Appendix C:
Additional Supporting Information

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Site Work Construction Assumptions

Construction Schedule

Construction Activity	*Start Date*	*End Date*	*Number of Days Per Week*	*Number of Days*
Demolition	1/1/2021	1/28/2021	5	20
Site Preparation	1/29/2021	2/11/2021	5	10
Grading	2/12/2021	3/25/2021	5	30

Construction Equipment

Phase Name	*Offroad Equipment Type*	*Amount*	*Usage Hours*	*Horse Power*	*Load Factor*
Demolition	Concrete/Industrial Saws	1	8	81	0.73
Demolition	Excavators	3	8	158	0.38
Demolition	Rubber Tired Dozers	2	8	247	0.4
Site Preparation	Rubber Tired Dozers	3	8	247	0.4
Site Preparation	Tractors/Loaders/Backhoes	4	8	97	0.37
Grading	Excavators	2	8	158	0.38
Grading	Graders	1	8	187	0.41
Grading	Rubber Tired Dozers	1	8	247	0.4
Grading	Scrapers	2	8	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8	97	0.37

Construction Trips

Phase Name	*Offroad Equipment Count*	*Worker Trip Number*	*Vendor Trip Number*	*Hauling Trip Number*	*Worker Trip Length*	*Vendor Trip Length*	*Hauling Trip Length*	*Worker Vehicle Class*	*Vendor Vehicle Class*	*Hauling Vehicle Class*
Demolition	6	15	0	258	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18	0	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT
Grading	8	20	0	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT

Phase 1 Construction Assumptions

Construction Schedule

Construction Activity	*Start Date*	*End Date*	*Number of Days Per Week*	*Number of Days*
Demolition	1/1/2021	1/28/2021	5	20
Site Preparation	1/29/2021	2/11/2021	5	10
Grading	2/12/2021	3/25/2021	5	30

Construction Equipment

Phase Name	*Offroad Equipment Type*	*Amount*	*Usage Hours*	*Horse Power*	*Load Factor*
Building Construction	Cranes	1	7	231	0.29
Building Construction	Forklifts	3	8	89	0.2
Building Construction	Generator Sets	1	8	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7	97	0.37
Building Construction	Welders	1	8	46	0.45
Paving	Pavers	1	8	130	0.42
Paving	Paving Equipment	2	6	132	0.36
Paving	Rollers	2	6	80	0.38
Architectural Coating	Air Compressors	1	6	78	0.48

Construction Trips

Phase Name	*Offroad Equipment Count*	*Worker Trip Number*	*Vendor Trip Number*	*Hauling Trip Number*	*Worker Trip Length*	*Vendor Trip Length*	*Hauling Trip Length*	*Worker Vehicle Class*	*Vendor Vehicle Class*	*Hauling Vehicle Class*
Building Construction	9	67	15	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT
Paving	5	13	0	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	13	0	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT

Phase 2 Construction Assumptions

Construction Schedule

Construction Activity	*Start Date*	*End Date*	*Number of Days Per Week*	*Number of Days*
Demolition	1/1/2021	1/28/2021	5	20
Site Preparation	1/29/2021	2/11/2021	5	10

Grading	2/12/2021	3/25/2021	5	30

Construction Equipment

Phase Name	*Offroad Equipment Type*	*Amount*	*Usage Hours*	*Horse Power*	*Load Factor*
Building Construction	Cranes	1	2.4	231	0.29
Building Construction	Forklifts	3	2.8	89	0.2
Building Construction	Generator Sets	1	2.8	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	2.4	97	0.37
Building Construction	Welders	1	2.8	46	0.45
Paving	Pavers	1	7	130	0.42
Paving	Rollers	1	7	80	0.38
Architectural Coating	Air Compressors	1	6	78	0.48

Construction Trips

Phase Name	*Offroad Equipment Count*	*Worker Trip Number*	*Vendor Trip Number*	*Hauling Trip Number*	*Worker Trip Length*	*Vendor Trip Length*	*Hauling Trip Length*	*Worker Vehicle Class*	*Vendor Vehicle Class*	*Hauling Vehicle Class*
Building Construction	9	5	2	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT
Paving	2	5	0	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	1	0	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT

