

Regional Construction Emissions

Worst-Case Project-Related Regional Construction Emissions

	LBS/DAY				
	CO	ROG	NOx	PM10	Sox
Worst-Case Daily Emissions	1343.298	550.0052	1497.045	168.4275	89.53
SCAQMD	550	75	100	150	150
OVER (Under)	793.30	475.01	1397.05	18.43	(60.47)

	Tons/Quarter				
	CO	ROG	NOx	PM10	Sox
Worst-Case Quarterly Emissions	34.46	18.56	44.04	4.08	2.69
SCAQMD	24.75	2.5	2.5	6.75	6.75
OVER (UNDER)	9.71	16.06	41.54	(2.67)	(4.06)

The worst-case condition is represented by summing the maximum emission rates from each of the six areas for each pollutant.

Quarterly Emissions Total (tons/quarter)

Months of construction
per quarter

Duration of Demolition (months)	8.125	Duration for 1 quarter	3
Duration of Site Preparation (months)	8.125	Duration for 1 quarter	3
Excavation & I-Beam Placement	16.25	Duration for 1 quarter	3
Duration of Construction (months)	32.5	Duration for 1 quarter	3

Daily Emissions	CO	ROG	NO_x	PM10	SO_x
Demolition Emissions (lbs/day)	49	14	129	11	12
Site Prep. Emissions (lbs/day)	47	9	115	23	12
Excavation & I-Beam Placement	120	25	193	13	16
Construction (lbs/day)	205	66	225	20	7
SCAQMD Daily Threshold (lbs/day)	550	75	100	150	150
Difference (lbs/day)					
Demolition Emissions (lbs/day)	(501)	(61)	29	(139)	(138)
Site Prep. Emissions (lbs/day)	(503)	(66)	15	(127)	(138)
Excavation & I-Beam Placement	(430)	(50)	93	(137)	(134)
Construction (lbs/day)	(345)	(9)	125	(130)	(143)
Significant?	No	No	Yes	No	No
Quarterly Emissions					
Demolition Emissions (tons/quarter)	1.67	0.48	4.35	0.39	0.41
Site Prep. Emissions (tons/quarter)	1.58	0.31	3.90	0.77	0.41
Excavation & I-Beam Placement	4.04	0.85	6.53	0.44	0.55
Construction Emissions (tons/quarter)	6.91	2.23	7.58	0.69	0.25
Combined Emissions (tons/quarter)					
SCAQMD Significant?	24.75	2.50	2.50	6.75	6.75
Difference (tons/quarter)					
Demolition Emissions (tons/quarter)	(23.08)	(2.02)	1.85	(6.36)	(6.34)
Site Prep. Emissions (tons/quarter)	(23.17)	(2.19)	1.40	(5.98)	(6.34)
Excavation & I-Beam Placement	(20.71)	(1.65)	4.03	(6.31)	(6.20)
Construction Emissions (tons/quarter)	(17.84)	(0.27)	5.08	(6.06)	(6.50)
Significant?					
Demolition Emissions (tons/quarter)	NO	NO	YES	NO	NO
Site Prep. Emissions (tons/quarter)	NO	NO	YES	NO	NO
Excavation & I-Beam Placement	NO	NO	YES	NO	NO
Construction Emissions (tons/quarter)	NO	NO	YES	NO	NO

Demolition

Parking Structure

Demolition and Site Preparation Emissions (Removal of Asphaltic Concrete from Surface Parking Lot)

Asphalt Wrecking

Depth (ft)	0.3
Area (sqft)	4*4,673
Parking Lot Volume (CuFt)	136,224
PM10 (lbs/CuFt) ¹	0.00042
PM10 (lbs)	58
Control Efficiency	50%
Duration of Demolition (months) ²	8.13
Demolition Total (PM10 lbs/day)	0.16
Days of operation per month	22.5
Parking Lot Area (SF)	414,673
Debris Volume Factor ³ (Sqft per CuYd debris)	108
Debris Volume (CuYd)	3,840
Truck Capacity (CuYd)	15
Number of Hauls	256
Number of Hauls per Day	1

¹ Table A9-9-H, CCA Air Quality Handbook (SCAQMD, 1993)

² Heavy Construction Cost Data, 1999, i.e. Removal of 6" thick asphaltic concrete @ 402 sq. yds. per crew per day)...

³ National Construction Estimator, 1995, (i.e. 108 sq. ft. of asphaltic concrete produces 1 CuYd. of debris)

Demolition Emissions

Loading of Debris into Trucks

Particle size multiplier (dimensionless) ¹	0.30
Mean wind speed (mph) ²	3.7
Moisture content (%) ³	2.5
Density of debris (lb/ft ³) ⁴	90
Debris Volume (CuYd)	3,840
Emission Factor (lb/ton) ⁵	0.0005540
Debris removed (tons)	4665.07125
Loading Emissions Total (PM10 lbs)	2.58
Control Efficiency	50%
Duration of Demolition (months)	8.13
Days worked per month	22.5
Loading Emissions Total (PM10/day)	0.0071

¹ AP42, Section 13.2.4-3

² California Surface Wind Climatology, CARB 1992

³ Table A9-9 G-1, CCA Air Quality Handbook (1993, AQMD)

⁴ AP42, Appendix A-8

⁵ AP42, sec 13.2.4, eqn. 1

Truck Transport Debris (unpaved roads)

Haul Trucks	
Capacity (CY)	15
Distance travelled (miles)/day	0.5
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% WT) (s)	7.5
Mean Vehicle Weight (Tons) (W)	25.7
lbs of PM10/WT	2.0
Control Efficiency	0.8
lbs of PM10/day per haul	0.20
Number of Hauls	1
On-Site Haul Truck Emissions (lbs/day)	0.20

¹ Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2

² Emission Factor (lbs/MVT)=(k/(s/12)*a/(w/3)*b)/(W/0.2)*c

Demolition

Construction Employee Trips

Employees	16
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.6
Total Trips	26

Trip Length taken from Table A9-5-C, CEQA Air Quality Handbook (1993, AQMD)

Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
	13.88	0.48	0.41	0.04	0.26	0.86	0.01

Emission factor from the CARB emission factor model EMFAC7F (Year 2008, 73% LDA, 27% LDT, 100% cold starts)

Emissions (lbs/day)
Max Day 1st Quarter

Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
25	0.2	0.3	0.0086	0.0009	0.0142	0.5	0.006
Total	0.2	0.3				0.5	0.006

Number of Haul Truck Trips (debris)

Per Day			
Number of Trips	Trips per Vehicle	Trip Length	VMT
2	2	10.7	42.8
			0

Haul Truck Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.64	2.46	-	-	-	11.60	1.05

Emission factor from the CARB emission factor model EMFAC7F (Year 2008 EF, 100% HDD, 100% cold starts)

Haul Truck Emissions (lbs/day)

CO	ROG	Diurnal	Resting	Soak	Nox	PM10
1.4	0.2	-	-	-	1.0	0.1
Total	1.4	0.2	-	-	1.0	0.1

Equipment emissions

- Diesel
- Off-highway Trucks
- Scraper
- Crane
- Backhoe
- Tracked Loader
- Fork Lift-50 HP
- Fork Lift - 175 HP
- Tracked tractor/tracked dozer
- Wheeled loader
- Roller
- Motor grader
- Miscellaneous

	Emission Factor (lbs/hour)				
	CO	ROG	Nox	PM10	Sox
Off-highway Trucks	1.8	0.19	4.17	0.26	0.46
Scraper	1.25	0.27	3.84	0.41	0.46
Crane	1.746	0.582	4.462	0.291	0.388
Backhoe	0.572	0.23	1.9	0.17	0.182
Tracked Loader	0.201	0.095	0.83	0.058	0.076
Fork Lift-50 HP	0.18	0.055	0.441	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.54	0.093	0
Tracked tractor/tracked dozer	0.35	0.12	1.26	0.112	0.14
Wheeled loader	0.572	0.23	1.9	0.17	0.182
Roller	0.3	0.065	0.87	0.05	0.067
Motor grader	0.151	0.059	0.713	0.061	0.086
Miscellaneous	0.675	0.150	1.700	0.140	0.148

Emission factors from Table A5-8-A, CEQA Air Quality Handbook (1993, AQMD)

Quantity	Hours/day	Emissions (lbs/day)				
		CO	ROG	Nox	PM10	Sox
Off highway Trucks	0	0.0	-	-	-	-
Scraper	0	10.0	-	-	-	-
Crane	0	10.0	-	-	-	-
Backhoe	2	10.0	11.44	4.60	38.00	3.64
Tracked Loader	2	10.0	4.02	1.90	16.60	1.52
Fork Lift-50 HP	0	10.0	-	-	-	-
Fork Lift - 175 HP	0	10.0	-	-	-	-
Tracked tractor/tracked dozer	0	10.0	-	-	-	-
Wheeled loader	2	10.0	11.44	4.60	38.00	3.64
Roller	0	10.0	-	-	-	-
Motor grader	0	10.0	-	-	-	-
Miscellaneous	2	90.0	13.50	3.00	34.00	2.80
Total			40.40	14.10	126.60	11.66

Demolition Emissions (lbs/day)

- Project
- Building Demolition (fugitive dust)
- Haul Trips
- Employee Trips
- Const Equip Emissions
- Total

	CO	ROG	NOx	PM10	SOx
Project				0	
Building Demolition (fugitive dust)		0		0	
Haul Trips	1		1		
Employee Trips	8	0	1	0	
Const Equip Emissions	40	14	127	11	12
Total	49	14	129	11	12

Site Preparation

Site Preparation Emissions

Grading Emissions		
Speed (MPH)	5	Assumed
Grading Emissions (lbs/VMT)	0.765	
Distance Traveled (miles/day)	30	
Control Efficiency	50%	
Grading Operation (hrs/day)	6	
Grading Emissions (lbs/day)	11.475	
Operation (months)	8.125	

Loader Emissions		
Building footprint (ft ²)	414,873	
Depth of cut (ft)	1	
Total Excavation (CY)	15358.26	
Grading Period (Months)	2	
Workdays/Month	22.5	
Excavation/Day (CY)	341.29	
Distance (feet)/Cycle	50	
Output (yd ³)/cycle	4	
Cycles/day	85.92	
VMT/day	0.81	

Loading Emissions		
K	0.35	(4)
Mean Wind Speed (mph) (u)	3.7	(1)
Moisture Content (%WT)	2.5	(3)
Lbs of PM10/Ton of Material Loaded	5.5E-04	
Volume Excavated (yd ³)	341	
Tons of Material Excavated	460.7	
Control Efficiency	50%	
Loading Emissions (lbs/day)	0.128	

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lbs/ton) = $k(0.032)(u/5)^{exp 1.3} / (M/2)^{exp 1.4}$
 Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993.

Unloading Emissions		
K	0.35	
Mean Wind Speed (mph) (u)	3.7	
Moisture Content (%WT)	2.5	
Lbs of PM10/Ton of Material Loaded	5.5E-04	
Volume Excavated (yd ³)	341	
Tons of Material Excavated	460.7	
Control Efficiency	50%	
Unloading Emissions (lbs/day)	0.128	

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lbs/ton) = $k(0.032)(u/5)^{exp 1.3} / (M/2)^{exp 1.4}$
 Soil materials assumed to weigh 2550 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993

Transportation on Unpaved Roads		
Scraper Full		
Moisture Content (%WT)	2.5	
Particle Size Multiplier for PM10 (K)	2.6	(1)

Excavator Emissions	
Building footprint (ft ²)	414,873
Depth of cut (ft)	1
Total Excavation (CY)	15358.26
Grading Period (Months)	1
Workdays/Month	22.5
Excavation/Day (CY)	682.59
Distance (feet)/Cycle	5
Output (yd ³)/cycle	0.98
Cycles/day	697
VMT/day	0.880

Caterpillar E140

Loading Emissions	
K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	683
Tons of Material Excavated	921.5
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.265

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lbs/ton) = $k(0.032)(u/5)^{exp 1.3} / (M/2)^{exp 1.4}$
 Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993.

Unloading Emissions	
K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	683
Tons of Material Excavated	921.5
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.265

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lbs/ton) = $k(0.032)(u/5)^{exp 1.3} / (M/2)^{exp 1.4}$
 Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993.

Transportation on Unpaved Roads	
Scraper Full	
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% Wt) (s)	7.5
Mean Vehicle Weight (Tons) (W)	15.4
Lbs of PM10/VMT	1.61
Control Efficiency	80%
Lbs of PM10/day	0.213

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
 (2) Emission Factor (lbs/VMT) = $k(12)^a(w/3)^b / (M/0.2)^c$

Excavator Emissions	0.72
Number of Excavators	1
Excavator Emissions	0.72

Construction Employee Trips

Employees
 Number of Trips per vehicle
 Trip Distance
 Average Vehicle Ridership
 Total Trips

Emission Factor

Source

Emissions (lbs/day)

Total

Haul Trips (total)

Haul Truck Emission Factor

Source

Haul Truck Emissions (lbs/day)

Days per Quarter

Equipment emissions

- Diesel
- Off-highway Trucks
- Scraper
- Crane
- Tracked Excavator
- Backhoe
- Tracked Loader
- Fork Lift - 50 HP
- Fork Lift - 175 HP
- Tracked tractor
- Wheeled loader
- Roller
- Motor grader

Site Preparation

Silt Content (% Wt) (a)	7.5 (2)
Mean Vehicle Weight (Tons) (W)	18.3
lbs of PM10/VMT	1.72
Control Efficiency	80%
lbs of PM10/day	0.278

Truck Capacity (yd3)	15
Number of Haul Trips	1023.88
Duration (months)	8.125
Days worked per month	22.5
Number of Haul Trips per day	6
Average Haul Trip Length (miles)	15

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
 (2) Emission Factor (lbs/VMT) = $(k/a \cdot 12)^{-a} \cdot (w/3)^{-b} / (M/0.2)^{-c}$

Loader Emissions	0.53
Number of Loaders	1
Loader Emissions	0.53
Grader Emissions	11.48
Excavator Emissions	0.72
Total Emissions (lbs/day)	12.73

Miscellaneous

- Off-highway Trucks
- Scraper
- Crane
- Tracked Excavator
- Backhoe
- Tracked Loader
- Fork Lift - 50 HP
- Fork Lift - 175 HP
- Tracked tractor
- Wheeled loader
- Roller
- Motor grader
- Miscellaneous
- Total

Site Preparation Emissions (lbs)

Project

- Graders/Loaders (fugitive dust)
- Haul Trips
- Employee Trips
- Const Equip Emissions
- Total Project
- SCAQMD Daily Threshold
- Difference
- Significant?

Site Preparation

20	20	20	20
2.3	2.3	2.3	2.3
10.7	10.7	10.7	10.7
2	2	2	2
23	23	23	23

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
13.88	0.49	0.41	0.04	0.26	0.86	0.01

Emission factor from the CA (Year 2008 75% LDA, 27% LDT, 100% cold starts)

Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
23	7.5	0.3	0.009	0.001	0.013	0.5	0.01
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
23	7.5	0.3	0.009	0.001	0.013	0.5	0.01

Per Day

Number of Trips	Trip Length	VMT
5.600733	10.23	57.2955
	0	0
	0	0
	0	0

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.64	2.46	-	-	-	11.80	1.08

(Year 2008 EF, 100% HDD, 100% cold starts)

CO	ROG	Diurnal	Resting	Soak	Nox	PM10
1.9	0.3	-	-	-	1.5	0.1
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

67.5

Cycle times (minutes)

Load Time	0.6
Maneuver & dump	0.7
Travel	1.5
Total	2.8
Distance (feet)/Cycle	3000
Cycles/50 minute hour	22.72727
Distance travelled (miles)/hour	17.85714286
Distance travelled (miles)/day	10.1461039
Output (yd ³)/cycle	0
Output (yd ³)/hour	27.77777778
Output (yd ³)/day	75000 rated load divided by 2700 lbs/cy
	496.031746
	0

Emission Factor (lbs/hour)				
CO	ROG	Nox	PM10	Sox
1.8	0.19	4.17	0.28	0.45
1.25	0.27	3.84	0.41	0.46
1.748	0.582	4.482	0.291	0.388
0.978	0.088	2.136	0.1335	0.178
0.572	0.23	1.9	0.17	0.182
0.201	0.095	0.83	0.059	0.078
0.16	0.053	0.441	0.031	0
0.52	0.17	1.54	0.093	0
0.35	0.12	1.26	0.112	0.14
0.572	0.23	1.9	0.17	0.182
0.3	0.065	0.87	0.05	0.067
0.151	0.039	0.713	0.061	0.068

Site Preparation

Vehicle	Hours/day	0.675	0.150	1.700	0.140	0.143
		Emissions (lbs/day)				
0	10.0	-	-	-	-	-
1	10.0	12.5	2.7	38.4	4.1	4.8
0	10.0	-	-	-	-	-
1	10.0	9.8	0.9	21.4	1.3	1.8
1	10.0	5.7	2.300	19.0	1.7	1.8
1	10.0	2.0	1.0	8.3	0.6	0.8
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
1	10.0	3.5	1.2	12.6	1.1	1.4
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
2	10.0	3.0	0.8	14.3	1.2	1.7
1	10.0	8.8	1.5	17.0	1.4	1.4
		43.28	10.32	130.92	11.47	13.51

CO	ROG	NOx	PM10	SOx
			12.7	
2	0	1	0	
8	0	0	0	
37	9	114	10	12
47	9	116	23	12
550	75	100	150	150
(503)	(66)	15	(127)	(138)
NO	NO	YES	NO	NO

Construction Employees

Building Area	#REF!	#REF!
Employment Factor	8.78	8.78
Percent of construction	0.458	0.458
Construction cost	27.32	59.88
Number of Construction	#REF!	#REF!
Total Number of Constr	#REF!	

AP42, Section 13.2.4-3

AP42, Section 13.2.4, eqn. 1

Excavation I-Beams

Parking Structure

Excavation

Site Characteristics

Size of Site (sqft)	414,673
Size of Excavation (sqft)	-
Cut (ft)	25
Total volume moved (CY)	-
Volume Filled (yd3)	-
Silt Content (%)	7.5
Mean wind speed (mph)	3.7
Moisture content (%)	15
Excavation Duration (months)	16.25
Workdays/month	22.5
Excavation Volume (CY/day)	-

Site Preparation Emissions (Drilling for Placement of I-Beams)

Transportation on Unpaved Surface (On-Site)
Haul Trucks Bringing Materials (I-Beams) for placement.

Distance travelled (miles)/day	0.50
Moisture Content (%WT)	15
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% Wt) (s)	7.5
Mean Vehicle Weight (Tons) (W)	29.3
lbs of PM10/MT	1.05
Control Efficiency	80%
lbs of PM10/day	0.105

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
(2) Emission Factor (lbs/MT) = $(K/3)(s/12)^a(w/2)^b/(MAO 2)^c$

Number of Hauls	10
On-Site Haul Truck Emissions (lbs/day)	1.05

Construction Employee Trips

Employees	10
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	15

Trip Length taken from Table A9-5-C, CEQA Air Quality Handbook (1993, AQMD)

Emission Factor

CO (gpm/mile)	ROG (gpm/mile)	Diurnal (gpm/veh)	Resting (gpm/veh)	Soak (gpm/trip)	Nox (gpm/mile)	PM10 (gpm/mile)
13.88	0.49	0.41	0.04	0.26	0.86	0.01

Emission factor from the CARB emission factor model EMFAC2F (Year 2008, 73% LDA, 27% LDT, 100% cold starts)

Emissions (lbs/day)

Max Day 1st Quarter

Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
15	4.9059	0.1732	0.1449	0.0141	0.0919	0.3046	0.0035
Total	4.9	0.4	0.14	0.01	0.09	0.30	0.0035

Number of Haul Trips (Materials Transport)

Per Day		
Number of Trips	Trip Length	VMT
10	11.54	115.40
	11.54	0
	11.54	0

Haul Truck Emission Factor

CO (gpm/mile)	ROG (gpm/mile)	Diurnal (gpm/veh)	Resting (gpm/veh)	Soak (gpm/trip)	Nox (gpm/mile)	PM10 (gpm/mile)
14.64	2.46	-	-	-	11.60	1.95

(Year 2008, 100% HDD, 100% cold starts)

Haul Truck Emissions (lbs/day)

CO	ROG	Diurnal	Resting	Soak	Nox	PM10
3.7	0.6	-	-	-	2.9	0.3
-	-	-	-	-	-	-
-	-	-	-	-	-	-
Total	3.7	0.6	-	-	2.9	0.3

Off-highway Trucks
Scraper
Crane
Backhoe
Tracked excavator
Tracked loader
Fork Lift-50 HP

Emission Factor (lbs/hour)					
CO	ROG	Nox	PM10	Sox	
1.8	0.18	4.17	0.26	0.45	
1.25	0.27	3.84	0.41	0.48	
1.746	0.582	4.462	0.291	0.388	
0.572	0.23	1.9	0.17	0.182	
0.817	0.074	1.782	0.111	0.148	
0.201	0.085	0.83	0.059	0.076	
0.18	0.053	0.441	0.031	0	

Excavation I-beams

Fork Lift - 175 HP		0.52	0.17	1.54	0.093	0
Tracked tractor		0.35	0.12	1.26	0.112	0.14
Wheeled loader		0.52	0.23	1.9	0.17	0.182
Roller		0.9	0.068	0.87	0.05	0.067
Motor grader		0.151	0.039	0.713	0.061	0.088
Wheeled dozer		0.675	0.15	1.7	0.14	0.143
Bar/Dull Rig						
		3.135	0.470	3.762	0.235	0.314

Vehicles	Hours/day	Emissions (lbs/day)				
Off-highway Trucks	0	-	-	-	-	-
Scraper	0	-	-	-	-	-
Crane	2	80	27.9	9.3	71.4	4.7
Backhoe	0	80	-	-	-	-
Tracked excavator	0	80	-	-	-	-
Tracked loader	2	80	3.2	1.5	13.3	0.9
Fork Lift-50 HP	0	80	-	-	-	-
Fork Lift - 175 HP	0	80	-	-	-	-
Tracked tractor	0	80	-	-	-	-
Wheeled loader	2	40	4.6	1.8	15.2	1.4
Roller	0	100	-	-	-	-
Motor grader	0	100	-	-	-	-
Wheeled dozer	0	100	-	-	-	-
Push Rig	3	80	75.2	11.3	90.3	5.6
Total			110.98	23.95	190.16	12.6

Total Excavation/I-beam Placement Emissions

Project

	CO	ROG	NOx	PM10	SOx
Fugitive Emissions				0.10	
Employee Emissions	5	6	0	0	
Haul Truck Emissions (lbs/day)	3.721266722	0.625295154	2.848546255	0.269436173	
Construction equipment	11.1	24	193	13	16
Total (lbs/day)	120	25	193	13	16
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(430)	(50)	93	(137)	(134)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	4.0	0.9	6.6	6.4	0.6
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.0	2.5	6.75	6.75
Difference	(20.7)	(1.6)	4.0	(6.3)	(6.2)
Significant?	NO	NO	YES	NO	NO

Parking Structure

General Construction Emissions
Architectural Coatings

Building Area (sqft)	1,640,000	-
Surface Area Coating Factor	2	Table A9-13-C, CEQA Air Quality Handbook (1993, AQMD)
Surface Area to be coated (ft ²)	3,280,000	-
Coating Requirements (sqft/gal)	300	300
Coating Usage (gal)	10,532	-
Rule 113 limit (lbs ROG/gal)	2.08	2.08 Table A9-13-B, CEQA Air Quality Handbook (1993, AQMD)
Total ROG (lbs)	22741	0
Duration (months)	32.5	3
Days of work per month	22.5	22.5
ROG (lbs/day)	31.10	0.00

Truck Traffic on Paved Surface (On-Site)

Base EF for particle size (lb/VMT)	0.016	AP42, section 13.2.1-1
Road surface soil loading (m ² /yd ²)	0.04	CEQA Air Quality Handbook (SCAQMD, 1993), Table A9-D-C-1 (construction sites w/ clean
Road surface soil loading (g/m ²)	1.356	
Mean vehicle weight (ton)	10	
PM10 emission factor (lb/VMT)	0.075	AP42, section 13.2.1-3
Average trip length (miles)	11.54	
Number of trucks per day	150	
Truck VMT (miles)	10334	
Truck traffic emissions (lbs PM10/day)	1.39	

Construction Employee Trips

Employees	65
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	100
Trip Length taken from Table A9-5-C, CEQA Air Quality Handbook (1993, AQMD)	

Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
13.88	0.48	0.41	0.04	0.25	0.88	0.01

Emission factor from the CARB emission factor model EMFAC7F (Year 2000, 75% LDA, 27% LDT, 100% cold starts)

