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**	**NOx**	**PM10**	**SOx**
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

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

Asphalt Wrecking

Depth (ft)	0.3
Area (sq ft)	414,673
Parking Lot Volume (CuFt)	136,224
PM10 (lbs/CuFt)[3]	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, CEQA 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]	0.35
Mean wind speed (mph)[2]	3.7
Moisture content (%)[3]	2.5
Density of debris (lb/ft³)[4]	90
Debris Volume (CuYd)	3,840
Emission Factor (lb/ton)[5]	0.0005540
Debris removed (tons)	4565.07125
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, 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	0.5
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/VMT	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/VMT)=(k(s/12)^a(w/3)^b)/(M/0.2)^c

Construction Employee Trips

Employees	16
Number of Trips per Vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	25

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	0.49	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)

Max Day 1st Quarter

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	25	8.2	0.3	0.0036	0.0009	0.0143	0.5	0.006
Total		8.2	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	2.45	-	-	-	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

	Emission Factor (lbs/hour)				
	CO	ROC	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	1.740	0.592	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	0.059	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	0.143

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

	Quantity	Hours/day	Emissions (lbs/day) CO	ROC	Nox	PM10	Sox
Off highway Trucks	0	10.0	-	-	-	-	-
Scraper	0	10.0	-	-	-	-	-
Crane	0	10.0	-	-	-	-	-
Backhoe	2	10.0	11.44	4.60	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	4.60	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)				0	
Haul Trips	1	0	1	0	
Employee Trips	8	0	1	0	
Const Equip Emissions	40	14	127	11	12
Total	49	14	129	11	12

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)	414,673
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 (yd3)/cycle	4
Cycles/day	85.32
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 (yd3)	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(.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 (yd3)	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(.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)

Excavator Emissions	Caterpiller E140
Building footprint (ft^2)	414,673
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 (yd3)/cycle	0.98
Cycles/day	697
VMT/day	0.660

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 (yd3)	683
Tons of Material Excavated	921.5
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.255

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 (yd3)	683
Tons of Material Excavated	921.5
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.255

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	**0.213**

(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	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 (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

Site Preparation

Silt Content (% Wt) (s)	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**

(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

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

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

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?

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

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

(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

Emission Factor (lbs/hour)				
CO	ROC	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	0.291	0.388
0.979	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	0.076
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	0.051	0.068

	Cycle times (minutes)	
Load Time	0.6	
Maneuver & dump	0.7	
Travel	1.5	
Total	2.8	
Distance (feet)/Cycle	3000	22.72727
Cycles/60 minute hour	17.85714286	
Distance travelled (miles)/hour	10.1461039	
Distance travelled (miles)/day	0	
Output (yd3)/cycle	27.77777778	75000 rated load divided by 2700 lbs/cy
Output (yd3)/hour	496.031746	
Output (yd3)/day	0	

Site Preparation

		0.675	0.150	1.700	0.140	0.143
Vehicle	Hours/day	Emissions (lbs/day)				
0	10.0	-	-	-	-	-
1	10.0	12.5	2.7	38.4	4.1	4.6
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	6.8	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	
0	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	6.78		6.78
Percent of construction	0.458		0.458
Construction cost	27.32		59.98
Number of Construction	#REF!	#REF!	
Total Number of Constr	#REF!		

AP42, Section 13.2.4-3

AP42, Section13.2.4, eqn. 1

Parking Structure

Excavation

Site Characteristics

Size of Site (sqft)	414,573
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)	20.3
lbs of PM10/VMT	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/VMT)=(k(s/12)^a(w/3)^b)/(M/0.2)^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 (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
13.86	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)
Max Day 1st Quarter

Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
15	4.9069	0.1732	0.1449	0.0141	0.0919	0.3040	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 (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

(Year 2009, 100% HDC, 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

	Emission Factor (lbs/hour)				
	CO	ROC	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	0.388
Backhoe	0.572	0.23	1.9	0.17	0.182
Tracked excavator	0.817	0.074	1.782	0.111	0.148
Tracked loader	0.201	0.095	0.63	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	1.04	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	0.005	0.87	0.05	0.067
Motor grader			0.151	0.039	0.713	0.061	0.068
Wheeled dozer			0.675	0.15	1.7	0.14	0.143
Bore/Drill Rig			3.135	0.470	3.762	0.235	0.314
	Vehicle	Hours/day	Emissions (lbs/day)				
Off-highway Trucks	0	10.0	-	-	-	-	-
Scraper	0	10.0	-	-	-	-	-
Crane	2	8.0	27.9	9.3	71.4	4.7	6.2
Backhoe	0	8.0	-	-	-	-	-
Tracked excavator	0	8.0	-	-	-	-	-
Tracked loader	2	8.0	3.2	1.5	13.3	0.9	1.2
Fork Lift-50 HP	0	8.0	-	-	-	-	-
Fork Lift - 175 HP	0	8.0	-	-	-	-	-
Tracked tractor	0	8.0	-	-	-	-	-
Wheeled loader	2	4.0	4.6	1.8	15.2	1.4	1.5
Roller	0	10.0	-	-	-	-	-
Motor grader	0	10.0	-	-	-	-	-
Wheeled dozer	0	10.0	-	-	-	-	-
Push Rig	3	8.0	75.2	11.3	90.3	5.6	7.5
Total			110.98	23.95	190.16	12.6	16.41

Total Excavation/I-Beam Placement Emissions

Project	**CO**	**ROG**	**NOx**	**PM10**	**SOx**
Fugitive Emissions				0.10	
Employee Emissions	5	5	0	0	
Haul Truck Emissions (lbs/day)	3.721268722	0.525295154	2.848546356	0.269436193	
Construction equipment	111	24	190	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**	**6.5**	**0.4**	**0.6**
SCAQMD Quarterly Threshold (tons/quarter	24.75	2.5	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	2	Table A9-13-C, CEQA Air Quality Handbook (1993, AQMD)
Surface Area to be coated (ft2)	3,280,000	-	
Coating Requirements (sqft/gal)	300	300	
Coating Usage (gal)	10,933	-	
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 silt loading (oz/yd2)	0.04	CEQA Air Quality Hndbk (SCAQMD, 1993), Table A9-9-C-1 (construction sites w/ clean
Road surface silt loading (g/m2)	1.356	
Mean vehicle weight (tons)	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)	1730	
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-D, 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	0.46	0.41	0.04	0.25	0.98	0.01

Emission factor from the CARB emission factor model EMFAC7F (Year 2000, 73% LDA, 27% LDT, 100% cold starts)

Emissions (lbs/day)
Max Day 1st Quarter

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	100	32.7	1.15	1.0	0.1	0.6	2.0	0.020
Total		32.71	1.15	0.97	0.09	0.61	2.03	0.02

Number of Haul Trips (Materials Transport)

Per Day

Number of Trips	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
111.8	18.8	-	-	-	88.5	8.1
-	-	-	-	-	-	-
-	-	-	-	-	-	-
Total 111.8	18.8	-	-	-	88.5	8.1

	Emission Factor (lbs/hour)				
	CO	ROC	Nox	PM10	Sox
Concrete Pump	1.96	0.36	3.21	0.26	0.18
Generator	6.05	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	4.462	0.291	0.308
Backhoe	0.572	0.22	1.9	0.17	0.182
Tracked loader	0.201	0.091	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	0.085	0.87	0.05	0.067
Motor grader	0.151	0.039	0.743	0.051	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)				
Concrete Pump	2	6.0	23.6	4.3	38.5	4.3	2.2
Generator	0	10.0	-	-	-	-	-
Welder Station	2	6.0	2.8	0.5	4.2	0.5	0.2
Crane	1	8.0	14.0	4.7	35.7	2.3	3.1
Backhoe	0	8.0	-	-	-	-	-
Tracked loader	0	6.0	-	-	-	-	-
Fork Lift-50 HP	2	8.0	2.9	0.8	7.1	0.5	-
Fork Lift - 175 HP	2	8.0	8.3	2.7	24.8	1.5	-
Tracked tractor	0	6.0	-	-	-	-	-
Wheeled loader	0	8.0	-	-	-	-	-
Roller	2	6.0	3.6	0.9	10.4	0.6	0.8
Motor grader	0	6.0	-	-	-	-	-
Wheeled dozer	0	6.0	-	-	-	-	-
Miscellaneous	1	8.0	5.4	1.2	13.6	1.1	1.1
Total			60.25	15.01	134.17	10.84	7.36

