

Appendix D

Energy Calculation



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**Burbank Avion
Construction Energy Analysis**

Annual Fuel Summary

| | |
|--|---|
| Heavy-Duty Construction Equipment | |
| 485,226 | Total Project Consumption |
| 202,178 | Annual Consumption |
| Haul Trucks | |
| - | Total Project Consumption |
| - | Annual Consumption |
| Vendor Trucks | |
| 23,759 | Total Project Consumption |
| 9,899 | Annual Consumption |
| Workers | |
| 139,817 | Total Project Consumption |
| 58,257 | Annual Consumption |
| 23,759 | Project Consumption of diesel for Haul Trucks and Vendors |
| 9,899 | Annual Consumption |
| 508,985 | Total Gallons Diesel |
| 139,817 | Total Gallons Gasoline |

2.4 Estimated Project Construction Duration (years)

212,077 Annual Average Gallons Diesel
58,257 Annual Average Gallons Gasoline

| South Coast Air Basin Annual Fuel Consumption (2017) | | | Percent of Annual Project Compared to South Coast Air Basin |
|---|------------------|----------------|--|
| Source | Fuel Type | Gallons | |
| Workers ¹ | Gasoline | 4,438,766,655 | 0.0013% |
| Vendors ² | Diesel | 955,737,693 | 0.0010% |
| Haul Trucks ³ | Diesel | - | 0.0000% |

Notes:

- 1 EMFAC2011 Categories: LDA, LDT1, LDT2
- 2 EMFAC2007 Categories: MHDT, HHDT
- 3 EMFAC2011 Categories: T7 Single Construction

**Burbank Avion
Construction Energy Analysis**

Off-Road Equipment

Equipment ≤ 50 hp

| | |
|---|------------------|
| pounds fuel/hp-hr (OFFROAD2011 model, ≤ 50 hp): | 0.408 lb/hp-hr |
| diesel pounds/gallon (CARB density assumption): | 7.07 lb/gal |
| diesel gallons/hp-hr: | 0.0577 gal/hp-hr |
| Total <50 | 345,483 hp-hr |
| Total diesel gallons: | 19,937 gal |

Equipment > 50 hp

| | |
|---|------------------|
| pounds fuel/hp-hr (OFFROAD2011 model, > 50 hp): | 0.367 lb/hp-hr |
| diesel pounds/gallon (CARB density assumption): | 7.07 lb/gal |
| diesel gallons/hp-hr: | 0.0519 gal/hp-hr |
| Total >50 | 8,963,468 hp-hr |
| Total diesel gallons: | 465,289 gal |

Total diesel gallons (off-road equipment): 485,226 gal

| Construction Phase | Equipment | Number | Hours/Day | HP | Load | Days | Total hp-hr |
|--------------------------------------|---------------------------|--------|-----------|-----|------|------|-------------|
| Demolition (Remove pavement)-Phase 1 | Off-Highway Trucks | 3 | 6 | 402 | 0.38 | 17 | 46,745 |
| Demolition (Remove pavement)-Phase 1 | Rubber Tired Dozers | 2 | 10 | 247 | 0.4 | 17 | 33,592 |
| Demolition (Remove pavement)-Phase 1 | Sweepers/Scrubbers | 2 | 6 | 64 | 0.46 | 17 | 6,006 |
| Demolition (Remove pavement)-Phase 1 | Tractors/Loaders/Backhoes | 2 | 10 | 97 | 0.37 | 17 | 12,203 |
| Grading-Phase 1 | Graders | 4 | 10 | 187 | 0.41 | 51 | 156,407 |
| Grading-Phase 1 | Off-Highway Trucks | 10 | 6 | 402 | 0.38 | 51 | 467,446 |
| Grading-Phase 1 | Rubber Tired Dozers | 2 | 10 | 247 | 0.4 | 51 | 100,776 |
| Grading-Phase 1 | Scrapers | 6 | 10 | 367 | 0.48 | 51 | 539,050 |
| Grading-Phase 1 | Tractors/Loaders/Backhoes | 2 | 10 | 97 | 0.37 | 51 | 36,608 |
| Drainage/Utilities/Trenching-Phase 1 | Cranes | 1 | 10 | 231 | 0.29 | 26 | 17,417 |
| Drainage/Utilities/Trenching-Phase 1 | Excavators | 2 | 10 | 158 | 0.38 | 26 | 31,221 |
| Drainage/Utilities/Trenching-Phase 1 | Off-Highway Trucks | 1 | 6 | 402 | 0.38 | 26 | 23,831 |
| Drainage/Utilities/Trenching-Phase 1 | Tractors/Loaders/Backhoes | 2 | 10 | 97 | 0.37 | 26 | 18,663 |
| Foundation-Phase 1 | Aerial Lifts | 3 | 10 | 63 | 0.31 | 136 | 79,682 |