Emissions (lbs/day)

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
Max Day 1st Quarter	100	32.7	1.15	1.0	0.1	0.6	2.0	0.020
Total		32.71	1.15	0.91	0.09	0.81	2.03	0.02

Number of Haul Trips (Materials Transport)

Number of Trips	Per Day	
	Trip Length	VMT
300	11.54	3462
	11.54	0
	11.54	0

Haul Truck Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.84	2.46	-	-	-	11.60	1.06

100% HDD, 100% cold starts

Haul Truck Emissions (lbs/day)

CO	ROG	Diurnal	Resting	Soak	Nox	PM10
111.9	18.8	-	-	-	89.5	6.1
-	-	-	-	-	-	-
-	-	-	-	-	-	-
Total	111.8	18.8	-	-	89.5	6.1

Construction MAH

	Emission Factor (lbs/hour)				
	CO	ROG	NOx	PM10	SOx
Concrete Pump	1.96	0.36	3.21	0.76	0.18
Generator	6.05	1.1	9.9	0.55	1.1
Welder Station	0.16	0.05	0.26	0.03	0.01
Crane	1.746	0.582	4.462	0.291	0.308
Backhoe	0.572	0.23	1.9	0.17	0.182
Tracked loader	0.201	0.093	0.83	0.059	0.076
Fork Lift - 50 HP	0.18	0.063	0.441	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.54	0.093	0
Tracked tractor	0.35	0.12	1.26	0.112	0.14
Wheeled loader	0.572	0.23	1.9	0.17	0.182
Roller	0.3	0.095	0.87	0.05	0.067
Motor grader	0.151	0.039	0.743	0.061	0.086
Wheeled dozer	0.675	0.15	1.7	0.14	0.143
Miscellaneous	0.675	0.150	1.700	0.140	0.143

Vehicle	Hours/day	Emissions (lbs/day)				
		CO	ROG	NOx	PM10	SOx
Concrete Pump	2	3.92	0.72	6.42	1.52	0.36
Generator	0	0	0	0	0	0
Welder Station	2	0.32	0.10	0.52	0.06	0.02
Crane	1	1.746	0.582	4.462	0.291	0.308
Backhoe	0	0	0	0	0	0
Tracked loader	0	0	0	0	0	0
Fork Lift - 50 HP	2	0.36	0.126	0.882	0.062	0
Fork Lift - 175 HP	2	1.04	0.34	3.08	0.186	0
Tracked tractor	0	0	0	0	0	0
Wheeled loader	0	0	0	0	0	0
Roller	2	0.6	0.19	1.74	0.1	0.134
Motor grader	0	0	0	0	0	0
Wheeled dozer	0	0	0	0	0	0
Miscellaneous	1	0.675	0.15	1.7	0.14	0.143
Total		60.25	15.01	134.12	10.84	7.36

Building Construction Emissions

Project

- Coating Emissions
- Truck Traffic on Paved Roads
- Concrete Batching
- Employee Emissions
- Haul Truck Emissions (lbs/day)
- Construction equipment
- Total Project (lbs/day)

	CO	ROG	NOx	PM10	SOx
Coating Emissions		0.00	-		
Truck Traffic on Paved Roads				1.4	
Concrete Batching				0.0	
Employee Emissions	32.71	1.15	2.03	0.0	
Haul Truck Emissions (lbs/day)	111.64	18.76	98.46	8.08	
Construction equipment	60	15	134	11	7
Total Project (lbs/day)	205	66	225	20	7

#

Quarterly Emissions Total (tons/quarter)Months of construction
per quarter

Duration of Demolition (months)	5	Duration for 1 quarter	3
Duration of Site Preparation (months)	5	Duration for 1 quarter	3
Excavation & I-Beam Placement	10	Duration for 1 quarter	3
Duration of Construction (months)	20	Duration for 1 quarter	3

Daily Emissions

	CO	ROG	NOx	PM10	SOx
Demolition Emissions (lbs/day)	49	14	129	12	12
Site Prep. Emissions (lbs/day)	32	6	77	18	7
Excavation & I-Beam Placement	231	42	302	30	18
Construction (lbs/day)	131	26	156	13	7
SCAQMD Daily Threshold (lbs/day)	550	75	100	150	150
Difference (lbs/day)					
Demolition Emissions (lbs/day)	(501)	(61)	29	(138)	(138)
Site Prep. Emissions (lbs/day)	(518)	(69)	(23)	(132)	(143)
Excavation	(319)	(33)	202	(120)	(132)
Construction Total Difference (lbs/day)	(419)	(49)	56	(137)	(143)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions					
Demolition Emissions (tons/quarter)	1.65	0.49	4.35	0.39	0.41
Site Prep. Emissions (tons/quarter)	1.08	0.21	2.59	0.61	0.24
Excavation & I-Beam Placement	7.78	1.40	10.20	1.01	0.62
Construction Emissions (tons/quarter)	4.44	0.87	5.25	0.45	0.22
Combined Emissions (tons/quarter)					
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	6.75
Difference (tons/quarter)					
Demolition Emissions (tons/quarter)	(23.10)	(2.01)	1.85	(6.36)	(6.34)
Site Prep. Emissions (tons/quarter)	(23.67)	(2.29)	0.09	(6.14)	(6.51)
Excavation & I-Beam Placement	(16.97)	(1.10)	7.70	(5.74)	(6.13)
Construction Emissions (tons/quarter)	(20.31)	(1.63)	2.75	(6.30)	(6.53)
Significant?					
Demolition Emissions (tons/quarter)	NO	NO	YES	NO	NO
Site Prep. Emissions (tons/quarter)	NO	NO	YES	NO	NO
Excavation & I-Beam Placement	NO	NO	YES	NO	NO
Construction Emissions (tons/quarter)	NO	NO	YES	NO	NO

Parking Structure

Demolition and Site Preparation Emissions (Removal of Asphaltic Concrete from Surface Parking Lot)

Asphalt Wrecking

Depth (ft)	0.3
Area (sqft)	306,172
Parking Lot Volume (CuFt)	102,057
PM10 (lbs/CuFt) ¹	0.00042
PM10 (lbs)	43
Control Efficiency	50%
Duration of Demolition (months) ²	5.00
Demolition Total (PM10 lbs/day)	0.19
Days of operation per month	22.5
Parking Lot Area (SF)	306,172
Debris Volume Factor ³ (SqFt per CuYd debris)	108
Debris Volume (CuYd)	2,835
Truck Capacity (CuYd)	15
Number of Hauls	189
Number of Hauls per Day	2

¹ Table A9-9-4f, CEQA Air Quality Handbook (SCAQMD, 1993);² Heavy Construction Cost Data, 1998, (i.e., Removal of 6" thick asphaltic concrete is 492 sq. yds. per crew per day).³ National Construction Estimator, 1985 (i.e., 108 sq. ft. of asphaltic concrete produces 1 CuYd. of debris)

Demolition Emissions

Loading of Debris into Trucks	
Particle size multiplier (dimensionless) ¹	0.35
Mean wind speed (mph) ²	3.7
Moisture content (%) ³	3
Density of debris (lb/ft ³) ⁴	90
Debris Volume (CuYd)	2,835
Emission Factor (lb/ton) ⁵	0.0005540
Debris removed (tons)	3444.435
Loading Emissions Total (PM10 lbs)	1.91
Control Efficiency	50%
Duration of Demolition (months)	5.00
Days worked per month	22.5
Loading Emissions Total (PM10/day)	0.01

¹ AP42, Section 13.2.4-3² California Surface Wind Climatology, CARB 1992³ Table A9-9-3-1 CEQA Air Quality Handbook (1993, AQMD)⁴ AP42, Appendix A-8⁵ AP42, sec 13.2.4, eqn. 1

Truck Transport Debris (unpaved roads)

Haul Trucks	
Capacity (CY)	15
Distance travelled (miles)/day	0.14
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% Wt) (s)	7.5
Mean Vehicle Weight (Tons) (W)	25.7
lbs of PM10/WMT	2.0
Control Efficiency	0.8
lbs of PM10/day per haul	0.06
Number of Hauls	2
On-Site Haul Truck Emissions (lbs/day)	0.11

¹ Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2² Emission Factor (lbs/WMT) = $(k/s^{12}) * a(w/3)^b / (M/0.2)^c$

Demolition

Construction Employee Trips

Employees	12
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	18

Trip Length taken from Table A9-5-C, CEQA Air Quality Handbook (1993, AQMD)

Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
	13.88	0.48	0.41	0.04	0.25	0.85	0.05

Emission factor from the CARB emission factor model EMFAC7F (Year 2008, 75% LDA, 27% LDT, 100% cold starts)

Emissions (lbs/day)

Max Day 1st Quarter	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	18	5.9	0.2	0.0072	0.0007	0.0103	0.4	0.004
Total		5.9	0.2				0.4	0.004

Number of Haul Truck Trips (debris)

Per Day			
Number of Trips	Trips per Vehicle	Trip Length	VMT
4	2	10.7	85.6
			0

Haul Truck Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
	14.64	2.46	-	-	-	11.60	1.05

Emission factor from the CARB emission factor model EMFAC7F (Year 2008 EF, 100% HDD, 100% cold starts)

Haul Truck Emissions (lbs/day)

	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	2.8	0.5	-	-	-	2.0	0.2
Total	2.8	0.5	-	-	-	2.0	0.2

Equipment emissions

	Emission Factor (lbs/hour)				
	CO	ROG	Nox	PM10	Sox
Diesel					
Off-highway Trucks	1.8	0.19	4.17	0.26	0.45
Scraper	1.25	0.27	3.84	0.41	0.46
Crane	1.748	0.582	4.482	0.291	0.398
Backhoe	0.572	0.23	1.9	0.17	0.182
Tracked Loader	0.201	0.095	0.83	0.059	0.076
Fork Lift - 50 HP	0.18	0.053	0.443	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.54	0.083	0
Tracked tractor/tracked dozer	0.35	0.12	1.25	0.112	0.14
Wheeled loader	0.572	0.23	1.9	0.17	0.182
Roller	0.3	0.085	0.87	0.05	0.067
Motor grader	0.151	0.039	0.713	0.061	0.085
Miscellaneous	0.675	0.150	1.700	0.140	0.143

Emission factors from Table A9-8-A, CEQA Air Quality Handbook (1993, AQMD)

	Quantity	Hours/day	Emissions (lbs/day)				
			CO	ROG	Nox	PM10	Sox
Off-highway Trucks	0	10.0	-	-	-	-	-
Scraper	0	10.0	-	-	-	-	-
Crane	0	10.0	-	-	-	-	-
Backhoe	2	10.0	11.44	4.50	38.00	3.40	3.64
Tracked Loader	2	10.0	4.02	1.90	16.60	1.18	1.52
Fork Lift - 50 HP	0	10.0	-	-	-	-	-
Fork Lift - 175 HP	0	10.0	-	-	-	-	-
Tracked tractor/tracked dozer	0	10.0	-	-	-	-	-
Wheeled loader	2	10.0	11.44	4.50	38.00	3.40	3.64
Roller	0	10.0	-	-	-	-	-
Motor grader	0	10.0	-	-	-	-	-
Miscellaneous	2	10.0	13.50	3.00	34.00	2.80	2.86
Total			40.40	14.10	126.60	10.78	11.66

Demolition Emissions (lbs/day)

Project	CO	ROG	NOx	PM10	SOx
Building Demolition (fugitive dust)	3	0	2	0	0
Haul Trips	6	0	0	0	0
Employee Trips	40	14	127	11	12
Const Equip Emissions					
Total	49	14	129	12	12

Parking Structure

Excavation

Site Characteristics	
Size of Site (sqft)	306,172
Size of Excavation (sqft)	153,088
Cut (ft)	25
Total volume moved (CY)	141,740
Volume Filled (yd3)	-
Silt Content (%)	7.5
Mean Wind Speed (mph)	3.7
Moisture Content (%)	2.5
Excavation Duration (months)	10.00
Workdays/month	22.5
Excavation Volume (CY/day)	2,500

Transportation on Unpaved Surface (On-Site)

Haul Trucks	
Capacity (CY)	16
Distance travelled (miles/day)	0.12
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% WT) (s)	7.6
Mean Vehicle Weight (Tons) (W)	26.0
Lbs of PM10/VMT	1.79
Control Efficiency	80%
Lbs of PM10/day	0.043

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
 (2) Emission Factor (lbs/VMT) = $(k/s/12)^a * (w/3)^b * (W/2)^c$

Number of Hauls	156
On-Site Haul Truck Emissions	6.89

Excavator Emissions

Caterpillar 320	
Cycle Time (Minutes)	0.23
Distance (feet)/Cycle	0.5
Cycles/50 minute hour	217.38
Distance travelled (miles)/hour	0.02
Distance travelled (miles)/day	0.21
Output (yd3)/day	2,500
Excavator Operation (hrs/day)	10

Batch-Drop

K	0.26
Mean Wind Speed (mph) (U)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd3)	2500
Tons of Material Excavated	3375
Control Efficiency	80%
Batch-Drop Emissions (lbs/day)	0.935

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lbs/ton) = $k/(U/5)^a * (W/2)^b * exp(1.4)$
 Soil materials assumed to weigh 2700 lbs/yd3 - Caterpillar Performance Handbook Edition 24, 1999

Transportation on Unpaved Surface (On-Site) Excavator

Excavator	
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% WT) (s)	7.6
Mean Vehicle Weight (Tons) (W)	20.0
Lbs of PM10/VMT	1.79
Control Efficiency	50%
Lbs of PM10/day	0.194

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
 (2) Emission Factor (lbs/VMT) = $(k/s/12)^a * (w/3)^b * (W/2)^c$

Excavator Emissions	1.12
Number of Excavators	1
Excavator Emissions	1.12

Construction Employee Trips

Employees	12
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	18

Trip Length taken from Table A9-5-C, CEQA Air Quality Handbook (1993, AQMD)

Emission Factor	CO (gpm/mile)	ROG (gpm/mile)	Diurnal (gpm/veh)	Resting (gpm/veh)	Soak (gpm/trip)	Nox (gpm/mile)	PM10 (gpm/mile)
Emission factor from the CARB emission factor model EMFAC7F (Year 2008, 73% LDA, 27% LDT, 100% cold starts)	13.88	0.49	0.41	0.04	0.26	0.86	0.01

Emissions (lbs/day)	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
Max Day 1st Quarter								

Excavation I-beams

Total	5.9	0.2	0.010	0.0007	0.01	0.36	0.0042
	5.8903	0.2100	0.0100	0.00070	0.01000	0.36	0.00424

Number of Haul Truck Round Trips

Per Day		
Number of Trips	Trip Length	VMT
312	10.7	3338.40

Haul Truck Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trp)	Nox (gm/mile)	PM10 (gm/mile)
14.64	2.48	-	-	-	11.60	1.08

(Year 2008 100% HDD, 100% cold starts)

Haul Truck Emissions (lbs/day)

CO	ROG	Diurnal	Resting	Soak	Nox	PM10
107.7	18.1	-	-	-	65.3	7.8
Total	107.7	18.1	-	-	65.3	7.8

- Off-highway Trucks
- Scraper
- Crane
- Backhoe
- Tracked excavator
- Tracked loader
- Fork Lift-50 HP
- Fork Lift - 175 HP
- Tracked tractor
- Wheeled loader
- Roller
- Motor grader
- Wheeled dozer
- Miscellaneous

	Emission Factor (lbs/hour)				
	CO	ROG	Nox	PM10	Sox
Off-highway Trucks	1.8	0.19	4.17	0.26	0.45
Scraper	1.25	0.27	3.84	0.41	0.48
Crane	1.46	0.587	4.457	0.291	0.388
Backhoe	0.572	0.23	1.9	0.17	0.182
Tracked excavator	0.617	0.074	1.782	0.111	0.148
Tracked loader	0.201	0.095	0.83	0.059	0.078
Fork Lift-50 HP	0.16	0.063	0.441	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.64	0.093	0
Tracked tractor	0.35	0.12	1.26	0.112	0.14
Wheeled loader	0.572	0.23	1.9	0.17	0.182
Roller	0.3	0.065	0.87	0.05	0.067
Motor grader	0.154	0.039	0.713	0.004	0.059
Wheeled dozer	0.675	0.15	1.7	0.14	0.143
Miscellaneous	0.675	0.150	1.700	0.140	0.143

Vehicle	Hours/day	Emissions (lbs/day)				
Off-highway Trucks	0	-	-	-	-	-
Scraper	0	-	-	-	-	-
Crane	0	-	-	-	-	-
Backhoe	0	-	-	-	-	-
Tracked excavator	3	24.5	2.2	53.5	3.3	4.5
Tracked loader	0	-	-	-	-	-
Fork Lift-50 HP	0	-	-	-	-	-
Fork Lift - 175 HP	0	-	-	-	-	-
Tracked tractor	0	-	-	-	-	-
Wheeled loader	0	-	-	-	-	-
Roller	0	-	-	-	-	-
Motor grader	0	-	-	-	-	-
Wheeled dozer	0	-	-	-	-	-
Miscellaneous	0	-	-	-	-	-
Total		24.5	2.23	53.45	3.34	4.45

Building Construction Emissions

Project

- Fugitive Emissions
- Employee Emissions
- Haul Truck Emissions (lbs/day)
- Construction equipment
- Total Phase (lbs/day)
- SCAQMD Daily Threshold
- Difference
- Significant?
- Quarterly Emissions (tons/quarter)
- SCAQMD Quarterly Threshold (tons/quarter)
- Difference
- Significant?

	CO	ROG	NOx	PM10	SOx
Fugitive Emissions				8	
Employee Emissions	8	0	0	0	
Haul Truck Emissions (lbs/day)	107.65	18.09	65.3	7.78	
Construction equipment	25	2	53	3	4
Total Phase (lbs/day)	138	21	119	15	4
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(412)	(54)	39	(131)	(146)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	4.7	0.7	4.7	0.6	0.2
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	6.75
Difference	(20.1)	(1.8)	2.2	(6.1)	(6.6)
Significant?	NO	NO	YES	NO	NO

Site Preparation Emissions (Drilling for Placement of I-Beams)

Transportation on Unpaved Surface (On-Site)

Haul Trucks Bringing Materials (I-Beams) for placement.

Distance travelled (miles)/day	0.20
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.5
SR Content (% WT) (s)	7.5
Mean Vehicle Weight (Tons) (W)	20.3
lbs of PM10/VMT	1.60
Control Efficiency	80%
lbs of PM10/day	0.072

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 19-2.2.2

(2) Emission Factor (lbs/VMT) = (K/s^{1.2}) * (w^{0.3}) * (W^{0.2}) * e

Number of Hauls	10
On-Site Haul Truck Emissions (lbs/day)	0.72

Construction Employee Trips

Employees	5
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Excavation Emissions

Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	9
Trip Length taken from Table A9-5-C, CEQA Air Quality Handbook (1993, AQMD)	

Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
Emission factor from the CARB emission factor model EMFAC7F (Year 2008, 73% LDA, 27% LDT 100% cold starts)	13.89	0.49	0.41	0.04	0.26	0.86	0.91

Emissions (lbs/day)	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
Max Day 1st Quarter	9	2.8	0.1	0.08	0.01	0.06	0.2	0.002
Total		2.8	0.100	0.090	0.010	0.060	0.180	0.002

Number of Haul Trips (Materials Transport)

Number of Trips	Per Day	
	Trip Length	VMT
10	11.54	115.40
	11.54	0
	11.54	0

Haul Truck Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.64	2.46	-	-	-	2.60	1.06
(Year 2008, 100% HDJ, 100% cold starts)						

Haul Truck Emissions (lbs/day)

CO	ROG	Diurnal	Resting	Soak	Nox	PM10
3.7	0.6	-	-	-	2.9	0.3
-	-	-	-	-	-	-
-	-	-	-	-	-	-
Total	3.7	0.6	-	-	2.9	0.3

Off-highway Trucks

- Scraper
- Crane
- Backhoe
- Tracked excavator
- Tracked loader
- Fork Lift-50 HP
- Fork Lift - 175 HP
- Tracked tractor
- Wheeled loader
- Roller
- Motor grader
- Wheeled dozer
- Boom/Ditch Rig

	Emission Factor (lbs/hour)				
	CO	ROG	Nox	PM10	Sox
Scraper	1.8	0.19	4.17	0.28	0.45
Crane	1.25	0.27	3.84	0.41	0.46
Backhoe	1.746	0.582	4.482	0.291	0.389
Tracked excavator	0.572	0.23	1.8	0.17	0.162
Tracked loader	0.817	0.074	1.782	0.111	0.148
Fork Lift-50 HP	0.201	0.095	0.83	0.059	0.076
Fork Lift - 175 HP	0.19	0.053	0.441	0.031	0
Tracked tractor	0.52	0.17	1.64	0.033	0
Wheeled loader	0.36	0.12	1.26	0.112	0.14
Roller	0.572	0.23	1.9	0.17	0.182
Motor grader	0.3	0.065	0.67	0.05	0.067
Wheeled dozer	0.151	0.039	0.713	0.081	0.089
Boom/Ditch Rig	0.675	0.15	1.7	0.14	0.143
Total	3.135	0.470	3.782	0.236	0.314

Vehicle	Hours/day	CO	ROG	Nox	PM10	Sox
Off-highway Trucks	0	10.0	-	-	-	-
Scraper	0	10.0	-	-	-	-
Crane	2	6.0	27.0	9.3	71.4	4.7
Backhoe	0	8.0	-	-	-	-
Tracked excavator	0	8.0	-	-	-	-
Tracked loader	2	8.0	3.2	1.5	13.3	0.9
Fork Lift-50 HP	0	8.0	-	-	-	-
Fork Lift - 175 HP	0	8.0	-	-	-	-
Tracked tractor	0	8.0	-	-	-	-
Wheeled loader	2	4.0	4.8	1.8	15.2	1.4
Roller	0	10.0	-	-	-	-
Motor grader	0	10.0	-	-	-	-
Wheeled dozer	0	10.0	-	-	-	-
Push Rig	2	8.0	50.2	7.5	60.2	3.8
Total		65.0	20.18	160.08	10.72	13.91

Total Excavation/Beam Placement Emissions

- Project
- Fugitive Emissions
- Employee Emissions
- Haul Truck Emissions (lbs/day)
- Construction equipment
- Total (lbs/day)
- SCAQMD Daily Threshold
- Difference
- Significant?
- Quarterly Emissions (tons/quarter)
- SCAQMD Quarterly Threshold (tons/quarter)
- Difference
- Significant?