Phase 3 Construction Assumptions

Construction Schedule

Construction Activity	*Start Date*	*End Date*	*Number of Days Per Week*	*Number of Days*
Demolition	1/1/2021	1/28/2021	5	20
Site Preparation	1/29/2021	2/11/2021	5	10
Grading	2/12/2021	3/25/2021	5	30

Construction Equipment

Phase Name	*Offroad Equipment Type*	*Amount*	*Usage Hours*	*Horse Power*	*Load Factor*
Building Construction	Cranes	1	2.40	231	0.29
Building Construction	Forklifts	3	2.80	89	0.20
Building Construction	Generator Sets	1	2.80	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	2.40	97	0.37
Building Construction	Welders	1	2.80	46	0.45
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	2	6.00	132	0.36
Paving	Rollers	2	6.00	80	0.38
Architectural Coating	Air Compressors	1	6.00	78	0.48

Construction Trips

Phase Name	*Offroad Equipment Count*	*Worker Trip Number*	*Vendor Trip Number*	*Hauling Trip Number*	*Worker Trip Length*	*Vendor Trip Length*	*Hauling Trip Length*	*Worker Vehicle Class*	*Vendor Vehicle Class*	*Hauling Vehicle Class*
Building Construction	9	30	11	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT
Paving	5	13	0	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	6	0	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT

Phase 4 Construction Assumptions

Construction Schedule

Construction Activity	*Start Date*	*End Date*	*Number of Days Per Week*	*Number of Days*
Demolition	1/1/2021	1/28/2021	5	20
Site Preparation	1/29/2021	2/11/2021	5	10
Grading	2/12/2021	3/25/2021	5	30

Construction Equipment

Phase Name	*Offroad Equipment Type*	*Amount*	*Usage Hours*	*Horse Power*	*Load Factor*
Building Construction	Cranes	1	2.4	231	0.29
Building Construction	Forklifts	3	2.8	89	0.2
Building Construction	Generator Sets	1	2.8	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	2.4	97	0.37

Building Construction	Welders	1	2.8	46	0.45
Paving	Pavers	1	6	130	0.42
Paving	Paving Equipment	1	8	132	0.36
Paving	Rollers	1	7	80	0.38
Architectural Coating	Air Compressors	1	6	78	0.48

Construction Trips

Phase Name	*Offroad Equipment Count*	*Worker Trip Number*	*Vendor Trip Number*	*Hauling Trip Number*	*Worker Trip Length*	*Vendor Trip Length*	*Hauling Trip Length*	*Worker Vehicle Class*	*Vendor Vehicle Class*	*Hauling Vehicle Class*
Building Construction	9	18	5	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT
Paving	3	8	0	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	4	0	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT

Phase 5 Construction Assumptions

Construction Schedule

Construction Activity	*Start Date*	*End Date*	*Number of Days Per Week*	*Number of Days*
Demolition	1/1/2021	1/28/2021	5	20
Site Preparation	1/29/2021	2/11/2021	5	10
Grading	2/12/2021	3/25/2021	5	30

Construction Equipment

Phase Name	*Offroad Equipment Type*	*Amount*	*Usage Hours*	*Horse Power*	*Load Factor*
Building Construction	Cranes	1	2.4	231	0.29
Building Construction	Forklifts	3	2.8	89	0.2
Building Construction	Generator Sets	1	2.8	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	2.4	97	0.37
Building Construction	Welders	1	2.8	46	0.45
Paving	Pavers	2	8	130	0.42
Paving	Paving Equipment	2	8	132	0.36
Paving	Rollers	2	8	80	0.38
Architectural Coating	Air Compressors	1	6	78	0.48