Building Construction Emissions

Project	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	56	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-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. 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 13.2.4-3

[2] California Surface Wind Climatology, CARB 1992

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

[4] AP42, Appendix A-B

[5] AP42, sec 13.2.4, eqn 1

Truck Transport Debris (unpaved roads)

Haul Trucks	
Capacity (CY)	15
Distance traveled (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/VMT	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 13.2.2.2

[2] Emission Factor (lbs/VMT)=(k(s/12)^a(w/3)^b)((M/0.2)^c

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	0.49	0.41	0.04	0.25	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
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	1.09

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	ROC	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	4.462	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	0.441	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.54	0.093	0
Tracked tractor/tracked dozer	0.35	0.12	1.25	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	0.087
Motor grader	0.151	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	ROC	Nox	PM10	Sox
Off-highway Trucks	0	10.0	-	-	-	-	-
Scraper	0	10.0	-	-	-	-	-
Crane	0	10.0	-	-	-	-	-
Backhoe	2	10.0	11.44	4.60	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	4.60	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)				0	
Haul Trips	3	0	2	0	
Employee Trips	6	0	0	0	
Const Equip Emissions	40	14	127	11	12
Total	**49**	**14**	**129**	**12**	**12**

Site Preparation Emissions

[illegible] Emissions

[illegible]	5	Assumed
[illegible]	0.145	
[illegible]	30	
Control Efficiency	50%	
[illegible]	6	
[illegible]	[illegible]	
[illegible]	5	

Loader Emissions

[illegible]	450,085
[illegible]	1
Total Excavation (CY)	[illegible]
[illegible]	1
[illegible]	22.5
[illegible]	251.89
[illegible]	50
[illegible]	4
[illegible]	41.00
[illegible]	0.80

Loading Emissions

K	0.35	[illegible]
Mean Wind Speed [illegible]	3.7	[illegible]
Moisture Content [illegible]	2.5	[illegible]
[illegible]	6.9E-04	
[illegible]	750	
Tons of Material [illegible]	3402	
Control Efficiency	50%	
Loading Emissions (lbs/day)	[illegible]	

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
Emission Factor [illegible] 0.0032[illegible]
[illegible] assumed to weigh 2700 lbs/yd3 - Caterpillar Performance Handbook Edition 24, 1993

Unloading Emissions

K	0.35
Mean Wind Speed [illegible]	3.7
Moisture Content [illegible]	2.5
[illegible]	5.5E-04
[illegible]	750
[illegible]	3402
Control Efficiency	50%
Unloading Emissions (lbs/day)	[illegible]

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
Emission Factor [illegible] 0.0032[illegible]
[illegible] assumed to weigh 2700 lbs/yd3 - Caterpillar Performance Handbook Edition 24, 1993

Transportation on Unpaved Roads

[illegible]		
Moisture Content [illegible]	2.5	
[illegible]	2.6	[1]
[illegible]	7.5	[2]
Mean Vehicle Weight [illegible]	10.4	
[illegible]	1.72	
Control Efficiency	50%	
[illegible]	[illegible]	

[1] Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2
[2] [illegible]

Loader Emissions	[illegible]
Number of Loaders	1
Loader Emissions	[illegible]

[illegible] Emissions	11.48
[illegible] Emissions	3.27
Total Emissions (lbs/day)	[illegible]

[illegible] Emissions [illegible]

[illegible]	450,085
[illegible]	1
[illegible]	[illegible]
[illegible]	1
[illegible]	22.5
[illegible]	251.89
[illegible]	5
[illegible]	0.98
[illegible]	[illegible]
[illegible]	0.240

Loading Emissions

K	0.35
Mean Wind Speed [illegible]	3.7
Moisture Content [illegible]	2.5
[illegible]	[illegible]
[illegible]	750
[illegible]	3402
Control Efficiency	50%
Unloading Emissions (lbs/day)	[illegible]

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
Emission Factor [illegible]
Soil [illegible] assumed to weigh 2700 lbs/yd3 - Caterpillar Performance Handbook Edition 24, 1993

Unloading Emissions

K	0.35
Mean Wind Speed [illegible]	3.7
Moisture Content [illegible]	2.5
[illegible]	[illegible]
[illegible]	750
[illegible]	3402
Control Efficiency	50%
Unloading Emissions (lbs/day)	[illegible]

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
Emission Factor [illegible]
Soil [illegible] assumed to weigh 2700 lbs/yd3 - Caterpillar Performance Handbook Edition 24, 1993

Transportation on Unpaved Roads

[illegible]	
Moisture Content [illegible]	2.5
[illegible]	2.6
[illegible]	7.5
Mean Vehicle Weight [illegible]	15.4
[illegible]	1.61
Control Efficiency	50%
[illegible]	[illegible]

[1] Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.2
[2] [illegible]

[illegible] Emissions	[illegible]
Number of [illegible]	1
[illegible] Emissions	[illegible]

Truck Capacity (yd3)	[illegible]
Number of Haul Trips	[illegible]
Duration (months)	[illegible]
Days worked per month	21.5
Number of Haul Trips per day	3
Average Haul Trip Length (miles)	15

Construction Worker Trips [illegible]

[illegible]

Emission Factor [illegible]

Emissions (lbs/day) [illegible]

Haul Trips (unit) [illegible]

Haul Truck Emission Factor [illegible]

Haul Truck Emissions (lbs/day) [illegible]

Days per Quarter [illegible]

Equipment emissions [illegible]

[illegible]

Site Preparation Emissions (lbs/day)

Project	CO	NOx	ROG	PM10	SOx
[illegible]				15.4	
[illegible] Trips	1	0	1	[illegible]	
Employee Trips	7	0	0	[illegible]	
[illegible]	24	[illegible]	[illegible]	[illegible]	[illegible]
Total Project	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] Daily Threshold	550	75	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Significant?	NO	NO	NO	NO	NO
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Quarterly Emissions	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] Quarterly Threshold	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Difference [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Parking Structure

Excavation

Site Characteristics	
Size of Site (sqft)	306,172
Size of Excavation (sqft)	153,086
Cut (ft)	25
Total volume moved (CY)	141,746
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)	7.5
Mean Vehicle Weight (Tons) (W)	20.0
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)/(M/0.2)^c

Number of Hauls	156
On-Site Haul Truck Emissions	**6.69**

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 (yd3)/day	2,500
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 (yd3)	2500
Tons of Material Excavated	3375
Control Efficiency	50%
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(.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 Surface [On-Site] Excavator	
Excavator	
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% Wt) (s)	7.5
Mean Vehicle Weight (Tons) (W)	20.0
lbs of PM10/VMT	1.79
Control Efficiency	50%
lbs of PM10/day	**0.134**

(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	**1.12**
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 (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
	13.86	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)

Max Day 1st Quarter	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10

0	16	5.9	0.3	0.010	0.0037	0.01	0.36	0.0042
Total		5.8900	0.2100	0.0100	0.00370	0.0100	0.36	0.00420

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/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.64	2.46	-	-	-	11.60	1.06

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

Haul Truck Emissions (lbs/day)

	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	107.7	18.1	-	-	-	85.3	7.8
Total	107.7	18.1	-	-	-	85.3	7.8

	Emission Factor (lbs/hour)				
	CO	ROC	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	1.746	0.587	4.467	0.291	0.389
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	0.065	0.83	0.059	0.075
Fork Lift-50 HP	0.16	0.053	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	0.151	0.039	0.713	0.061	0.095
Wheeled dozer	0.875	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	10.0	-	-	-	-	-
Scraper	0	10.0	-	-	-	-	-
Crane	0	10.0	-	-	-	-	-
Backhoe	0	10.0	-	-	-	-	-
Tracked excavator	3	10.0	24.5	2.2	53.5	3.3	4.5
Tracked loader	0	10.0	-	-	-	-	-
Fork Lift-50 HP	0	10.0	-	-	-	-	-
Fork Lift - 175 HP	0	10.0	-	-	-	-	-
Tracked tractor	0	10.0	-	-	-	-	-
Wheeled loader	0	10.0	-	-	-	-	-
Roller	0	10.0	-	-	-	-	-
Motor grader	0	10.0	-	-	-	-	-
Wheeled dozer	0	10.0	-	-	-	-	-
Miscellaneous	0	10.0	-	-	-	-	-
Total			24.5	2.23	53.45	3.34	4.45