CO	ROG	Nox	PM10	SOx
3.721286722	0.625295154	2.94546256	0.209436123	
86	20	160	11	14
231	42	302	30	18
550	75	100	150	150
(318)	(33)	202	(120)	(132)
NO	NO	YES	NO	NO
7.8	1.4	10.2	1.0	0.6
24.75	2.5	2.5	6.75	6.75
(17.0)	(1.1)	7.7	(5.7)	(6.1)
NO	NO	YES	NO	NO

Parking Structure

General Construction Emissions
Architectural Coatings

Building Area (sqft)	125,000	
Surface Area Coating Factor	2	2 Table A9-13-C, CEQA Air Quality Handbook (1993, AQMD)
Surface Area to be coated (ft ²)	250,000	
Coating Requirements (sqft/gal)	300	300
Coating Usage (gal)	833	
Rule 113 limit (lbs ROG/gal)	2.08	2.08 Table A9-13-B, CEQA Air Quality Handbook (1993, AQMD)
Total ROG (lbs)	1,733	0
Duration (months)	20	3
Days of work per month	22.5	22.5
ROG (lbs/day)	3.85	0.00

Truck Traffic on Paved Surface (On-Site)

Dust EF for particle size (lb/VMT)	0.016	AP42, section 13.2.1-1
Road surface soil loading (oz/yd ²)	0.04	CEQA Air Quality Hndbk (SCLAQMD, 1993), Table A9-9-C-1, (construction sites w/ cleaning)
Road surface soil loading (g/m ²)	1.356	
Mean vehicle weight (tons)	10	
PM10 emission factor (lb/VMT)	0.076	AP42, section 13.2.1-3
Average trip length (miles)	11.54	
Number of trucks per day	50	
Truck VMT (miles)	6.11	
Truck traffic emissions (lbs PM10/day)	0.46	

Construction Employee Trips

Employees	75
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.6
Total Trips	115

Trip Length taken from Table A9-5-C, CEQA Air Quality Handbook (1993, AQMD)

Emission Factor	CO (g/mile)	ROG (g/mile)	Diurnal (g/mile)	Resting (g/mile)	Soak (g/mile)	Nox (g/mile)	PM10 (g/mile)
	13.88	0.49	0.41	0.04	0.26	0.83	0.01

Emission factor from the CARB emission factor model EMFAC7F (Year 2008, 73% LDA, 27% LDT, 100% cold starts)

Emissions (lbs/day)

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
Max Day 1st Quarter	115	37.8	1.3	0.1	-	0.1	2.5	0.030
Total		37.82	1.33	0.05	-	0.07	7.93	0.03

Number of Haul Trips (Materials Transport)

Number of Trips	Per Day	
	Trip Length	VMT
100	11.54	1154
	11.54	0
	11.54	0

Haul Truck Emission Factor

CO (g/mile)	ROG (g/mile)	Diurnal (g/mile)	Resting (g/mile)	Soak (g/mile)	Nox (g/mile)	PM10 (g/mile)
14.04	2.46	-	-	-	11.00	1.08

100% HDD, 100% cold starts

Haul Truck Emissions (lbs/day)

	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	37.2	6.3	-	-	-	29.5	2.7
0	-	-	-	-	-	-	-
0	-	-	-	-	-	-	-
Total	37.2	6.3	-	-	-	29.5	2.7

Construction MAH

	Emission Factor (lbs/hour)				
	CO	ROG	Nox	PM10	SOx
Concrete Pump	1.96	0.36	3.71	0.36	0.18
Generator	8.05	1.1	9.9	0.55	1.1
Welder Station	0.16	0.03	0.26	0.03	0.01
Crane	1.746	0.582	4.482	0.291	0.398
Backhoe	0.572	0.23	1.8	0.17	0.187
Tracked loader	0.201	0.085	0.83	0.058	0.076
Fork Lift-50 HP	0.16	0.053	0.441	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.54	0.095	0
Tracked tractor	0.35	0.12	1.26	0.112	0.14
Wheeled loader	0.672	0.23	1.9	0.17	0.182
Roller	0.3	0.065	0.87	0.05	0.067
Motor grader	0.151	0.039	0.713	0.061	0.085
Wheeled dozer	0.675	0.15	1.7	0.14	0.143
Miscellaneous		0.150	1.700	0.140	0.143

Vehicle	Hours/day	Emissions (lbs/day)				
Concrete Pump	2	3.92	0.72	7.42	0.72	0.36
Generator	0	0	0	0	0	0
Welder Station	2	0.32	0.06	0.52	0.06	0.02
Crane	1	1.746	0.582	4.482	0.291	0.398
Backhoe	0	0	0	0	0	0
Tracked loader	0	0	0	0	0	0
Fork Lift-50 HP	2	0.32	0.106	0.882	0.062	0
Fork Lift - 175 HP	2	1.04	0.34	3.08	0.19	0
Tracked tractor	0	0	0	0	0	0
Wheeled loader	0	0	0	0	0	0
Roller	0	0	0	0	0	0
Motor grader	0	0	0	0	0	0
Wheeled dozer	0	0	0	0	0	0
Miscellaneous	1	0.15	0.15	1.7	0.14	0.143
Total		58.85	14.23	123.69	70.24	6.50

Building Construction Emissions

Project

	CO	ROG	NOx	PM10	SOx
Coating Emissions		0.00	-		
Truck Traffic on Paved Roads				0.5	
Concrete Batching				0.0	
Employee Emissions	37.62	1.33	2.33	0.0	
Haul Truck Emissions (lbs/day)	37.21	6.25	29.49	2.89	
Construction equipment	57	14	124	10	7
Total Project (lbs/day)	131	26	156	13	7
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(419)	(49)	(56)	(137)	(143)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	4.4	0.9	5.2	0.5	0.23
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	6.75
Tons/Quarter Over (Under)	(20.3)	(1.6)	2.7	(6.3)	(6.5)
Significant?	NO	NO	YES	NO	NO

Quarterly Emissions Total (tons/quarter)

Months of construction
per quarter

Duration of Demolition (months)	1.75	Duration for 1 quarter	1.75
Duration of Site Preparation (months)	1.75	Duration for 1 quarter	1.75
Excavation & I-Beam Placement	3.5	Duration for 1 quarter	3
Duration of Construction (months)	7	Duration for 1 quarter	3

Daily Emissions	CO	ROG	NOx	PM10	SOx
Demolition Emissions (lbs/day)	25	7	84	5	6
Site Prep. Emissions (lbs/day)	29	6	69	20	7
Excavation & I-Beam Placement	208	36	214	27	8
Construction(lbs/day)	74	34	94	8	3
SCAQMD Daily Threshold (lbs/day)	550	75	100	150	150
Difference (lbs/day)					
Demolition Emissions (lbs/day)	(525)	(68)	(36)	(145)	(144)
Site Prep. Emissions (lbs/day)	(521)	(69)	(31)	(130)	(143)
Excavation	(342)	(39)	114	(123)	(142)
Construction(lbs/day)	(476)	(41)	(6)	(142)	(147)
Significant?	No	No	Yes	No	No
Quarterly Emissions					
Demolition Emissions (tons/quarter)	0.50	0.14	1.26	0.10	0.12
Site Prep. Emissions (tons/quarter)	0.57	0.12	1.35	0.40	0.14
Excavation & I-Beam Placement	7.01	1.23	7.24	0.92	0.27
Construction Emissions (tons/quarter)	2.49	1.15	3.17	0.28	0.12
Combined Emissions (tons/quarter)					
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	6.75
Difference (tons/quarter)					
Demolition Emissions (tons/quarter)	(24.25)	(2.36)	(1.24)	(6.65)	(6.63)
Site Prep. Emissions (tons/quarter)	(24.18)	(2.38)	(1.15)	(6.35)	(6.61)
Excavation & I-Beam Placement	(17.74)	(1.27)	4.74	(5.83)	(6.48)
Construction Emissions (tons/quarter)	(22.26)	(1.35)	0.67	(6.47)	(6.63)
Significant?					
Demolition Emissions (tons/quarter)	NO	NO	NO	NO	NO
Site Prep. Emissions (tons/quarter)	NO	NO	NO	NO	NO
Excavation & I-Beam Placement	NO	NO	YES	NO	NO
Construction Emissions (tons/quarter)	NO	NO	YES	NO	NO

Demolition

Parking Structure

Demolition and Site Preparation Emissions (Removal of Asphaltic Concrete from Surface Parking Lot)

Asphalt Wrecking

Depth (ft)	0.3
Area (sqft)	57,494
Parking Lot Volume (CuFt)	19,165
PM10 (lbs/CuFt) ¹	0.00042
PM10 (lbs)	8
Control Efficiency	50%
Duration of Demolition (months) ²	1.75
Demolition Total (PM10 lbs/day)	0.10
Days of operation per month	22.5
Parking Lot Area (SF)	57,494
Debris Volume Factor ³ (SqF/lpe: CuYd debris)	108
Debris Volume (CuYd)	532
Truck Capacity (CuYd)	15
Number of Hauls	35
Number of Hauls per Day	1

¹ Table A9-9-H, CEQA Air Quality Handbook (SCAQMD, 1993)

² Heavy Construction Cost Data, 1999 (i.e. Removal of 6" thick asphaltic concrete @ 492 sq. yds. per crew per day)

³ National Construction Estimator, 1995 (i.e. 100 sq. ft. of asphaltic concrete produces 1 CuYd. of debris)

Demolition Emissions

Loading of Debris into Trucks

Particle size multiplier (dimensionless) ¹	0.36
Mean wind speed (mph) ²	3.7
Moisture content (%) ³	3
Density of debris (lb/ft ³) ⁴	90
Debris Volume (CuYd)	532
Emission Factor (lb/ton) ⁵	0.0005540
Debris removed (tons)	646.8075
Loading Emissions Total (PM10 lbs)	0.36
Control Efficiency	50%
Duration of Demolition (months)	1.75
Days worked per month	22.5
Loading Emissions Total (PM10/day)	0.006

¹ AP42, Section 13.2.4-3

² California Surface Wind Climatology, CARB 1992

³ Table A9-9-G-1, CEQA Air Quality Handbook (1993, AQMD)

⁴ AP42, Appendix A-8

⁵ AP42, sec 13.2.4, eqn. 1

Truck Transport Debris (unpaved roads)

Haul Trucks	
Capacity (CY)	15
Distance travelled (miles)/day	0.14
Moisture Content (%WT)	15
Particle Size Multiplier for PM10 (K)	2.8
Silt Content (% WT) (s)	7.5
Mean Vehicle Weight (Tons) (W)	25.7
lbs of PM10/VMT	1.2
Control Efficiency	0.8
lbs of PM10/day per haul	0.03
Number of Hauls	1
On-Site Haul Truck Emissions (lbs/day)	0.03

¹ Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2

² Emission Factor (lbs/VMT) = (K)(s^{1.2})^a(w/3)^b(M/0.2)^c

Demolition

Construction Employee Trips

Employees	8
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	12

Trip Length taken from Table A9-5-C, CEQA Air Quality Handbook (1993, AQMD)

Emission Factor	CO (gmi/mile)	ROG (gmi/mile)	Diurnal (gmi/veh)	Resting (gmi/veh)	Soak (gmi/trip)	Nox (gmi/mile)	PM10 (gmi/mile)
Emission factor from the CARB emission factor model EMFAC7F (Year 2008, 73% LDA, 27% LDT, 100% cold starts)	13.88	0.49	0.41	0.04	0.26	0.88	0.01

Emissions (lbs/day)
Max Day 1st Quarter

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	12	3.9	0.1	0.0048	0.0005	0.0058	0.2	0.003
Total		3.9	0.2				0.2	0.003

Number of Haul Truck Trips (debris)

Number of Trips	Per Day		
	Trips per Vehicle	Trip Length	VMT
2	2	10.7	21.4
			0

Haul Truck Emission Factor	CO (gmi/mile)	ROG (gmi/mile)	Diurnal (gmi/veh)	Resting (gmi/veh)	Soak (gmi/trip)	Nox (gmi/mile)	PM10 (gmi/mile)
Emission factor from the CARB emission factor model EMFAC7F (Year 2008 EF, 100% HDD, 100% cold starts)	14.84	2.46	-	-	-	11.80	1.03

Haul Truck Emissions (lbs/day)

	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	14	0.2	-	-	-	1.0	0.1
Total	14	0.2	-	-	-	1.0	0.1

Equipment emissions

	Emission Factor (lbs/hour)				
	CO	ROG	Nox	PM10	Sox
Diesel					
Off-highway Trucks	1.8	0.19	4.17	0.26	0.45
Scraper	1.25	0.27	3.84	0.41	0.46
Crane	1.746	0.582	4.462	0.291	0.388
Backhoe	0.572	0.23	1.9	0.17	0.182
Tracked Loader	0.201	0.095	0.83	0.050	0.076
Fork Lift - 50 HP	0.18	0.053	0.441	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.54	0.093	0
Tracked tractor/tracked dozer	0.35	0.12	1.26	0.112	0.14
Wheeled loader	0.572	0.23	1.9	0.17	0.182
Roller	0.3	0.065	0.87	0.05	0.067
Motor grader	0.151	0.039	0.713	0.081	0.086
Miscellaneous	0.675	0.150	1.700	0.140	0.143

Emission factors from Table A9-B-A, CEQA Air Quality Handbook (1993, AQMD)

	Quantity	Hours/day	Emissions (lbs/day)				
			CO	ROG	Nox	PM10	Sox
Off-highway Trucks	0	8.0	-	-	-	-	-
Scraper	0	8.0	-	-	-	-	-
Crane	0	8.0	-	-	-	-	-
Backhoe	1	10.0	5.72	2.30	19.00	1.70	1.82
Tracked Loader	1	10.0	2.01	0.95	8.30	0.59	0.76
Fork Lift - 50 HP	0	8.0	-	-	-	-	-
Fork Lift - 175 HP	0	8.0	-	-	-	-	-
Tracked tractor/tracked dozer	0	8.0	-	-	-	-	-
Wheeled loader	1	10.0	5.72	2.30	19.00	1.70	1.82
Roller	0	8.0	-	-	-	-	-
Motor grader	0	8.0	-	-	-	-	-
Miscellaneous	1	10.0	6.75	1.50	17.00	1.40	1.43
Total			20.20	7.05	63.30	5.39	5.83

Demolition Emissions (lbs/day)

	CO	ROG	Nox	PM10	SOx
Project					
Building Demolition (fugitive dust)				0	
Haul Trips	1	0	1	0	
Employee Trips	4	0	0	0	
Const Equip Emissions	20	7	63	5	6
Total	25	7	64	5	6

Site Preparation

Site Preparation Emissions

Grading Emissions	
Speed (MPH)	5 Assumed
Grading Emissions (lbs/VMT)	0.785
Distance Travelled (miles/day)	46
Control Efficiency	50%
Grading Operation (hrs/day)	8
Grading Emissions (lbs/day)	15.3
Operation (months)	1.75

Loader Emissions	
Building Footprint (ft ²)	39,494
Depth of cut (ft)	1
Total Excavation (CY)	1,952.74
Grading Period (Months)	1.75
Workdays/Month	22.5
Excavation/Day (CY)	37.15
Distance (feet)/Cycle	93
Output (yd ³ /cycle)	4
Cycles/day	9.28
VMT/day	0.09

Loading Emissions	
K	0.35 (4)
Mean Wind Speed (mph) (u)	3.7 (1)
Moisture Content (%WT)	2.5 (3)
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	37
Tons of Material Excavated	50.2
Control Efficiency	50%
Loading Emissions (lbs/day)	0.014

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lbs/ton) = $k(0.032)(u^5) \exp(1.3 / (M/2) \exp(1.4))$
 Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993.

Unloading Emissions	
K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	37
Tons of Material Excavated	50.2
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.014

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lbs/ton) = $k(0.032)(u^5) \exp(1.3 / (M/2) \exp(1.4))$
 Soil materials assumed to weigh 2550 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993.

Transportation on Unpaved Roads

Scrapper Full	
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6 (1)
Silt Content (% Wt) (s)	7.5 (2)
Mean Vehicle Weight (Tons) (W)	15.4
Lbs of PM10/VMT	1.72
Control Efficiency	80%
Lbs of PM10/day	0.030

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
 (2) Emission Factor (lbs/VMT) = $k(u/12)^2(u/w)^2/(M/2)^2$

Loader Emissions	
Number of Loaders	1
Loader Emissions	0.06

Grader Emissions	
Excavator Emissions	15.3
Total Emissions (lbs/day)	15.4

Excavator Emissions	
Building Footprint (ft ²)	39,494
Depth of cut (ft)	1
Total Excavation (CY)	1,952.74
Grading Period (Months)	1.75
Workdays/Month	22.5
Excavation/Day (CY)	37.15
Distance (feet)/Cycle	5
Output (yd ³ /cycle)	0.98
Cycles/day	38
VMT/day	0.036

Loading Emissions	
K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	37
Tons of Material Excavated	50.2
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.014

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lbs/ton) = $k(0.032)(u^5) \exp(1.3 / (M/2) \exp(1.4))$
 Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993.

Unloading Emissions	
K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	37
Tons of Material Excavated	50.2
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.014

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lbs/ton) = $k(0.032)(u^5) \exp(1.3 / (M/2) \exp(1.4))$
 Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993.

Transportation on Unpaved Roads

Scrapper Full	
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% Wt) (s)	7.5
Mean Vehicle Weight (Tons) (W)	15.4
Lbs of PM10/VMT	1.91
Control Efficiency	80%
Lbs of PM10/day	0.032

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
 (2) Emission Factor (lbs/VMT) = $k(u/12)^2(u/w)^2/(M/2)^2$

Excavator Emissions	
Number of Excavators	1
Excavator Emissions	0.04

Truck Capacity	
Truck Capacity (yd ³)	15
Number of Hour Trips	87.52
Duration (months)	1.75
Days worked per month	22.5
Number of Hour Trips per day	2
Average Hour Trip Length (miles)	15

Site Preparation

Construction Employee Trips

Employees	12	12	12	12
Number of Trips per vehicle	2.3	2.3	2.3	2.3
Trip Distance	10.7	10.7	10.7	10.7
Average Vehicle Ridership	2	2	2	2
Total Trips	14	14	14	14

Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
Source	13.58	0.49	0.41	0.04	0.26	0.86	0.07

Emission factor from the CA (Year 2008 73% LDA, 27% LDT, 100% cold starts)

Emissions (lb/day)

Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
14	4.6	0.2	0.01	0.00	0.01	0.3	0.003
14	-	-	-	-	-	-	-
14	-	-	0.0	0.0	0.0	-	-
Total	4.580	0.160	0.016	0.002	0.016	0.280	0.003

Haul Trips (one)

Per Day		
Number of Trips	Trip Length	VMT
2	10.23	25.3366
	0	0
	0	0

Haul Truck Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.64	2.46	-	-	-	11.60	1.06

Source (Year 2008 EF, 100% HDD, 100% cold starts)

Haul Truck Emissions (lb/day)

CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0.8	0.1	-	-	-	0.7	0.1
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Days per Quarter

87.5

Equipment emissions

Diesel	Emission Factor (lb/hour)				
	CO	ROG	Nox	PM10	Sox
Off-highway Trucks	1.8	0.19	4.17	0.26	0.45
Scraper	1.25	0.27	3.84	0.41	0.46
Crane	1.746	0.582	4.462	0.291	0.368
Tracked Excavator	4.879	0.089	2.136	0.1335	0.176
Backhoe	0.572	0.23	1.9	0.17	0.182
Tracked Loader	0.201	0.095	0.83	0.057	0.076
Fork Lift-50 HP	0.16	0.053	0.441	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.54	0.093	0
Tracked tractor	0.35	0.12	1.26	0.112	0.14
Wheeled loader	0.672	0.23	1.9	0.17	0.182
Roller	0.3	0.055	0.87	0.05	0.057
Motor grader	0.151	0.038	0.713	0.061	0.085
Miscellaneous	0.675	0.150	1.700	0.140	0.143

Vehicle	Hours/day	Emissions (lb/day)				
Off-highway Trucks	8.0	-	-	-	-	-
Scraper	8.0	-	-	-	-	-
Crane	8.0	-	-	-	-	-
Tracked Excavator	1	10.0	9.8	0.9	21.4	1.3
Backhoe	1	10.0	5.7	2.300	18.0	1.7
Tracked Loader	1	10.0	2.0	1.0	8.3	0.6
Fork Lift-50 HP	0	0.0	-	-	-	-
Fork Lift - 175 HP	0	8.0	-	-	-	-
Tracked tractor	1	10.0	3.5	1.2	12.6	1.1
Wheeled loader	0	8.0	-	-	-	-
Roller	0	8.0	-	-	-	-
Motor grader	1	10.0	1.5	0.4	7.1	0.6
Miscellaneous	0	8.0	-	-	-	-
Total			22.53	5.73	88.39	5.36

Site Preparation Emissions (lb/day)

Project	CO	ROG	NOx	PM10	Sox
Graders/Loaders (fugitive dust)				15.4	
Haul Trips	1	0	1	0	
Employee Trips	5	0	0	0	
Consl Equip Emissions	23	9	68	5	7
Total Project	29	9	69	20	7
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(521)	(66)	(31)	(130)	(143)
Significant?	NO	NO	NO	NO	NO
Months of Grading	1	1	1	1	1
Quarterly Emissions	0.32	0.07	0.77	0.23	0.08
SCAQMD Quarterly Threshold	24.75	2.5	1.5	6.75	6.75
Difference (tons/quarter)	-24.43	-2.43	-1.73	-6.52	-6.67

Parking Structure

Excavation

Site Characteristics	
Size of Site (sqft)	57,454
Size of Excavation (sqft)	15,000
Cut (ft)	15
Total volume moved (CY)	10,200
Volume Filled (yd3)	-
Soil Content (%)	7.5
Mean wind speed (mph)	3.7
Maximum concern (%)	3
Excavation Duration (months)	3.90
Weekdays/month	27.5
Excavation Volume (CY/May)	3,100

Transportation on Unpaved Surface (On-Site)

Haul Trucks	
Capacity (CY)	15
Distance traveled (miles/day)	0.12
Moisture Content (NWT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Soil Content (% Wt) (s)	7.5
Mean Vehicle Weight (Tons) (W)	20.3
lbs of PM10/MMT	1.80
Control Efficiency	80%
lbs of PM10/day	0.043

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
 (2) Emission Factor (lbs/MMT) = $(s)(K)(W)^2 / (a)(b)(MMT)^2(c)$

Number of Trucks	200
On-Site Haul Truck Emissions	8.62

Excavator Emissions

Caterpillar 335	
Cycle Time (Minutes)	0.23
Distance (ft)/Cycle	0.5
Cycles/80 minute hour	217.39
Distance traveled (miles/year)	0.03
Distance traveled (miles/day)	0.18
Output (yd3)/day	2,000
Excavator Operation (hours)	8

Batch-Disp

K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (NWT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd3)	3000
Tons of Material Excavated	4050
Control Efficiency	60%
Batch-Disp Emissions (lb/day)	1.322

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.7.4
 Emission Factor (lb/day) = $K(u)(C)(W)^2 \exp(1.1 / (0.0222222 - 1.4))$
 Soil materials assumed to weigh 2700 lbs/yd3 - Caterpillar Performance Handbook Edition 24, 1993

Transportation on Unpaved Surface (Off-Site) Excavator

Excavator	
Moisture Content (NWT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Soil Content (% Wt) (s)	7.5
Mean Vehicle Weight (Tons) (W)	20.3
lbs of PM10/MMT	1.80
Control Efficiency	80%
lbs of PM10/day	0.148

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
 (2) Emission Factor (lbs/MMT) = $(s)(K)(W)^2 / (a)(b)(MMT)^2(c)$

Excavator Emissions	1.27
Number of Excavators	1
Excavator Emissions	1.27

Construction Employee Trips

Employees	10
Number of Trips per vehicle	2.3
Trip Distance	11.54
Average Vehicle Rate/ship	1.5
Total Trips	35

Trip Length taken from Table AII-5-C, CEQA Air Quality Handbook (1993, AQND)

Emission Factor

	CO (g/mile)	ROG (g/mile)	Distnat (g/mile)	Resting (g/mile)	Soak (g/mile)	Hot (g/mile)	PM10 (g/mile)
13.01	0.41	0.04	C-20	0.06	0.01		

Emission factor from the CARB emission factor model EMFAC2F
 (Year 2008: 33% CO, 2% ROG, 100% distnat)

Emission (lb/day)

	Trips	CO	ROG	Distnat	Resting	Soak	Hot	PM10
0	35	5.3	0.2	0.002	0.002	0.000	0.330	0.003
Total		5.2900	0.1800	0.0050	0.0005	0.0000	0.3300	0.0030

Number of Haul Truck Road Trips

Per Day		
Number of Trips	Trip Length	MMT
400	11.54	46.16 50

Haul Truck Emission Factor

CO (g/mile)	ROG (g/mile)	Distnat (g/mile)	Resting (g/mile)	Soak (g/mile)	Hot (g/mile)	PM10 (g/mile)
----------------	-----------------	---------------------	---------------------	------------------	-----------------	------------------

14.84	7.46	-	-	11.20	13.8
Year 2008 100% LDD, 100% LDT, 100% load status					

Haul Truck Emissions (Building)

	CO	ROG	Diurnal	Evening	Soak	Max	PM10
	148.8	25.5	-	-	-	117.9	13.8
Total	148.8	25.5	-	-	-	117.9	13.8

On-highway Trucks

- Scraper
- Crane
- Backhoe
- Tracked loader
- Tracked loader
- Fork Lift - 50 HP
- Fork Lift - 175 HP
- Tracked loader
- Wheeled loader
- Roller
- Motor grader
- Wheeled dozer
- Miscellaneous

	Emission Factor (lb/hr)					
	CO	ROG	Diurnal	Evening	Soak	PM10
Scraper	1.8	0.18	4.17	0.38	0.43	0.43
Crane	1.25	0.127	3.54	0.41	0.46	0.46
Backhoe	1.740	0.187	4.402	0.201	0.388	0.388
Tracked loader	0.072	0.23	1.8	0.17	0.152	0.152
Tracked loader	0.017	0.074	1.742	0.111	0.148	0.148
Fork Lift - 50 HP	0.201	0.095	0.01	0.005	0.006	0.006
Fork Lift - 175 HP	0.18	0.052	0.441	0.031	0	0
Tracked loader	0.02	0.17	1.54	0.083	0	0
Wheeled loader	0.08	0.12	1.26	0.112	0.14	0.14
Roller	0.372	0.23	1.9	0.17	0.182	0.182
Motor grader	0.3	0.095	0.87	0.06	0.067	0.067
Wheeled dozer	0.251	0.038	0.713	0.011	0.086	0.086
Miscellaneous	0.075	0.23	1.7	0.14	0.143	0.143
	0.075	0.151	1.700	0.140	0.143	0.143

Vehicle	Hours/day	Emissions (lb/day)					
Off-highway Trucks	0	10.0	-	-	-	-	-
Scraper	0	10.0	-	-	-	-	-
Crane	0	15.0	-	-	-	-	-
Backhoe	0	15.0	-	-	-	-	-
Tracked loader	1	8.3	0.5	0.6	14.3	0.8	3.2
Tracked loader	0	10.0	-	-	-	-	-
Fork Lift - 50 HP	0	10.0	-	-	-	-	-
Fork Lift - 175 HP	0	10.0	-	-	-	-	-
Tracked loader	0	10.0	-	-	-	-	-
Wheeled loader	0	10.0	-	-	-	-	-
Roller	0	10.0	-	-	-	-	-
Motor grader	0	10.0	-	-	-	-	-
Wheeled dozer	0	13.0	-	-	-	-	-
Miscellaneous	0	15.0	-	-	-	-	-
Total	0	99.7	0.58	14.25	0.81	1.19	1.19

Building Construction Emissions

- Project
- Fugitive Emissions
- Employee Emissions
- Haul Truck Emissions (lb/day)
- Construction equipment
- Total Phase (lb/day)
- SCAQMD Daily Threshold
- Deficiency
- Significant?
- Quarterly Emissions (lb/quarter)
- SCAQMD Quarterly Threshold (lb/quarter)
- Deficiency
- Significant?