Construction Trips

Phase Name	*Offroad Equipment Count*	*Worker Trip Number*	*Vendor Trip Number*	*Hauling Trip Number*	*Worker Trip Length*	*Vendor Trip Length*	*Hauling Trip Length*	*Worker Vehicle Class*	*Vendor Vehicle Class*	*Hauling Vehicle Class*
Building Construction	9	41	15	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT
Paving	6	15	0	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	8	0	0	10.8	7.3	20	LD_Mix	HDT_Mix	HHDT

Burbank Phases 2-5

Construction Duration

	CalEEMod Defaults	Revisions	Difference	Ratio of Actual to Default Duration
Building Construction	300	866		
Total Working Days	**300**	**866**	**566**	2.8867

CalEEMod Defaults					
Building Construction					
Equipment	**Amount**	**Usage Hours**	**Horsepower**	**Load Factor**	**HP Hours**
Cranes	1	7	231	0.29	140,679
Forklifts	3	8	89	0.20	128,160
Generator Sets	1	8	84	0.74	149,184
Tractors/Loaders/Backhoes	3	7	97	0.37	226,107
Welders	1	8	46	0.45	49,680
				Total	**693,810**

Revisions					
Building Construction					
Equipment	**Amount**	**Usage Hours**	**Horsepower**	**Load Factor**	**HP Hours**
Cranes	1	2.42	231	0.29	140,679
Forklifts	3	2.77	89	0.20	128,160
Generator Sets	1	2.77	84	0.74	149,184
Tractors/Loaders/Backhoes	3	2.42	97	0.37	226,107
Welders	1	2.77	46	0.45	49,680
				Total	**693,810**

Cross-Check	
Cross-Check	
Goal HP Hours	**Difference**
140,679	-
128,160	-
149,184	-
226,107	-
49,680	-
693,810	-

Hardscape Tonnage Calculation

ft. = feet
in. = inches
s.f. = square feet
c.f. = cubic feet
lbs = pounds

Measured on kmz file:

9,847 s.f. existing hardscape to be removed

Assumption:

4.5 in (0.375 ft.) thickness of asphalt — Asphalt Institute. 2019. Asphalt: Commercial and Residential Paving - Part 2. Website: http://asphaltmagazine.com/commercial-and-residential-paving-part-2/. Accessed August 1, 2019.

145 lbs/c.f. asphalt density — National Asphalt Pavement Association. 2019. How to Determine Quantities. Website: https://www.asphaltpavement.org/index.php?option=com_content&view=article&id=144&Itemid=271. Accessed August 1, 2019.

9,847 s.f. x 0.375 ft. =	3693	c.f.	Multiply square footage by thickness to get asphalt volume in cubic feet.
3,693 c.f. x 145 lbs/c.f. =	535431	lbs.	Multiply asphalt volume by density to get asphalt weight in pounds.
535,431 lbs. / 2000 lbs/ton =	**268**	**tons**	Convert weight from pounds to tons.

Building Volume Calculation

s.f. = square feet
c.y. = cubic yards

Structure (as pinned on kmz)	**Building area (sq. ft.)**
1	1607
2	1295
3	353
4	174
5	1400
6	2440
7	4740
8	6691
9	6071
Total building sq. ft. to be removed	**24771 sq. ft.**

Assumption:
(cubic yards of debris based on square footage of buildings)

https://www.hometowndemolitioncontractors.com/blog/how-many-dumpsters-does-it-take-to-demolish-a-house

How Many Dumpsters Does it Take to Demo a House?

House Size	Amount of Debris	# of 40-yard Dumpsters
1,000 sq. ft.	135 cubic yards	3.5
2,000 sq. ft.	270 cubic yards	6.75
3,000 sq. ft.	405 cubic yards	10.5

Debris c.y. to building sq. ft. ratio: 0.135

Total c.y. of building debris to be removed: 24,771 sq. ft. x 0.135 c.y./sq. ft. = **3344 c.y.**

Assumption:
(tons of debris based on cubic yards of debris)

http://syracuselandbank.org/wp-content/uploads/2014/07/CD-weight-to-volume-calculation-Waste-Cap-from-other-sources.pdf

