

Appendix IS-4

Energy Analysis Worksheets

Getty Center Parking Improvement Project

Draft MND

Appendix IS-4

Energy Analysis Spreadsheets

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Getty Center Parking Improvement Project

Summary of Energy Use During Construction

Electricity	
Water Consumption	5,299 kWh
Temporary Power (lighting, tools)	3,326 kWh
Total:	8,626 kWh
Gasoline	
On Road	660 Gallons
Off Road	0 Gallons
Total:	660 Gallons
Diesel	
On Road	3,380 Gallons
Off Road	8,292 Gallons
Total:	11,672 Gallons
Total Mobile	12,332

Summary of Energy Use During Operations

	Baseline (Buildout)	Buildout Without Project Features	Buildout With Project Features
Electricity			
Electricity (building)	0	978,581	978,525 kWh/year
Electricity (water)	0	7,883	7,883 kWh/year
Electricity Total	0	986,464	986,408 kWh/year
Natural Gas	0	0	0 cu ft/year
Mobile			
Gasoline	0	0	0 Gallons/year
Diesel	0	0	0 Gallons/year
Mobile Total	0	0	0 Gallons/year

Construction Electricity Usage

Construction Electricity Usage

Caterpillar 40-C4.4 Generator^a

Peak Power Rating - Prime (kW)	36
Typical Load	70%
Average Output (kW)	25.2
Hours per Day	2
Average Daily Output (kWh)	50.4
Building Construction Phase Duration (days)	66
Total Construction (kWh)	3,326
Total Construction (MWh)	3.3

^a<https://www.albancat.com/content/uploads/2014/06/40-C4.4-Spec-Sheet.pdf>

Calculation of Diesel Usage During Construction (Offroad Equipment):

Phase Name	Off Road Equipment Type	Units	Hours	HP	Load Factor	Avg. Daily Factor	Number of Days	Diesel Fuel Usage	
Site Preparation	Air Compressors	1	8	78	0.48	0.6	22	198	
Site Preparation	Graders	1	8	187	0.41	0.6	22	405	
Site Preparation	Rubber Tired Dozers	0	7	247	0.4	0.6	22	0	
Site Preparation	Tractors/Loaders/Backhoes	2	8	97	0.37	0.6	22	379	
Grading	Excavators	1	8	158	0.38	0.6	44	634	
Grading	Graders	0	6	187	0.41	0.6	44	0	
Grading	Rubber Tired Dozers	1	8	247	0.4	0.6	44	1,043	
Grading	Rubber Tired Loaders	1	8	203	0.36	0.6	44	772	
Grading	Tractors/Loaders/Backhoes	1	8	97	0.37	0.6	44	379	
Grading	Trenchers	1	8	78	0.5	0.6	44	412	
Paving	Air Compressors	1	8	78	0.48	0.6	66	593	
Paving	Cement and Mortar Mixers	1	8	9	0.56	0.6	66	80	
Paving	Forklifts	1	8	89	0.2	0.6	66	282	
Paving	Generator Sets	1	8	84	0.74	0.6	66	985	
Paving	Paving Equipment	1	8	132	0.36	0.6	66	753	
Paving	Rollers	1	8	80	0.38	0.6	66	482	
Paving	Tractors/Loaders/Backhoes	1	8	97	0.37	0.6	66	568	
Paving	Welders	1	8	46	0.45	0.6	66	328	
Building Construction	Air Compressors	1	0	78	0.48	0.6	44	0	
Architectural Coatings	Air Compressors	1	0	78	0.48	0.6	23	0	
Total Diesel Usage for Construction (Offr								8,291.5	gallons of diesel fuel

gallons of diesel fuel per horsepower-hour=

0.05

Notes: Equipment assumptions are provide in the CalEEMod output files and fuel usage estimate of 0.05 gallons of diesel fuel per horsepower-hour is from the SCAQMD CEQA Air Quality Handbook, Table A9-3E.

EMFAC2014 Emissions Inventory

Region Type: Air Basin

Region: South Coast

Calendar Year:

2022

Season: Annual

Vehicle Classification: EMFAC2011 Categories

Region	Veh_Class	Fuel	Speed (miles/hr)	Population (vehicles)	VMT (miles/day)	Trips (trips/day)	Fuel_Gas (1000 gallons/day)	Fuel_DSL (1000 gallons/day)	Miles per Gallon
South Coast	LDA	GAS	Aggregate	6,370,883	246,404,319	30,101,253	7,990	0	30.8
South Coast	LDT1	GAS	Aggregate	716,397	26,563,675	3,305,301	1,003	0	26.5
South Coast	LDT2	GAS	Aggregate	2,182,002	82,381,240	10,234,301	3,340	0	24.7
Construction Worker Trip (Composite LDA/LDT1/LDT2):									28.2
South Coast	HHDT	DSL	Aggregate	98,508	11,795,119	994,225	0	1763.0	6.7

Notes: Consistent with CalEEMod, a construction worker trip is assumed to be a composite of 50% LDA , 25% for LDT1, and 25% for LDT2. Used EMFAC 2011 Categories for construction as EMFAC2011 has specific categories for vehicle class T7.