	CO	ROG	NOx	PM10	SOx
Project	5	0.205	0.330	0.304	0
Fugitive Emissions	141.85	28.01	117.84	13.74	0
Employee Emissions	7	1	14	1	1
Haul Truck Emissions (lb/day)	181	26	133	22	1
Construction equipment	550	75	100	150	150
Total Phase (lb/day)	(389)	(49)	33	(128)	(148)
SCAQMD Daily Threshold	NO	NO	YES	NO	NO
Deficiency	3.4	6.9	4.5	4.7	0.8
SCAQMD Quarterly Threshold (lb/quarter)	24.75	2.5	2.5	8.75	8.75
Deficiency	(19.3)	(1.6)	2.0	(6.0)	(6.0)
Significant?	NO	NO	YES	NO	NO

Site Preparation Emissions (Drilling for Placement of I-Beams)

- Transportation on Unpaved Surface (D-BE)
- Haul Trucks Bringing Materials (I-Beams) for placement

Distance traveled (miles/day)	0.13
Motorless Content (MWT)	2.5
Particle Size Multiplier for PM10 (K)	2.8
SB Content (% Wt) (a)	7.5
Mean Vehicle Weight (Tons) (W)	20.3
lbs of PM10/MWT	1.80
Control Efficiency	80%
lbs of PM10/day	0.047

(1) Empirical formula from AP-42, Calculation of Air Pollutant Emission Factors 1.2.2.2.2
 (2) Emission Factor (lb/MWT) = (K)(a)(W)(b)(c)(d)(e)(f)(g)(h)(i)(j)(k)(l)(m)(n)(o)(p)(q)(r)(s)(t)(u)(v)(w)(x)(y)(z)

Number of Haul	8
On-Site Haul Truck Emissions (lb/day)	0.38

Construction Employee Trips

Employees	4
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Mileage	1.5
Total Trips	6

Trip Length taken from Table A9-5 C, CEQA Air Quality Handbook (1993, ADMMU)

Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Evening (gm/veh)	Soak (gm/trip)	Max (gm/mile) (gm/mile)	PM10 (gm/mile)
	13.48	0.45	0.61	0.64	0.26	0.65	0.01

Emission factor from the CARB emission factor model EMFAC7F (Year 2008, 12% LDD, 21% LDT, 100% load status)

Emissions (Building)	Trips	CO	ROG	Diurnal	Evening	Soak	Max	PM10
Max Day 1st Quarter	6	2.0	2.7	0.060	0.380	0.040	0.120	0.0014
Total	0	2.0	0.0792	0.060	0.0162	0.0400	0.1200	0.0014

Number of Haul Trips (Motor/Air Transport)

Number of Trips	Per Day	
	Trip Length	VMT
6	11.54	69.24
	11.54	0
	11.54	0

Haul Truck Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Evening (gm/veh)	Soak (gm/trip)	Max (gm/mile)	PM10 (gm/mile)
13.48	0.45	0.61	0.64	0.26	0.65	0.01

(Year 2008, 100% LDD, 100% load status)

Haul Truck Emissions (Building)

Excavation Emissions

CO	NOx	Diesel	Rolling	Scrub	Max	PM10
2.2	0.4	-	-	-	1.6	0.2
2.2	0.4	-	-	-	1.6	0.2

Off-highway Trucks
 Scrapers
 Crane
 Backhoe
 Tracked excavator
 Tracked loader
 Fork Lift 30 HP
 Fork Lift - 175 HP
 Tracked loader
 Wheeled loader
 Roller
 Motor grader
 Wheeled dozer
 Backhoe Rip

CO	Emission Factor (lbs/hour)				SOx
	Idle	Rolling	Scrub	Max	
1.8	0.18	4.17	0.26	0.43	
1.25	0.27	3.64	0.41	0.46	
1.146	0.87	4.462	0.291	0.358	
0.572	0.23	1.8	0.17	0.152	
0.877	0.074	1.782	0.111	0.148	
0.201	0.085	0.43	0.055	0.076	
0.18	0.053	0.441	0.031	0	
0.02	0.17	1.54	0.048	0	
0.25	0.12	1.26	0.112	0.14	
0.572	0.23	1.8	0.17	0.152	
0.3	0.066	0.87	0.06	0.087	
0.151	0.036	0.713	0.051	0.068	
0.875	0.15	1.7	0.14	0.143	
3.125	0.470	3.767	0.270	0.314	

Off-highway Trucks
 Scrapers
 Crane
 Backhoe
 Tracked excavator
 Tracked loader
 Fork Lift 30 HP
 Fork Lift - 175 HP
 Tracked loader
 Wheeled loader
 Roller
 Motor grader
 Wheeled dozer
 Push 12g
 Total

Vehicle	Hours/Day	Emissions (lb/day)				
0	10.0	-	-	-	-	-
1	4.0	14.0	4.7	2.3	2.1	
0	8.0	-	-	-	-	-
0	8.0	-	-	-	-	-
1	8.0	1.8	0.8	0.5	0.6	
0	8.0	-	-	-	-	-
0	8.0	-	-	-	-	-
1	4.0	2.3	0.9	0.7	0.7	
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
1	1.0	29.1	3.8	3.1	2.5	
Total		47.8	12.1	8.6	6.9	

Total Excavation Emission Placement Emissions

Project
 Fugitive Emissions
 Employee Emissions
 Non-Fugitive Emissions (hourly)
 Construction equipment
 Total (lb/day)
 SCAQMD Daily Threshold
 Difference
 Significant?
 Quarterly Emissions (lb/quarter)
 SCAQMD Quarterly Threshold (lb/quarter)
 Difference
 Significant?

CO	PM10	NOx	SOx
2	0.05	0	0
2,232,761,233	0.1761,7203	1,764,127,133	0.16,185,974
43	16	46	7
268	28	214	27
550	75	100	150
(342)	(48)	114	(123)
NO	NO	YES	NO
7.0	1.2	7.3	0.3
24,75	2.6	2.5	0.75
(17.7)	(1.3)	4.7	(0.5)
NO	NO	YES	NO

Construction

Parking Structure

General Construction Emissions
Architectural Coatings

Building Area (sqft)	225,000	-
Surface Area Coating Factor	2	2 Table A9-13-C, CEQA Air Quality Handbook (1993, AQMD)
Surface Area to be coated (ft2)	450,000	-
Coating Requirements (sqft/gal)	350	300
Coating Usage (gal)	1,500	-
Rule 113 limit (lbs ROG/gal)	2.08	2.08 Table A9-13-B, CEQA Air Quality Handbook (1993, AQMD)
Total ROG (lbs)	3,120	0
Durability (months)	7	3
Days of work per month	22.5	22.5
ROG (lbs/day)	19.81	0.00

Truck Traffic on Paved Surface (On-Site)

Base EF for particle size (lb/VMT)	0.016	AP42, section 13.2-1-1
Road surface silt loading (oz/yd2)	0.04	CEQA Air Quality Hndbk (SCAQMD, 1993), Table A9-9-C-1, (construction sites w/ cleaning)
Road surface silt loading (g/m2)	1.356	-
Mean vehicle weight (tons)	10	-
PM10 emission factor (lb/VMT)	0.076	AP42, section 13.2-1-3
Average trip length (miles)	10.7	-
Number of trucks per day	50	-
Truck VMT (miles)	535	-
Truck traffic emissions (lbs PM10/day)	0.46	-

Concrete Batching (PM-10)

Capacity (cu yds per hour)	0	-
Mixer	0.0	AP42, section 11.12-4 (Baghouse, 99% Control Efficiency)
Transfer to Cement/FlyAsh Batcher	0.0	AP42, section 11.12-1 (Baghouse, 99% Control Efficiency)
Pneumatic Transfer to Silos	0.0	AP42, section 11.12-4 (Baghouse, 99% Control Efficiency)
Transfer to Sand Storage/Bin	0.0	AP42, section 11.12-4 (Water Curtain, 90% Control Efficiency)
Transfer to Aggregate Storage/Bin	0.0	AP42, section 11.12-4 (Water Curtain, 90% Control Efficiency)
Total: (lbs PM10/day)	0.0	-

Construction Employee Trips

Employees	15
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	23

Trip Length taken from Table A5-5-C, CEQA Air Quality Handbook (1993, AQMD)

Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
Emission factor from the CARB emission factor model EMFAC7F (Year 2008, 73% LDA, 27% LDT, 100% cold starts)	12.88	0.49	0.41	0.041	0.26	0.66	0.01

Emissions (lbs/day)

Max Day 1st Quarter	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	23	7.5	0.3	0.01	0.001	0.0	0.5	0.010
Total		7.5	0.3	0.010	0.001	0.010	0.470	0.010

Number of Haul Trips (Materials Transport)

Number of Trips	Per Day	
	Trip Length	VMT
100	11.54	1154
	11.54	0
	11.54	0

Haul Truck Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.64	2.48	-	-	-	11.60	1.06

100% HDD, 100% cold starts

Haul Truck Emissions (lbs/day)

CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	37.2	0.3	-	-	29.5	2.7
0	-	-	-	-	-	-
0	-	-	-	-	-	-
Total	37.2	0.3	-	-	29.5	2.7

Concrete Pump

	Emission Factor (lbs/hour)				
	CO	ROG	Nox	PM10	Sox
Concrete Pump	1.96	0.36	3.21	0.36	0.18
Generator	6.05	1.1	9.9	0.36	1.1
Welder Station	0.16	0.03	0.26	0.03	0.01
Crane	1.746	0.582	4.462	0.291	0.386
Backhoe	0.672	0.23	1.9	0.17	0.182
Treaded loader	0.201	0.056	0.83	0.059	0.078
Fork LM - 50 HP	0.18	0.053	0.441	0.031	0
Fork LM - 175 HP	0.52	0.17	1.54	0.083	0
Treaded loader	0.35	0.12	1.26	0.112	0.14
Wheeled loader	0.572	0.23	1.9	0.17	0.182
Roller	0.3	0.065	0.7	0.05	0.067

Construction

Motor grader	0.151	3.039	0.713	0.061	0.086
Wheel loader	0.675	0.15	1.7	0.14	0.143
Miscellaneous	0.675	0.150	1.700	0.140	0.143

Vehicle	Hours/day	Emissions (lb/day)					
Concrete Pump	1	6.0	11.8	2.2	18.3	2.2	1.1
Generator	0	10.0	-	-	-	-	-
Welder Station	1	8.0	1.3	0.2	2.1	0.7	0.1
Crane	1	6.0	10.5	3.5	26.6	1.8	2.3
Backhoe	0	6.0	-	-	-	-	-
Tracked loader	0	6.0	-	-	-	-	-
Fork Lift - 50 HP	1	8.0	1.4	0.4	3.5	0.3	-
Fork Lift - 175 HP	1	8.0	4.2	1.4	12.3	0.7	-
Tracked tractor	0	6.0	-	-	-	-	-
Wheel loader	0	6.0	-	-	-	-	-
Roller	0	6.0	-	-	-	-	-
Motor grader	0	6.0	-	-	-	-	-
Wheel loader	0	6.0	-	-	-	-	-
Miscellaneous	0	6.0	-	-	-	-	-
Total	0	8.0	-	-	-	-	-
		79.12	7.67	63.96	5.14	3.49	

Building Construction Emissions

Project

Coating Emissions

Truck Traffic on Paved Roads

Concrete Batching

Employee Emissions

Haul Truck Emissions (lbs/day)

Construction equipment

Total Project (lbs/day)

SCAQMD Daily Threshold

Difference

Significant?

Quarterly Emissions (tons/quarter)

SCAQMD Quarterly Threshold (tons/quarter)

Tons/Quarter Over (Under)

Significant?

	CO	ROG	NOx	PM10	SOx
Project		0.00	-		
Coating Emissions				0.5	
Truck Traffic on Paved Roads				0.0	
Concrete Batching				0.0	
Employee Emissions	7.57	6.29069106	0.47	0.0	
Haul Truck Emissions (lbs/day)	37.21	6.75	29.40	2.89	
Construction equipment	29	8	64	5	3
Total Project (lbs/day)	74	34	94	8	3
SCAQMD Daily Threshold	560	75	100	150	150
Difference	(478)	(41)	(6)	(142)	(147)
Significant?	NO	NO	NO	NO	NO
Quarterly Emissions (tons/quarter)	2.5	1.1	3.2	0.3	0.1
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	6.75
Tons/Quarter Over (Under)	(22.3)	(1.4)	0.7	(6.5)	(6.6)
Significant?	NO	NO	YES	NO	NO

Quarterly Emissions Total (tons/quarter)

Months of construction
per quarter

Duration of Demolition (months)	2.75	Duration for 1 quarter	2.75
Duration of Site Preparation (months)	2.75	Duration for 1 quarter	2.75
Excavation I-Beam	5.5	Duration for 1 quarter	3
Duration of Construction (months)	11	Duration for 1 quarter	3

Daily Emissions

	CO	ROG	NOx	PM10	SOx
Demolition Emissions (lbs/day)	35	9	82	8	7
Site Prep. Emissions (lbs/day)	35	7	70	21	7
Excavation & I-Beam Placement Construction (lbs/day)	252	43	280	31	14
SCAQMD Daily Threshold (lbs/day)	550	75	100	150	150
Difference (lbs/day)					
Demolition Emissions (lbs/day)	(515)	(66)	(18)	(142)	(143)
Site Prep. Emissions (lbs/day)	(515)	(68)	(30)	(129)	(143)
Excavation	(298)	(32)	180	(119)	(136)
Construction Total Difference (lbs/day)	(438)	22	30	(138)	(145)
Significant?	No	Yes	Yes	No	No
Quarterly Emissions					
Demolition Emissions (tons/quarter)	1.08	0.29	2.54	0.23	0.22
Site Prep. Emissions (tons/quarter)	1.08	0.21	2.17	0.65	0.22
Excavation & I-Beam Placement Construction Emissions (tons/quarter)	8.52	1.44	9.46	1.05	0.48
Construction Emissions (tons/quarter)	3.79	3.29	4.40	0.39	0.16
Combined Emissions (tons/quarter)					
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	6.75
Difference (tons/quarter)					
Demolition Emissions (tons/quarter)	(23.67)	(2.21)	0.04	(6.52)	(6.53)
Site Prep. Emissions (tons/quarter)	(23.67)	(2.29)	(0.33)	(6.10)	(6.53)
Excavation & I-Beam Placement	(16.23)	(1.06)	6.96	(5.70)	(6.27)
Construction Emissions (tons/quarter)	(20.96)	0.79	1.90	(6.36)	(6.59)
Significant?					
Demolition Emissions (tons/quarter)	NO	NO	YES	NO	NO
Site Prep. Emissions (tons/quarter)	NO	NO	NO	NO	NO
Excavation & I-Beam Placement	NO	NO	YES	NO	NO
Construction Emissions (tons/quarter)	NO	YES	YES	NO	NO

Demolition

Parking Structure

Demolition and Site Preparation Emissions (Removal of Asphaltic Concrete from Surface Parking Lot)

Asphalt Wrecking

Depth (ft)	0.3
Area (sqft)	216,613
Parking Lot Volume (CuFt)	72,204
PM10 (lb/CuFt) ¹	0.00042
PM10 (lbs)	30
Control Efficiency	50%
Duration of Demolition (months) ²	2.75
Demolition Total (PM10 (lb/day))	0.24
Days of operation per month	22.5
Parking Lot Area (SF)	216,613
Debris Volume Factor ³ (SqFt per CuYd debris)	108
Debris Volume (CuYd)	2,006
Truck Capacity (CuYd)	15
Number of Hauls	134
Number of Hauls per Day	2

¹ Table A8-9-H, CEQA Air Quality Handbook (SCAQMD, 1993)

² Heavy Construction Cost Data, 1999, (i.e., Removal of 6" thick asphaltic concrete @ 452 sq. yds. per crew per day).

³ National Construction Estimator, 1995, (i.e., 108 sq. ft. of asphaltic concrete produces 1 CuYd. of debris)

Demolition Emissions

Loading of Debris into Trucks

Particle size multiplier (dimensionless) ¹	0.35
Mean wind speed (mph) ²	3.7
Moisture content (%) ³	2.50
Density of debris (lb/ft ³) ⁴	90
Debris Volume (CuYd)	2,006
Emission Factor (lb/ton) ⁵	0.0005540
Debris removed (tons)	2436.89625
Loading Emissions Total (PM10 lbs)	1.35
Control Efficiency	50%
Duration of Demolition (months)	2.75
Days worked per month	22.5
Loading Emissions Total (PM10/day)	0.01

¹ AP42, Section 13.2.4-3

² California Surface Wind Climatology, CARB 1992

³ AP42, Section 13.2.4-3

⁴ AP42, Appendix A-8

⁵ AP42, sec 13.2.4, eqn. 1

Truck Transport Debris (unpaved roads)

Haul Trucks	
Capacity (CY)	15
Distance travelled (miles/day)	0.14
Moisture Content (%WT)	15
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% WT) (s)	7.5
Mean Vehicle Weight (Tons) (W)	25.7
Lbs of PM10/VMT	1.2
Control Efficiency	0.8
Lbs of PM10/day per haul	0.03
Number of hauls	2
On-Site Haul Truck Emissions (lbs/day)	0.06

¹ Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2

² Emission Factor (lbs/VMT) = $k(s/12)^a(w/3)^b/(MAD)^c$

Demolition

Construction Employee Trips

Employees	10
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	15
Trip Length taken from Table A9-5-C, CEQA Air Quality Handbook (1993, AQMD)	

Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
Emission factor from the CARB emission factor model EMFAC7F (Year 2008, 73% LDA, 27% LDT, 100% cold starts)	13.86	0.49	0.41	0.04	0.26	0.86	0.01

Emissions (lbs/day) Max Day 1st Quarter	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	15	4.9	0.2	0.060	0.006	0.0096	0.3	0.004
Total		4.9	0.2				0.3	0.004

Number of Haul Truck Trips (debris)

Per Day			
Number of Trips	Trips per Vehicle	Trip Length	VMT
4	2	10.7	85.6
			0

Haul Truck Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
Emission factor from the CARB emission factor model EMFAC7F (Year 2008 EF, 100% HDD, 100% cold starts)	14.64	2.46	-	-	-	11.60	1.06

Haul Truck Emissions (lbs/day)	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	2.8	0.5	-	-	-	2.0	0.2
Total	2.8	0.5	-	-	-	2.0	0.2

Equipment emissions

	Emission Factor (lbs/hour)				
	CO	ROG	Nox	PM10	Sox
Diesel	1.8	0.19	4.17	0.26	0.45
Off-highway Trucks	1.25	0.27	3.84	0.41	0.46
Scraper	1.746	0.582	4.462	0.291	0.388
Crane	0.572	0.23	1.9	0.17	0.162
Backhoe	0.201	0.096	0.83	0.059	0.076
Tracked Loader	0.19	0.053	0.441	0.031	0
Fork Lift - 50 HP	0.52	0.17	1.54	0.093	0
Fork Lift - 175 HP	0.35	0.12	1.26	0.112	0.14
Tracked tractor/tracked dozer	0.572	0.23	1.9	0.17	0.162
Wheeled loader	0.3	0.065	0.67	0.05	0.067
Roller	0.151	0.039	0.713	0.061	0.069
Motor grader	0.675	0.150	1.700	0.140	0.143
Miscellaneous					

Emission factors from Table A9-3-A, CEQA Air Quality Handbook (1993, AQMD)

	Quantity	Hours/day	Emissions (lbs/day)				
			CO	ROG	Nox	PM10	Sox
Off-highway Trucks	0	8.0	-	-	-	-	-
Scraper	0	8.0	-	-	-	-	-
Crane	0	8.0	-	-	-	-	-
Backhoe	1	10.0	5.72	2.30	19.00	1.70	1.62
Tracked Loader	1	10.0	2.01	0.95	6.30	0.59	0.76
Fork Lift - 50 HP	0	8.0	-	-	-	-	-
Fork Lift - 175 HP	0	8.0	-	-	-	-	-
Tracked tractor/tracked dozer	0	8.0	-	-	-	-	-
Wheeled loader	1	10.0	5.72	2.30	19.00	1.70	1.62
Roller	0	8.0	-	-	-	-	-
Motor grader	0	8.0	-	-	-	-	-
Miscellaneous	2	10.0	13.50	3.00	24.00	2.80	2.86
Total			26.95	6.55	80.30	6.79	7.26

Demolition Emissions (lbs/day)

Project	CO	ROG	NOx	PM10	SOx
Building Demolition (fugitive dust)				0	
Haul Trips	3	0	2	0	
Employee Trips	5	0	0	0	
Const Equip Emissions	27	9	80	7	7
Total	35	9	82	8	7

Site Preparation

Site Preparation Emissions

Grading Emissions	
Speed (MPH)	5 Assumed
Grading Productivity (bu/VMT)	0.755
Distance Traveled (miles/day)	40
Control Efficiency	50%
Grading Operation (hrs/day)	8
Grading Emissions (lbs/day)	15.3
Operation (months)	7.75

Loader Emissions	
Building Footprint (ft ²)	135,884
Depth of cut (ft)	1
Total Excavation (CY)	6032.74
Grading Period (Months)	8
Workdays/Month	22.5
Excavation/Day (CY)	729.08
Distance (feet)/Cycle	50
Output (yd ³ /cycle)	4
Cycle/day	55.92
VMT/day	0.33

Loading Emissions	
K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	6.5E-04
Volume Excavated (yd ³)	224
Tons of Material Excavated	302
Control Efficiency	50%
Loading Emissions (lbs/day)	0.084

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
Emission Factor (lbs/ton) = $K(0.032)(u^5) \exp(1.37(M/2)(\exp(1.4)))$
Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1990.

Unloading Emissions	
K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	224
Tons of Material Excavated	302
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.084

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
Emission Factor (lbs/ton) = $K(0.032)(u^5) \exp(1.37(M/2)(\exp(1.4)))$
Soil materials assumed to weigh 2550 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1990.

Transportation on Unpaved Roads	
Scraper Full	
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6 (1)
Silt Content (% Wt) (d)	7.5 (2)
Mean Vehicle Weight (Tons) (W)	18.3
Rt of PM10/VMT	1.72
Control Efficiency	80%
Rt of PM10/day	0.183

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
(2) Emission Factor (lbs/VMT) = $0.012(W^0.75)(d^0.75)(MO)^0.27$

Loader Emissions	
Number of Loaders	1
Loader Emissions	0.35
Grader Emissions	
Excavator Emissions	15.3
Total Emissions (lbs/day)	15.42

Excavator Emissions	
Building Footprint (ft ²)	135,884
Depth of cut (ft)	1
Total Excavation (CY)	5032.74
Grading Period (Months)	8
Workdays/Month	22.5
Excavation/Day (CY)	623.68
Distance (feet)/Cycle	5
Output (yd ³ /cycle)	0.98
Cycle/day	776
VMT/day	0.218

Loading Emissions	
K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	224
Tons of Material Excavated	302
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.084

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
Emission Factor (lbs/ton) = $K(0.032)(u^5) \exp(1.37(M/2)(\exp(1.4)))$
Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1990.

Unloading Emissions	
K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	224
Tons of Material Excavated	302
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.084

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
Emission Factor (lbs/ton) = $K(0.032)(u^5) \exp(1.37(M/2)(\exp(1.4)))$
Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1990.