Construction and Demolition Debris Weight to Volume Conversion
Note: These numbers are used throughout this training

	Volume	Weight (pounds)	Weight (tons)
Trash[2]			
Residential waste (uncompacted at curb)	1 cubic yard	150 – 300	.075 – .15
Commercial-industrial waste (uncompacted)	1 cubic yard	300 – 600	.15 – .30
Mixed Waste[1]	1 cubic yard	350	.175
Asphalt[3]	1 square yard 1 inch thick	110 - 115	0.055 – 0.057
Asphalt[3]	1 cubic yard	4,050 – 4,140	2.025 – 2.07
Cans & Bottles[2]			
Aluminum cans (whole)	1 cubic yard	50 – 75	.025 – .038
Glass bottles (whole bottles)	1 cubic yard	500 – 700	.25 – .35
Plastic bottles (soda bottles)	1 cubic yard	30 – 40	.015 – .02
Corrugated Cardboard[1]			
Uncompacted	1 cubic yard	50 – 150	.025 – .075
Compacted	1 cubic yard	300 – 500	.15 – .25
Concrete[4]	1 cubic yard	4,050	2
Rubble[1]	1 cubic yard	1,400	.7
Drywall[1]	1 cubic yard	500	.25
Scrap Metal[1] (loose light iron sheet metal)	1 cubic yard	1,000	.5
Wood – pallets[2]	1 cubic yard	286	.143
Wood – pallets[2] (Each)	1 Unit	30 – 50	.015 – .025
Scrap Wood[1]	1 cubic yard	300	.15

1 US Green Building Council. "LEED Reference Guide for Green Building Design and Construction 2009 Edition, Section 6-Calculations, Table 2- Solid Waste Conversion Factors. Page 360.

2 US Environmental Protection Agency. "Measuring Recycling. A Guide for State and Local Governments." September 1997 Appendix B. Standard Volume-to-Weight Conversion Factors pp. 59 – 62. W ww.epa.gov/epawaste/conserve/tools/recmeas/docs/guide_b.pdf

3 Asphalt Pavement Association of Michigan (4,050 lbs/yd^3) and LEED EB v. 2.0 Reference Guide (p. 256) Table 2 Volume to Weight Conversions (115 lbs per yd^2 or 4,140 lbs per yd^3).

4 Reade Advanced Materials, Providence RI 401.433.7000 www.reade.com/Particle_Briefings/spec_gra2.html

Rubble tons/c.y. of debris ratio: 0.7

Total tons of building debris to be removed: 3,344 c.y. x 0.7 tons/c.y. = 2341 tons

PG&E Electricity Emissions Factors

Year	lbs CO_2e/MWh
2025	390.65
2030	292.24

2008 Electricity Emissions Factor

Emissions Factors	t/kWh	Share of Portfolio	t/kWh	t/MWh	lbs/MWh
RPS sources	-	14%	-		
Natural Gas	0.000459	44%	0.00020174		
Nuclear	0.000002	22%	0.00000035		
Coal	0.001037	2%	0.00002075		
Other	0.000427	18%	0.00007695		
Total	-	100%	0.00029979	0.30	**660.91**

Power Content Label

PG&E 2008	%	Source
RPS sources	14%	https://ww2.energy.ca.gov/pcl/labels/2008_index.html
Natural Gas	44%	
Nuclear	22%	
Coal	2%	
Other	18%	
Total	100%	

Natural Gas Facility Emissions Factor Calculation

Natural Gas Emissions Factor

	CO_2	CH_4	N_2O	CO_2e	Source
kg per mmBtu	53.06	-	-	-	https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf
g per mmBtu	53,060	1.00	0.10	-	
t per mmBtu	0.05	0.00	0.00	-	Calculated
t CO_2e per mmBtu	0.05	0.00	0.00	0.05	Calculated
t CO_2e per GJ	-	-	-	0.06	Calculated

