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SUBJECT: MERRILL COMMERCE CENTER SPECIFIC PLAN ENERGY TABLES

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

CONSTRUCTION EQUIPMENT ELECTRICITY USAGE ESTIMATES

Based on the *2017 National Construction Estimator*, Richard Pray (2017) (1), the typical power cost per 1,000 square feet of building construction per month is estimated to be $2.32. The proposed development consists of 6,312,000 square feet of high-cube fulfillment center warehouse use, 701,400 square feet of high-cube cold storage warehouse and up to 1,441,000 square feet of business park uses (total of 8,455,000 square feet of development). Table 1 estimates the total power cost of the on-site electricity usage during the construction of the proposed Project to be approximately $778,781.31.

TABLE 1: PROJECT CONSTRUCTION POWER COST (1 OF 2)

Land Use	Power Cost (per 1,000 construction per month)	Total Building Size (1,000 sf)	Construction Duration (months)	Project Construction Power Cost
Phase A (2022) - Planning Areas 4 & 5				
PA4: High-Cube Fulfillment Center Warehouse	$2.32	642.477	30	$44,716.40
PA5: High-Cube Fulfillment Center Warehouse	$2.32	1,237.523	30	$86,131.60
PA4/PA5: High-Cube Cold Storage Warehouse	$2.32	300.000	30	$20,880.00
Phase B (2025) - Planning Areas 1, 2, 3, & 6				
PA1: High-Cube Fulfillment Center Warehouse	$2.32	1,293.835	36	$108,061.10
PA2: High-Cube Fulfillment Center Warehouse	$2.32	1,364.441	36	$113,958.11
PA3: High-Cube Fulfillment Center Warehouse	$2.32	673.968	36	$56,289.81
PA6: High-Cube Fulfillment Center Warehouse	$2.32	1,100.356	36	$91,901.73
PA1-3/PA5: High-Cube Cold Storage Warehouse	$2.32	401.400	36	$33,524.93

TABLE 1: PROJECT CONSTRUCTION POWER COST (2 OF 2)

Land Use	Power Cost (per 1,000 construction per month)	Total Building Size (1,000 sf)	Construction Duration (months)	Project Construction Power Cost
Phase C (2026) - Planning Areas 1A, 3A, 4A, 5A, & 6A				
PA1A: Business Park	$2.32	598.000	12	$16,648.32
PA3A: Business Park	$2.32	150.000	12	$4,176.00
PA4A: Business Park	$2.32	152.000	12	$4,231.68
PA5A: Business Park	$2.32	293.000	12	$8,157.12
PA6A: Business Park	$2.32	248.000	12	$6,904.32
Off-Site Utilities Infrastructure				
Off-Site Utilities Infrastructure	$2.32	4,935.350	16	$183,200.19
TOTAL PROJECT CONSTRUCTION COST				***$778,781.31***

Electricity will be provided to the Project by Southern California Edison (SCE). As shown in Table 2, using the total power cost (calculated in Table 1) and SCE's July 26, 2019, general service rate schedule (GS-1) for industrial land uses of $0.08 per kWh of electricity (2), the total electricity usage from on-site Project construction related activities is estimated to be approximately 9,734,766 kWh.

TABLE 2: PROJECT CONSTRUCTION ELECTRICITY USAGE (1 OF 2)

Land Use	Cost per kWh	Project Construction Electricity Usage (kWh)
Phase A (2022) - Planning Areas 4 & 5		
PA4: High-Cube Fulfillment Center Warehouse	$0.08	558,955
PA5: High-Cube Fulfillment Center Warehouse	$0.08	1,076,645
PA4/PA5: High-Cube Cold Storage Warehouse	$0.08	261,000
Phase B (2025) - Planning Areas 1, 2, 3, & 6		
PA1: High-Cube Fulfillment Center Warehouse	$0.08	1,350,764
PA2: High-Cube Fulfillment Center Warehouse	$0.08	1,424,476
PA3: High-Cube Fulfillment Center Warehouse	$0.08	703,623
PA6: High-Cube Fulfillment Center Warehouse	$0.08	1,148,772
PA1-3/PA5: High-Cube Cold Storage Warehouse	$0.08	419,062