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Calculation of Gasoline and Diesel Usage During Phase 1 Construction (Onroad Vehicles):

Phase Name	Daily Woker Trips	Daily Vendor Trips	Days	Total Worker Trips	Total Vendor Trips	Total Haul Trips	Trip Length (miles)			Total Length (miles)			Avg. Daily Factor (worker and vendor)	Gallons of Fuel	
							Worker	Vendor	Haul	Worker	Vendor	Haul		Gasoline	Diesel
Site Preparation	10	0	22	220	0	13	14.7	6.9	22	3234	0	286	0.6	68.8	42.7
Grading	13	0	44	572	0	500	14.7	6.9	22	8408.4	0	11000	0.6	178.9	1,644.1
Paving	20	20	66	1320	1320	20	14.7	13.8	20	19404	18216	400	0.6	412.8	1,693.4
													Total:	660.4	3,380.3

Worker Miles per gallon= 28.21 gasoline
 Vedor/Haul miles per gallon= 6.69 diesel

Notes: Consistent with CalEEMod worker vehicles are assumed to be gasoline and 50% LDA, 25%LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy Duty Trucks (T7).

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Water Usage for Control of Fugitive Dust during Construction:

Phase	Days	Average Daily Acreage Disturbed	Gallons Per Year	Electricity (kWhr)
Site Preparation	22	0.5	33,220	323
Grading	44	1.5	199,320	1,939
Paving	66	1.5	298,980	2,908
Total:			544,808	5,299

Water application rate= 3020 gal/acre/day
 kWhr equivalent= 0.01 kWhr

Notes: 1) Gallons per year of water usage for dust control is calculated based on a minimum control efficiency of 66% (three times daily) with an application rate of 3,020 gal/acre/day (Air & Waste Management Association Air Pollution Engineering Manual (1992 Edition)) and average of 26 construction days per month.
 2) CalEEMod Default: Each gallon of delivered potable water in Southern California is associated with 0.009727 kWhr of electricity).

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Electric Vehicle (EV) Modeling Parameters

Electricity Calculations for EV Charging Stations

Light Duty Vehicle (Visitor) - Number of Charging Stations	24
Average Output (kW)	7.2 kW
Hours of Operation per day	12
Days of Operation per year	312 6 days per week
Annual EV Charging Station Electricity Usage (Visitors)	646,963 kWh/year
Bus - Number of Charging Stations	2
Average Output (kW)	65 kW
Hours of Operation per day	8
Days of Operation per year	312 6 days per week
Annual EV Charging Station Electricity Usage (Bus)	323,482 kWh/year
Total EV Charging Station Electricity Usage	970,445 kWh/year
Electricity Usage per Square Foot	7.4 kWh/SF
Fuel Economy of Electric Vehicle ¹	0.33 kWh/mile
Miles on Electric Vehicle	2,940,742
Average MPG ²	25.99
Fuel Savings (gallons)	113,156

Notes:

- 1) US Department of Energy, 2013. Benefits and Considerations of Electricity as a Vehicle Fuel. Available at: http://afdc.energy.gov/fuels/electricity_benefits.html.
- 2) California Air Resources Board EMFAC2017 Model. Year 2022. Los Angeles County. Average Fuel Economy

**Getty Parking - Buildout Operations
Los Angeles-South Coast County, Annual**

Land Use Details

<i>Land Uses</i>	<i>Size</i>	<i>Metric</i>	<i>Lot Acreage</i>	<i>Floor Surface Area</i>	<i>Population</i>
Parking Lot	217.00	Space	1.98	130,630.00	0
Health Club	0.25	1000sqft	0.01	250.00	0

Trip Summary Information

<i>Land Uses</i>	<i>Average Daily Trip Rate</i>			<i>Mitigated</i>
	<i>Weekday</i>	<i>Saturday</i>	<i>Sunday</i>	
Health Club	0.0	0.0	0.0	0
Parking Lot	0.0	0.0	0.0	0
Total	0.00	0.00	0.00	0

Mitigated Gasoline and Diesel Usage

	<i>Gasoline</i>	<i>Diesel</i>
<i>Miles/Gallon</i>	26.0	10.3
<i>% Fleet Mix</i>	93.2%	6.8%
Total (Gallons):	0	0

Energy by Land Use - Natural Gas (Mitigated)

<i>Land Uses</i>	<i>kBTU/yr</i>	<i>cu ft/year</i>
Health Club	0.0	0
Parking Lot	0.0	0
Total	0	0

Energy by Land Use - Electricity (Mitigated)

<i>Land Uses</i>	<i>kWH/yr</i>
Health Club	2,719
Parking Lot	975,806
Total	978,525

Water Detail (Unmitigated)

<i>Land Uses</i>	<i>Indoor Use (Mgal)</i>	<i>Outdoor Use (Mgal)</i>	<i>Electricity Use (kWh/yr)</i>
Health Club	0.008	0.801	7,883
Parking Lot	0.000	0.000	0
Total	0.01	0.80	7,883

Notes: Indoor water results in 0.0111 kWhr of electricity usage per gallon from delivery, treatment, and distribution of water within Southern California (CalEEMod). Outdoor water results in 0.009727 kWhr of electricity usage per gallon from delivery and distribution of water within Southern California (CalEEMod).

Peak Electricity Demand Calculations

Electrical Load Factor Equation

$$f_{Load} = \frac{\text{Average load}}{\text{Maximum load in given time period}}$$

Load Factor (%)¹ **52%**

Project Electricity Demand (Operational)

	Baseline (Existing)	Project	Net Increase
Annual Demand			
Building (MWh)	0	979	979
Water (MWh)	0	8	8
Total (MWh)	0	986	986

Average Daily Demand

Building (kWh)	0	2,681	2,681
Water (kWh)	0	22	22
Total (kWh)	0	2,702	2,702

Average Load

Building (kW)	0	112	112
Water (kW)	0	1	1
Total (kW)	0	113	113

Peak Load Calculation

Peak Load (kW)	0	216	216
Systemwide Peak Load (MW)			5,854
Percent of Peak			0.0037%

¹2017 Report: System Efficiency of California's Electric Grid. California Public Utilities Co 2017. Page 11, Figure 6. Visual estimate.