Heat Rates

Value	Units	Source	Notes
7,755	btu/kWh	http://www.energy.ca.gov/2017publications/CEC-200-2017-003/CEC-200-2017-003.pdf	Table 1, State Average w/o Cogeneration (per last paragraph on pg 4)
0.00818196	GJ/kWh	Converted in Google: GJ per btu	

Natural Gas Facility Emissions Factor

Natural gas emissions factor	0.06	t CO_2e per GJ
Natural gas facility heat rate	0.00818196	GJ/kWh
Natural Gas Facility Emissions Factor	0.000458507	t CO_2e per kWh

Nuclear Emissions Factor

Nuclear GHG Emissions	0.40	gCO2e/MJ	https://www.arb.ca.gov/fuels/lcfs/022709lcfs_elec.pdf
Nuclear Emissions Factor	0.00000159	t/kWh	

Unspecified Electricity Source Emissions Factor Calculation

ARB California GHG Inventory Unspecified Electricity Emissions Factors

2014	CO_2	CH_4	N_2O	CO_2e	Units	Source
Pacific Northwest (PNW)	427	0.008117	0.00094388	427.4774	g/kWh	https://www.arb.ca.gov/cc/inventory/doc/methods_00-14/annex_1b_electricity_production_imports.pdf
Pacific Southwest (PSW)	427	0.008117	0.00094388	427.4774	g/kWh	
PNW and PSW	-	-	-	0.000427	t/kWh	-

Other/Unspecified Emissions Factor

Unspecified Electricity Emissions Factor	0.000427	t CO_2e per kWh

Coal Electricity Source Emissions Factor Calculation

ARB California GHG Inventory Unspecified Electricity Emissions Factors

2007	CO_2	CH_4	N_2O	CO_2e	Units	Source
Coal Electricity Source Emissions Factor Calculation	1033	0.011	0.0153	1037.363	g/kWh	https://www.arb.ca.gov/cc/inventory/doc/methods_00-14/annex_1b_electricity_production_imports.pdf
Total	-	-	-	0.001037	t/kWh	-

Coal Emissions Factor

Unspecified Electricity Emissions Factor	0.001037	t CO_2e per kWh

2025 and 2030 Electricity Emissions Factors

Non-RPS Energy	Year	PG&E RPS Position	Notes	Source
89.0%	2008	11.0%		https://ww2.energy.ca.gov/pcl/labels/2009_index.html
67.0%	2025	33.0%		
50.0%	2030	50.0%		

Estimated Power Content Label Sources

PG&E	2008	Share of Non-RPS in 2008	2025	Share of Non-RPS in 2025	2030
RPS	14.0%	-	33.0%	-	50.0%
Natural Gas	44.0%	49%	20.0%	29.9%	14.9%
Nuclear	22.0%	25%	27.0%	40.3%	20.1%
Coal	2.0%	2%	0.0%	0.0%	0.0%
Other	18.0%	20%	20.0%	29.9%	14.9%
Total	100%	97%	100%	100.0%	100%

2025					
Emissions Factors	**t/kWh**	**Share of Portfolio**	**t/kWh**	**t/MWh**	**lbs/MWh**
RPS	-	33.0%	-		
Natural Gas	0.000459	20.0%	0.000092		
Nuclear	0.000002	27.0%			
Coal	0.001037	0.0%	-		
Unspecified	0.000427	20.0%	0.000085		
Total	-	100.0%	0.000177	0.18	**390.65**

2030					
Emissions Factors	**t/kWh**	**Share of Portfolio**	**t/kWh**	**t/MWh**	**lbs/MWh**
RPS	-	50.0%	-		
Natural Gas	0.000459	14.9%	0.000068		
Nuclear	0.000002	20.1%	0.000000		
Coal	0.001037	0.0%	-		
Unspecified	0.000427	14.9%	0.000064		
Total	-	100.0%	0.000133	0.13	**292.24**

CONVERSION FACTORS

Conversions

GJ	mmBtu
1	0.947817
g	kg
1	1,000
g	t
1	0.000001
lb	t
2,204.62	1
kW	MW
1	0.001

GWP Factors

CO_2	1
CH_4	28
N_2O	265