TABLE 2: PROJECT CONSTRUCTION ELECTRICITY USAGE (2 OF 2)

Land Use	Cost per kWh	Project Construction Electricity Usage (kWh)
Phase C (2026) - Planning Areas 1A, 3A, 4A, 5A, & 6A		
PA1A: Business Park	$0.08	208,104
PA3A: Business Park	$0.08	52,200
PA4A: Business Park	$0.08	52,896
PA5A: Business Park	$0.08	101,964
PA6A: Business Park	$0.08	86,304
Off-Site Utilities Infrastructure		
Off-Site Utilities Infrastructure	$0.08	2,290,002
TOTAL PROJECT CONSTURCTION ELECTRICTY USAGE (kWh)		***9,734,766***

CONSTRUCTION EQUIPMENT FUEL ESTIMATES

Fuel consumption estimates are presented in Tables 3 through 6. 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 639,042 gallons of diesel fuel.

TABLE 3: CONSTRUCTION EQUIPMENT FUEL CONSUMPTION ESTIMATES

Activity/Duration	Equipment	Horsepower Rating	Quantity	Usage Hours	Load Factor	hp-hrs/day	Total Fuel Consumption (gal. diesel fuel)
Phase A (2022) - Planning Areas 4 & 5							
Demolition (60 days)	Concrete/Industrial Saws	81	1	8	0.73	473	1,534
	Excavators	158	3	8	0.38	1,441	4,673
	Rubber Tired Dozers	247	2	8	0.40	1,581	5,127
Site Preparation (60 days)	Crawler Tractors	212	4	8	0.43	2,917	9,461
	Rubber Tired Dozers	247	3	8	0.40	2,371	7,690
Grading (100 days)	Crawler Tractors	212	2	8	0.43	1,459	7,884
	Excavators	158	2	8	0.38	961	5,193
	Graders	187	1	8	0.41	613	3,315
	Rubber Tired Dozers	247	1	8	0.40	790	4,272
	Scrapers	367	2	8	0.48	2,819	15,235
Building Construction (450 days)	Cranes	231	1	8	0.29	536	13,036
	Crawler Tractors	212	3	8	0.43	2,188	53,218
	Forklifts	89	3	8	0.20	427	10,391
	Generator Sets	84	1	8	0.74	497	12,096
	Welders	46	1	8	0.45	166	4,028
Paving (110 days)	Pavers	130	2	8	0.42	874	5,194
	Paving Equipment	132	2	8	0.36	760	4,521
	Rollers	80	2	8	0.38	486	2,892
Architectural Coating (110 days)	Air Compressors	78	1	8	0.48	300	1,781
PHASE A CONSTRUCTION FUEL DEMAND (GALLONS DIESEL FUEL)							***171,543***

TABLE 4: CONSTRUCTION EQUIPMENT FUEL CONSUMPTION ESTIMATES

Activity/Duration	Equipment	Horsepower Rating	Quantity	Usage Hours	Load Factor	hp-hrs/day	Total Fuel Consumption (gal. diesel fuel)
Phase B (2025) - Planning Areas 1, 2, 3, & 6							
Demolition (80 days)	Concrete/Industrial Saws	81	1	8	0.73	473	2,046
	Excavators	158	3	8	0.38	1,441	6,231
	Rubber Tired Dozers	247	2	8	0.40	1,581	6,836
Site Preparation (80 days)	Crawler Tractors	212	4	8	0.43	2,917	12,615
	Rubber Tired Dozers	247	3	8	0.40	2,371	10,254
Grading (140 days)	Crawler Tractors	212	2	8	0.43	1,459	11,038
	Excavators	158	2	8	0.38	961	7,270
	Graders	187	1	8	0.41	613	4,642
	Rubber Tired Dozers	247	1	8	0.40	790	5,981
	Scrapers	367	2	8	0.48	2,819	21,330
Building Construction (485 days)	Cranes	231	1	8	0.29	536	14,050
	Crawler Tractors	212	3	8	0.43	2,188	57,357
	Forklifts	89	3	8	0.20	427	11,200
	Generator Sets	84	1	8	0.74	497	13,037
	Welders	46	1	8	0.45	166	4,341
Paving (330 days)	Pavers	130	2	8	0.42	874	15,583
	Paving Equipment	132	2	8	0.36	760	13,562
	Rollers	80	2	8	0.38	486	8,676
Architectural Coating (330 days)	Air Compressors	78	1	8	0.48	300	5,343
PHASE B CONSTRUCTION FUEL DEMAND (GALLONS DIESEL FUEL)							***231,390***

