavy Trucks/Other	*5.23%*	*Diesel*	35536	0.00	4738.09
Motorcycle	*2.66%*	*Gasoline*	18074	0.00	410.78

Total Gasoline Consumption (gallons)	**29766.98**
Total Diesel Consumption (gallons)	**4738.09**

Sources:

[1] United States Department of Transportation, Bureau of Transportation Statistics. 2019. National Transportation Statistics 2019. Available at: https://www.bts.gov/topics/national-transportation-statistics.

BOE Asphalt Plant No. 1 Phase 2

Construction Fuel Consumption

Last Updated: 8/21/2023

Compression-Ignition Engine Brake-Specific Fuel Consumption (BSFC) Factors [1]:

HP: 0 to 100	0.0588	HP: Greater than 100	0.0529

Values above are expressed in gallons per horsepower-hour/BSFC.

CONSTRUCTION EQUIPMENT

Construction Equipment	#	Hours per Day	Horsepower	Load Factor	Construction Phase	Fuel Used (gallons)
Tractors/Loaders/Backhoes	3	8	97	0.37	Demolition Phase	13,413.55
Rubber Tired Dozers	1	8	247	0.4	Demolition Phase	11,071.63
Concrete/Industrial Saws	1	8	81	0.73	Demolition Phase	7,366.42
Graders	1	8	187	0.41	Site Preparation	8,591.72
Rubber Tired Dozers	1	6	247	0.4	Site Preparation	8,303.73
Tractors/Loaders/Backhoes	1	8	97	0.37	Site Preparation	4,471.18
Generator Sets	1	8	84	0.74	Building Construction	7,743.90
Tractors/Loaders/Backhoes	1	6	97	0.37	Building Construction	3,353.39
Welders	1	8	46	0.45	Building Construction	2,578.81
Rough Terrain Forklifts	1	8	100	0.4	Building Construction	4,983.21
Tractors/Loaders/Backhoes	1	8	97	0.37	Paving	4,471.18
Pavers	1	6	130	0.42	Paving	4,588.90
Paving Equipment	1	8	132	0.36	Paving	5,325.14
Rollers	1	7	80	0.38	Paving	3,313.83
Cement and Mortar Mixers	1	6	9	0.56	Paving	470.91
Air Compressors	1	6	78	0.48	Architectural Coating	3,498.21
Aerial Lifts	1	8	63	0.31	Architectural Coating	2,433.05

Total Fuel Used	95,978.77
	(Gallons)

Construction Phase	Days of Operation
Demolition Phase	30
Site Preparation Phase	20
Building Construction Phase	265
Paving Phase	130
Architectural Coating Phase	130
Total Days	575

WORKER TRIPS

Constuction Phase	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
Demolition	24.2	30	18.5	688.02
Site Preparation	24.2	20	18.5	458.68
Building Construction Phase	24.2	60	18.5	12154.96
Paving	24.2	22	18.5	2186.36
Architectural Coating	24.2	24	18.5	2385.12
			Total	**17,873.14**

HAULING AND VENDOR TRIPS

Trip Class	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
HAULING TRIPS				
Demolition	6.5	900	20.0	2769.23
Site Preparation	6.5	400	20.0	1230.77
Paving	6.5	260	20.0	800.00
		Total		**4,800.00**
VENDOR TRIPS				
Building Construction	6.5	4	10.2	1663.38
Paving	6.5	2	10.2	408.00
Architectural Coating	6.5	2	10.2	408.00
		Total		**2,479.38**

Total Gasoline Consumption (gallons)	**17,873.14**
Total Diesel Consumption (gallons)	**103,258.15**

Sources:

[1] United States Environmental Protection Agency. 2018. *Exhaust and Crankcase Emission Factors for Nonroad Compression-Ignition Engines in MOVES2014b* . July 2018. Available at: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100UXEN.pdf.

[2] United States Department of Energy Energy Efficiency & Renewable Energy. 2020. https://afdc.energy.gov/data.

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