Transportation on Unpaved Roads	
Scraper Full	
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% Wt) (d)	7.5
Mean Vehicle Weight (Tons) (W)	15.4
Lbs of PM10/VMT	1.81
Control Efficiency	80%
Rt of PM10/day	0.870

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
(2) Emission Factor (lbs/VMT) = $0.012(W^0.75)(d^0.75)(MO)^0.27$

Excavator Emissions	
Number of Excavators	1
Excavator Emissions	0.24
Truck Capacity (yd³)	
Number of Haul Trips	335.52
Duration (months)	2.75
Days worked per month	22.6
Number of Haul Trips per day	6
Average Haul Trip Length (miles)	10.23

Site Preparation

Construction Employed Trips

Employees	20	20	20	20
Number of Trips per vehicle	2.3	2.3	2.3	2.3
Top Distance	10.7	10.7	10.7	10.7
Average Vehicle Fuelship	1.8	1.5	1.5	1.5
Total Trips	31	31	31	31

Emission Factor	CO (g/mile)	ROG (gpm/mile)	Diurnal (gpm/veh)	Resing (gpm/veh)	Soak (gpm/trip)	Nox (gpm/mile)	PM10 (gpm/mile)
Source	12.88	0.49	0.41	0.04	0.26	0.80	0.01

Emission factor from the CA (Year 2008) 73% LD, 27% LD1, 100% cold starts

Emissions (lb/day)	CO	ROG	Diurnal	Resing	Soak	Nox	PM10
31	10.1	0.4	0.01	0.00	0.02	0.6	0.01
Total	31	10.14	0.26	0.04	0.02	0.62	0.01

Haul Trips (soil)

Per Day	Number of Trips	Trip Length	VMT
	3,422/8	10.23	55,472
	0	0	0
	0	0	0

Haul Truck Emission Factor	CO (gpm/mile)	ROG (gpm/mile)	Diurnal (gpm/veh)	Resing (gpm/veh)	Soak (gpm/trip)	Nox (gpm/mile)	PM10 (gpm/mile)
Source	14.64	2.45	-	-	-	11.60	1.06

(Year 2008 FF, 100% HCD, 100% cold starts)

Haul Truck Emissions (lb/day)	CO	ROG	Diurnal	Resing	Soak	Nox	PM10
67.5	1.2	0.3	-	-	-	1.4	0.1
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-

Days per Quarter 67.5

Equipment emissions

Equipment	Emission Factor (lb/hour)				
	CO	ROG	Nox	PM10	Sox
Off-highway Trucks	1.8	0.18	4.17	0.26	0.40
Scrapper	1.25	0.27	3.04	0.41	0.46
Crane	1.746	0.582	4.462	0.281	0.388
Tracked Excavator	0.979	0.069	2.138	0.130	0.178
Backhoe	0.572	0.21	1.9	0.17	0.382
Tracked Loader	0.201	0.095	0.63	0.058	0.076
Fork LR-50 HP	0.18	0.053	0.441	0.031	0
Fork LR-175 HP	0.32	0.17	1.54	0.083	0
Tracked tractor	0.36	0.12	1.28	0.112	0.14
Wheeled loader	0.572	0.23	1.9	0.17	0.182
Roller	0.3	0.065	0.87	0.05	0.067
Motor grader	0.191	0.038	0.713	0.061	0.088
Miscellaneous	0.673	0.180	1.700	0.140	0.143

Vehicle	Hours/day	Emissions (lb/day)				
		CO	ROG	Nox	PM10	Sox
Off-highway Trucks	0	0.0	-	-	-	-
Scrapper	0	0.0	-	-	-	-
Crane	0	0.0	-	-	-	-
Tracked Excavator	1	10.2	0.4	0.8	21.4	1.3
Backhoe	1	10.2	5.7	2,300	19.0	1.7
Tracked Loader	1	10.0	2.0	1.0	8.3	0.6
Fork LR-50 HP	0	0.0	-	-	-	-
Fork LR-175 HP	0	0.0	-	-	-	-
Tracked tractor	1	10.0	3.5	1.2	12.6	1.1
Wheeled loader	0	0.0	-	-	-	-
Roller	0	0.0	-	-	-	-
Motor grader	1	10.0	1.5	0.4	7.1	0.6
Miscellaneous	0	0.0	-	-	-	-
Total		22.01	5.73	85.39	5.36	6.62

Site Preparation Emissions (lb/day)

Project	CO	ROG	Nox	PM10	Sox
Graders/Loaders (light dust)				15.9	
Haul Trips	2	0	1	0.13	
Employed Trips	10	0.36	0.63	0.01	
Const Equip Emissions	23	5	68	5	7
Total Project	35	7	76	21	7
SCAQMD Daily Threshold	350	75	100	150	150
Difference	(315)	(68)	(20)	(129)	(143)
Significant?	NO	NO	NO	NO	NO
Months of Grading	1	1	1	1	1
Quarterly Emissions	0.29	0.07	0.78	0.24	0.68
SCAQMD Quarterly Threshold (t)	24.78	2.5	2.5	5.73	5.76
Difference (lb/quarter)	-24.56	-2.43	-1.71	5.51	5.67

Site Preparation

Site Preparation Emissions

Grading Emissions	
Speed (MPH)	5 Assumed
Grading Emissions (lbs/VMT)	0.765
Distance Traveled (miles/day)	60
Control Efficiency	50%
Grading Operation (hr/day)	3
Grading Emissions (lbs/day)	16.3
Operation (months)	2.75

Loader Emissions	
Bulking (cuyd ³) (ft ³)	135,884
Depth of cut (ft)	1
Total Excavation (CY)	5032.74
Grading Period (Months)	3
Weekdays/Month	22.5
Excavation/Day (CY)	221.68
Distance (feet)/Cycle	50
Output (yd ³)/cycle	4
Cycles/day	36.92
VMT/day	0.53

Loading Emissions	
K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	224
Tons of Material Excavated	302
Control Efficiency	50%
Loading Emissions (lbs/day)	0.084

Empirical formula from AP-42, Compilation of Air Pollution Emission Factors 13.2.4
 Emission Factor (lb/dton) = $14.0032(u^0.5) \exp(-1.3 / (M/2) \exp(1.4))$
 Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993.

Unloading Emissions	
K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	224
Tons of Material Excavated	302
Control Efficiency	50%
Unloading Emissions (lb/day)	0.084

Empirical formula from AP-42, Compilation of Air Pollution Emission Factors 13.2.4
 Emission Factor (lb/dton) = $14.0032(u^0.5) \exp(-1.3 / (M/2) \exp(1.4))$
 Soil materials assumed to weigh 2550 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993.

Transportation on Unpaved Roads	
Scooper Full	
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.5 (1)
SR Constant (% Vd) (a)	7.5 (2)
Mean Vehicle Weight (Tons) (W)	16.2
Lbs of PM10/VMT	1.72
Control Efficiency	50%
Lbs of PM10/day	8.743

(1) Empirical formula from AP-42, Compilation of Air Pollution Emission Factors 13.2.2.2
 (2) Emission Factor (lb/VMT) = $(a)(W)^{0.12} (b)(Vd)^{0.75} (M/2)^{0.2} (c)$

Loader Emissions	0.35
Number of Loaders	1
Loader Emissions	0.35
Grader Emissions	
Excavator Emissions	0.24
Total Emissions (lb/day)	15.60

Excavator Emissions	
Bulking (cuyd ³) (ft ³)	135,884
Depth of cut (ft)	1
Total Excavation (CY)	5032.74
Grading Period (Months)	3
Weekdays/Month	22.5
Excavation/Day (CY)	221.68
Distance (feet)/Cycle	50
Output (yd ³)/cycle	4
Cycles/day	36.92
VMT/day	0.216

Calculator E140

Loading Emissions	
K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	224
Tons of Material Excavated	302
Control Efficiency	50%
Unloading Emissions (lb/day)	0.084

Empirical formula from AP-42, Compilation of Air Pollution Emission Factors 13.2.4
 Emission Factor (lb/dton) = $14.0032(u^0.5) \exp(-1.3 / (M/2) \exp(1.4))$
 Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993.

Unloading Emissions	
K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	224
Tons of Material Excavated	302
Control Efficiency	50%
Unloading Emissions (lb/day)	0.084

Empirical formula from AP-42, Compilation of Air Pollution Emission Factors 13.2.4
 Emission Factor (lb/dton) = $14.0032(u^0.5) \exp(-1.3 / (M/2) \exp(1.4))$
 Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993.

Transportation on Unpaved Roads	
Scooper Full	
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.5
SR Constant (% Vd) (a)	7.5
Mean Vehicle Weight (Tons) (W)	15.4
Lbs of PM10/VMT	1.61
Control Efficiency	50%
Lbs of PM10/day	0.870

(1) Empirical formula from AP-42, Compilation of Air Pollution Emission Factors 13.2.2.2
 (2) Emission Factor (lb/VMT) = $(a)(W)^{0.12} (b)(Vd)^{0.75} (M/2)^{0.2} (c)$

Excavator Emissions	
Number of Excavators	1
Excavator Emissions	0.24
Truck Capacity	
Truck Capacity (yd ³)	15
Number of Haul Trips	215.52
Duration (months)	2.75
Days worked per month	22.5
Number of Haul Trips per day	5
Average Haul Trip Length (miles)	10.23

Construction Employee Trips

Employees	20	20	20	20
Number of Trips per vehicle	2.3	2.3	2.3	2.3
Trip Distance	10.7	10.7	10.7	10.7
Average Vehicle Roadway	1.5	1.5	1.5	1.5
Total Trips	31	31	31	31

Emission Factor

	CO (g/mile)	ROG (g/mile)	Diesel (g/mile)	Resting (g/mile)	Soak (g/mile)	Nox (g/mile)	PM10 (g/mile)
Source	13.88	0.49	0.41	0.04	0.26	0.26	0.01

Emission factor from the CA (Year 2000) 13% LDA, 27% LDT, 100% cold starts

Emissions (lb/day)

Trips	CO	ROG	Diesel	Resting	Soak	Nox	PM10
31	10.8	0.4	0.01	0.00	0.00	0.6	0.01
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
Total	10.14	0.36	0.01	0.00	0.00	0.63	0.01

Haul Trips (mi)

Per Day		
Number of Trips	Trip Length	VMT
5 474.5	10.73	55 472
0	0	0
0	0	0

Haul Truck Emission Factor

CO (g/mile)	ROG (g/mile)	Diesel (g/mile)	Resting (g/mile)	Soak (g/mile)	Nox (g/mile)	PM10 (g/mile)
14.64	2.46	-	-	-	11.80	1.06

Source: (Year 2000 EF, 100% HDD, 100% cold starts)

Haul Truck Emissions (lb/day)

CO	ROG	Diesel	Resting	Soak	Nox	PM10
1.8	0.3	-	-	-	1.4	0.1
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Days per Quarter

67.5

Equipment emissions

Equipment	Emission Factor (lb/hour)				
	CO	ROG	Nox	PM10	Sox
Diesel	4.8	0.18	4.17	0.26	0.43
Off-highway Trucks	1.25	0.27	3.44	0.41	0.46
Backhoe	1.746	0.542	4.492	0.281	0.380
Crane	0.879	0.088	7.138	0.135	0.178
Tracked Excavator	0.572	0.79	1.9	0.17	0.182
Backhoe	0.201	0.085	0.43	0.059	0.076
Tracked Loader	0.18	0.053	0.441	0.034	0
Fork L8-50 HP	0.52	0.17	1.54	0.093	0
Fork L8-125 HP	0.35	0.12	1.26	0.112	0.14
Tracked tractor	0.572	0.23	1.9	0.17	0.182
Wheeled tractor	0.3	0.065	0.87	0.05	0.067
Roller	0.151	0.039	0.713	0.051	0.066
Motor grader	0.576	0.190	1.700	0.140	0.143
Miscellaneous					

Vehicle	Hours/Day	Emissions (lb/day)				
Off-highway Trucks	0	0.0	-	-	-	-
Excavator	0	0.0	-	-	-	-
Crane	0	0.0	-	-	-	-
Tracked Excavator	1	10.0	9.8	0.9	21.4	1.3
Backhoe	1	10.0	5.7	2.300	69.0	1.7
Tracked Loader	1	10.0	2.0	1.0	8.3	0.6
Fork L8-50 HP	0	0.0	-	-	-	-
Fork L8-125 HP	0	0.0	-	-	-	-
Tracked tractor	1	10.0	3.5	1.2	12.6	1.4
Wheeled tractor	0	0.0	-	-	-	-
Roller	0	0.0	-	-	-	-
Motor grader	1	10.0	1.0	0.4	7.1	0.6
Miscellaneous	0	0.0	-	-	-	-
Total		22.53	6.73	68.39	5.38	6.80

Site Preparation Emissions (lb/day)

Project	CO	ROG	NOx	PM10	SOx
Graders/Loaders (light dust)				15.8	
Haul Trips	2	0	1	0.13	
Employee Trips	10	0.36	0.83	0.81	
Const Equip. Emissions	23	6	68	5	7
Total Project	35	7	70	25	7
SCAQMD Daily Threshold	550	75	100	130	130
Difference	(515)	(68)	(30)	(128)	(143)
Significant?	NO	NO	NO	NO	NO
Months of Grading	1	1	1	1	1
Quarterly Emissions	0.39	0.07	0.79	0.24	0.08
SCAQMD Quarterly Threshold (t)	24.76	3.8	2.6	6.78	6.78
Difference (ton/quarter)	24.36	-2.43	-1.71	6.51	6.67

Parking Structure

Excavation

Site Characteristics	
Size of Site (sqft)	216,613
Size of Excavation (sqft)	80,729
Cut (ft)	25
Total volume moved (CY)	74,748
Volume Filled (yd3)	-
Silt Content (%)	7.5
Mean wind speed (mph)	3.7
Moisture content (%)	3
Excavation Duration (months)	5.50
Workdays/month	22.5
Excavation Volume (CY/day)	3,000

Transportation on Unpaved Surface (On-Site)

haul Trucks	
Capacity (CY)	15
Distance travelled (miles)/day	0.12
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% Wt) (s)	7.5
Mean Vehicle Weight (Tons) (W)	20.3
lbs of PM10/VMT	1.80
Control Efficiency	80%
lbs of PM10/day	0.043

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2

(2) Emission Factor (lbs/VMT) = $(k(s/12)^a(w/2)^b)/(M/2)^c$

Number of Hauls	200
On-Site Haul Truck Emissions	8.62

Excavator Emissions

Caterpillar 320	
Cycle Time (Minutes)	0.23
Distance (feet)/Cycle	6.5
Cycles/50 minute hour	217.39
Distance travelled (miles)/hour	0.02
Distance travelled (miles)/day	0.21
Output (yd3)/day	3,000
Excavator Operation (hrs/day)	10

Batch-Drop

K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.6E-04
Volume Excavated (yd3)	3000
Tons of Material Excavated	4050
Control Efficiency	50%
Batch-Drop Emissions (lbs/day)	1.122

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4

Emission Factor (lb/ton) = $k(0.032)(u/5) \exp 1.3 / (M/2)^{exp 1.4}$

Soil materials assumed to weigh 2700 lbs/yd3 - Caterpillar Performance Handbook Edition 24, 1993.

Transportation on Unpaved Surface (On-Site) Excavator

Excavator	
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.8
Silt Content (% Wt) (s)	7.5
Mean Vehicle Weight (Tons) (W)	20.3
lbs of PM10/VMT	1.80
Control Efficiency	50%
lbs of PM10/day	0.185

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2

(2) Emission Factor (lbs/VMT) = $(k(s/12)^a(w/2)^b)/(M/2)^c$

Excavator Emissions	1.31
Number of Excavators	1
Excavator Emissions	1.31

Construction Employee Trips

Employees	12
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	18

Trip Length taken from Table A3-5-C, CEQA Air Quality Handbook (1983, AQMD)

Emission Factor	CO (g/mile)	ROG (g/mile)	Diurnal (g/mile)	Resting (g/mile)	Soak (g/mile)	Nox (g/mile)	PM10 (g/mile)
	13.88	0.49	0.41	0.04	0.26	0.86	0.01

Emission factor from the CARB emission factor model EMFAC7F

(Year 2008, 75% LDA, 27% LDT, 100% cold starts)

Excavation I-beams

Emissions (lb/day)

Max Day 1st Quarter

Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
18	5.9	0.2	0.0		0.6	0.4	0.004
Total	5.9	0.2				0.4	0.0042

Number of Haul Truck Round Trips

Per Day		
Number of Trips	Trip Length	VMT
400	10.7	4280.00

Haul Truck Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trp)	Nox (gm/mile)	PM10 (gm/mile)
14.84	2.46	-	-	-	11.60	1.06

(Year 2008 100% HDD, 100% cold starts)

Haul Truck Emissions (lb/day)

CO	ROG	Diurnal	Resting	Soak	Nox	PM10
138.0	23.2	-	-	-	108.4	10.0
Total	138.0	23.2			108.4	10.0

Off-highway Trucks

Scraper

Crane

Backhoe

Tracked excavator

Tracked loader

Fork Lift - 50 HP

Fork Lift - 175 HP

Tracked tractor

Wheeled loader

Roller

Motor grader

Wheeled dozer

Miscellaneous

	Emission Factor (lb/hour)				
	CO	ROG	Nox	PM10	Sox
Off-highway Trucks	1.8	0.19	4.17	0.26	0.45
Scraper	1.25	0.27	3.84	0.41	0.42
Crane	1.745	0.582	4.457	0.291	0.358
Backhoe	0.572	0.23	1.9	0.17	0.182
Tracked excavator	0.817	0.074	1.732	0.111	0.148
Tracked loader	0.204	0.095	0.82	0.059	0.076
Fork Lift - 50 HP	0.18	0.053	0.441	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.54	0.093	0
Tracked tractor	0.35	0.12	1.26	0.112	0.14
Wheeled loader	0.572	0.23	1.8	0.17	0.182
Roller	0.3	0.085	0.87	0.05	0.067
Motor grader	0.451	0.098	0.713	0.061	0.086
Wheeled dozer	0.875	0.15	1.7	0.14	0.143
Miscellaneous	0.875	0.150	1.700	0.140	0.143

Off-highway Trucks

Scraper

Crane

Backhoe

Tracked excavator

Tracked loader

Fork Lift - 50 HP

Fork Lift - 175 HP

Tracked tractor

Wheeled loader

Roller

Motor grader

Wheeled dozer

Miscellaneous

Total

Vehicle	Hours/day	Emissions (lb/day)				
		CO	ROG	Nox	PM10	Sox
Off-highway Trucks	10.0	-	-	-	-	-
Scraper	10.0	-	-	-	-	-
Crane	10.0	-	-	-	-	-
Backhoe	10.0	-	-	-	-	-
Tracked excavator	2	8.9	1.2	29.5	1.8	2.4
Tracked loader	0	-	-	-	-	-
Fork Lift - 50 HP	0	-	-	-	-	-
Fork Lift - 175 HP	0	-	-	-	-	-
Tracked tractor	0	-	-	-	-	-
Wheeled loader	0	-	-	-	-	-
Roller	0	-	-	-	-	-
Motor grader	0	-	-	-	-	-
Wheeled dozer	0	-	-	-	-	-
Miscellaneous	0	-	-	-	-	-
Total		13.07	1.19	29.51	1.78	2.38

Excavation Emissions

Project

Fugitive Emissions

Employee Emissions

Haul Truck Emissions (lb/day)

Construction equipment

Total Phase (lb/day)

SCAQMD Daily Threshold

Difference

Significant?

Quarterly Emissions (tons/quarter)

SCAQMD Quarterly Threshold (tons/quarter)

Difference

Significant?

	CO	ROG	NOx	PM10	SOx
Project				0.93	
Fugitive Emissions				0.0042	
Employee Emissions	6	0.23	0.38		
Haul Truck Emissions (lb/day)	138.02	23.19	108.36	8.99	
Construction equipment	13	1	28	2	2
Total Phase (lb/day)	167	25	138	22	2
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(383)	(50)	(38)	(128)	(148)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	5.9	0.8	4.7	0.7	0.1
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	8.75	8.75
Difference	(19.5)	(1.7)	(2.2)	(6.0)	(6.7)
Significant?	NO	NO	YES	NO	NO

Excavation Emissions (Drilling for Placement of I-Beams)

Transportation on Unpaved Surface (On-Site)

Haul Trucks Bringing Materials (I-Beams)

Distance Traveled (miles)/day	0.13
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Soil Content (% WT) (s)	7.5
Mean Vehicle Weight (Tons) (W)	20.3
lbs of PM10/VMT	1.80
Control Efficiency	80%
lbs of PM10/day	0.047

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2

(2) Emission Factor (lbs/VMT)=(k/s^{1.2})*a(wC)^b/(W*2)^c

Number of Hauls	6
On-Site Haul Truck Emissions (lb/day)	0.28

Excavation I-beams

Construction Employee Trips

Employees	5
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	8
Trip Length taken from Table AB-5-C, CEQA Air Quality Handbook (1998, AQMD)	

Emission Factor	CO (gpm/mile)	ROG (gpm/mile)	Diurnal (gpm/veh)	Resting (gpm/veh)	Soak (gpm/trip)	Nox (gpm/mile)	PM10 (gpm/mile)
Emission factor from the CARB emission factor model EM-FAC/F	13.69	0.49	0.41	0.04	0.26	0.96	0.01
(Year 2008, 73% LDA, 27% LDT, 100% cold starts)							

Emissions (lbs/day)

Max Day 1st Quarter	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	8	0.3	0.1	-	-	-	0.1621	0.0019
Total		0.3	0.1				0.2	0.002

Number of Haul Trips (Materials Transport)

Per Day		
Number of Trips	Trip Length	YMT
5	10.7	54.20
	10.7	0
	10.7	0

Haul Truck Emission Factor

Emission Factor	CO (gpm/mile)	ROG (gpm/mile)	Diurnal (gpm/veh)	Resting (gpm/veh)	Soak (gpm/trip)	Nox (gpm/mile)	PM10 (gpm/mile)
	14.54	2.46	-	-	-	11.60	1.06
(Year 2008, 100% LDT, 100% cold starts)							

Haul Truck Emissions (lbs/day)

	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	2.1	0.3	-	-	-	1.6	0.1
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
Total	2.1	0.3	-	-	-	1.6	0.1

Off-highway Trucks

- Scrapper
- Crane
- Backhoe
- Tracked excavator
- Tracked loader
- Fork Lift-50 HP
- Fork Lift - 175 HP
- Tracked tractor
- Wheeled loader
- Roller
- Motor grader
- Wheeled dozer
- Boiler/Rig

	Emission Factor (lbs/hour)				
	CO	ROG	Nox	PM10	Sox
Scrapper	1.9	0.19	4.17	0.26	0.45
Crane	1.25	0.27	3.84	0.41	0.46
Backhoe	1.746	0.582	4.482	0.291	0.388
Tracked excavator	0.572	0.23	1.9	0.17	0.182
Tracked loader	0.817	0.074	1.782	0.117	0.148
Fork Lift-50 HP	0.201	0.065	0.83	0.059	0.078
Fork Lift - 175 HP	0.18	0.053	0.441	0.031	0
Tracked tractor	0.52	0.17	1.54	0.093	0
Wheeled loader	0.35	0.12	1.29	0.112	0.14
Roller	0.572	0.23	1.9	0.17	0.182
Motor grader	0.3	0.065	0.87	0.05	0.067
Wheeled dozer	0.151	0.039	0.713	0.051	0.063
Boiler/Rig	0.675	0.15	1.7	0.14	0.143
Total	9.195	0.470	3.782	0.236	0.314

Off-highway Trucks

- Scrapper
- Crane
- Backhoe
- Tracked excavator
- Tracked loader
- Fork Lift-50 HP
- Fork Lift - 175 HP
- Tracked tractor
- Wheeled loader
- Roller
- Motor grader
- Wheeled dozer
- Push Rig

Vehicle	Hours/day	Emissions (lbs/day)				
		CO	ROG	Nox	PM10	Sox
Scrapper	10.0	-	-	-	-	-
Crane	10.0	-	-	-	-	-
Backhoe	8.0	14.0	4.7	35.7	2.3	3.1
Tracked excavator	8.0	-	-	-	-	-
Tracked loader	8.0	1.6	0.6	6.8	0.5	0.6
Fork Lift-50 HP	8.0	-	-	-	-	-
Fork Lift - 175 HP	8.0	-	-	-	-	-
Tracked tractor	8.0	-	-	-	-	-
Wheeled loader	4.0	2.3	0.9	7.8	0.7	0.7
Roller	10.0	-	-	-	-	-
Motor grader	10.0	-	-	-	-	-
Wheeled dozer	10.0	-	-	-	-	-
Push Rig	8.0	75.2	11.3	90.3	5.6	7.5
Total		93.11	17.53	140.23	9.32	11.95

Total Excavation-I-beam Placement Emissions

Project

- Fugitive Emissions
- Employee Emissions
- Haul Truck Emissions (lbs/day)
- Construction equipment
- Total (lbs/day)
- SCAQMD Daily Threshold
- Difference
- Significant?
- Quarterly Emissions (tons/quarter)
- SCAQMD Quarterly Threshold (tons/quarter)
- Difference
- Significant?

