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SUBJECT: CITY CENTER ENERGY TABLES

The following Energy Tables were prepared for the proposed City Center development (referred to as "Project") which is located in the City of Redlands.

CONSTRUCTION POWER COSTS

Based on the *2022 National Construction Estimator* (1), the typical power cost per 1,000 square feet of building construction per month is estimated to be $2.41. The Project is proposed to consist of multi-family residential units and restaurant uses. The Project would also develop a ground floor and subterranean parking garage located beneath the proposed residential building. The Project includes 131 multifamily dwelling units and 23,476 square feet (sf) of amenity space consisting of a 9,770 sf Roof Deck, 7,380 sf Pool Plaza, 5,356 sf Spa Plaza, and 527 sf Upper Lounge. The Project also proposes 10,550 sf of restaurant space on the corner of Eureka Street and Brookside Avenue. The residential units would include studio, studio/den, one-bedroom, two-bedroom, and two-bedroom/den floor plans that range from approximately 517 sf to 1,252 sf. The residential building would include approximately 23,476 sf of amenity space, including a pool, lounge, rooftop bar, fitness room, shared kitchen, and game room. The proposed restaurant space would be split into three separate pads. Restaurant Pad 1 is approximately 3,505 sf, Restaurant Pad 2 is approximately 3,450 sf, and Restaurant Pad 3 is approximately 3,578 sf. Restaurant parking would be provided through a surface lot adjacent to the proposed restaurants. Table 1 estimates the total power cost of the on-site electricity usage during the construction of the proposed Project to be approximately $9,747.67.

TABLE 1: PROJECT CONSTRUCTION POWER COST

Land Use	Power Cost (per 1,000 SF)	Size (1,000 SF)	Construction Duration (months)	Project Construction Power Cost
Apartments Mid Rise	$2.41	123.623	18	$5,362.77
High Turnover (Sit Down Restaurant)	$2.41	10.550	18	$457.66
Enclosed Parking with Elevator	$2.41	44.921	18	$1,948.67
Landscape	$2.41	9.407	18	$408.08
Other Asphalt Surfaces	$2.41	36.203	18	$1,570.50
			CONSTRUCTION POWER COST	***$9,747.67***

CONSTRUCTION ELECTRICITY USAGE

The SCE's general service and residential rate schedule were used to determine the Project's electrical usage. As of January 1, 2022, SCE's general service rate is $0.13 per kilowatt hours (kWh) of electricity for commercial uses, $0.17 per kWh of electricity of residential uses, and $0.13 per kWh of electricity for street and area lighting (2), the total electricity usage from on-site Project construction related activities is estimated to be approximately 65,110 kWh.

TABLE 2: PROJECT CONSTRUCTION ELECTRICITY USAGE

Land Use	Cost per kWh	Project Construction Electricity Usage (kWh)
Apartments Mid Rise	$0.17	31,821
High Turnover (Sit Down Restaurant)	$0.13	3,474
Enclosed Parking with Elevator	$0.13	14,794
Landscape	$0.13	3,098
Other Asphalt Surfaces	$0.13	11,923
CONSTRUCTION ELECTRICITY USAGE		***65,110***

CONSTRUCTION EQUIPMENT FUEL CONSUMPTION

Fuel consumption estimates are presented in Table 3. The aggregate fuel consumption rate for all equipment is estimated at 18.5 hp-hr-gal., obtained from California Air Resources Board (CARB) 2018 Emissions Factors Tables and cited fuel consumption rate factors presented in Table D-24 of the Moyer guidelines (3). For the purposes of this analysis, the calculations are based on all construction equipment being diesel-powered which is standard practice consistent with industry standards. Diesel fuel would be supplied by existing commercial fuel providers serving the City and region. As presented in Table 3, Project construction activities would consume an estimated 54,473 gallons of diesel fuel.

