

**Complete Streets Improvements  
Construction Energy Analysis**

**Construction Fuel Summary**

164,567 gallons of diesel fuel for heavy-duty construction equipment  
11,050 gallons of diesel fuel for haul trucks  
6,887 gallons of diesel fuel for vendor trucks  
11,385 gallons of fuel (primarily gasoline) for workers

182,504 Total Gallons Diesel  
11,385 Total Gallons Gasoline

	State Fuel Consumption (2014, gallons)	Percent of Annual Project Compared to State
Diesel	3,400,000,000	0.0054%
Gasoline	14,400,000,000	0.0001%

**Estimated Fuel Savings from Project Regulatory Compliance and Mitigation Measures**

Estimated Diesel Fuel Savings from Anti-Idling Regulation:  
8,298 gallons diesel fuel savings (total)

State fuel consumption data:

United States Energy Information Administration (USEIA), "Table F3: Motor Gasoline Consumption, Price, and Expenditure Estimates, 2015," [http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep\\_fuel/html/fuel\\_mg.html&sid=CA](http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_fuel/html/fuel_mg.html&sid=CA), accessed December 2016;  
"Table F7: Distillate Fuel Oil Consumption Estimates, 2015," [http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep\\_fuel/html/fuel\\_use\\_df.html&sid=CA](http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_fuel/html/fuel_use_df.html&sid=CA), accessed December 2016.

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**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 hp-hr for equipment ≤ 50 hp: 21,850 hp-hr  
 Total diesel gallons: 1,261 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 hp-hr for equipment > 50 hp: 504,088 hp-hr  
 Total diesel gallons: 26,167 gal

**Total diesel gallons (off-road equipment): 27,428 gal (1/6th of project)**  
**164,567 gal (full project)**

Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
<b>Proposed Project</b>							
1	Demolition	2	10	81	0.73	13	15,374
1	Demolition	2	10	85	0.78	13	17,238
1	Demolition	2	10	162	0.38	13	16,006
1	Demolition	2	10	199	0.36	13	18,626
1	Demolition	4	10	6	0.82	13	2,558
1	Demolition	2	10	97	0.37	13	9,331
2	Site Preparation	2	10	162	0.38	13	16,006
2	Site Preparation	2	10	199	0.36	13	18,626
2	Site Preparation	4	10	6	0.82	13	2,558
2	Site Preparation	2	10	97	0.37	13	9,331
3	Grading	2	10	162	0.38	13	16,006
3	Grading	2	10	8	0.43	13	894
3	Grading	2	10	199	0.36	13	18,626
3	Grading	4	10	6	0.82	13	2,558
3	Grading	2	10	97	0.37	13	9,331
4	Utility Trenching	2	10	80	0.5	13	10,400
4	Utility Trenching	2	10	162	0.38	25	30,780
5	Building Construction	2	10	8	0.43	25	1,720
5	Building Construction	2	10	199	0.36	25	35,820
5	Building Construction	4	10	6	0.82	25	4,920
5	Building Construction	4	10	97	0.37	25	35,890
6	Paving	2	10	162	0.38	25	30,780
6	Paving	2	10	89	0.2	25	8,900
6	Paving	2	10	174	0.41	25	35,670
6	Paving	2	10	125	0.42	25	26,250
6	Paving	4	10	130	0.36	25	46,800
6	Paving	2	10	8	0.43	25	1,720
6	Paving	2	10	80	0.38	25	15,200
6	Paving	2	10	199	0.36	25	35,820
6	Paving	4	10	6	0.82	25	4,920
6	Paving	2	10	97	0.37	25	17,945
(1/6th of project)							21,850
(1/6th of project)							504,088
Total hp-hr for equipment ≤ 50 hp:							21,850
Total hp-hr for equipment > 50 hp:							504,088