Building Construction Emissions

Project	CO	ROG	NOx	PM10	SOx
Fugitive Emissions				8	
Employee Emissions	8	0	0	0	
Haul Truck Emissions (lbs/day)	107.65	18.09	85.3	7.78	
Construction equipment	25	2	53	3	4
Total Phase (lbs/day)	138	21	139	19	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)	2.6
Silt 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 13.2.2.2
(2) Emission Factor (lbs/VMT)=(k(s/12)^a(w/3)^b)/(M/0.2)^c

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

Construction Employee Trips

Employees	5

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)
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)
Max Day 1st Quarter

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	9	2.8	0.1	0.08	0.01	0.05	0.2	0.002
Total		2.8	0.100	0.080	0.010	0.050	0.180	0.002

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 (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.64	2.48	-	-	-	31.60	1.08

(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

	Emission Factor (lbs/hour)				
	CO	ROG	Nox	PM10	Sox
Off-highway Trucks	1.8	0.19	4.17	0.28	0.45
Scraper	1.25	0.27	3.84	0.41	0.48
Crane	1.746	0.582	4.482	0.291	0.388
Backhoe	0.572	0.23	1.8	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	0.076
Fork Lift-50 HP	0.18	0.053	0.441	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.64	0.093	0
Tracked tractor	0.36	0.12	1.26	0.112	0.14
Wheeled loader	0.572	0.23	1.9	0.17	0.182
Roller	0.3	0.085	0.67	0.05	0.067
Motor grader	0.151	0.039	0.713	0.081	0.096
Wheeled dozer	0.875	0.15	1.7	0.14	0.143
Bore/Drill Rig	3.135	0.479	5.762	0.236	0.314

	Vehicle	Hours/day	Emissions (lbs/day)				
Off-highway Trucks	0	10.0	-	-	-	-	-
Scraper	0	10.0	-	-	-	-	-
Crane	2	8.0	27.9	9.3	71.4	4.7	6.2
Backhoe	0	8.0	-	-	-	-	-
Tracked excavator	0	8.0	-	-	-	-	-
Tracked loader	2	8.0	3.2	1.5	13.3	0.9	1.2
Fork Lift-50 HP	0	8.0	-	-	-	-	-
Fork Lift - 175 HP	0	8.0	-	-	-	-	-
Tracked tractor	0	8.0	-	-	-	-	-
Wheeled loader	2	4.0	4.6	1.8	15.2	1.4	1.5
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	5.0
Total			85.9	20.19	160.08	10.72	13.91

Total Excavation/I-Beam Placement Emissions

Project	CO	ROG	NOx	PM10	SOx
Fugitive Emissions				0.07	
Employee Emissions	3	0	0	0	
Haul Truck Emissions (lbs/day)	3.721268722	0.625295154	2.948546256	0.209436123	
Construction equipment	86	20	160	11	14
Total (lbs/day)	231	42	302	30	15
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(319)	(33)	202	(120)	(132)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	7.6	1.4	10.2	1.0	0.5
SCAQMD Quarterly Threshold (tons/quarter	24.75	2.5	2.5	6.75	6.75
Difference	(17.0)	(1.1)	7.7	(5.7)	(6.1)
Significant?	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 (ft2)	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)	1733	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)

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)	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 (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	0.85	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
0	115	37.6	1.3	0.1	-	0.1	2.3	0.030
Total		37.62	1.33	0.05	-	0.07	2.33	0.03

Number of Haul Trips (Materials Transport)

Per Day

Number of Trips	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)
14.54	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	6.3	-	-	-	29.5	2.7
0	-	-	-	-	-	-	-
0	-	-	-	-	-	-	-
Total	37.2	6.3	-	-	-	29.5	2.7

	Emission Factor (lbs/hour)				
	CO	ROC	Nox	PM10	Sox
Concrete Pump	7.96	0.36	3.71	0.36	0.18
Generator	6.05	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	0.095	0.83	0.059	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	0.087
Motor grader	0.151	0.039	0.713	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)				
Concrete Pump	2	8.0	23.5	4.3	38.5	4.3	2.2
Generator	0	10.0	-	-	-	-	-
Welder Station	2	8.0	2.6	0.5	4.2	0.5	0.2
Crane	1	8.0	14.0	4.7	35.7	2.3	3.1
Backhoe	0	8.0	-	-	-	-	-
Tracked loader	0	8.0	-	-	-	-	-
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	8.0	-	-	-	-	
Motor grader	0	8.0	-	-	-	-	-
Wheeled dozer	0	8.0	-	-	-		-
Miscellaneous	1	8.0	5.4	1.2	13.6	1.1	1.1
Total			56.85	14.23	123.68	10.24	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	2.69	
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)	(48)	56	(137)	(143)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	**4.4**	**0.9**	**5.2**	**0.5**	**0.2**
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	64	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)	(2.38)	(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

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] (SqFt per 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]	0.35
Mean wind speed (mph)[2]	8.7
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)	0.005

[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)	2.6
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	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/12)^a(w/3)^b)/(M/0.2)^c

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 (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	0.88	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
0	12	3.9	0.1	0.0048	0.0005	0.0059	0.2	0.003
Total		3.9	0.2				0.2	0.003

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	1.08

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 (lbs/hour)				
Diesel	CO	ROC	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	0.388
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	0.441	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	0.085	0.87	0.05	0.067
Motor grader	0.151	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	ROC	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)

Project	CO	ROG	NOx	PM10	SOx
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 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)	1.75	

Loader Emissions	
Building footprint (ft^2)	39,494
Depth of cut (ft)	1
Total Excavation (CY)	1462.74
Grading Period (Months)	1.75
Workdays/Month	22.5
Excavation/Day (CY)	37.15
Distance (feet)/Cycle	90
Output (yd3)/cycle	4
Cycles/day	9.29
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 (yd3)	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(.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 (yd3)	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(.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	
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(s/12)^a(w/3)^b)/(M/0.2)^c

Loader Emissions	0.06
Number of Loaders	1
Loader Emissions	0.06

Grader Emissions	15.3
Excavator Emissions	0.04
Total Emissions (lbs/day)	15.4

Excavator Emissions	Caterpillar E140
Building footprint (ft^2)	39,494
Depth of cut (ft)	1
Total Excavation (CY)	1462.74
Grading Period (Months)	1.75
Workdays/Month	22.5
Excavation/Day (CY)	37.15
Distance (feet)/Cycle	5
Output (yd3)/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 (yd3)	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(.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 (yd3)	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(.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	0.012

(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	0.04
Number of Excavators	1
Excavator Emissions	0.04

Truck Capacity (yd3)	15
Number of Haul Trips	97.52
Duration (months)	1.75
Days worked per month	22.5
Number of Haul Trips per day	2
Average Haul Trip Length (miles)	15

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)
	13.58	0.49	0.41	0.04	0.26	0.85	0.01

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

Emissions (lbs/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	42	4.580	0.160	0.010	0.002	0.010	0.280	0.003

Haul Trips (soil)

Per Day

Number of Trips	Trip Length	VMT
2	20.23	25.3356
	0	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)
	14.54	2.46	-	-	-	11.60	1.06

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

Haul Truck Emissions (lbs/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 (lbs/hour)				
	CO	ROC	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	0.388
Tracked Excavator	0.879	0.089	2.136	0.1335	0.178
Backhoe	0.572	0.23	1.9	0.17	0.182
Tracked Loader	0.201	0.095	0.83	0.065	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	1.25	0.112	0.14
Wheeled loader	0.672	0.23	1.9	0.17	0.182
Roller	0.3	0.095	0.87	0.05	0.057
Motor grader	0.151	0.039	0.713	0.061	0.095
Miscellaneous	0.675	0.150	1.700	0.140	0.143

	Vehicle	Hours/day	Emissions (lbs/day)				
Off-Highway Trucks	0	8.0	-	-	-	-	-
Scraper	0	8.0	-	-	-	-	-
Crane	0	8.0	-	-	-	-	-
Tracked Excavator	1	10.0	9.8	0.5	21.4	1.3	1.8
Backhoe	1	10.0	5.7	2.300	19.0	1.7	1.8
Tracked Loader	1	10.0	2.0	1.0	8.3	0.6	0.8
Fork Lift-50 HP	0	8.0	-	-	-	-	-
Fork Lift - 175 HP	0	8.0	-	-	-	-	-
Tracked tractor	1	10.0	3.5	1.2	12.6	1.1	1.4
Wheeled loader	0	8.0	-	-	-	-	-
Roller	0	8.0	-	-	-	-	-
Motor grader	1	10.0	1.5	0.4	7.1	0.6	0.9
Miscellaneous	0	8.0	-	-	-	-	-
Total			22.53	5.73	88.39	5.36	6.02