TABLE 5: CONSTRUCTION EQUIPMENT FUEL CONSUMPTION ESTIMATES

Activity/Duration	Equipment	Horsepower Rating	Quantity	Usage Hours	Load Factor	hp-hrs/day	Total Fuel Consumption (gal. diesel fuel)
Phase C (2026) - Planning Areas 1A, 3A, 4A, 5A, & 6A							
Demolition (30 days)	Concrete/Industrial Saws	81	1	8	0.73	473	767
	Excavators	158	3	8	0.38	1,441	2,337
	Rubber Tired Dozers	247	2	8	0.40	1,581	2,563
Site Preparation (30 days)	Crawler Tractors	212	4	8	0.43	2,917	4,730
	Rubber Tired Dozers	247	3	8	0.40	2,371	3,845
Grading (50 days)	Crawler Tractors	212	2	8	0.43	1,459	3,942
	Excavators	158	2	8	0.38	961	2,596
	Graders	187	1	8	0.41	613	1,658
	Rubber Tired Dozers	247	1	8	0.40	790	2,136
	Scrapers	367	2	8	0.48	2,819	7,618
Building Construction (150 days)	Cranes	231	1	8	0.29	536	4,345
	Crawler Tractors	212	3	8	0.43	2,188	17,739
	Forklifts	89	3	8	0.20	427	3,464
	Generator Sets	84	1	8	0.74	497	4,032
	Welders	46	1	8	0.45	166	1,343
Paving (75 days)	Pavers	130	2	8	0.42	874	3,542
	Paving Equipment	132	2	8	0.36	760	3,082
	Rollers	80	2	8	0.38	486	1,972
Architectural Coating (75 days)	Air Compressors	78	1	8	0.48	300	1,214
PHASE C CONSTRUCTION FUEL DEMAND (GALLONS DIESEL FUEL)							***72,926***

TABLE 6: CONSTRUCTION EQUIPMENT FUEL CONSUMPTION ESTIMATES

Activity/Duration	Equipment	Horsepower Rating	Quantity	Usage Hours	Load Factor	hp-hrs/day	Total Fuel Consumption (gal. diesel fuel)
Off-Site Utilities Infrastructure							
Offsite-Infrastructure Utilities Construction (365 days)	Bore/Drill Rigs	221	1	8	0.50	884	17,441
	Cranes	231	1	8	0.29	536	10,574
	Crushing/Proc. Equipment	85	1	8	0.78	530	10,465
	Excavators	158	2	8	0.38	961	18,953
	Generator Sets	84	1	8	0.74	497	9,811
	Graders	187	1	8	0.41	613	12,101
	Off-Highway Trucks	402	1	8	0.38	1,222	24,111
	Pavers	130	2	8	0.42	874	17,236
	Paving Equipment	132	1	8	0.36	380	7,500
	Rollers	80	1	8	0.38	243	4,798
	Rubber Tired Dozers	247	1	8	0.40	790	15,594
	Tractors/Loaders/Backhoe	97	2	8	0.37	574	11,330
	Welders	46	1	8	0.45	166	3,267
OFF-SITE UTILITIES INFRASTRUCTURE CONSTRUCTION FUEL DEMAND (GALLONS DIESEL FUEL)							***163,182***

CONSTRUCTION WORKER FUEL ESTIMATES

It is assumed that all construction worker trips are from light duty autos (LDA) along area roadways. Data regarding Project related construction worker trips were based on CalEEMod 2016.3.2 model defaults utilized within the AQIA. Vehicle fuel efficiencies for LDAs were estimated using information generated within the 2017 version of the EMFAC developed by the CARB.