| | | | | | | | |
|--------------------------------------|---------------------------|---|----|-----|------|-----|---------|
| Foundation-Phase 1 | Bore/Drill Rigs | 3 | 10 | 221 | 0.5 | 136 | 450,840 |
| Foundation-Phase 1 | Excavators | 3 | 10 | 158 | 0.38 | 136 | 244,963 |
| Foundation-Phase 1 | Pumps | 3 | 10 | 84 | 0.74 | 136 | 253,613 |
| Foundation-Phase 1 | Rough Terrain Forklifts | 3 | 10 | 100 | 0.4 | 136 | 163,200 |
| Foundation-Phase 1 | Tractors/Loaders/Backhoes | 3 | 10 | 97 | 0.37 | 136 | 146,431 |
| Drainage/Utilities/Trenching-Phase 2 | Excavators | 1 | 10 | 158 | 0.38 | 23 | 13,809 |
| Drainage/Utilities/Trenching-Phase 2 | Off-Highway Trucks | 1 | 6 | 402 | 0.38 | 23 | 21,081 |
| Drainage/Utilities/Trenching-Phase 2 | Tractors/Loaders/Backhoes | 2 | 10 | 97 | 0.37 | 23 | 16,509 |
| Drainage/Utilities/Trenching-Phase 2 | Trenchers | 1 | 10 | 78 | 0.5 | 23 | 8,970 |
| Foundation-Phase 2 | Aerial Lifts | 2 | 10 | 63 | 0.31 | 88 | 34,373 |
| Foundation-Phase 2 | Bore/Drill Rigs | 2 | 10 | 221 | 0.5 | 88 | 194,480 |
| Foundation-Phase 2 | Cranes | 1 | 10 | 231 | 0.29 | 88 | 58,951 |
| Foundation-Phase 2 | Excavators | 2 | 10 | 158 | 0.38 | 88 | 105,670 |
| Foundation-Phase 2 | Pumps | 3 | 10 | 84 | 0.74 | 88 | 164,102 |
| Foundation-Phase 2 | Rough Terrain Forklifts | 2 | 10 | 100 | 0.4 | 88 | 70,400 |
| Foundation-Phase 2 | Tractors/Loaders/Backhoes | 2 | 10 | 97 | 0.37 | 88 | 63,166 |
| Paving-Phase 1 | Pavers | 2 | 10 | 130 | 0.42 | 245 | 267,540 |
| Paving-Phase 1 | Paving Equipment | 5 | 10 | 132 | 0.36 | 245 | 582,120 |
| Building Construction-Phase 1 | Cranes | 2 | 10 | 231 | 0.29 | 215 | 288,057 |
| Building Construction-Phase 1 | Forklifts | 2 | 10 | 89 | 0.2 | 215 | 76,540 |
| Building Construction-Phase 1 | Generator Sets | 4 | 10 | 84 | 0.74 | 215 | 534,576 |
| Building Construction-Phase 1 | Off-Highway Trucks | 2 | 6 | 402 | 0.38 | 215 | 394,121 |
| Building Construction-Phase 1 | Pumps | 2 | 10 | 84 | 0.74 | 215 | 267,288 |
| Building Construction-Phase 1 | Tractors/Loaders/Backhoes | 3 | 10 | 97 | 0.37 | 215 | 231,491 |
| Building Construction-Phase 1 | Welders | 2 | 10 | 46 | 0.45 | 215 | 89,010 |
| Building Construction-Phase 2 | Air Compressors | 3 | 10 | 78 | 0.48 | 413 | 463,882 |
| Building Construction-Phase 2 | Cranes | 1 | 10 | 231 | 0.29 | 413 | 276,669 |
| Building Construction-Phase 2 | Forklifts | 2 | 10 | 89 | 0.2 | 413 | 147,028 |
| Building Construction-Phase 2 | Generator Sets | 2 | 10 | 84 | 0.74 | 413 | 513,442 |
| Building Construction-Phase 2 | Off-Highway Trucks | 1 | 6 | 402 | 0.38 | 413 | 378,539 |
| Building Construction-Phase 2 | Pumps | 1 | 10 | 84 | 0.74 | 413 | 256,721 |
| Building Construction-Phase 2 | Tractors/Loaders/Backhoes | 1 | 10 | 97 | 0.37 | 413 | 148,226 |
| Building Construction-Phase 2 | Welders | 3 | 10 | 46 | 0.45 | 413 | 256,473 |
| Architectural Coating-Phase 1 | Aerial Lifts | 6 | 10 | 63 | 0.31 | 105 | 123,039 |
| Architectural Coating-Phase 1 | Air Compressors | 3 | 10 | 78 | 0.48 | 105 | 117,936 |
| Landscaping-Phase 1 | Skid Steer Loaders | 3 | 10 | 65 | 0.37 | 22 | 15,873 |
| Landscaping-Phase 1 | Sweepers/Scrubbers | 2 | 6 | 64 | 0.46 | 22 | 7,772 |
| Landscaping-Phase 1 | Tractors/Loaders/Backhoes | 3 | 10 | 97 | 0.37 | 22 | 23,687 |
| Architectural Coating-Phase 2 | Aerial Lifts | 3 | 10 | 63 | 0.31 | 77 | 45,114 |
| Architectural Coating-Phase 2 | Air Compressors | 3 | 10 | 78 | 0.48 | 77 | 86,486 |