Site Preparation Emissions (lbs/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	
Const Equip Emissions	23	6	68	5	7
Total Project	29	6	69	20	7
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(521)	(69)	(31)	(130)	(143)
Significant?	ND	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	2.5	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)	10,000
Volume Filled (yd3)	-
Silt Content (%)	7.5
Mean wind speed (mph)	3.7
Moisture content (%)	3
Excavation Duration (months)	3.50
Workdays/month	22.5
Excavation Volume (CY/day)	3,000

Transportation on Unpaved Surface (On-Site)	
Haul Trucks	
Capacity (CY)	15
Distance traveled (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)	20.0
lbs of PM10/VMT	1.80
Control Efficiency	60%
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)/(M/0.2)^c

Number of Hauls	200
On-Site Haul Truck Emissions	8.62

Excavator Emissions	
Caterpillar 320	
Cycle Time (Minutes)	0.23
Distance (feet)/Cycle	0.5
Cycles/60 minute hour	217.39
Distance traveled (miles/hour)	0.02
Distance traveled (miles/day)	0.16
Output (yd3)/day	3,000
Excavator Operation (hrs/day)	8

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 (yd3)	3000
Tons of Material Excavated	4050
Control Efficiency	60%
Batch-Drop Emissions (lbs/day)	1.192

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 Surface (On-Site) Excavator	
Excavator	
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% Wt) (s)	7.5
Mean Vehicle Weight (Tons) (W)	20.0
lbs of PM10/VMT	1.80
Control Efficiency	60%
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/VMT)=(k(s/12)^a(w/3)^b)/(M/0.2)^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 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)
	12.68	0.48	0.41	0.04	0.20	0.86	0.01

Emission factor from the CARB emission factor model EMFAC7F (Year 2006, 73% LDA, 27% LDT, 100% cold starts)

Emissions (lbs/day)

Max Day 1st Quarter		Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	0	15	5.3	0.2	0.009	0.0006	0.2046	0.330	0.0028
Total			5.2900	0.1800	0.0060	0.0006	0.0198	0.3300	0.0030

Number of Haul Truck Round Trips

Number of Trips	Trip Length	VMT
	Per Day	
400	11.54	4616.00

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	-	-	-	11.50	1.06

(Year 2008 100% HDD 100% cold starts)

Haul Truck Emissions (lbs/day)

	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	148.9	25.5	-	-	-	117.9	10.8
Total	148.9	25.5	-	-	-	117.9	10.8

	Vehicle	Hours/day	CO	ROG	Nox	PM10	Sox
Emission Factor (lbs/hour)							
Off-highway Trucks			1.8	0.18	4.17	0.26	0.45
Scraper			1.25	0.27	3.84	0.41	0.46
Crane			1.740	0.587	4.462	0.201	0.348
Backhoe			0.072	0.23	1.9	0.17	0.152
Tracked excavator			0.817	0.074	1.782	0.111	0.148
Tracked loader			0.201	0.095	0.81	0.005	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	1.9	0.17	0.182
Roller			0.3	0.065	0.87	0.05	0.067
Motor grader			0.151	0.038	0.713	0.061	0.086
Wheeled dozer			0.875	0.25	1.7	0.14	0.143
Miscellaneous			0.075	0.150	1.700	0.140	0.143
Emissions (lbs/day)							
Off-highway Trucks	0	10.0	-	-	-	-	-
Scraper	0	10.0		-	-	-	-
Crane	0	10.0		-	-	-	-
Backhoe	0	10.0	-	-	-	-	-
Tracked excavator	1	8.5	6.5	0.6	14.3	0.8	1.2
Tracked loader	0	10.0	-		-	-	-
Fork Lift-50 HP	0	10.0	-	-	-	-	-
Fork Lift - 175 HP	0	10.0	-	-	-	-	-
Tracked tractor	0	10.0	-	-		-	-
Wheeled loader	0	10.0		-	-	-	-
Roller	0	10.0		-	-	-	-
Motor grader	0	10.0	-	-	-	-	-
Wheeled dozer	0	10.0	-		-	-	-
Miscellaneous	0	10.0	-	-	-	-	-
Total			6.52	0.58	14.25	0.80	1.19

Building Construction Emissions

Project	CO	ROG	NOx	PM10	SOx
Fugitive Emissions				10	
Employee Emissions	5	0.205	0.330	0.004	
Haul Truck Emissions (lbs/day)	148.85	25.05	117.94	10.78	
Construction equipment	7	1	14	1	1
Total Phase (lbs/day)	161	26	133	22	1
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(389)	(49)	33	(128)	(149)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	5.4	0.9	4.5	0.7	0.0
SCAQMD Quarterly Threshold (tons/quarter	24.75	2.5	2.5	6.75	6.75
Difference	(19.3)	(1.6)	2.0	(6.0)	(6.7)
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 traveled (miles)/day	0.13
Moisture Control (%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/12)^a(w/3)^b/(M/0.2)^c

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

Construction Employee Trips

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

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)
13.48	0.45	0.41	0.04	0.26	0.85	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
0	6	2.0	0.1	0.060	0.010	0.040	0.120	0.0014
Total		2.0	0.0700	0.0600	0.0100	0.0400	0.1200	0.0014

Number of Haul Trips (Materials Transport)

Per Day

Number of Trips	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)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.64	2.46	-	-	-	11.50	1.06

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

Haul Truck Emissions (lbs/day)

	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	2.2	0.4	-	-	-	1.6	0.2
	-	-		-	-	-	-
	-	-				-	-
Total	2.2	0.4	-		-	1.5	0.2

	Emission Factor (lbs/hour)				
	CO	ROG	Nox	PM10	Sox
Off-highway Trucks	1.8	0.18	4.17	0.26	0.45
Scraper	1.25	0.27	3.04	0.41	0.46
Crane	1.745	0.517	4.462	0.281	0.358
Backhoe	0.572	0.23	1.8	0.17	0.152
Tracked excavator	0.847	0.074	1.782	0.111	0.148
Tracked loader	0.201	0.095	0.43	0.055	0.076
Fork Lift-50 HP	0.15	0.053	0.441	0.031	0
Fork Lift - 175 HP	0.02	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	0.066	0.87	0.05	0.067
Motor grader	0.151	0.038	0.713	0.061	0.088
Wheeled dozer	0.875	0.15	1.7	0.14	0.143
Bore/Drill Rig	3.125	0.470	7.762	0.236	0.314

	Vehicle	Hours/day	Emissions (lbs/day)				
Off-highway Trucks	0	10.0	-	-	-		
Scraper	0	10.0	-	-	-	-	
Crane	1	8.0	14.0	4.7	35.7	2.3	3.1
Backhoe	0	8.0		-	-	-	-
Tracked excavator	0	8.0	-	-	-	-	-
Tracked loader	1	8.0	1.6	0.8	6.6	0.5	0.6
Fork Lift-50 HP	0	8.0	-		-	-	-
Fork Lift - 175 HP	0	8.0	-	-	-	-	-
Tracked tractor	0	8.0	-	-	-	-	-
Wheeled loader	1	4.0	2.3	0.9	7.8	0.7	0.7
Roller	0	10.0	-	-	-	-	-
Motor grader	0	10.0	-	-	-	-	-
Wheeled dozer	0	10.0		-	-	-	-
Push Rig	1	8.0	25.1	3.8	20.1	1.9	2.5
Total			42.85	10.1	80.54	5.06	6.59

Total Excavation/I-Beam Placement Emissions

Project	CO	ROG	NOx	PM10	SOx
Fugitive Emissions				0.05	
Employee Emissions	2	0	0	0	
Haul Truck Emissions (lbs/day)	2.232761231	0.376177695	1.768127753	0.161851874	
Construction equipment	43	10	80	5	7
Total (lbs/day)	208	36	214	27	8
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(342)	(39)	114	(123)	(142)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	7.0	1.2	7.2	0.9	0.3
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	6.75
Difference	(17.7)	(1.3)	4.7	(5.8)	(6.5)
Significant?	NO	NO	YES	NO	NO