	CO	ROG	Nox	PM10	SOx
Fugitive Emissions				0.06	
Employee Emissions	0.27	0.09	0.16	0.007	
Haul Truck Emissions (lbs/day)	2.079237865	0.347867841	1.540352423	0.149884273	
Construction equipment	83	18	140	9	12
Total (lbs/day)	252	43	280	31	14
SCAQMD Daily Threshold	550	75	400	150	150
Difference	(298)	(32)	180	(119)	(136)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	8.5	1.4	9.5	1.0	4.5
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	6.75
Difference	(16.2)	(1.1)	7.8	(5.7)	(6.3)
Significant?	NO	NO	YES	NO	NO

Parking Structure

General Construction Emissions
Architectural Coatings

Building Area (sqft)	1,405,000	-
Surface Area Coating Factor	2	Table A9-13-C, CEQA Air Quality Handbook (1993, AQMD)
Surface Area to be Coated (ft ²)	2,810,000	-
Coating Requirements (sqft/gal)	300	300
Coating Usage (gal)	9,367	-
Rule 113 limit (lbs ROG/gal)	2.08	2.08 Table A9-13-B, CEQA Air Quality Handbook (1993, AQMD)
Total ROG lbs	19,485	0
Duration (months)	11	3
Days of work per month	22.5	22.5
ROG (lbs/day)	78.72	0.00

Truck Traffic on Paved Surface (On-Site)

Base EF for particle size (lb/VMT)	0.018	AP42, section 13.2.1-1
Road surface silt loading (oz/yd ²)	0.04	CEQA Air Quality Hndbk (SCAQMD 1993) Table A9-9-C-1, (construction sites w/ clearing)
Road surface silt loading (g/m ²)	1.355	
Mean vehicle weight (tons)	10	
PM10 emission factor (lb/VMT)	0.076	AP42, section 13.2.1-3
Average trip length (miles)	0.13	
Number of trucks per day	50	
Truck VMT (miles)	6.50	
Truck traffic emissions (lbs PM10/day)	0.48	

Concrete Batching (PM-10)

Capacity (cu yds per hour)	0	
Mixer	0.0	AP42, section 11.12-4 (Baghouse, 99% Control Efficiency)
Transfer to Cement/FlyAsh Silo	0.0	AP42, section 11.12-4 (Baghouse, 99% Control Efficiency)
Pneumatic Transfer to Silos	0.0	AP42, section 11.12-4 (Baghouse, 99% Control Efficiency)
Transfer to Sand Storage/Bin	0.0	AP42, section 11.12-4 (Water Curtain, 90% Control Efficiency)
Transfer to Aggregate Storage/Pit	0.0	AP42, section 11.12-4 (Water Curtain, 90% Control Efficiency)
Total: (lbs PM10/day)	0.0	

Construction Employee Trips

Employees	60
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.5
Truck Type	92

Trip Length taken from Table A9-5-C, CEQA Air Quality Handbook (1993, AQMD)

Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
	13.58	0.48	0.41	0.04	0.25	0.88	0.01

Emission factor from the CARE emission factor model EMFAC7F (Year 2008, 73% LDA, 27% LDT, 100% cold starts)

Emissions (lbs/day)

Max Day 1st Quarter	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	92	30.1	1.1	0.040	0.000	0.1	1.9	0.020
Total		30.1	1.1	0.04	-	0.1	1.9	0.02

Number of Haul Trips (Materials Transport)

Per Day		
Number of Trips	Trip Length	VMT
100	10.7	1070
	10.7	0
	10.7	0

Haul Truck Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.84	2.48	-	-	-	11.60	1.06

100% HDD, 100% cold starts

Haul Truck Emissions (lbs/day)

CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	34.5	8.8	-	-	27.3	2.5
0	-	-	-	-	-	-
0	-	-	-	-	-	-
Total	34.5	8.8	-	-	27.3	2.5

Construction

	Emission Factor (lbs/hour)				
	CO	ROG	NOx	PM10	SOx
Concrete Pump	1.99	0.36	3.21	0.38	0.18
Generator	0.05	1.1	9.9	0.55	1.1
Welder Station	0.16	0.03	0.26	0.03	0.01
Crane	1.746	0.687	4.403	0.291	0.366
Backhoe	0.572	0.23	1.8	0.17	0.182
Tracked loader	0.201	0.095	0.83	0.059	0.076
Fork Lift - 50 HP	0.18	0.053	0.441	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.54	0.088	0
Tracked tractor	0.35	0.12	1.26	0.192	0.14
Wheeled loader	0.572	0.23	1.9	0.17	0.187
Roller	0.3	0.065	0.87	0.05	0.067
Motor grader	0.151	0.039	0.713	0.061	0.066
Wheeled dozer	0.675	0.15	1.7	0.14	0.143
Miscellaneous	0.875	0.150	1.700	0.140	0.143

Vehicle	Hours/day	Emissions (lbs/day)				
		CO	ROG	NOx	PM10	SOx
Concrete Pump	2	4.0	23.5	4.3	98.5	4.3
Generator	3	10.0	-	-	-	-
Welder Station	7	8.0	2.8	0.5	4.2	0.5
Crane	1	6.0	10.5	3.5	26.8	1.8
Backhoe	0	6.0	-	-	-	-
Tracked loader	0	6.0	-	-	-	-
Fork Lift - 50 HP	2	8.0	2.9	0.9	7.1	0.5
Fork Lift - 175 HP	2	8.0	8.3	2.7	24.8	1.5
Tracked tractor	0	8.0	-	-	-	-
Wheeled loader	0	8.0	-	-	-	-
Roller	0	5.0	-	-	-	-
Motor grader	0	6.0	-	-	-	-
Wheeled dozer	0	5.0	-	-	-	-
Miscellaneous	0	8.0	-	-	-	-
Total			47.75	11.86	101.15	8.54

Building Construction Emissions

Project

	CO	ROG	NOx	PM10	SOx
Coating Emissions		0.00	-	-	-
Truck Traffic on Paved Roads		-	-	0.5	-
Concrete Batching		-	-	0.0	-
Employee Emissions	30.10	1.06	1.86	0.0	-
Haul Truck Emissions (lbs/day)	34.5	5.8	27.34	2.5	-
Construction equipment	45	12	101	9	5
Total Project (lbs/day)	112	97	130	12	5
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(438)	22	30	(138)	(145)
Significant?	NO	YES	YES	NO	NO
Quarterly Emissions (tons/quarter)	3.8	3.3	4.4	0.4	0.2
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	6.75
Tons/Quarter Over (Under)	(21.0)	0.8	1.9	(6.4)	(6.6)
Significant?	NO	YES	YES	NO	NO

Quarterly Emissions Total (tons/quarter)

Months of construction
per quarter

Duration of Demolition (months)	2.5	Duration for 1 quarter	2.5
Duration of Site Preparation (months)	2.5	Duration for 1 quarter	2.5
Excavation & I-Beam Placement	5	Duration for 1 quarter	3
Duration of Construction (months)	10	Duration for 1 quarter	3

Daily Emissions

	CO	ROG	NOx	PM10	SOx
Demolition Emissions (lbs/day)	23	7	64	5	6
Site Prep. Emissions (lbs/day)	31	6	69	21	7
Excavation & I-Beam Placement	197	34	220	26	10
Construction (lbs/day)	94	49	116	10	4
SCAQMD Daily Threshold (lbs/day)	550	75	100	150	150
Difference (lbs/day)					
Demolition Emissions (lbs/day)	(527)	(68)	(36)	(145)	(144)
Site Prep. Emissions (lbs/day)	(519)	(69)	(31)	(129)	(143)
Excavation & I-Beam Placement	(353)	(41)	120	(124)	(140)
Construction (lbs/day)	(456)	(26)	16	(140)	(146)
Significant?	NO	NO	YES	NO	NO

Quarterly Emissions

Demolition Emissions (tons/quarter)	0.66	0.20	1.80	0.15	0.17
Site Prep. Emissions (tons/quarter)	0.88	0.17	1.94	0.59	0.20
Excavation & I-Beam Placement	6.66	1.15	7.43	0.89	0.33
Construction Emissions (tons/quarter)	3.19	1.67	3.91	0.32	0.15

Combined Emissions (tons/quarter)

SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	6.75
Difference (tons/quarter)					
Demolition Emissions (tons/quarter)	(24.09)	(2.30)	(0.70)	(6.60)	(6.58)
Site Prep. Emissions (tons/quarter)	(23.87)	(2.33)	(0.56)	(6.16)	(6.55)
Excavation & I-Beam Placement	(18.09)	(1.35)	4.93	(5.86)	(6.42)
Construction Emissions (tons/quarter)	(21.56)	(0.83)	1.41	(6.43)	(6.60)

Significant?

Demolition Emissions (tons/quarter)	NO	NO	NO	NO	NO
Site Prep. Emissions (tons/quarter)	NO	NO	NO	NO	NO
Excavation & I-Beam Placement	NO	NO	YES	NO	NO
Construction Emissions (tons/quarter)	NO	NO	YES	NO	NO

Demolition

Demolition and Site Preparation Emissions (Removal of Asphaltic Concrete from Surface Parking Lot)

Asphalt Wrecking

Depth (ft)	0.3
Area (sqft)	124,853
Parking Lot Volume (CuFt)	41,618
PM10 (lbs/CuFt) ¹	0.00042
PM10 (lbs)	17
Control Efficiency	50%
Duration of Demolition (months) ²	2.50
Demolition Total (PM10 lbs/day)	0.15
Days of operation per month	22.5
Parking Lot Area (SF)	124,853
Debris Volume Factor ³ (SqFt per CuYd debris)	108
Debris Volume (CuYd)	1,156
Truck Capacity (CuYd)	15
Number of Hauls	77
Number of Hauls per Day	1

¹ Table A9-9-411, CEQA Air Quality Handbook (SCAQMD, 1993)

² Heavy Construction Cost Data, 1999, (i.e., Removal of 6" thick asphaltic concrete @ 492 sq. yds. per crew per day)

³ National Construction Estimator, 1985, (i.e., 108 sq. ft. of asphaltic concrete produces 1 CuYd. of debris)

Demolition Emissions

Loading of Debris into Trucks

Particle size multiplier (dimensionless) ¹	0.35
Mean wind speed (mph) ²	3.7
Moisture content (%) ³	2.5
Density of debris (lb/ft ³) ⁴	90
Debris Volume (CuYd)	1,156
Emission Factor (lb/ton) ⁵	0.0005540
Debris removed (tons)	1404.59625
Loading Emissions Total (PM10 lbs)	0.78
Control Efficiency	50%
Duration of Demolition (months)	2.50
Days worked per month	22.5
Loading Emissions Total (PM10/day)	0.01

¹ AP-42, Section 13.2.4-3

² California Surface Wind Climatology, CARB 1992

³ Table A9-9-G-1, CEQA Air Quality Handbook (1993, AQMD)

⁴ AP-42, Appendix A-3

⁵ AP-42, sec 13.2.4, eqn. 1

Truck Transport Debris (unpaved roads)

Haul Trucks	
Capacity (CY)	15
Distance travelled (miles)/day	0.14
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% W) (s)	7.5
Mean Vehicle Weight (Tons) (W)	25.7
lbs of PM10/MT	2.0
Control Efficiency	0.8
lbs of PM10/day per haul	0.05
Number of Hauls	1
On-Site Haul Truck Emissions (lbs/day)	0.05

¹ Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2

² Emission Factor (lbs/MT) = (k/s/12)² * (w/3)^{0.5} / (W/2)^{0.2}

Demolition

Asphalt Wreckling Construction Employee Trips

Employees	8
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	2
Total Trips	7
Trip Length taken from Table A9-5 C, CEQA Air Quality Handbook (1993, AQMD)	

Removal of Parking Lot

Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
13.88	0.49	0.41	0.04	0.28	0.86	0.01

Emission factor from the CARB emission factor model EMFAC7F (Year 2008, 73% LDA, 27% LDT, 100% cold starts)

Emissions (lbs/day)

Max Day 1st Quarter
Removal of Parking Lot

Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
7	2.3	0.1	0.0027	0.0003	0.0040	0.1	0.002
Total	2.3	0.1	0.003	0.000	0.004	0.142	0.002

Number of Haul Truck Trips (debris)

Per Day

Number of Trips	Trips per Vehicle	Trip Length	VMT
2	2	10.7	42.8
			0

Haul Truck Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.84	2.48	-	-	-	11.60	1.05

Emission factor from the CARB emission factor model EMFAC7F (Year 2008 EF, 100% HDD, 100% cold starts)

Haul Truck Emissions (lbs/day)

CO	ROG	Diurnal	Resting	Soak	Nox	PM10
1.4	0.2	-	-	-	1.0	0.1
Total	1.4	0.2	-	-	1.0	0.1

Equipment emissions

Diesel
Off-highway Trucks
Scraper
Crane
Backhoe
Tracked Loader
Fork Lift - 50 HP
Fork Lift - 175 HP
Tracked tractor/tracked dozer
Wheeled loader
Roller
Motor grader
Miscellaneous

	Emission Factor (lbs/hour)				
	CO	ROG	Nox	PM10	Sox
Off-highway Trucks	1.8	0.19	4.17	0.26	0.45
Scraper	1.25	0.27	3.84	0.41	0.46
Crane	1.745	0.582	4.462	0.291	0.388
Backhoe	0.572	0.23	1.9	0.17	0.182
Tracked Loader	0.201	0.096	0.83	0.059	0.078
Fork Lift - 50 HP	0.18	0.053	0.441	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.54	0.093	0
Tracked tractor/tracked dozer	0.35	0.12	1.28	0.112	0.14
Wheeled loader	0.572	0.23	1.9	0.17	0.182
Roller	0.3	0.085	0.87	0.05	0.067
Motor grader	0.451	0.039	0.713	0.061	0.086
Miscellaneous	0.675	0.150	1.700	0.140	0.143

Emission factors from Table A9-8-A, CEQA Air Quality Handbook (1993, AQMD)

	Quantity	Hours/day	Emissions (lbs/day)				
			CO	ROG	Nox	PM10	Sox
Off-highway Trucks	0	10.0	-	-	-	-	-
Scraper	0	10.0	-	-	-	-	-
Crane	0	10.0	-	-	-	-	-
Backhoe	1	10.0	5.72	2.30	19.00	1.70	1.82
Tracked Loader	1	10.0	2.01	0.95	8.30	0.59	0.76
Fork Lift - 50 HP	0	10.0	-	-	-	-	-
Fork Lift - 175 HP	0	10.0	-	-	-	-	-
Tracked tractor/tracked dozer	0	10.0	-	-	-	-	-
Wheeled loader	1	10.0	5.72	2.30	19.00	1.70	1.82
Roller	0	10.0	-	-	-	-	-
Motor grader	0	10.0	-	-	-	-	-
Miscellaneous	1	10.0	6.75	1.50	17.00	1.40	1.43
Total			20.20	7.05	63.30	5.39	5.83

Demolition Emissions (lbs/day)

Project
Building Demolition (fugitive dust)
Haul Trips
Employee Trips
Const Equip Emissions
Total

	CO	ROG	Nox	PM10	Sox
Building Demolition (fugitive dust)				0	
Haul Trips	1	0	1	0	
Employee Trips	2	0	0	0	
Const Equip Emissions	20	7	63	5	6
Total	23	7	64	5	6

Site Preparation Emissions

Grading Emissions	
Speed (MPH)	5 Assumed
Grading Efficiency (ft ³ /VMT)	0.765
Distance Traveled (miles/day)	40
Control Efficiency	50%
Grading Operation (days)	8
Grading Emissions (lb/day)	15.1
Operation (months)	2.5

Loader Emissions	
Working Volume (ft ³)	82,860
Depth of cut (ft)	1
Total Excavation (CY)	303.03
Grading Period (Months)	1
Workdays/Month	22.5
Excavation/Day (CY)	136.88
Distance (mi)/Cycle	50
Cycles/Day	34.10
VMT/Day	0.37

Leaving Earthwork After Excavation	
K	0.35 (4)
Mean Wind Speed (mph) (1)	5.9 (1)
Mixture Content (%AVT)	2.5 (2)
Lib of PM10/Ton of Material (lbs)	1.0E-03
Volume Excavated (yd ³)	139
Tons of Material Excavated	184.1
Control Efficiency	50%
Resulting Emissions (lb/day)	0.98

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lb/day) = K [(DMS)(VA)^{0.95} exp 1.3 (MW)^{0.14} (1)]
 Soil materials assumed to weigh 2700 lbs/yd³ - Comptrol Performance Handbook Edition 24, 1983

Unloading Emissions After Excavation	
K	0.35
Mean Wind Speed (mph) (1)	5.9
Mixture Content (%AVT)	2.5
Lib of PM10/Ton of Material Loaded	1.0E-03
Volume Excavated (yd ³)	139
Tons of Material Excavated	184.1
Control Efficiency	50%
Unloading Emissions (lb/day)	0.98

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lb/day) = K [(DMS)(VA)^{0.95} exp 1.3 (MW)^{0.14} (1)]
 Soil materials assumed to weigh 2700 lbs/yd³ - Comptrol Performance Handbook Edition 24, 1983

Transportation on Unimproved Roads	
Truck Capacity (yd ³)	2.5
Number of Trucks	28 (1)
Soil Content (% AVT) (2)	7.5
Mean Vehicle Weight (Tons) (AV)	18.3
Re of PM10/AVMT	1.72
Control Efficiency	80%
Re of PM10/day	8.111

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
 (2) Emission Factor (lb/AVMT) = (1)(M^{0.12})(W^{0.75})(AVW)^{0.75}

Loader Emissions	0.3
Member of Loaders	1
Loader Emissions	0.3

Grader Emissions	15.3
Excavator Emissions	5.94
Total Emissions (lb/day)	15.74

Excavator Emissions	
Working Volume (ft ³)	82,860
Depth of cut (ft)	1
Total Excavation (CY)	303.03
Grading Period (Months)	1
Workdays/Month	22.5
Excavation/Day (CY)	136.88
Distance (mi)/Cycle	50
Cycles/Day	138
VMT/Day	0.132

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lb/day) = K [(DMS)(VA)^{0.95} exp 1.3 (MW)^{0.14} (1)]
 Soil materials assumed to weigh 2700 lbs/yd³ - Comptrol Performance Handbook Edition 24, 1983

Unloading Emissions	
K	0.35
Mean Wind Speed (mph) (1)	5.9
Mixture Content (%AVT)	2.5
Lib of PM10/Ton of Material Loaded	1.0E-03
Volume Excavated (yd ³)	139
Tons of Material Excavated	184.1
Control Efficiency	50%
Unloading Emissions (lb/day)	0.98

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lb/day) = K [(DMS)(VA)^{0.95} exp 1.3 (MW)^{0.14} (1)]
 Soil materials assumed to weigh 2700 lbs/yd³ - Comptrol Performance Handbook Edition 24, 1983

Transportation on Unimproved Roads	
Truck Capacity (yd ³)	2.5
Number of Trucks	28 (1)
Soil Content (% AVT) (2)	7.5
Mean Vehicle Weight (Tons) (AV)	18.3
Re of PM10/AVMT	1.72
Control Efficiency	80%
Re of PM10/day	8.111

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
 (2) Emission Factor (lb/AVMT) = (1)(M^{0.12})(W^{0.75})(AVW)^{0.75}

Excavator Emissions	0.14
Member of Excavators	1
Excavator Emissions	0.14

Truck Capacity (yd ³)	2.5
Number of Truck Trips	204.58
Duration (months)	2.5
Days worked per month	22.5
Number of Truck Trips per day	4
Average Road Trip Length (miles)	10

Construction Employee Trips

Employees	17	17	17	17
Number of Trips per minute	2.5	2.1	2.3	2.3
Inc Distance	10.7	10.7	10.7	10.7
Average Vehicle Ride/ship	2	2	2	2
Total Trips	20	20	20	20

	CO (g/mile)	PM10 (g/mile)	PM2.5 (g/mile)	NOx (g/mile)	SOx (g/mile)	HC (g/mile)	Other (g/mile)
Source	19.55	0.48	0.41	0.04	0.26	0.88	0.01

(Emission factor from the CA (Year 2008) 17% CO, 27% PM10, 100% solid state)

Trip	CO	PM10	PM2.5	NOx	SOx	HC	PM10
20	3.91	0.096	0.082	0.008	0.052	0.176	0.0047
20	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-
Total	3.91	0.096	0.082	0.008	0.052	0.176	0.0047

Half Trips (half)

Per Day	Number of Trips	Length	VMT
3.0346	10.21	87.20664	
	0	0	
	0	0	
	0	0	

Half Truck Emission Factor

CO (g/mile)	PM10 (g/mile)	PM2.5 (g/mile)	NOx (g/mile)	SOx (g/mile)	HC (g/mile)	Other (g/mile)
14.64	2.46	-	-	-	11.62	0.00

(Year 2008 EF, 100% HD, 100% solid state)

Half Truck Emissions (lb/day)

CO	PM10	PM2.5	NOx	SOx	HC	PM10
1.2	0.2	-	-	-	1.0	0.1
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Days per Quarter 87.5

Equipment emissions

	CO	PM10	PM2.5	NOx	SOx	HC
Off-highway Tractor	1.8	0.19	0.17	0.28	0.45	0.45
Backhoe	1.25	0.27	0.24	0.41	0.49	0.49
Crane	17.66	0.582	0.52	0.201	0.308	0.308
Tracked Excavator	0.979	0.065	0.058	0.136	0.176	0.176
Backhoe	0.572	0.23	0.21	0.17	0.17	0.17
Tracked Loader	0.284	0.028	0.025	0.059	0.076	0.076
Forklift-50 HP	0.18	0.008	0.007	0.035	0.04	0.04
Fork Lift - 175 HP	0.32	0.11	0.1	0.063	0.063	0.063
Tracked tractor	0.85	0.12	0.11	0.12	0.14	0.14
Wheeled loader	0.572	0.23	0.21	0.17	0.17	0.17
Roller	0.3	0.056	0.051	0.06	0.097	0.097
Motor grader	0.151	0.039	0.035	0.061	0.080	0.080
Motor grader	0.427	0.150	0.135	0.140	0.143	0.143

Vehicle	Hourly	Emissions (lb/day)
Off-highway Tractor	0	10.0
Backhoe	0	10.0
Crane	0	10.0
Tracked Excavator	1	10.0
Backhoe	1	10.0
Tracked Loader	1	10.0
Forklift-50 HP	0	10.0
Fork Lift - 175 HP	0	10.0
Tracked tractor	1	10.0
Wheeled loader	0	10.0
Roller	0	10.0
Motor grader	1	10.0
Motor grader	0	10.0
Total		22.88

Site Preparation Emissions (lb/day)

Project	CO	PM10	PM2.5	NOx	SOx
Grading (before high-water)				15.1	
Half Trips	1	0	0	0	
Employee Trips	2	0	0	0	
Construction Emissions	20	6	5	7	
Total Project	23	6	5	22	
SCAQMD Daily Threshold	200	75	100	160	450
Difference	(177)	(69)	(95)	(138)	(443)
Significant?	NO	NO	NO	NO	NO
Months of Grading	1	1	1	1	1
Quarterly Excesses	0.25	0.27	0.28	0.23	0.08
SCAQMD Quarterly Threshold (1)	24.75	2.6	2.6	5.75	4.75
Difference (quarterly)	-24.4	-2.43	-1.72	-5.52	-4.67

Parking Structure

Excavation

Site Characteristics	
Size of Site (sqft)	124,863
Size of Excavation (sqft)	42,000
CUA (ft)	25
Total volume moved (CY)	58,689
Volume Filled (yd ³)	-
Silt Content (%)	7.5
Mean wind speed (mph)	3.7
Moisture content (%)	3
Excavation Duration (months)	5.00
Workdays/month	22.5
Excavation Volume (CY/day)	3,000

Transportation on Unpaved Surface (On-Site)

Haul Trucks	
Capacity (CY)	16
Distance travelled (miles/day)	0.12
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% Wt) (s)	7.5
Mean Vehicle Weight (Tons) (W)	20.3
Lbs of PM10/VMT	1.80
Control Efficiency	60%
Lbs of PM10/haul	0.043

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
 (2) Emission Factor (lbs/VMT) = $(k(s/12)^a(w/3)^b)(M/0.2)^c$