Table 7 provides an estimated annual fuel consumption resulting from the Project generated by LDAs related to construction worker trips. Based on Table 7, it is estimated that 833,743 gallons of fuel will be consumed related to construction worker trips during full construction of the proposed Project.

TABLE 7: CONSTRUCTION WORKER FUEL CONSUMPTION ESTIMATES (1 OF 2)

Construction Activity	Worker Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Phase A (2022) - Planning Areas 4 & 5					
Demolition (60 days)	15	14.7	13,230	30.39	435
Site Preparation (60 days)	18	14.7	15,876	30.39	522
Grading (100 days)	20	14.7	29,400	30.93	950
Building Construction (450 days)	1,052	14.7	6,958,980	31.74	219,236
Paving (110 days)	15	14.7	24,255	32.15	754
Architectural Coating (110 days)	210	14.7	339,570	32.15	10,561
PHASE A CONSTRUCTION WORKER FUEL CONSUMPTION					***232,460***

TABLE 7: CONSTRUCTION WORKER FUEL CONSUMPTION ESTIMATES (2 OF 2)

Construction Activity	Worker Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Phase B (2025) - Planning Areas 1, 2, 3, & 6					
Demolition (80 days)	15	14.7	17,640	33.17	533
Site Preparation (80 days)	18	14.7	21,168	33.17	638
Grading (140 days)	20	14.7	41,160	33.40	1,232
Building Construction (485 days)	2,332	14.7	16,625,994	34.73	478,728
Paving (330 days)	15	14.7	72,765	35.03	2,077
Architectural Coating (330 days)	466	14.7	2,260,566	35.03	64,539
PHASE B CONSTRUCTION WORKER FUEL CONSUMPTION					***547,748***
Phase C (2026) - Planning Areas 1A, 3A, 4A, 5A, & 6A					
Demolition (30 days)	15	14.7	6,615	36.40	182
Site Preparation (30 days)	18	14.7	7,938	36.40	218
Grading (50 days)	20	14.7	14,700	36.40	404
Building Construction (150 days)	688	14.7	1,517,040	36.40	41,677
Paving (75 days)	15	14.7	16,538	36.40	454
Architectural Coating (75 days)	138	14.7	152,145	36.40	4,180
PHASE C CONSTRUCTION WORKER FUEL CONSUMPTION					***47,116***
Off-Site Utilities Infrastructure					
Grading (365 days)	40	14.7	214,620	33.43	6,419
OFF-SITE UTILITIES INFRASTRUCTURE CONSTRUCTION WORKER FUEL CONSUMPTION					***547,748***
TOTAL PROJECT CONSTRUCTION WORKER FUEL CONSUMPTION					***833,743***

CONSTRUCTION VENDOR FUEL ESTIMATES

It is assumed that 50% of all vendor trips are from Medium-Heavy-Duty-Trucks (MHDT), 50% are from Heavy-Heavy-Duty Trucks (HHDT), and 100% of all hauling trips are HHDTs. These assumptions are consistent with the 2016.3.2 CalEEMod defaults utilized within the within the AQIA. Vehicle fuel efficiencies for MHDTs and HHDTs were estimated using information generated within EMFAC2017.

Tables 8 and 9 shows the estimated fuel economy of MHDTs and HHDTs accessing the Project site. Based on Tables 8 and 9, fuel consumption from construction trips will total approximately 590,410 gallons.

TABLE 8: CONSTRUCTION VENDOR FUEL CONSUMPTION ESTIMATES (MHD TRUCKS)

Construction Activity	Vendor Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Vendor					
Phase A (2022) - Planning Areas 4 & 5					
Building Construction (450 days)	205	6.9	636,525	9.61	66,268
				PHASE A - MHDT TOTAL	***66,268***
Phase B (2025) - Planning Areas 1, 2, 3, & 6					
Building Construction (485 days)	455	6.9	1,522,658	10.26	148,365
				PHASE B - MHDT TOTAL	***148,365***
Phase C (2026) - Planning Areas 1A, 3A, 4A, 5A, & 6A					
Building Construction (150 days)	134	6.9	138,690	10.51	13,190
				PHASE C - MHDT TOTAL	***13,190***
				PROJECT TOTAL - MHDT TOTAL	***227,822***