| | | | | | | | |
|---------------------|---------------------------|---|----|-----|------|---------------------|-----------|
| Paving-Phase 2 | Pavers | 1 | 10 | 130 | 0.42 | 49 | 26,754 |
| Paving-Phase 2 | Paving Equipment | 1 | 10 | 132 | 0.36 | 49 | 23,285 |
| Paving-Phase 2 | Rollers | 2 | 10 | 80 | 0.38 | 49 | 29,792 |
| Paving-Phase 2 | Surfacing Equipment | 1 | 10 | 263 | 0.3 | 49 | 38,661 |
| Landscaping-Phase 2 | Skid Steer Loaders | 1 | 10 | 65 | 0.37 | 24 | 5,772 |
| Landscaping-Phase 2 | Sweepers/Scrubbers | 1 | 6 | 64 | 0.46 | 24 | 4,239 |
| Landscaping-Phase 2 | Tractors/Loaders/Backhoes | 1 | 10 | 97 | 0.37 | 24 | 8,614 |
| | | | | | | Total >50 | 8,963,468 |
| | | | | | | Total <50 | 345,483 |

**Burbank Avion
Construction Energy Analysis**

On-Road Vendor Trucks

| | | | | |
|---|---------------|--------------|--------------|--------------|
| | | | miles/gallon | |
| EMFAC2014 Diesel Fuel Consumption Factor: ¹ | 0.1552 | gallons/mile | | 6.4 |
| Total Vendor Truck VMT: | 144,472 | miles | | |
| Total VMT diesel gallons (on-road vendor trucks): | 22,425 | | | |
| <i>Estimated Fuel Savings from</i> | | | | |
| <i>Anti-Idling Regulation (64 percent based on</i> | | | | |
| <i>estimated CARB emissions reductions):³</i> | | | | |
| EMFAC2014 Diesel Fuel Consumption Factor: ² | 0.7645 | gallons/hour | | |
| Total Haul Truck Idle-Hours per Year: | 1,745 | hours | | |
| Total Idling diesel gallons (on-road haul trucks): | 1,334 | | | 3,705 |
| Total diesel gallons (on-road haul trucks): | 23,759 | gal | | |

1. California Air Resources Board, EMFAC2014 (South Coast Air Basin; HHDT and MHDT; Annual; CY 2017; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2014 (South Coast Air Basin; HHDT and MHDT; Annual; CY 2017; Aggregate MY; 5 miles per hour converted to hourly rate)
3. Source: California Air Resources Board (CARB), 2004. Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling, Appendix F, July 2004, <https://www.arb.ca.gov/regact/idling/idling.htm>, accessed November 2016.

| Phase | Days | Trips/Day | Miles/Trip | VMT | Idle Hours |
|--------------------------------------|------|-----------|------------|-------------------------|------------|
| Demolition (Remove pavement)-Phase 1 | 17 | 6 | 6.9 | 704 | 9 |
| Grading-Phase 1 | 51 | 6 | 6.9 | 2,111 | 26 |
| Drainage/Utilities/Trenching-Phase 1 | 26 | 6 | 6.9 | 1,076 | 13 |
| Foundation-Phase 1 | 136 | 72 | 6.9 | 67,565 | 816 |
| Drainage/Utilities/Trenching-Phase 2 | 23 | 6 | 6.9 | 952 | 12 |
| Foundation-Phase 2 | 88 | 18 | 6.9 | 10,930 | 132 |
| Paving-Phase 1 | 245 | 14 | 6.9 | 23,667 | 286 |
| Building Construction-Phase 1 | 215 | 6 | 6.9 | 8,901 | 108 |
| Building Construction-Phase 2 | 413 | 6 | 6.9 | 17,098 | 207 |
| Architectural Coating-Phase 1 | 105 | 6 | 6.9 | 4,347 | 53 |
| Landscaping-Phase 1 | 22 | 6 | 6.9 | 911 | 11 |
| Architectural Coating-Phase 2 | 77 | 6 | 6.9 | 3,188 | 39 |
| Paving-Phase 2 | 49 | 6 | 6.9 | 2,029 | 25 |
| Landscaping-Phase 2 | 24 | 6 | 6.9 | 994 | 12 |
| | | | | Total Vendor Truck VMT: | 144,472 |
| | | | | Total Idle-Hours: | 1,745 |