TABLE 3: CONSTRUCTION EQUIPMENT FUEL CONSUMPTION ESTIMATES

Construction Activity	Duration (Days)	Equipment	HP Rating	Quantity	Usage Hours	Load Factor	HP-hrs/day	Total Fuel Consumption
Site Preparation	5	Crawler Tractors	87.0	4.00	8.00	0.43	1,197	324
		Rubber Tired Dozers	367	3.00	8.00	0.40	3,523	952
Grading	8	Crawler Tractors	87.0	3.00	8.00	0.43	898	388
		Excavators	36.0	1.00	8.00	0.38	109	47
		Graders	148	1.00	8.00	0.41	485	210
		Rubber Tired Dozers	367	1.00	8.00	0.40	1,174	508
Building Construction	390	Cranes	367	1.00	8.00	0.29	851	17,949
		Crawler Tractors	87.0	3.00	8.00	0.43	898	18,927
		Forklifts	82.0	3.00	8.00	0.20	394	8,298
		Generator Sets	14.0	1.00	8.00	0.74	83	1,747
		Welders	46.0	1.00	8.00	0.45	166	3,491
Paving	18	Cement and Mortar Mixers	10.0	2.00	8.00	0.56	90	87
		Crawler Tractors	87.0	1.00	8.00	0.43	299	291
		Pavers	81.0	1.00	8.00	0.42	272	265
		Paving Equipment	89.0	2.00	8.00	0.36	513	499
		Rollers	36.0	2.00	8.00	0.38	219	213
Architectural Coating	36	Air Compressors	37.0	1.00	8.00	0.48	142	276
CONSTRUCTION FUEL DEMAND (GALLONS DIESEL FUEL)								***54,473***

CONSTRUCTION WORKER FUEL ESTIMATES

For purposes of analysis, it is assumed that 50% of all worker trips are from light-duty-auto vehicles (LDA), 25% are from light-duty-trucks with a gross vehicle weight rating (GVWR) of less than 6,000 lbs. and equivalent test weight (ETW) of less than or equal to 3,750 lbs (LDT1), and 25% are from light-duty-trucks with a GVWR of less than 6,000 lbs. and ETW between 3,751 lbs. and 5,750 lbs (LDT2). Data regarding Project related construction worker trips were based on CalEEMod 2022.1 model defaults utilized within the AQIA. Vehicle fuel efficiencies for LDAs, LDT1s, and LDT2s were estimated using information generated within the 2021 version of the EMFAC developed by the CARB.

Table 4 provides an estimated annual fuel consumption resulting from the Project generated by LDAs, LDT1s, and LDT2s related to construction worker trips. Based on Table 4, it is estimated that 32,467 gallons of fuel will be consumed related to construction worker trips during full construction of the proposed Project.

TABLE 4: CONSTRUCTION WORKER FUEL CONSUMPTION ESTIMATES (1 OF 2)

Year	Construction Activity	Duration (Days)	Worker Trips/Day	Trip Length (miles)	VMT	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
2023	LDA						
	Site Preparation	5	9	18.5	833	30.68	27
	Grading	8	8	18.5	1,184	30.68	39
	Building Construction	181	59	18.5	197,562	30.68	6,438
	LDT1						
	Site Preparation	5	5	18.5	463	24.14	19
	Grading	8	4	18.5	592	24.14	25
	Building Construction	181	30	18.5	100,455	24.14	4,162
	LDT2						
	Site Preparation	5	5	18.5	463	23.82	19
	Grading	8	4	18.5	592	23.82	25
	Building Construction	181	30	18.5	100,455	23.82	4,218
2024	LDA						
	Building Construction	209	59	18.5	228,124	31.57	7,225
	Paving	18	10	18.5	3,330	31.57	105
	Architectural Coating	36	12	18.5	7,992	31.57	253

TABLE 4: CONSTRUCTION WORKER FUEL CONSUMPTION ESTIMATES (2 OF 2)

Year	Construction Activity	Duration (Days)	Worker Trips/Day	Trip Length (miles)	VMT	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
2024	LDT1						
	Building Construction	209	30	18.5	115,995	24.59	4,717
	Paving	18	5	18.5	1,665	24.59	68
	Architectural Coating	36	6	18.5	3,996	24.59	162
	LDT2						
	Building Construction	209	30	18.5	115,995	24.51	4,733
	Paving	18	5	18.5	1,665	24.51	68
	Architectural Coating	36	6	18.5	3,996	24.51	163
TOTAL CONSTRUCTION WORKER FUEL CONSUMPTION							***32,467***

CONSTRUCTION VENDOR FUEL ESTIMATES

It is assumed that 50% of all vendor trips are from Medium-Heavy-Duty-Trucks (MHDT) and 50% are from Heavy-Heavy-Duty Trucks (HHDT). These assumptions are consistent with the CalEEMod 2022.1 defaults utilized within the within the AQIA. Vehicle fuel efficiencies for MHDTs and HHDTs were estimated using information generated within EMFAC2021.