Number of Hauls	186
On-Site Haul Truck Emissions	8.10

Excavator Emissions

Caterpillar 320	
Cycle Time (Minutes)	0.23
Distance (feet)/Cycle	0.5
Cycles/50 minute hour	217.39
Distance travelled (miles)/hour	0.02
Distance travelled (miles)/day	0.21
Output (yd ³ /day)	2,000
Excavator Operation (hrs/day)	10

Batch-Drop

K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	3000
Tons of Material Excavated	4050
Control Efficiency	50%
Batch-Drop Emissions (lbs/day)	1.122

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lb/ton) = $4.0032 \times (u/5)^{exp(1.3)} / (M/2)^{exp(1.4)}$
 Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993

Transportation on Unpaved Surface (On-Site) Excavator

Excavator	
Moisture Content (%WT)	15
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% Wt) (s)	7.5
Mean Vehicle Weight (Tons) (W)	20.3
Lbs of PM10/VMT	1.05
Control Efficiency	50%
Lbs of PM10/day	0.108

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
 (2) Emission Factor (lbs/VMT) = $(k(s/12)^a(w/3)^b)(M/0.2)^c$

Excavator Emissions	1.23
Number of Excavators	1
Excavator Emissions	1.23

Construction Employee Trips

Employees	10
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	15

Top Length taken from Table A9-5-C, CEQA Air Quality Handbook (1993, AQMD)

Emission Factor	CO (gm/mile)	RDG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Max (gm/mile)	PM10 (gm/mile)
Emission factor from the CARB emission factor model EMFAC7F (Year 2008 75% LDR, 27% LDF, 100% cold starts)	13.68	0.48	0.41	0.04	0.26	0.86	0.01

Emissions (lbs/day)

Excavation I-beams

Max Day 1st Quarter

Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
15	4.9	0.2	0.010	0.001	0.010	0.300	0.004
Total	4.9	0.2	0.010	0.001	0.010	0.300	0.004

Number of Haul Truck Round Trips

Number of Trips	Per Day	
	Trip Length	VMT
375	10.7	4023.20

Haul Truck Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.64	2.48	-	-	-	11.60	1.00

(Year 2006 100% HDD, 100% cold starts)

Haul Truck Emissions (lbs/day)

CO	ROG	Diurnal	Resting	Soak	Nox	PM10
129.7	21.8	-	-	-	102.8	9.4
Total	129.7	21.8	-	-	102.8	9.4

Off highway Trucks

Scraper
Crane
Backhoe
Tracked excavator
Tracked loader
Fork Lift-50 HP
Fork Lift - 175 HP
Tracked tractor
Wheeled loader
Roller
Motor grader
Wheeled dozer
Miscellaneous

	Emission Factor (lbs/hour)				
	CO	ROG	Nox	PM10	SOx
	1.0	0.19	4.17	0.26	0.45
Scraper	1.25	0.27	3.84	0.41	0.46
Crane	1.746	0.582	4.162	0.291	0.389
Backhoe	0.572	0.23	1.9	0.17	0.187
Tracked excavator	0.817	0.074	1.782	0.111	0.148
Tracked loader	0.201	0.085	0.83	0.059	0.078
Fork Lift-50 HP	0.18	0.053	0.441	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.54	0.093	0
Tracked tractor	0.35	0.12	1.28	0.112	0.14
Wheeled loader	0.572	0.23	1.9	0.17	0.187
Roller	0.3	0.065	0.87	0.06	0.067
Motor grader	0.151	0.058	0.713	0.051	0.066
Wheeled dozer	0.675	0.15	1.7	0.14	0.143
Miscellaneous	0.675	0.150	1.700	0.140	0.143

Off-highway Trucks
Scraper
Crane
Backhoe
Tracked excavator
Tracked loader
Fork Lift-50 HP
Fork Lift - 175 HP
Tracked tractor
Wheeled loader
Roller
Motor grader
Wheeled dozer
Miscellaneous
Total

Vehicle	Hours/day	Emissions (lbs/day)				
		CO	ROG	Nox	PM10	SOx
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
2	10.0	16.3	1.5	35.6	2.2	3.0
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
0	10.0	-	-	-	-	-
Total		16.33	1.48	35.64	2.75	2.97

Building Construction Emissions

Project

Fugitive Emissions
Employee Emissions
Haul Truck Emissions (lbs/day)
Construction equipment
Total Phase (lbs/day)
SCAQMD Daily Threshold
Difference
Significant?
Quarterly Emissions (tons/quarter)
SCAQMD Quarterly Threshold (tons/quarter)
Difference
Significant?

CO	ROG	NOx	PM10	SOx
4.0100	0.2112	0.3000	0.0025	3
128.73	21.8	102.8	9.39	
10	1	36	2	3
151	23	139	21	3
660	75	100	150	150
(259)	(52)	39	(129)	(147)
NO	NO	YES	NO	NO
8.1	0.8	4.7	0.7	0.1
24.75	2.5	2.5	6.75	6.75
(18.7)	(1.7)	2.2	(6.0)	(6.6)
NO	NO	YES	NO	NO

Site Preparation Emissions (Drilling for Placement of I-Beams)

Transportation on Unpaved Surface (On-Site)

Haul Trucks Bringing Materials (I-Beams) for placement

Distance travelled (miles)/day	0.13
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% Wt) (s)	7.5
Mean Vehicle Weight (Tons) (W)	20.3
lbs of PM10/VMT	1.80
Control Efficiency	80%
lbs of PM10/day	0.047

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2

(2) Emission Factor (lbs/VMT)=(k)(s)^{1.2}(w)³(b)(M/0.2)^{0.9}

Number of Hauls	4
On-Site Haul Truck Emissions (lbs/day)	0.19

Construction Employee Trips

Excavation - beams

Employees 4
 Number of Trips per vehicle 2.3
 Trip Distance 10.7
 Average Vehicle Ridership 1.5
 Total Trips 8
 Trip Length taken from Table A3-5-C, CEQA Air Quality Handbook (1993, AQMD);

Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
Emission factor from the CARB emission factor model EMFAC7F (Year 2006, 73% LDA, 27% LDT, 100% cold starts)	13.38	0.49	0.41	0.04	0.26	0.86	0.01

Emissions (lb/day)	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
Max Day 1st Quarter	8	1.9926	0.0693	0.0580	0.0057	0.0088	0.1218	0.0014
Total		2.0	0.2	0.058	0.006	0.037	0.122	0.0314

Number of Haul Trips (Materials Transport)

Number of Trips	Per Day	
	Trip Length	VMT
1	11.54	46.16
	11.54	0
	11.54	0

Haul Truck Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.64	2.46	-	-	-	11.90	1.08

(Year 2006, 100% LDA, 100% cold starts)

Haul Truck Emissions (lbs/day)

CO	ROG	Diurnal	Resting	Soak	Nox	PM10
1.5	0.3	-	-	-	1.2	0.1
-	-	-	-	-	-	-
Total	1.5	0.3	-	-	1.2	0.1

Off-highway Trucks

	Emission Factor (lbs/hour)					
	CO	ROG	Nox	PM10	Sox	
Scrapper	1.8	0.19	4.17	0.26	0.45	
Crane	1.25	0.27	3.84	0.41	0.46	
Backhoe	1.746	0.582	4.463	0.281	0.388	
Tracked excavator	0.572	0.23	1.9	0.17	0.162	
Tracked loader	0.817	0.074	1.782	0.111	0.146	
Fork Lift-50 HP	0.201	0.065	0.85	0.059	0.076	
Fork Lift - 175 HP	0.18	0.053	0.441	0.031	0	
Tracked tractor	0.52	0.17	1.54	0.093	0	
Wheeled loader	0.35	0.12	1.26	0.112	0.14	
Roller	0.572	0.23	1.9	0.17	0.182	
Motor grader	0.3	0.065	0.87	0.05	0.067	
Wheeled dozer	0.151	0.039	0.713	0.061	0.098	
Boom Drill Rig	0.675	0.15	1.7	0.14	0.143	
	3.135	0.470	3.782	0.235	0.314	

Off-highway Trucks

Vehicle	Hours/day	Emissions (lbs/day)					
0	10.0	-	-	-	-	-	-
0	10.0	-	-	-	-	-	-
1	8.0	14.0	4.7	35.7	2.3	3.1	
0	8.0	-	-	-	-	-	-
0	8.0	-	-	-	-	-	-
1	8.0	1.6	0.8	8.8	0.5	0.6	
0	8.0	-	-	-	-	-	-
0	8.0	-	-	-	-	-	-
1	4.0	2.3	0.9	7.8	0.7	0.7	
0	10.0	-	-	-	-	-	-
0	10.0	-	-	-	-	-	-
0	10.0	-	-	-	-	-	-
1	8.0	25.1	3.8	30.1	1.9	2.5	
Total		42.95	10.1	60.04	5.36	6.95	

Total Excavation-Beam Placement Emissions

Project	CO	ROG	NOx	PM10	SOx
Fugitive Emissions				0.05	
Employee Emissions	1.963	0.279	0.122	0.091	
Haul Truck Emissions (lbs/day)	1.48	0.25	1.18	0.11	
Construction equipment	43	10	80	5	7
Total (lbs/day)	197	34	220	28	10
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(353)	(41)	(26)	(124)	(140)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	6.7	1.2	7.4	0.9	0.3
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	6.75
Difference	(18.1)	(1.3)	(4.9)	(5.9)	(6.4)
Significant?	NO	NO	YES	NO	NO

Construction

Parking Structure

General Construction Emissions
Architectural Coatings

Building Area (sqft)	530,000	-	
Surface Area Coating Factor	2	2	Table A9-13-C, CEQA Air Quality Handbook (1993, AQMD)
Surface Area to be coated (ft ²)	1,060,000	-	
Coating Requirements (sqft/gal)	300	-	
Coating Usage (gall)	3,180	-	
Rule 113 limit (lbs ROG/gal)	2.08	2.08	Table A9-13-B, CEQA Air Quality Handbook (1993, AQMD)
Total ROG (lbs)	7349	0	
Duration (months)	10	3	
Days of work per month	22.5	22.5	
ROG (lbs/day)	32.66	0.00	

Truck Traffic on Paved Surface (On-Site)

Base EF for particle size (lb/VMT)	0.016	AP42, section 13.2.1-1
Road surface oil loading (oz/yd ²)	0.04	CEQA Air Quality Hndbk (SCAQMD), 1990, Table A9-9-C-1, (construction sites w/ cleaning)
Road surface silt loading (g/m ²)	1.358	
Mean vehicle weight (tons)	10	
PM10 emission factor (lb/VMT)	0.076	AP42, section 13.2.1-3
Average trip length (miles)	11.54	
Number of trucks per day	40	
Truck VMT (miles)	4.89	
Truck traffic emissions (lbs PM10/day)	0.37	

Concrete Batching (PM-10)

Capacity (cu yds per hour)	0	
Mixer	0.0	AP42, section 11.12-4 (Baghouse, 99% Control Efficiency)
Transfer to Cement/FlyAsh Batcher	0.0	AP42, section 11.12-4 (Baghouse, 99% Control Efficiency)
Pneumatic Transfer to Silos	0.0	AP42, section 11.12-4 (Baghouse, 99% Control Efficiency)
Transfer to Sand Storage/Bin	0.0	AP42, section 11.12-4 (Water Curtain, 90% Control Efficiency)
Transfer to Aggregate Storage/Bin	0.0	AP42, section 11.12-4 (Water Curtain, 90% Control Efficiency)
Total: (lbs PM10/day)	0.0	

Construction

Construction Employee Trips

Employees	30
Number of Trips per vehicle	7.5
1mp Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	77

Trip Length taken from Table A9-5-C, CEQA Air Quality Handbook (1993 AQMD)

Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
Emission factor from the CARB emission factor model EMFAC7F (Year 2008, 73% LDT, 27% LDT, 100% cold starts)	13.68	0.48	0.41	0.04	0.26	0.85	0.01

Emissions (lbs/day)

Max Day 1st Quarter

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	77	25.2	0.9	0.0	-	0.0	1.6	0.02
Total		25.2	1.0				1.6	0.02

Number of Haul Trips (Materials Transport)

Number of Trips	Per Day	
	Trip Length	VMT
20	11.54	923.2
	11.54	0
	11.54	0

Haul Truck Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.84	2.46	-	-	-	11.60	1.06

100% HDD, 100% cold starts

Haul Truck Emissions (lbs/day)

	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	29.8	5.0	-	-	-	23.8	2.2
0	-	-	-	-	-	-	-
0	-	-	-	-	-	-	-
Total	29.8	5.0	-	-	-	23.8	2.2

- Concrete Pump
- Generator
- Welder Station
- Crane
- Backhoe
- Tracked loader
- Fork Lift-50 HP
- Fork Lift - 175 HP
- Tracked tractor
- Wheeled loader
- Roller
- Motor grader
- Wheeled dozer
- Miscellaneous

	Emission Factor (lbs/hour)					
	CO	ROG	Nox	PM10	Sox	
Concrete Pump	1.98	0.36	3.21	0.36	0.18	
Generator	6.05	1.1	9.3	0.95	1.1	
Welder Station	0.15	0.03	0.26	0.03	0.01	
Crane	1.746	0.582	4.462	0.291	0.588	
Backhoe	0.572	0.23	1.9	0.17	0.182	
Tracked loader	0.201	0.036	0.83	0.059	0.076	
Fork Lift-50 HP	0.18	0.052	0.441	0.031	0	
Fork Lift - 175 HP	0.82	0.17	1.54	0.093	0	
Tracked tractor	0.35	0.12	1.28	0.112	0.14	
Wheeled loader	0.572	0.23	1.9	0.17	0.182	
Roller	0.3	0.065	0.67	0.05	0.067	
Motor grader	0.151	0.039	0.713	0.061	0.068	
Wheeled dozer	0.875	0.15	1.7	0.14	0.143	
Miscellaneous	0.875	0.150	1.700	0.140	0.143	

- Concrete Pump
- Generator
- Welder Station
- Crane
- Backhoe
- Tracked loader
- Fork Lift-50 HP
- Fork Lift - 175 HP
- Tracked tractor
- Wheeled loader
- Roller
- Motor grader
- Wheeled dozer
- Miscellaneous
- Total

Vehicle	Hours/day	Emissions (lbs/day)					
Concrete Pump	1	8.0	11.8	2.2	18.5	2.2	1.3
Generator	0	10.0	-	-	-	-	-
Welder Station	2	0.0	2.8	0.5	4.2	0.5	0.2
Crane	1	0.0	14.0	4.7	35.7	2.3	3.1
Backhoe	0	6.0	-	-	-	-	-
Tracked loader	0	6.0	-	-	-	-	-
Fork Lift-50 HP	2	8.0	2.9	0.9	7.1	0.5	-
Fork Lift - 175 HP	2	8.0	8.3	2.7	24.6	1.5	-
Tracked tractor	0	6.0	-	-	-	-	-
Wheeled loader	0	6.0	-	-	-	-	-
Roller	0	6.0	-	-	-	-	-
Motor grader	0	6.0	-	-	-	-	-
Wheeled dozer	0	6.0	-	-	-	-	-
Miscellaneous	0	6.0	-	-	-	-	-
Total			39.49	10.87	90.82	8.96	4.34

Building Construction Emissions

Project

- Coating Emissions
- Truck Traffic on Paved Roads
- Concrete Batching
- Employee Emissions
- Haul Truck Emissions (lbs/day)
- Construction equipment
- Total Project (lbs/day)
- SCAQMD Daily Threshold
- Difference
- Significant?
- Quarterly Emissions (tons/quarter)
- SCAQMD Quarterly Threshold (tons/quarter)
- Tons/Quarter Over (Under)
- Significant?

	CO	ROG	NOx	PM10	SOx
Coating Emissions		0.00	-		
Truck Traffic on Paved Roads				0.4	
Concrete Batching				0.0	
Employee Emissions	25.19	0.96	1.56	0.0	
Haul Truck Emissions (lbs/day)	29.77	5	23.59	2.16	
Construction equipment	39	11	81	7	4
Total Project (lbs/day)	94	49	116	19	4
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(456)	(26)	(16)	(140)	(146)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	3.2	1.7	3.9	0.3	0.1
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	6.75
Tons/Quarter Over (Under)	(21.5)	(0.8)	1.4	(6.4)	(6.6)
Significant?	NO	NO	YES	NO	NO

Quarterly Emissions Total (tons/quarter)

Months of construction
per quarter

Duration of Demolition (months)	2	Duration for 1 quarter	2
Duration of Site Preparation (months)	2	Duration for 1 quarter	2
Excavation & I-Beam Placement	4	Duration for 1 quarter	3
Duration of Construction (months)	8	Duration for 1 quarter	3

Daily Emissions	CO	ROG	NOx	PM10	SOx
Demolition Emissions (lbs/day)	32	9	83	7	8
Site Prep. Emissions (lbs/day)	29	6	68	21	7
Excavation & i-Beam Placement	198	36	214	32	9
Construction (lbs/day)	83	21	108	9	5
SCAQMD Daily Threshold (lbs/day)	550	75	100	150	150
Difference (lbs/day)					
Demolition Emissions (lbs/day)	(518)	(66)	(17)	(143)	(142)
Site Prep. Emissions (lbs/day)	(521)	(69)	(32)	(129)	(143)
Excavation	(352)	(39)	114	(118)	(141)
Construction Total Difference (lbs/day)	(467)	(54)	8	(141)	(145)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions					
Demolition Emissions (tons/quarter)	0.73	0.21	1.87	0.16	0.18
Site Prep. Emissions (tons/quarter)	0.64	0.14	1.54	0.46	0.16
Excavation & i-Beam Placement	6.69	1.20	7.23	1.07	0.30
Construction Emissions (tons/quarter)	2.79	0.72	3.64	0.32	0.16
Combined Emissions (tons/quarter)					
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	6.75
Difference (tons/quarter)					
Demolition Emissions (tons/quarter)	(24.02)	(2.29)	(0.63)	(6.59)	(6.57)
Site Prep. Emissions (tons/quarter)	(24.11)	(2.36)	(0.96)	(6.29)	(6.59)
Excavation & i-Beam Placement	(18.06)	(1.30)	4.73	(5.68)	(6.45)
Construction Emissions (tons/quarter)	(21.96)	(1.78)	1.14	(6.43)	(6.59)
Significant?					
Demolition Emissions (tons/quarter)	NO	NO	NO	NO	NO
Site Prep. Emissions (tons/quarter)	NO	NO	NO	NO	NO
Excavation & i-Beam Placement	NO	NO	YES	NO	NO
Construction Emissions (tons/quarter)	NO	NO	YES	NO	NO

Parking Structure

Demolition and Site Preparation Emissions (Removal of Asphaltic Concrete from Surface Parking Lot)

Asphalt Wrecking

Depth (ft)	0.3
Area (sqft)	67,100
Parking Lot Volume (CuFt)	22,367
PM10 (lbs/CuFt) ¹	0.00042
PM10 (lbs)	9
Control Efficiency	50%
Duration of Demolition (months) ²	2.00
Demolition Total (PM10 lbs/day)	0.10
Days of operation per month	22.5
Parking Lot Area (SF)	67,100
Debris Volume Factor ³ (SqF ² per CuYd debris)	106
Debris Volume (CuYd)	621
Truck Capacity (CuYd)	15
Number of Hauls	41
Number of Hauls per Day	1

¹ Table A9-9-11, CEQA Air Quality Handbook (SCAQMD, 1993)² Heavy Construction Cost Data, 1999, (i.e. Removal of 0" thick asphaltic concrete @ 492 sq. yds. per crew per day)³ National Construction Estimator, 1995, (i.e. 106 sq. ft. of asphaltic concrete produces 1 CuYd. of debris)

Demolition Emissions

Loading of Debris into Trucks

Particle size multiplier (dimensionless) ¹	0.35
Mean wind speed (mph) ²	3.7
Moisture content (%) ³	3
Density of debris (lb/ft ³) ⁴	90
Debris Volume (CuYd)	621
Emission Factor (lb/ton) ⁵	0.0005540
Debris removed (tons)	754.875
Loading Emissions Total (PM10 lbs)	0.42
Control Efficiency	50%
Duration of Demolition (months)	2.00
Days worked per month	22.5
Loading Emissions Total (PM10/day)	0.005

¹ AP42, Section 13.2.4-3² California Surface Wind Climatology, CARB 1992³ Table A9-9-G-1, CEQA Air Quality Handbook (1993, AQMD)⁴ AP42, Appendix A-8⁵ AP42, sec. 13.2.4, eqn. 1

Truck Transport Debris (unpaved roads)

Haul Trucks	
Capacity (CY)	15
Distance travelled (miles)/day	9.14
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% Wt) (s)	7.5
Mean Vehicle Weight (Tons) (W)	25.7
lbs of PM10/VMT	2.0
Control Efficiency	0.8
lbs of PM10/day per haul	0.06
Number of Hauls	1
On-Site Haul Truck Emissions (lbs/day)	0.06

¹ Empirical formula from AP-42, Compendium of Air Pollutant Emission Factors 13.2.2.2² Emission Factor (lbs/VMT) = (K/s¹²) * (w/G)^{0.9} * (W/M^{0.2})^{1.9} * c

Demolition:

Construction Employee Trips

	Removal of Parking Lot
Employees	10
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	15

Trip Length taken from Table A9-5-C, CEQA Air Quality Handbook (1993, AQM(1))

Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
	13.88	0.49	0.41	0.04	0.26	0.86	0.01

Emission factor from the CARB emission factor model EMFAC7F (Year 2008, 73% LDA, 27% LDT, 100% cold starts)

Emissions (lbs/day)

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
Max Day 1st Quarter								
Removal of Parking Lot	15	4.9	0.2	0.0060	0.0005	0.0089	0.3	0.004
Total		4.9	0.2				0.3	0.004

Number of Haul Truck Trips (debris)

Number of Trips	Trips per Vehicle	Per Day	
		Trip Length	VMT
2	2	10.7	47.6
			0

Haul Truck Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
	14.64	2.46	-	-	-	11.00	1.06

Emission factor from the CARB emission factor model EMFAC7F (Year 2008 EF, 100% HDD, 100% cold starts)

Haul Truck Emissions (lbs/day)

	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	1.4	0.2	-	-	-	1.0	0.1
Total	1.4	0.2	-	-	-	1.0	0.1

Equipment emissions

	Emission Factor (lb/hour)				
	CO	ROG	Nox	PM10	Sox
Diesel	1.8	0.18	4.17	0.26	0.45
Off-highway Trucks	1.25	0.27	3.84	0.41	0.46
Scraper	1.746	0.582	4.462	0.291	0.388
Crane	0.572	0.23	1.9	0.17	0.182
Backhoe	0.201	0.085	0.83	0.059	0.078
Tracked Loader	0.18	0.053	0.441	0.031	0
Fork Lift-50 HP	0.52	0.17	1.54	0.093	0
Fork Lift - 175 HP	0.35	0.12	1.26	0.112	0.14
Tracked tractor/tracked dozer	0.572	0.23	1.9	0.17	0.182
Wheeled loader	0.3	0.055	0.87	0.05	0.067
Roller	0.151	0.039	0.713	0.051	0.096
Motor grader	0.675	0.150	1.700	0.140	0.143
Miscellaneous					

Emission factors from Table A9-8-A, CEQA Air Quality Handbook (1993, AQM(1))

Quantity	Hours/day	Emissions (lbs/day)				
		CO	ROG	Nox	PM10	Sox
Off highway Trucks	0	0.0	-	-	-	-
Scraper	0	0.0	-	-	-	-
Crane	0	0.0	-	-	-	-
Backhoe	2	11.44	4.60	38.00	3.40	3.64
Tracked Loader	1	2.01	0.95	8.30	0.59	0.78
Fork Lift-50 HP	0	0.0	-	-	-	-
Fork Lift - 175 HP	0	0.0	-	-	-	-
Tracked tractor/tracked dozer	0	0.0	-	-	-	-
Wheeled loader	1	5.72	2.30	18.00	1.70	1.82
Roller	0	0.0	-	-	-	-
Motor grader	0	0.0	-	-	-	-
Miscellaneous	1	6.75	1.50	17.00	1.40	1.43
Total		25.62	9.35	62.30	7.09	7.65

Demolition Emissions (lbs/day)

	CO	ROG	NOx	PM10	SOx
Project					
Building Demolition (fugitive dust)				0	
Haul Trips	1	0	1	0	
Employee Trips	5	0	0	0	
Const Equip Emissions	26	9	82	7	8
Total	32	9	83	7	8

Site Preparation

Site Preparation Emissions

Grading Emissions

Speed (MPH)	5	Assumed
Grading Emissions (lbs/VMT)	0.765	
Distance Travelled (miles/day)	40	
Control Efficiency	50%	
Grading Operation (hrs/day)	8	
Grading Emissions (lbs/day)	15.3	
Operation (months)	2	

Loader Emissions

Building footprint (ft ²)	31,100
Depth of cut (ft)	1
Total Excavation (CY)	1151.85
Grading Period (Months)	0.5
Workdays/Month	22.5
Excavation/Day (CY)	102.39
Distance (feet)/Cycle	50
Output (yd ³)/cycle	4
Cycles/day	25.60
VMT/day	0.24

Loading Emissions

K	0.35	(4)
Mean Wind Speed (mph) (u)	3.7	(1)
Moisture Content (%WT)	2.5	(3)
Lbs of PM10/Ton of Material Loaded	5.5E-04	
Volume Excavated (yd ³)	102	
Tons of Material Excavated	138.2	
Control Efficiency	50%	
loading Emissions (lbs/day)	0.038	

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lbs/ton) = k(.0032)((u/5) exp 1.3 / (M/2)exp 1.4)
 Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993.