TABLE 9: CONSTRUCTION VENDOR/HAULING FUEL CONSUMPTION ESTIMATES (HHD TRUCKS)

Construction Activity	Vendor Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Vendor					
Phase A (2022) - Planning Areas 4 & 5					
Building Construction (450 days)	205	6.9	636,525	6.69	95,158
				PHASE A - HHDT TOTAL	***95,158***
Phase B (2025) - Planning Areas 1, 2, 3, & 6					
Building Construction (485 days)	455	6.9	1,522,658	7.27	209,419
				PHASE B - HHDT TOTAL	***209,419***
Phase C (2026) - Planning Areas 1A, 3A, 4A, 5A, & 6A					
Building Construction (150 days)	134	6.9	138,690	7.51	18,467
				PHASE C – HHDT (VENDOR) TOTAL	***18,467***
Construction Activity	**Hauling Trips / Day**	**Trip Length (miles)**	**Vehicle Miles Traveled**	**Average Vehicle Fuel Economy (mpg)**	**Estimated Fuel Consumption (gallons)**
Hauling					
Phase A (2022) - Planning Areas 4 & 5					
Demolition (60 days)	21	20	25,200	6.49	3,882
				PHASE A - HHDT TOTAL	***3,882***
Phase B (2025) - Planning Areas 1, 2, 3, & 6					
Demolition (80 days)	76	20	121,600	7.19	17,245
				PHASE B - HHDT TOTAL	***17,245***
Phase C (2026) - Planning Areas 1A, 3A, 4A, 5A, & 6A					
Demolition (30 days)	230	20	138,000	7.49	18,417
				PHASE C – HHDT (HAULING) TOTAL	***18,417***
				PROJECT TOTAL - HHDT TOTAL	***362,588***

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 10 presents the estimated annual fuel consumption from project-generated traffic.

TABLE 10: PROJECT-GENERATED TRAFFIC ANNUAL FUEL CONSUMPTION

Vehicle Type	Annual VMT	Estimated Annual Fuel Consumption (gallons)
LDA	60,819,389	1,748,846
LDT1	3,820,144	131,485
LDT2	19,792,483	713,979
MDV	11,993,183	540,356
LHDT	7,547,523	526,223
MHDT	6,217,813	607,293
HHDT	36,318,200	5,045,667
Total (All Vehicles)	***146,508,735***	***9,313,849***

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 Tables 11 and 12.

TABLE 11: PROJECT ANNUAL OPERATIONAL NATURAL GAS DEMAND SUMMARY

Natural Gas Demand	kBTU/yr
Phase A (2022) - Planning Areas 4 & 5	
Other Asphalt Surfaces	0
Refrigerated Warehouse	15,234,000
Unrefrigerated Warehouse	2,688,400
Phase B (2025) - Planning Areas 1, 2, 3, & 6	
Other Asphalt Surfaces	0
Refrigerated Warehouse	20,383,100
Unrefrigerated Warehouse	6,338,620
Phase C (2026) - Planning Areas 1A, 3A, 4A, 5A, & 6A	
Industrial Park	3,501,630
Other Asphalt Surfaces	0
TOTAL PROJECT NATURAL GAS DEMAND	***48,145,750***

TABLE 11: PROJECT ANNUAL OPERATIONAL ELECTRICITY DEMAND SUMMARY

Electricity Demand	kWh/yr
Phase A (2022) - Planning Areas 4 & 5	
Other Asphalt Surfaces	0
Refrigerated Warehouse	11,676,000
Unrefrigerated Warehouse	3,572,000
Phase B (2025) - Planning Areas 1, 2, 3, & 6	
Other Asphalt Surfaces	0
Refrigerated Warehouse	15,622,500
Unrefrigerated Warehouse	8,421,940
Phase C (2026) - Planning Areas 1A, 3A, 4A, 5A, & 6A	
Industrial Park	10,807,500
Other Asphalt Surfaces	0
TOTAL PROJECT ELECTRICITY DEMAND	***50,099,940***

REFERENCES

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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.