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)	300	300	
Coating Usage (gal)	1,500	-	
Rule 113 lims (lbs ROG/gal)	2.08	2.08	Table A9-13-B CEQA Air Quality Handbook (1993, AQMD)
Total ROG (lbs)	3120	0	
Duration (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 Handbk (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)	5.11	
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 11.12-4 (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 Curatin, 90% Control Efficiency)
Transfer to Aggregate Storage/Bin	0.0	AP42, section 11.12-4 (Water Curatin, 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/d)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
	13.98	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)
Max Day 1st Quarter

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	23	7.5	0.3	0.001	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)

Per Day		
Number of Trips	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	-	-	-	11.80	1.06

100% HDD, 100% cord 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

	Emission Factor (lbs/hour)				
	CO	ROC	Nox	PM10	Sox
Concrete Pump	1.96	0.38	3.21	0.36	0.18
Generator	6.05	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	4.462	0.291	0.388
Backhoe	0.572	0.23	1.9	0.17	0.182
Tracked loader	0.201	0.055	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	0.083	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	0.151	0.039	0.710	0.061	0.056
Wheeled dozer	0.675	0.15	1.7	0.14	0.145
Miscellaneous	0.675	0.150	1.700	0.140	0.143

Vehicle	Hours/day	Emissions (lbs/day)				
Concrete Pump	1	6.0	11.8	2.2	18.3	2.7	1.1
Generator	0	10.0	-	-	-	-	-
Welder Stebon	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	-	-	-	-	-
Wheeled loader	0	6.0	-	-	-	-	-
Roller	0	6.0	-	-	-	-	-
Motor grader	0	8.0	-	-	-	-	-
Wheeled dozer	0	6.0	-	-	-	-	-
Miscellaneous	0	8.0	-	-	-	-	-
Total			29.12	7.67	63.96	5.14	3.49

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	7.52	0.293669106	0.47	0.0	
Haul Truck Emissions (lbs/day)	37.21	6.75	29.40	2.69	
Construction equipment	29	8	64	5	3
Total Project (lbs/day)	74	34	94	8	3
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(476)	(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)	(72.3)	(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	252	43	280	31	14
Construction (lbs/day)	112	97	130	12	5
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	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

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 (lbs/CuFt)[1]	0.00042
PM10 (lbs)	30
Control Efficiency	50%
Duration of Demolition (months)[2]	2.75
Demolition Total (PM10 lbs/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 A9-9-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]	9.7
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)/((M/0.2)^c

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)
13.86	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)

Max Day 1st Quarter

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	15	4.9	0.2	0.0080	0.0006	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)
14.64	2.46	-	-	-	11.60	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
2.8	0.5	-	-	-	2.0	0.2
		-	-	-		
Total 2.8	0.5	-	-	-	2.0	0.2

Equipment emissions

	Emission Factor (lbs/hour)				
	CO	ROC	Nox	PM10	Sox
Diesel					
Off-highway Trucks	1.8	0.19	4.17	0.25	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	0.076
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	0.057
Motor grader	0.151	0.039	0.733	0.061	0.088
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	ROC	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	2	10.0	13.50	3.00	34.00	2.80	2.86
Total			26.95	8.55	80.30	6.79	7.26

Demolition Emissions (lbs/day)

	CO	ROG	NOx	PM10	SOx
Project					
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 Emissions

Grading Emissions	
Speed (MPH)	5 Assumed
Grading Emissions (lbs/VMT)	0.765
Distance Traveled (miles/day)	40
Control Efficiency	50%
Grading Operation (hrs/day)	8
Grading Emissions (lbs/day)	15.3
Operation (months)	2.75

Loader Emissions	
Building footprint (ft^2)	135,864
Depth of cut (ft)	1
Total Excavation (CY)	5032.74
Grading Period (Months)	1
Workdays/Month	22.5
Excavation/Day (CY)	223.68
Distance (feet)/Cycle	50
Output (yd3)/cycle	4
Cycles/day	55.92
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	6.5E-04
Volume Excavated (yd3)	224
Tons of Material Excavated	302
Control Efficiency	50%
loading Emissions (lbs/day)	**0.034**

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	6.5E-04
Volume Excavated (yd3)	224
Tons of Material Excavated	302
Control Efficiency	50%
Unloading Emissions (lbs/day)	**0.034**

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 (1)
Silt Content (% Wt) (s)	7.5 (2)
Mean Vehicle Weight (Tons) (W)	16.3
lbs of PM10/VMT	1.72
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/3)^b)/(M/0.2)^c

Loader Emissions	0.35
Number of Loaders	1
Loader Emissions	0.35
Grader Emissions	15.3
Excavator Emissions	0.24
Total Emissions (lbs/day)	15.89

Excavator Emissions	Caterpillar E 140
Building footprint (ft^2)	135,864
Depth of cut (ft)	1
Total Excavation (CY)	5032.74
Grading Period (Months)	1
Workdays/Month	22.5
Excavation/Day (CY)	223.68
Distance (feet)/Cycle	5
Output (yd3)/cycle	0.95
Cycles/day	236
VMT/day	0.216

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 (yd3)	224
Tons of Material Excavated	302
Control Efficiency	50%
Unloading Emissions (lbs/day)	**0.034**

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. 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 (yd3)	224
Tons of Material Excavated	302
Control Efficiency	50%
Unloading Emissions (lbs/day)	**0.034**

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	1.81
Control Efficiency	50%
lbs 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)=(k(s/12)^a(w/3)^b)/(M/0.2)^c

Excavator Emissions	0.24
Number of Excavators	1
Excavator Emissions	0.24

Truck Capacity (yd3)	16
Number of Haul Trips	335.52
Duration (months)	2.75
Days worked per month	22.5
Number of Haul Trips per day	6
Average Haul Trip Length (miles)	10.23

Construction Employee Trips

Employees	20	20	20	20
Number of Trips per vehicle	2.0	2.0	2.0	2.0
Trip Distance	10.7	10.7	10.7	10.7
Average Vehicle Ridership	1.5	1.5	1.5	1.5
Total Trips	31	31	31	31

Emission Factor

	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
	12.68	0.49	0.41	0.64	0.26	0.80	0.01

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

Emissions (lbs/day)

Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
31	10.1	0.4	0.01	0.00	0.02	0.6	0.01
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
31	10.14	0.36	0.01	0.00	0.02	0.63	0.01

Total

Haul Trips (soil)

Per Day

Number of Trips	Trip Length	VMT
5.42248	10.23	55.472
	0	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	-	-	-	11.66	1.05

Source: (Year 2008 FF, 100% HDD, 100% cold starts)

Haul Truck Emissions (lbs/day)

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

Days per Quarter: 67.5

Equipment Emissions

Diesel	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	1.746	0.582	4.462	0.281	0.368
Tracked Excavator	0.579	0.088	2.138	0.1336	0.178
Backhoe	0.572	0.21	1.9	0.17	0.382
Tracked Loader	0.201	0.095	0.63	0.059	0.076
Fork Lift 50 HP	0.18	0.053	0.441	0.031	0
Fork Lift 175 HP	0.32	0.17	1.54	0.093	0
Tracked tractor	0.36	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	0.057
Motor grader	0.191	0.038	0.713	0.061	0.058
Miscellaneous	0.973	0.190	1.700	0.140	0.143

	Vehicle	Hours/day	Emissions (lbs/day)				
Off-highway Trucks	0	8.0	-	-	-	-	-
Scraper	0	8.0	-	-	-	-	-
Crane	0	8.0	-	-	-	-	-
Tracked Excavator	1	10.0	9.4	0.8	21.4	1.3	1.8
Backhoe	1	10.0	5.7	2.300	19.0	1.7	1.8
Tracked Loader	1	10.0	2.0	1.0	8.3	0.6	0.8
Fork Lift-50 HP	0	8.0	-		-	-	-
Fork Lift - 175 HP	0	8.0	-	-	-	-	-
Tracked tractor	1	10.0	3.5	1.2	12.6	1.1	1.4
Wheeled loader	0	8.0	-	-	-	-	-
Roller	0	8.0	-	-	-	-	-
Motor grader	1	10.0	1.9	0.4	7.1	0.6	0.9
Miscellaneous	0	8.0	-		-	-	-
Total			22.53	5.73	68.39	5.36	6.62

Site Preparation Emissions (lbs/day)