Unloading Emissions

K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	102
Tons of Material Excavated	138.2
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.038

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lbs/ton) = k(.0032)((u/5) exp 1.3 / (M/2)exp 1.4)
 Soil materials assumed to weigh 2550 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993.

Transportation on Unpaved Roads

Scraper Full		
Moisture Content (%WT)	2.5	
Particle Size Multiplier for PM10 (K)	2.6	(1)
Silt Content (% WT) (s)	7.5	(2)
Mean Vehicle Weight (Tons) (W)	18.3	

Excavator Emissions

Building footprint (ft ²)	31,100
Depth of cut (ft)	1
Total Excavation (CY)	1151.85
Grading Period (Months)	2
Workdays/Month	22.5
Excavation/Day (CY)	25.60
Distance (feet)/Cycle	5
Output (yd ³)/cycle	0.98
Cycles/day	26
VMT/day	0.025

Loading Emissions

K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	26
Tons of Material Excavated	34.8
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.010

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lbs/ton) = k(.0032)((u/5) exp 1.3 / (M/2)exp 1.4)
 Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993.

Unloading Emissions

K	0.35
Mean Wind Speed (mph) (u)	3.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd ³)	26
Tons of Material Excavated	34.8
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.010

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
 Emission Factor (lbs/ton) = k(.0032)((u/5) exp 1.3 / (M/2)exp 1.4)
 Soil materials assumed to weigh 2700 lbs/yd³ - Caterpillar Performance Handbook Edition 24, 1993.

Transportation on Unpaved Roads

Scraper Full	
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% WT) (s)	7.5
Mean Vehicle Weight (Tons) (W)	15.4
Lbs of PM10/VMT	1.61
Control Efficiency	80%
Lbs of PM10/day	0.008

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
 (2) Emission Factor (lbs/VMT) = (k(s/12)^a(w/3)^b)/(M/0.2)^c

Excavator Emissions

Number of Excavators	1
Excavator Emissions	0.03

Truck Capacity (yd ³)	15
Number of Haul Trips	79.79

Construction Employee Trips

Employees	
Number of Trips per vehicle	
Trip Distance	
Average Vehicle Ridership	
Total Trips	

Emission Factor

Source

Emissions (lbs/day)

Total

Haul Trips (soil)

Haul Truck Emission Factor

Source

Haul Truck Emissions (lbs/day)

Days per Quarter

Equipment emissions

- Diesel
- Off-highway Trucks
- Scraper
- Crane
- Tracked Excavator
- Backhoe
- Tracked Loader
- Fork Lift - 50 HP
- Fork Lift - 175 HP
- Tracked tractor
- Wheeled loader
- Roller
- Motor grader
- Miscellaneous

Site Preparation

lbs of PM10/VMT	1.72	Duration (months)	2
Control Efficiency	80%	Days worked per month	22.5
lbs of PM10/day	0.084	Number of Haul Trips per day	2
		Average Haul Trip Length (miles)	15

(1) Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2
 (2) Emission Factor (lbs/VMT) = $(k)(sr^{1.2})e^{(w/3)^b} / (M^{0.2})^c$

Loader Emissions	0.16
Number of Loaders	1
Loader Emissions	0.16
Grader Emissions	15.3
Excavator Emissions	0.03
Total Emissions (lbs/day)	15.49

- Off-highway Trucks
- Scraper
- Crane
- Tracked Excavator
- Backhoe
- Tracked Loader
- Fork Lift - 50 HP
- Fork Lift - 175 HP
- Tracked tractor
- Wheeled loader
- Roller
- Motor grader
- Miscellaneous
- Total

Site Preparation Emissions (lb

Project

- Graders/Loaders (fugitive dust)
- Haul Trips
- Employee Trips
- Const Equip Emissions
- Total Project
- SCAQMD Daily Threshold
- Difference
- Significant?

Site Preparation

13	13	13	13
2.3	2.3	2.3	2.3
10.7	10.7	10.7	10.7
2	2	2	2
15	15	15	15

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
13.88	0.49	0.41	0.04	0.28	0.86	0.03

Emission factor from the CA (Year 2008 73% LDA, 27% LDT, 100% cold starts)

Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
15	4.9	0.17	0.01	0.001	0.009	0.3	0.004
16	-	-	-	-	-	-	-
15	-	-	0.0	0.0	0.008	-	-
45	4.910	0.170	0.018	0.002	0.017	0.300	0.004

Per Day

Number of Trips	Trip Length	VMT
1.706447	10.23	17.45635
	0	0
	0	0
	0	0

CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.64	2.48	-	-	-	11.60	1.08

(Year 2008 EF, 100% HDD, 100% cold starts)

CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0.6	0.1	-	-	-	0.5	0.0
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

67.5

Vehicle	Hours/day	Emission Factor (lb/hr)				
		CO	ROG	Nox	PM10	Sox
		1.8	0.19	4.17	0.26	0.45
		1.25	0.27	3.84	0.41	0.46
		1.748	0.582	4.462	0.281	0.388
		0.879	0.089	2.136	0.1335	0.178
		0.572	0.23	1.9	0.17	0.182
		0.201	0.095	0.83	0.059	0.076
		0.18	0.053	0.441	0.031	0
		0.52	0.17	1.54	0.093	0
		0.36	0.12	1.26	0.112	0.14
		0.572	0.23	1.9	0.17	0.182
		0.3	0.085	0.87	0.05	0.067
		0.151	0.039	0.713	0.061	0.086
		0.675	0.150	1.700	0.140	0.143

Vehicle	Hours/day	Emissions (lb/day)
---------	-----------	--------------------

	Cycle times (minutes)
Load Time	0.6
Maneuver & dump	0.7
Travel	1.5
Total	2.8
Distance (feet)/Cycle	3000
Cycles/50 minute hour	22.72727
Distance travelled (miles)/hour	17.85714286
Distance travelled (miles)/day	10.1461039
Output (yd ³)/cycle	0
Output (yd ³)/hour	27.77777778
Output (yd ³)/day	75000 rated load divided by 2700 lbs/cy 496.031748
	0

Site Preparation

0	8.0	-	-	-	-	-
0	8.0	-	-	-	-	-
0	8.0	-	-	-	-	-
1	10.0	8.8	0.8	21.4	1.3	1.8
1	10.0	5.7	2.300	19.0	1.7	1.8
1	10.0	2.0	1.0	8.3	0.8	0.8
0	8.0	-	-	-	-	-
0	8.0	-	-	-	-	-
1	10.0	3.5	1.2	12.8	1.1	1.4
0	8.0	-	-	-	-	-
0	8.0	-	-	-	-	-
1	10.0	1.5	0.4	7.1	0.8	0.9
1	8.0	5.4	1.2	13.6	1.1	1.1
		27.93	8.93	81.98	6.48	7.76

CO	ROG	NOx	PM10	SOx
			15.5	
1	0	0	0	
5	0	0	0	
23	5	68	5	7
29	4	68	21	7
550	75	100	150	150
(521)	(68)	(32)	(129)	(143)
NO	NO	NO	NO	NO

Construction Employees

Building Area	#REF!	#REF!
Employment Factor	8.78	8.78
Percent of construction	0.458	0.458
Construction cost	27.32	59.98
Number of Construction	#REF!	#REF!
Total Number of Constr	#REF!	

Methodology from Table A9-17, CEQA Air Quality Handbook (1993, AQMD)

AP42, Section 13.2.4-3

AP42, Section 13.2.4, eqn 1

Parting Data by

Equipment

Site Characteristic			
Size of Site (acre)	47.120		425 128 6443
Size of Construction (sq ft)	36,000		885 261 802
Cur (ft)	75		
Total impervious (sq ft)	33,835		
Impervious Paved (sq ft)			
On Street (%)	7.5		
Off Street (%)	3.7		
Maximum number (%)	3		
Construction Distance (meters)	4.00		
Waterways (meters)	22.9		
Ecological Features (Distance)	3.00		

Transportation on Unpaved Surface (On-Street)

Peak Trucks			
Capacity (CV)	15		
Distance traveled (meters/day)	0.70		
Minimum Capacity (CV)	3.5		
Peak Size (Meters) for PM10.0	2.2		
Min Capacity (Meters) for PM10.0	1.3		
Mean Vehicle Weight (Tons) (M)	20.0		
Size of PM10.0 (M)	1.80		
Control Efficiency	80%		
Size of PM10.0 (M)	0.70		

(1) Emission Factor from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2

(2) Emission Factor (Meters) = $40 \times \frac{PM_{10.0}}{PM_{2.5}}$

3.10 20% 5-mph wind speed
 0.17 25.1 10 mph wind speed
 1.02 of long particle density, 2.2
 0.04882 0%

Vehicle of Road	1.00		
On-Street Truck Emissions	16.37		

Equipment Emissions

Category (CV)			
Circle Time (minutes)	0.28		
Distance (meters/day)	6.5		
Control Efficiency (meters)	21.70		
Distance traveled (meters/day)	0.01		
Distance traveled (meters/day)	0.21		
Output (meters/day)	1,000		
Emission Control Efficiency	10		
Category			
Size (CV)	0.30		
Mean Size (meters) (M)	3.3		
Minimum Control (M)	1.8		
Size of PM10.0 (M)	4.50		
Volume (meters/day)	3000		
Time of Material to Control	450		
Control Efficiency	90%		
Mean Size (meters) (M)	4.80		

1.832-00 0.0002

Emission Factor from AP-42, Compilation of Air Pollutant Emission Factors 13.1.4

Emission Factor (Meters) = $0.0002 \times \frac{PM_{10.0}}{PM_{2.5}}$

SOI results assumed to apply 2100 lbs/yr - Control Performance Handbook, Annex 3A, 1987

Transportation on Unpaved Surface (On-Street) Emissions

Category			
Minimum Control (M)	2.0		
Peak Size (Meters) for PM10.0 (M)	2.8		
Size of PM10.0 (M)	1.8		
Mean Vehicle Weight (Tons) (M)	20.0		
Size of PM10.0 (M)	1.80		
Control Efficiency	50%		
Size of PM10.0 (M)	0.90		

27.4
 1.102-00 0.0002

(1) Emission Factor from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2.2

(2) Emission Factor (Meters) = $40 \times \frac{PM_{10.0}}{PM_{2.5}}$

Equipment Emissions	0.26		
Number of Emissions	1		
Emission Emissions	0.26		

6.092-00 0.0002

Construction Emissions

Employees	12		
Number of Trips per vehicle	2.3		
Trips/Day	27.6		
Average Vehicle Emissions	1.5		
Total Trips	18		
Trips Length (meters) (M)	100		

Construction Factor

CO	PM10	Overall	Routing	Soil	Max	PM10
(g/mile)	(g/mile)	(g/mile)	(g/mile)	(g/mile)	(g/mile)	(g/mile)
13,000.0	2.40	0.40	0.40	0.30	0.30	0.01

Emission Factor from the CMAQ program based on the Emission Factor

Emissions (meters)

Per Day of Construction	CO	PM10	Overall	Routing	Soil	Max	PM10
Trips	6.8	9.2	0.4000	0.0000	0.0100	0.30	0.0047
Total	0.97	0.2	0.0100	0.0000	0.0110	0.3000	0.0047

Number of Road Truck Routing Trips

Per Day	Number of Trips	Trips Length	WMT
0.00	93.7	4280.00	

Heavy Truck Emission Factor

CO	PM10	Overall	Routing	Soil	Max	PM10
(g/mile)	(g/mile)	(g/mile)	(g/mile)	(g/mile)	(g/mile)	(g/mile)
14,000.0	2.40				1.00	1.00

0.00174

Heavy Truck Emissions (meters)

CO	PM10	Overall	Routing	Soil	Max	PM10
138.0	20.0				108.0	10.0
138.0	20.0				108.0	10.0

Off-Highway Trucks

Category	CO	PM10	Overall	Routing	Soil	Max	PM10
Tractor	3.8	0.18	4.17	0.20	0.20	0.43	
Tractor loader	1.25	0.07	3.84	0.40	0.40	0.40	
Tractor loader	1.94	0.09	4.98	0.50	0.50	0.50	
Tractor loader	0.57	0.03	1.8	0.17	0.17	0.17	
Tractor loader	0.11	0.004	1.02	0.11	0.11	0.11	
Tractor loader	0.34	0.01	0.83	0.03	0.03	0.03	
Tractor loader	0.16	0.003	0.44	0.03	0.03	0.03	
Tractor loader	0.32	0.01	1.54	0.03	0.03	0.03	
Tractor loader	0.12	0.003	1.8	0.17	0.17	0.17	
Tractor loader	0.3	0.01	0.87	0.03	0.03	0.03	
Tractor loader	0.15	0.003	0.73	0.03	0.03	0.03	
Tractor loader	0.16	0.003	0.7	0.14	0.14	0.14	
Tractor loader	2.07	0.10	2.00	0.14	0.14	0.14	

EMISSION FORMATS

Off Highway Tractor	0	12.0						
Scraper	0	12.0						
Comp	0	12.0						
Backhoe	0	12.0						
Tracked loader	1	4.3	0.5	0.8	14.3	0.9	1.2	
Tracked loader	1	0.3	2.3	1.0	8.9	0.8	0.8	
For L6 - 175 HP	0	10.0						
For L6 - 175 HP	0	10.0						
Tracked tractor	0	10.0						
Tracked loader	0	10.0						
Roller	0	10.0						
Motor grader	0	10.0						
Wheel loader	0	10.0						
Roller	0	10.0						
Motor grader	0	10.0						
Wheel loader	0	10.0						
Roller	0	10.0						
Total		6.54	1.24	22.55	1.36	1.95		

1-40-06

Building Construction Emissions

Project	CO	NOx	NO2	PM10	PM2.5
Engine Emissions	0	0	0	0	0
Hot Track Emissions (Battery)	138.00	29.98	108.38	0.88	
Concrete cement	0	0	23	1	3
Steel Plate (battery)	182	26	138	28	2
SGAGARD Daily Transport	350	76	300	150	180
Concrete	200	24	12	174	140
Gravel	0	0	12.8	0	0
Quantity Emissions (on site)	1.1	0.1	4.8	0.9	1.1
SGAGARD Quarry Transport	48.15	2.3	2.2	6.25	6.16
Quarry	150	17.7	2.0	7.8	6.7
Gravel	0	0	1.9	0	0

See Preparation Emissions (Listing by Placement of 1 Barrel)

Transportation on Improved Surface (On-Site)
Hot Trucks bringing material to Site

Distance traveled (miles)	0.20
Material weight (Tons)	12
Material weight (Tons) (Per 10)	2.8
SR Gravel (50 MB/G)	1.2
Mean Vehicle Weight (Tons) (M)	27.3
Eq of PM10/TAAP	1.00
Control Efficiency	90%
Eq of PM10/day	0.24

1) Emission Factor from AP-3 Computer of Air Pollutant Emission Factor 11.2.2
2) Emission Factor (from AP-3) 12.1/1000/340.2/10

Number of trucks	2
On-Site Hot Truck Emissions (Barrels)	0.28

0.10 0.7 3-mph road trip
0.17 1.2 10-mph road trip
1% of trips (Northbound) E.P.
0.04/0.7 0.8

Distribution Emissions Trip

Emphasis Factor	4
Number of trips per vehicle	2.3
Trip Distance	11.54
Average Vehicle Mileage	1.0
Total Trips	9.2

The Length of the Trip Table AP-3, C1231 Air Quality Handbook 1990, AGARD

Emphasis Factor	CO (gpm/hr)	NOx (gpm/hr)	NO2 (gpm/hr)	PM10 (gpm/hr)	PM2.5 (gpm/hr)
13.84	0.25	0.41	0.94	0.28	0.08

(Year 2008, 75% LDA, 27% LDT, 100% road travel)

Hot Trucks (Battery)

Hot Trucks (Battery)	CO	NOx	NO2	PM10	PM2.5
9	0.5	1.1		0.9	
Total	0.5	1.1			

Number of Hot Trips (Off-site) Transported

Hot Trips	CO	NOx	NO2	PM10	PM2.5
4	31.84	69.24			
	11.54	0			
	11.54	0			

Hot Truck Emissions (Battery)

Hot Truck Emissions (Battery)	CO (gpm/hr)	NOx (gpm/hr)	NO2 (gpm/hr)	PM10 (gpm/hr)	PM2.5 (gpm/hr)
14.64	2.46	5.62		4.62	1.08

(Year 2008, 100% LDA, 27% LDT, 100% road travel)

Hot Truck Emissions (Battery)

Hot Truck Emissions (Battery)	CO	NOx	NO2	PM10	PM2.5
2.2	0.4	1.1		0.9	0.2
Total	2.2	0.4		1.6	0.2

Off Highway Tractor

Off Highway Tractor	CO	NOx	NO2	PM10	PM2.5
Scraper	1.8	0.22	4.11	0.25	0.45
Comp	1.28	0.27	3.84	0.41	0.48
Backhoe	1.748	4.50	4.82	0.291	0.268
Tracked loader	0.872	0.23	1.8	4.17	1.185
Tracked loader	0.872	0.23	1.8	4.17	1.185
For L6 - 175 HP	0.18	0.468	0.441	0.221	0
For L6 - 175 HP	0.22	0.17	1.54	0.090	0
Tracked tractor	0.38	0.12	1.26	0.112	0.44
Wheel loader	4.572	0.23	8.8	11.17	0.982
Roller	0.3	0.064	0.57	0.88	0.087
Motor grader	0.131	0.250	0.215	0.581	0.088
Wheel loader	0.475	0.16	1.2	0.34	0.145
Roller (Eq)	3.175	0.470	3.745	0.726	0.274

Total Construction Emissions

0.04-0.2 0.8
0.04/0.3 0.4-0.2

Construction MAH

Parking Structure

General Construction Emissions
Architectural Coatings

Building Area (sqft)	75,000	-
Surface Area Coating Factor	2	2 Table A9-13-C, CEQA Air Quality Handbook (1993, AQMD)
Surface Area to be coated (ft ²)	150,000	-
Coating Requirements (sq/ft/gal)	500	500
Coating Usage (gal)	500	-
Rule 113 limit (lbs ROG/gal)	2.08	2.08 Table A9-13-B, CEQA Air Quality Handbook (1993, AQMD)
Total ROG (lbs)	1040	0
Duration (months)	6	3
Days of work per month	22.5	22.5
ROG (lbs/day)	6.78	0.00

Truck Traffic on Paved Surface (On-Site)

Base EF for particle size (lb/VMT)	0.016	AP42 section 13.2.1-1
Road surface silt loading (oz/yd ²)	0.04	CEQA Air Quality Handbook (SCAQMD, 1993), Table A9-9-C-1, (construction sites w/ cleaning)
Road surface silt loading (g/m ²)	1.356	
Mean vehicle weight (tons)	10	
PM10 emission factor (lb/VMT)	0.076	AP42, section 13.2.1-3
Average trip length (miles)	11.54	
Number of trucks per day	50	
Truck VMT (miles)	6.11	
Truck traffic emissions (lbs PM10/day)	0.46	

Construction Employee Trips

Employees	20
Number of Trips per vehicle	2.3
Trip Distance	11.54
Average Vehicle Ridership	1.5
Total Trips	31

Trip Length taken from Table A9-5-C, CEQA Air Quality Handbook (1993, AQMD)

Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resling (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
Emission factor from the CARB emission factor model EMFAC7F (Year 2008, 73% LDA, 27% LDT, 100% cold starts)	13.88	0.49	0.41	0.04	0.26	0.83	0.01

Emissions (lbs/day)

Max Day 1st Quarter	Trips	CO	ROG	Diurnal	Resling	Soak	Nox	PM10
	31	10.8	0.4	0.0		0.0	0.7	0.0
Total		10.8	0.4				0.7	0.01

Construction MAH

Number of Haul Trips (Materials Transport)

Number of Trips	Per Day	
	Trip Length	VMT
100	11.54	1154
	11.54	0
	11.54	0

Haul Truck Emission Factor

CO (gm/mile)	ROG (gm/mile)	Diesel (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.64	2.46	-	-	-	11.00	1.06

100% HDO, 100% cold starts

Haul Truck Emissions (lbs/day)

CO	ROG	Diesel	Resting	Soak	Nox	PM10
37.2	6.3	-	-	-	29.5	2.7
-	-	-	-	-	-	-
-	-	-	-	-	-	-
37.2	6.3	-	-	-	29.5	2.7

Total

- Concrete Pump
- Generator
- Welder Station
- Crane
- Backhoe
- Tracked loader
- Fork Lift-50 HP
- Fork Lift - 175 HP
- Tracked tractor
- Wheeled loader
- Roller
- Motor grader
- Wheeled dozer
- Miscellaneous

	Emission Factor (lbs/hour)				
	CO	ROG	Nox	PM10	Sox
Concrete Pump	7.06	0.36	3.21	0.36	0.18
Generator	8.05	1.1	9.9	0.85	1.1
Welder Station	0.16	0.00	0.26	0.03	0.01
Crane	1.740	0.582	4.462	0.731	0.368
Backhoe	0.572	0.23	1.9	0.17	0.162
Tracked loader	0.201	0.095	0.83	0.059	0.076
Fork Lift-50 HP	0.18	0.053	0.441	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.54	0.003	0
Tracked tractor	0.35	0.12	1.26	0.112	0.14
Wheeled loader	0.572	0.23	1.9	0.17	0.162
Roller	0.3	0.005	0.87	0.06	0.087
Motor grader	0.151	0.039	0.713	0.061	0.098
Wheeled dozer	0.875	0.15	1.7	0.14	0.143
Miscellaneous	0.675	0.156	1.700	0.140	0.143

Vehicle	Hours/day	Emissions (lbs/day)				
		CO	ROG	Nox	PM10	Sox
Concrete Pump	1	7.06	0.36	3.21	0.36	0.18
Generator	0	10.0	-	-	-	-
Welder Station	1	0.16	0.00	0.26	0.03	0.01
Crane	1	8.0	10.5	3.5	28.8	1.8
Backhoe	0	8.0	-	-	-	-
Tracked loader	0	8.0	-	-	-	-
Fork Lift-50 HP	1	8.0	1.4	0.4	3.5	0.3
Fork Lift - 175 HP	1	8.0	4.2	1.4	12.3	0.7
Tracked tractor	0	8.0	-	-	-	-
Wheeled loader	0	8.0	-	-	-	-
Roller	0	8.0	-	-	-	-
Motor grader	0	8.0	-	-	-	-
Wheeled dozer	0	8.0	-	-	-	-
Miscellaneous	1	8.0	5.4	1.2	13.6	1.1
Total			34.52	8.87	77.56	6.26

Building Construction Emissions

Project

Coating Emissions

Truck Traffic on Paved Roads

Concrete Batching

Employee Emissions

Haul Truck Emissions (lbs/day)

Construction equipment

Total Project (lbs/day)

SCAQMD Daily Threshold

Difference

Significant?

Quarterly Emissions (tons/quarter)

SCAQMD Quarterly Threshold (tons/quarter)

Tons/Quarter Over (Under)

Significant?

	CO	ROG	NOx	PM10	Sox
Coating Emissions		0.00	-		
Truck Traffic on Paved Roads				0.5	
Concrete Batching				0.0	
Employee Emissions	10.94	0.42	0.88	0.0	0.0
Haul Truck Emissions (lbs/day)	37.21	6.25	29.49	2.69	
Construction equipment	35	9	78	6	5
Total Project (lbs/day)	83	21	108	9	5
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(467)	(54)	8	(141)	(145)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	2.8	0.7	3.6	0.3	0.2
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	5.75
Tons/Quarter Over (Under)	(22.0)	(1.8)	1.1	(6.4)	(5.6)
Significant?	NO	NO	YES	NO	NO