Table 5 shows the estimated fuel economy of MHDTs and HHDTs accessing the Project site. Based on Table 5, fuel consumption from construction trips will total approximately 13,523 gallons.

TABLE 5: CONSTRUCTION VENDOR/HAULING FUEL CONSUMPTION ESTIMATES (1 OF 2)

Year	Construction Activity	Duration (Days)	Vendor/ Hauling Trips/Day	Trip Length (miles)	VMT	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
2023	MHDT						
	Site Preparation	5	1	10.2	51	8.30	6
	Grading	8	1	10.2	82	8.30	10
	Building Construction	181	11	10.2	20,308	8.30	2,448
	HHDT (Vendor)						
	Site Preparation	5	1	10.2	51	5.94	9
	Grading	8	1	10.2	82	5.94	14
	Building Construction	181	11	10.2	20,308	5.94	3,418

TABLE 5: CONSTRUCTION VENDOR/HAULING FUEL CONSUMPTION ESTIMATES (2 OF 2)

Year	Construction Activity	Duration (Days)	Vendor/ Hauling Trips/Day	Trip Length (miles)	VMT	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
2023	HHDT (Hauling)						
	Grading	8	34	20	5,440	5.94	916
2024	MHDT						
	Building Construction	209	11	10.2	23,450	8.34	2,811
	HHDT (Vendor)						
	Building Construction	209	11	10.2	23,450	6.03	3,892
TOTAL CONSTRUCTION VENDOR/HAULING FUEL CONSUMPTION							***13,523***

TRANSPORTATION ENERGY DEMANDS

Energy that would be consumed by Project-generated traffic is a function of total VMT and estimated vehicle fuel economies of vehicles accessing the Project site. Table 6 presents the estimated annual fuel consumption from project-generated traffic.

FACILITY ENERGY DEMANDS

Project building operations and Project site maintenance activities would result in the consumption of natural gas and electricity. Natural gas would be supplied to the Project by Southern California Gas (SoCalGas) and electricity would be supplied to the Project by SCE. Annual natural gas and electricity demands of the Project are summarized in Table 7.

TABLE 6: PROJECT-GENERATED TRAFFIC ANNUAL FUEL CONSUMPTION

Vehicle Type	Average Vehicle Fuel Economy (mpg)	Annual VMT	Estimated Annual Fuel Consumption (gallons)
LDA	31.57	3,079,771	97,543
LDT1	24.59	255,605	10,394
LDT2	24.51	1,226,330	50,042
MDV	19.97	947,476	47,453
LHDT1	15.81	179,062	11,323
LHDT2	14.97	48,328	3,229
MHDT	8.34	104,185	12,490
HHDT	6.03	104,853	17,402
OBUS	6.15	3,843	625
UBUS	4.86	1,940	399
MCY	41.98	129,861	3,093
SBUS	6.43	6,709	1,044
MH	5.74	29,652	5,164
TOTAL ANNUAL FUEL CONSUMPTION		***6,117,613***	***260,203***

MDV = Medium Duty Trucks; LHDT1 = Light-Duty Trucks (Vehicles under the LHDT1 category have a GVWR of 8,501 to 10,000 lbs.);
LHDT2 = Light-Duty Trucks (Vehicles under the LHDT2 category have a GVWR of 10,001 to 14,000 lbs.); OBUS = Other Buses; UBUS = Urban Buses
MCY = Motorcycle; SBUS = School Bus; MH = Motorhome

TABLE 7: PROJECT ANNUAL OPERATIONAL NATURAL GAS AND ELECTRICITY DEMAND SUMMARY

Land Use	Natural Gas Demand (kBTU/year)	Electricity Demand (kWh/year)
Apartments Mid Rise	1,445,871	565,417
High Turnover (Sit Down Restaurant)	1,140,588	350,667
Enclosed Parking with Elevator	0	797
Landscape	0	0
Other Asphalt Surfaces	0	0
TOTAL PROJECT ENERGY DEMAND	***2,586,459***	***916,881***

REFERENCES

1. **Pray, Richard.** *2022 National Construction Estimator.* Carlsbad : Craftsman Book Company, 2022.
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3. **California Air Resources Board.** *Methods to Find the Cost-Effectiveness of Funding Air Quality Projects For Evaluating Motor Vehicle Registration Fee Projects And Congestion Mitigation and Air Quality Improvement (CMAQ) Projects, Emission Factor Tables.* 2018.