Project	CO	ROG	NOx	PM10	SOx
Graders/Loaders (fugitive dust)				15.9	
Haul Trips	2	0	1	0.83	
Employee Trips	10	0.36	0.63	0.01	
Const Equip Emissions	23	5	68	5	7
Total Project	35	7	70	21	7
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(515)	(68)	(30)	(129)	(143)
Significant?	NO	NO	NO	NO	NO
Months of Grading	1	1	1	1	1
Quarterly Emissions	0.39	0.07	0.78	0.24	0.08
SCAQMD Quarterly Threshold (t	24.75	3.4	2.3	6.75	6.75
Difference (tons/quarter)	-24.36	-2.43	-1.71	-6.51	-6.67

Site Preparation Emissions

Grading Emissions		
Speed (MPH)	5	Assumed
Grading Emissions (lbs/VMT)	0.765	
Distance Traveled (miles/day)	40	
Control Efficiency	50%	
Grading Operation (hrs/day)	8	
Grading Emissions (lbs/day)	15.3	
Operation (months)	2.75	

Loader Emissions	
Building footprint (ft²)	135,864
Depth of cut (ft)	1
Total Excavation (CY)	5032.74
Grading Period (Months)	1
Workdays/Month	22.5
Excavation/Day (CY)	223.68
Distance (feet)/Cycle	50
Output (yd3)/cycle	4
Cycles/day	56.92
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 (yd3)	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(.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 (yd3)	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(.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	
lbs of PM10/VMT	1.72	
Control Efficiency	50%	
lbs of PM10/day	**0.793**	

(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

Loader Emissions	0.35
Number of Loaders	1
Loader Emissions	0.35
Grader Emissions	15.3
Excavator Emissions	0.24
Total Emissions (lbs/day)	15.89

Excavator Emissions	Caterpillar E140
Building footprint (ft²)	135,864
Depth of cut (ft)	1
Total Excavation (CY)	5032.74
Grading Period (Months)	1
Workdays/Month	22.5
Excavation/Day (CY)	223.68
Distance (feet)/Cycle	5
Output (yd3)/cycle	0.96
Cycles/day	226
VMT/day	0.216

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 (yd3)	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(.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 (yd3)	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(.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	50%
lbs 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)=(k(s/12)^a(W/3)^b)/((M/0.2)^c

Excavator Emissions	0.24
Number of Excavators	1
Excavator Emissions	0.24

Truck Capacity (yd3)	15
Number of Haul Trips	335.92
Duration (months)	2.75
Days worked per month	22.5
Number of Haul Trips per day	5
Average Haul Trip Length (miles)	10.25

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 Ridership	1.5	1.5	1.5	1.5
Total Trips	31	31	31	31

Emission Factor

CO (g/mi/mile)	ROG (gm/veh)	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	0.56	0.01

Source: Emissions factor from the CR, (Year 2008 73% LDA, 27% LDT, 100% cold starts)

Emissions (lbs/day)

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	31	10.8	0.4	0.01	0.00	0.02	0.6	0.01
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
Total	31	10.14	0.38	0.01	0.00	0.02	0.53	0.01

Haul Trips (soil)

Per Day

Number of Trips	Trip Length	VMT
5.67246	10.23	58.072
	0	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	-	-	-	11.80	1.06

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

Haul Truck Emissions (lbs/day)

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

Days per Quarter: 67.5

Equipment emissions

Detail	Vehicle	Hours/day	Emission Factor (lbs/hour) CO	ROG	Nox	PM10	Sox
Off-Highway Trucks	0	8.0	8.8	0.19	4.17	0.26	0.45
Scraper	0	8.0	1.25	0.27	3.64	0.41	0.46
Crane			1.746	0.582	4.462	0.281	0.388
Tracked Excavator			0.979	0.069	2.138	0.1335	0.178
Backhoe			0.572	0.29	1.9	0.17	0.182
Tracked Loader			0.201	0.085	0.43	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	1.9	0.17	0.182
Roller			0.3	0.065	0.87	0.05	0.067
Motor grader			0.151	0.039	0.713	0.051	0.066
Miscellaneous			0.576	0.150	1.700	0.140	0.141
	Vehicle	Hours/day	Emissions (lbs/day)				
Off-Highway Trucks	0	8.0	-	-	-	-	-
Scraper	0	8.0	-	-	-	-	-
Crane	0	8.0	-	-	-	-	-
Tracked Excavator	1	10.0	9.8	0.9	21.4	1.3	1.8
Backhoe	1	10.0	5.7	2.900	19.0	1.7	1.8
Tracked Loader	1	10.0	2.0	1.0	8.3	0.6	0.8
Fork Lift-50 HP	0	8.0	-	-	-	-	-
Fork Lift - 175 HP	0	8.0	-	-	-	-	-
Tracked tractor	1	10.0	3.5	1.2	12.6	1.1	1.4
Wheeled loader	0	8.0	-		-	-	-
Roller	0	8.0	-	-		-	-
Motor grader	1	10.0	1.5	0.4	7.1	0.5	0.9
Miscellaneous	0	8.0	-		-	-	-
Total			22.53	5.73	68.39	5.38	6.80

Site Preparation Emissions (lbs/day)

Project	CO	ROG	NOx	PM10	SOx
Graders/Loaders (fugitive dust)				15.8	
Haul Trips	2	0	1	0.13	
Employee Trips	10	0.36	0.83	0.01	
Const Equip Emissions	23	6	68	5	7
Total Project	35	7	70	21	7
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(515)	(68)	(30)	(129)	(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	24.75	3.4	2.5	6.75	6.75
Difference (tons/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)	74,749
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)	29.3
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/3)^b/(M/0.2)^c

Number of Hauls	200
On-Site Haul Truck Emissions	8.62

Excavator Emissions	
Caterpillar 320	
Cycle Time (Minutes)	0.23
Distance (feet)/Cycle	9.5
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 (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 Surface (On-Site) Excavator	
Excavator	
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	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/3)^b/(M/0.2)^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 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	0.49	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)
Max Day 1st Quarter

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	18	5.9	0.2	0.0		0.0	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/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.84	2.46	-	-	-	11.60	1.06

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

Haul Truck Emissions (lbs/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

	Emission Factor (lbs/hour)				
	CO	ROC	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	1.748	0.582	4.467	0.291	0.388
Backhoe	0.572	0.23	1.9	0.17	0.152
Tracked excavator	0.817	0.074	1.782	0.111	0.148
Tracked loader	0.201	0.095	0.93	0.058	0.075
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	0.36	0.12	1.26	0.112	0.14
Wheeled loader	0.572	0.23	1.9	0.17	0.152
Roller	0.3	0.065	0.87	0.05	0.087
Motor grader	0.151	0.038	0.713	0.051	0.096
Wheeled dozer	0.875	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)				
Off-highway Trucks	0	10.0	-	-	-	-	-
Scraper	0	10.0	-	-	-	-	-
Crane	0	10.0	-	-	-	-	-
Backhoe	0	10.0	-	-	-	-	-
Tracked excavator	2	8.0	13.1	1.2	28.5	1.8	2.4
Tracked loader	0	10.0	-	-	-	-	-
Fork Lift-50 HP	0	10.0	-	-	-	-	-
Fork Lift - 175 HP	0	10.0	-	-	-	-	-
Tracked tractor	0	10.0	-	-	-	-	-
Wheeled loader	0	10.0	-	-	-	-	-
Roller	0	10.0	-	-	-	-	-
Motor grader	0	10.0	-	-	-	-	-
Wheeled dozer	0	10.0	-	-	-	-	-
Miscellaneous	0	10.0	-	-	-	-	-
Total			13.07	1.19	28.51	1.78	2.38

Excavation Emissions

Project	CO	ROG	NOx	PM10	SOx
Fugitive Emissions				8.93	
Employee Emissions	6	0.23	0.36	0.0042	
Haul Truck Emissions (lbs/day)	138.02	23.19	108.36	8.99	
Construction equipment	13	1	29	2	2
Total Phase (lbs/day)	**157**	**25**	**138**	**22**	**2**
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(393)	(50)	38	(128)	(148)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	**5.3**	**0.8**	**4.7**	**0.7**	**0.1**
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	6.75
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 travelled (miles)/day	0.13
Moisture Content (%WT)	2.5
Particle Size Multiplier for PM10 (K)	2.6
Silt Content (% WI) (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/12)^a(w/3)^b](M/0.2)^c

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

Construction Employee Trips

Employees	5
Number of Trips per vehicle	2.5
Trip Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	8