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**On-Road Haul Trucks**

EMFAC2014 Diesel Fuel Consumption Factor: <sup>1</sup>	0.1715	gallons/mile	
Total Haul Truck VMT:	9,580	miles	
<b>Total VMT diesel gallons (on-road haul trucks):</b>	<b>1,643</b>		
<i>Estimated Fuel Savings from</i>			
EMFAC2014 Diesel Fuel Consumption Factor: <sup>2</sup>	1.6569	gallons/hour	
Total Haul Truck Idle-Hours per Year:	120	hours	
<b>Total Idling diesel gallons (on-road haul trucks):</b>	<b>198</b>		
<i>Anti-Idling Regulation (64 percent based on estimated CARB emissions reductions):<sup>3</sup></i>			
			551
			(1/6th of project)
			3,307
			(full project)
<b>Total diesel gallons (on-road haul trucks):</b>	<b>1,842</b>	<b>gal</b>	<b>(1/6th of project)</b>
	<b>11,050</b>	<b>gal</b>	<b>(full project)</b>

1. California Air Resources Board, EMFAC2014 (San Diego Air Basin; T7 Single Construction; Annual, CY 2017; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2014 (San Diego Air Basin; T7 Single Construction; 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	Total One-Way			Miles/Trip	VMT	Idle Hours
	Days	Trips				
<b>Proposed Project</b>						
1 Demolition	13	-	-	-	-	-
2 Site Preparation	13	375	20	7,500	94	
3 Grading	13	104	20	2,080	26	
4 Utility Trenching	13	-	-	-	-	-
5 Building Construction	25	-	-	-	-	-
6 Paving	25	-	-	-	-	-
	(1/6th of project)	Total Haul Truck VMT:		9,580		
	(1/6th of project)	Total Idle-Hours:			120	

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**On-Road Vendor Trucks**

EMFAC2014 Diesel Fuel Consumption Factor:<sup>1</sup> 0.1541 gallons/mile  
 Total Vendor Truck VMT: 5,504 miles  
**Total VMT diesel gallons (on-road vendor trucks): 848**

*Estimated Fuel Savings from  
 Anti-Idling Regulation (64 percent based on  
 estimated CARB emissions reductions):<sup>3</sup>*  
 (1/6th of project) 832  
 (full project) 4,992

EMFAC2014 Diesel Fuel Consumption Factor:<sup>2</sup> 1.5889 gallons/hour  
 Total Vendor Truck Idle-Hours per Year: 189 hours  
**Total Idling diesel gallons (on-road vendor trucks): 299**

**Total diesel gallons (on-road vendor trucks): 1,148 gal (1/6th of project)  
 6,887 gal (full project)**

1. California Air Resources Board, EMFAC2014 (San Diego Air Basin; HHDT and MHDT; Annual; CY 2017; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2014 (San Diego 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	One-Way Trips/Day	Miles/Trip	VMT	Idle Hours
<b>Proposed Project</b>					
1 Demolition	13	2	7.3	190	7
2 Site Preparation	13	2	7.3	190	7
3 Grading	13	2	7.3	190	7
4 Utility Trenching	13	2	7.3	190	7
5 Building Construction	25	24	7.3	4,380	150
6 Paving	25	2	7.3	365	13
	(1/6th of project)	Total Vendor Truck VMT:		5,504	
	(1/6th of project)	Total Idle-Hours:			189

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**On-Road Workers (LDA, LDT1, LDT2)**

EMFAC2014 Gasoline Fuel Consumption Factor:<sup>1</sup> 0.0418 gallons/mile  
 Total Worker VMT: 45,360 miles  
**Total gasoline gallons (workers): 1,898**

**Total gasoline gallons with Savings (workers): 1,898 gal (1/6th of project)**  
**11,385 gal (full project)**

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

Phase	Days	One-Way Trips/Day	Miles/Trip	VMT
<b>Proposed Project</b>				
1 Demolition	13	35	10.8	4,914
2 Site Preparation	13	25	10.8	3,510
3 Grading	13	30	10.8	4,212
4 Utility Trenching	13	10	10.8	1,404
5 Building Construction	25	56	10.8	15,120
6 Paving	25	60	10.8	16,200
	(1/6th of project)		Total Worker VMT:	45,360