**Burbank Avion
Construction Energy Analysis**

On-Road Workers (LDA, LDT1, LDT2)

EMFAC2014 Gasoline Fuel Consumption Factor:¹ 0.0397 gallons/mile miles/gallon
 Total Worker VMT: 3,522,135 miles 25.2
Total VMT gasoline gallons (workers): 139,817

1. California Air Resources Board, EMFAC2014 (South Coast Air Basin; LDA, LDT1, LDT2; CY 2017; Aggregate MY; Aggregate Speed)

| Phase | Days | One-Way Trips/Day | Miles/Trip | VMT |
|--------------------------------------|------|----------------------|--------------------------|------------------|
| Demolition (Remove pavement)-Phase 1 | 17 | 23 | 14.7 | 5,748 |
| Grading-Phase 1 | 51 | 60 | 14.7 | 44,982 |
| Drainage/Utilities/Trenching-Phase 1 | 26 | 15 | 14.7 | 5,733 |
| Foundation-Phase 1 | 136 | 45 | 14.7 | 89,964 |
| Drainage/Utilities/Trenching-Phase 2 | 23 | 13 | 14.7 | 4,395 |
| Foundation-Phase 2 | 88 | 35 | 14.7 | 45,276 |
| Paving-Phase 1 | 245 | 18 | 14.7 | 64,827 |
| Building Construction-Phase 1 | 215 | 572 | 14.7 | 1,807,806 |
| Building Construction-Phase 2 | 413 | 200 | 14.7 | 1,214,220 |
| Architectural Coating-Phase 1 | 105 | 114 | 14.7 | 175,959 |
| Landscaping-Phase 1 | 22 | 20 | 14.7 | 6,468 |
| Architectural Coating-Phase 2 | 77 | 40 | 14.7 | 45,276 |
| Paving-Phase 2 | 49 | 13 | 14.7 | 9,364 |
| Landscaping-Phase 2 | 24 | 6 | 14.7 | 2,117 |
| | | | Total Worker VMT: | 3,522,135 |

**Burbank Avion
Operational Energy Analysis**

Energy and VMT Estimates

| Source | Natural Gas demand (million kBTU/yr) | Electricity demand (million kWh/yr) | Electricity demand from water demand (million kWh/yr) | Annual Worker and Visitor VMT |
|--------|--------------------------------------|-------------------------------------|---|-------------------------------|
| | Burbank Avion | 15.640 | 16.880 | 0.628 |

| Source | CalEEMod | | Total Water Use (Mgal/yr) | Electricity Demand from water Demand (million kWh) |
|---------------|----------------------------|-----------------------------|---------------------------|--|
| | Indoor Water Use (Mgal/yr) | Outdoor Water Use (Mgal/yr) | | |
| Burbank Avion | 45.100 | 3.660 | 48.760 | 0.628 |

| CalEEMod Water Electricity Factors | Electricity Intensity Factor To Supply (kWh/Mgal) | Electricity Intensity Factor To Treat (kWh/Mgal) | Electricity Intensity Factor To Distribute (kWh/Mgal) | Electricity Intensity Factor For Wastewater Treatment (kWh/Mgal) |
|------------------------------------|---|--|---|--|
| Burbank Avion | 9727 | 111 | 1272 | 1911 |

Source: California Emissions Estimator Model (CalEEMod).

**Burbank Avion
Operational Energy Analysis**

Fuel Usage from VMT

Annual VMT (All): 30,070,805 miles/year
(With trip and VMT reductions from land use characteristics and proximity to public transit.)

| Fuel Type: ¹ | GAS | DSL | ELEC |
|--|------------|-----------|---|
| Percent: | 94.77% | 4.02% | 1.21% |
| Miles per Gallon Fuel: | 22.60 | 8.25 | - |
| Annual VMT by Fuel Type : | 28,498,493 | 1,208,727 | 363,585 miles/year |
| Annual Fuel Usage : | 1,260,957 | 146,508 | - gal/year |
| Annual Fuel Savings from Electric Vehicles: ² | - | - | 16,087 gal/year (assumed to be gasoline) |

Notes:

1. California Air Resources Board, EMFAC2014, South Coast Air Basin; 2020; Annual; All vehicle types; Aggregate model year; Aggregate speed).
<https://www.arb.ca.gov/emfac/2014/>
2. Assumes electric vehicles would replace traditional gasoline-fueled vehicles.