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)
	13.68	0.49	0.41	0.04	0.26	0.96	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
0	8	0.3	0.1	-	-	-	0.1521	0.0019
Total		0.3	0.1				0.2	0.002

Number of Haul Trips (Materials Transport)

Per Day

Number of Trips	Trip Length	VMT
6	10.7	64.20
	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)
14.54	2.46	-	-	-	11.60	1.06

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

Haul Truck Emissions (lbs/day)

	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	2.1	0.3	-	-	-	1.8	0.1
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
Total	2.1	0.3	-	-	-	1.8	0.1

	Emission Factor (lbs/hour)				
	CO	ROC	Nox	PM10	Sox
Off-highway Trucks	1.9	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 excavator	0.817	0.074	1.782	0.117	0.148
Tracked loader	0.201	0.065	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	1.64	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	0.095	0.87	0.05	0.067
Motor grader	0.151	0.039	0.713	0.051	0.086
Wheeled dozer	0.675	0.15	1.7	0.14	0.143
Bore/Drill Rig	3.135	0.470	3.762	0.235	0.314

Vehicle	Hours/day	Emissions (lbs/day)				
Off-highway Trucks	10.0	-	-	-	-	-
Scraper	10.0	-	-	-	-	-
Crane	8.0	14.0	4.7	35.7	2.3	3.1
Backhoe	8.0	-	-	-	-	-
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	7.6	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	17.63	140.23	9.12	11.95

Total Excavation/I-Beam Placement Emissions

Project	CO	ROG	NOx	PM10	SOx
Fugitive Emissions				0.05	
Employee Emissions	0.27	0.09	0.16	0.002	
Haul Truck Emissions (lbs/day)	2.070237865	0.347867841	1.640352423	0.149884273	
Construction equipment	93	18	140	9	12
Total (lbs/day)	252	43	280	31	14
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(298)	(32)	180	(119)	(136)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	5.5	1.4	9.5	1.0	0.5
SCAQMD Quarterly Threshold (tons/quarter	24.75	2.5	2.5	6.75	6.75
Difference	(19.2)	(1.1)	7.0	(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	2	Table A9-13-C, CEQA Air Quality Handbook (1993, AQMD)
Surface Area to be coated (ft2)	2,810,000	-	
Coating Requirements (sqft/gal)	300	300	
Coating Usage (gal)	9,367	-	
Rule 413 limit (lbs ROG/gal)	2.08	2.08	Table A9-13-B, CEQA Air Quality Handbook (1993, AQMD)
Total ROG (lbs)	19483	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)	0.016	AP42, section 13.2.1-1
Road surface silt loading (oz/yd2)	0.04	CEQA Air Quality Handbk (SCAQMD, 1993) Table A9-9-C-1, (construction sites w/ clearing)
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)	0.13	
Number of trucks per day	50	
Truck VMT (miles)	6.50	
Truck traffic emissions (lbs PM10/day)	0.49	

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/Fly Ash Bucher	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 Employee Trips

Employees	60
Number of Trips per vehicle	2.3
Trip Distance	10.7
Average Vehicle Ridership	1.5
Total Trips	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)
	13.56	0.49	0.41	0.04	0.26	0.66	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
0	92	30.1	1.1	0.040	0.0000	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)
14.64	2.48	-	-	-	11.60	1.06

100% HDD, 100% cold starts

Haul Truck Emissions (lbs/day)

	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	34.5	5.8	-	-	-	27.3	2.5
0	-	-	-	-	-	-	-
0	-	-	-	-	-	-	-
Total	34.5	5.8	-	-	-	27.3	2.5

	Emission Factor (lbs/hour)				
	CO	ROC	Nox	PM10	Sox
Concrete Pump	1.95	0.36	3.21	0.38	0.18
Generator	6.05	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	0.388
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	0.441	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.54	0.088	0
Tracked tractor	0.35	0.12	1.26	0.112	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	0.086
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)				
Concrete Pump	2	8.0	23.5	4.3	38.5	4.3	2.2
Generator	0	10.0	-	-	-	-	-
Welder Station	2	8.0	2.6	0.5	4.2	0.5	0.2
Crane	1	6.0	10.5	3.5	26.9	1.8	2.3
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	8.0	-		-	-	-
Total			47.76	11.86	101.15	8.54	4.65

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	3.86	0.9	
Haul Truck Emissions (lbs/day)	34.5	5.8	27.34	2.5	
Construction equipment	48	12	101	9	5
Total Project (lbs/day)	**112**	**97**	**130**	**12**	**6**
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)	0.86	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 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-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. 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] 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-3

[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 (%W/T)	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/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, 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

Asphalt Wrecking Construction Employee Trips — Removal of Parking Lot

Employees	6
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)

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)

Max Day 1st Quarter

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
Removal of Parking Lot	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)
14.64	2.46	-	-	-	11.90	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

	Emission Factor (lbs/hour)				
	CO	ROC	Nox	PM10	Sox
Diesel					
Off-highway Trucks	1.8	0.19	4.17	0.25	0.45
Scraper	1.25	0.27	3.84	0.41	0.46
Crane	1.746	0.582	4.462	0.291	0.389
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	0.151	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	ROC	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	0.78
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	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	6	6

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 (hr/day)	8	
Grading Emissions (lbs/day)	15.3	
Operation (months)	7.5	

Loader Emissions

Building footprint (ft^2)	82,860
Depth of cut (ft)	1
Total Excavation (CY)	3062.83
Grading Period (Months)	1
Workdays/Month	22.5
Excavation/Day (CY)	136.38
Distance (feet)/Cycle	50
Output (yd3)/cycle	4
Cycles/day	34.10
VMT/day	0.32

Loading Emissions Minor Excavation

K	0.35	(4)
Mean Wind Speed (mph) (u)	5.9	(1)
Moisture Content (%WT)	2.5	(3)
Lbs of PM10/Ton of Material Loaded	1.0E-03	
Volume Excavated (yd3)	136	
Tons of Material Excavated	184.1	
Control Efficiency	50%	
Loading Emissions (lbs/day)	0.094	

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 Minor Excavation

K	0.35
Mean Wind Speed (mph) (u)	5.9
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	1.0E-03
Volume Excavated (yd3)	136
Tons of Material Excavated	184.1
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.094

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	(1)
Silt Content (% Wt) (s)	7.5	(2)
Mean Vehicle Weight (Tons) (W)	14.3	
lbs of PM10/VMT	1.72	
Control Efficiency	80%	
lbs of PM10/day	0.111	

(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

Loader Emissions	0.3
Number of Loaders	1
Loader Emissions	0.3

Grader Emissions	15.3
Excavator Emissions	0.14
Total Emissions (lbs/day)	15.74

Excavator Emissions — Caterpillar E140

Building footprint (ft^2)	82,860
Depth of cut (ft)	1
Total Excavation (CY)	3062.83
Grading Period (Months)	1
Workdays/Month	22.5
Excavation/Day (CY)	136.38
Distance (feet)/Cycle	5
Output (yd3)/cycle	0.86
Cycles/day	159
VMT/day	0.132

Loading Emissions

K	0.35
Mean Wind Speed (mph) (u)	5.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd3)	136
Tons of Material Excavated	184.1
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.051

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)	5.7
Moisture Content (%WT)	2.5
Lbs of PM10/Ton of Material Loaded	5.5E-04
Volume Excavated (yd3)	136
Tons of Material Excavated	184.1
Control Efficiency	50%
Unloading Emissions (lbs/day)	0.051

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)	2.5
Silt Content (% Wt) (s)	7.5
Mean Vehicle Weight (Tons) (W)	15.4
lbs of PM10/VMT	3.05
Control Efficiency	80%
lbs of PM10/day	0.042

(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	0.14
Number of Excavators	1
Excavator Emissions	0.14

Truck Capacity (yd3)	15
Number of Haul Trips	204.58
Duration (months)	7.5
Days worked per month	22.5
Number of Haul Trips per day	4
Average Haul Trip Length (miles)	16

Construction Employee Trips

Employees	17	17	17	17
Number of Trips per Employee	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	20	20	20	20

Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
	13.55	0.49	0.47	0.04	0.28	0.86	0.01

Source: Emission factor from the CA (Year 2009 73% LDA, 27% LDT 100% cold starts)

Emissions (lbs/day)

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	20	6.5	0.2	0.01	0.001	0.01	0.4	0.0047
	20	-	-	-	-	-	-	-
	20	-	-	0.0	0.0	0.0	-	-
Total	40	6.7809	0.2792	0.4582	0.4369	0.4278	0.4147	0.0047

Haul trips (soil)

Per Day

Number of Trips	Trip Length	VMT
3.036864	>2.31	87.20643
	0	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	-	-	-	11.62	1.00

Source: (Year 2009 EF 100% HDD, 100% cold starts)

Haul Truck Emissions (lbs/day)

CO	ROG	Diurnal	Resting	Soak	Nox	PM10
1.2	0.2	-	-	-	1.0	0.1
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Days per Quarter: 67.5

Equipment emissions

	Emission Factor (lbs/hour)				
Diesel	CO	ROC	Nox	PM10	Sox
Off-highway Trucks	1.8	0.19	4.17	0.28	0.45
Dumper	1.25	0.27	3.64	0.41	0.49
Crane	1.744	0.582	4.492	0.201	0.388
Tracked Excavator	0.978	0.085	2.136	0.1356	0.176
Backhoe	0.572	0.23	1.0	0.17	0.162
Tracked Loader	0.204	0.035	0.83	0.059	0.076
Fork Lift-50 Hp	0.16	0.068	0.441	0.031	0
Fork Lift - 175 HP	0.52	0.17	1.54	0.103	0
Tracked tractor	0.85	0.12	1.28	0.113	0.14
Wheeled loader	0.572	0.23	1.9	0.17	0.162
Roller	0.3	0.065	0.87	0.06	0.097
Motor grader	0.151	0.039	0.753	0.051	0.090
Miscellaneous	0.675	0.150	1.700	0.149	0.143

	Vehicle	Horsepower	Emissions (lbs/day)				
Off-highway Trucks	0	100	-	-	-	-	-
Dumper	0	100	-	-	-	-	-
Crane	0	100	-	-	-	-	-
Tracked Excavator	1	100	9.8	0.8	21.4	1.3	1.8
Backhoe	1	100	5.7	2.300	10.0	1.7	1.6
Tracked Loader	1	100	2.0	1.0	8.3	0.6	0.8
Fork Lift-50 Hp	0	100	-	-	-	-	-
Fork Lift - 175 HP	0	100	-	-	-	-	-
Tracked tractor	1	100	3.5	1.2	12.8	1.1	1.4
Wheeled loader	0	100	-	-	-	-	-
Roller	0	100	-	-	-	-	-
Motor grader	1	100	1.0	0.4	7.1	0.6	0.8
Miscellaneous	0	100	-	-	-	-	-
Total			22.89	5.73	60.39	5.35	6.07

Site Preparation Emissions (lbs/day)

Project	CO	ROG	NOx	PM10	SOx
Grader/Loaders (hydrotreated)				15.7	
Haul Trips	1	0	1	0	
Employee Trips	7	0	0	0	
Const Equip Emissions	23	6	68	6	7
Total Project	31	6	69	21	7
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(519)	(69)	(31)	(129)	(143)
Significant?	NO	NO	NO	NO	NO
Months of Grading	1	1	1	1	1
Quarterly Emissions	0.95	0.07	0.78	0.23	0.08
SCAQMD Quarterly Threshold (t)	34.79	2.5	2.5	5.73	5.73
Difference (tons/quarter)	-33.8	-2.43	-1.72	-5.52	-5.67

Parking Structure

Excavation

Site Characteristics	
Size of Site (sqft)	124,963
Size of Excavation (sqft)	42,000
Cut (ft)	25
Total volume moved (CY)	58,689
Volume Filled (yd3)	-
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	50%
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	
Caterpiller 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 (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	5.5E-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 (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 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

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

Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
	13.66	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)

Max Day 1st Quarter

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	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

Per Day

Number of Trips	Trip Length	VMT
378	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	1.08

(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

	Emission Factor (lbs/hour)				
	CO	ROC	Nox	PM10	Sox
Off highway Trucks	1.9	0.19	4.17	0.26	0.45
Scraper	1.25	0.27	3.85	0.41	0.48
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	0.05	0.087
Motor grader	0.151	0.089	0.713	0.051	0.068
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	10.0	-	-	-	-	-
Scraper	0	10.0	-	-	-	-	-
Crane	0	10.0	-	-	-	-	-
Backhoe	0	10.0	-	-	-	-	-
Tracked excavator	2	10.0	16.3	1.5	35.6	2.2	3.0
Tracked loader	0	10.0	-	-	-	-	-
Fork Lift-50 HP	0	10.0	-	-	-	-	-
Fork Lift - 175 HP	0	10.0	-	-	-	-	-
Tracked tractor	0	10.0	-	-	-	-	-
Wheeled loader	0	10.0	-	-	-	-	-
Roller	0	10.0	-	-	-	-	-
Motor grader	0	10.0	-	-	-	-	-
Wheeled dozer	0	10.0	-	-	-	-	-
Miscellaneous	0	10.0	-	-	-	-	-
Total			16.33	1.48	35.64	2.73	2.97

Building Construction Emissions

Project	CO	ROG	NOx	PM10	SOx
Fugitive Emissions				9	
Employee Emissions	4.0100	0.2112	0.3000	0.0035	
Haul Truck Emissions (lbs/day)	128.73	21.8	102.8	8.39	
Construction equipment	18	1	36	2	3
Total Phase (lbs/day)	151	23	139	21	3
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(399)	(52)	39	(129)	(147)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	5.1	0.8	4.7	0.7	0.1
SCAQMD Quarterly Threshold (tons/quarter	24.75	2.5	2.5	5.75	5.75
Difference	(19.7)	(1.7)	2.2	(5.0)	(5.6)
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	0.13
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	1.99
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/12)^a(w/3)^b)((M/0.2)^c

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

Construction Employee Trips

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

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	0.49	0.41	0.04	0.26	0.86	0.01

Emission factor from the CARB emission factor model EMFAC7F (Year 2006, 73% LDA, 27% LDT, 100% cold starts)

Emissions (lbs/day)
Max Day 1st Quarter

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
0	6	1.9926	0.0693	0.0580	0.0057	0.0368	0.1216	0.0014
Total		2.0	0.2	0.058	0.006	0.037	0.122	0.0014

Number of Haul Trips (Materials Transport)

Per Day

Number of Trips	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	-	-	-	11.60	1.09

(Year 2006, 100% HDD, 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

	Emission Factor (lbs/hour)				
	CO	ROC	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	0.388
Backhoe	0.572	0.23	1.9	0.17	0.182
Tracked excavator	0.817	0.074	1.782	0.111	0.146
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	0.098	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	0.67	0.05	0.087
Motor grader	0.151	0.039	0.713	0.051	0.098
Wheeled dozer	0.675	0.15	1.7	0.14	0.143
Bore/Drill Rig	3.135	0.470	3.782	0.235	0.314

	Vehicle	Hours/day	Emissions (lbs/day)				
Off-highway Trucks	0	10.0	-	-	-	-	-
Scraper	0	10.0	-	-	-	-	-
Crane	1	8.0	14.0	4.7	35.7	2.3	3.1
Backhoe	0	8.0	-	-	-	-	-
Tracked excavator	0	8.0	-	-	-	-	-
Tracked loader	1	8.0	1.6	0.8	6.6	0.5	0.6
Fork Lift-50 HP	0	8.0	-	-	-	-	-
Fork Lift - 175 HP	0	8.0	-	-	-	-	-
Tracked tractor	0	8.0	-	-	-	-	-
Wheeled loader	1	4.0	2.3	0.9	7.6	0.7	0.7
Roller	0	10.0	-	-	-	-	-
Motor grader	0	10.0	-	-	-	-	-
Wheeled dozer	0	10.0	-	-	-	-	-
Push Rig	1	8.0	25.1	3.8	30.1	1.9	2.5
Total			42.95	10.1	80.04	5.36	6.96

Total Excavation/I-Beam Placement Emissions

Project	CO	ROG	NOx	PM10	SOx
Fugitive Emissions				0.05	
Employee Emissions	1.963	0.270	0.122	0.001	
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)	120	(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

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 (ft2)	1,060,000	-	
Coating Requirements (sqft/gal)	300	300	
Coating Usage (gal)	3,533	-	
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 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)	1.358	
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)	4.88	
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 Employee Trips

Employees	50
Number of Trips per vehicle	2.5
Trip 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)
	13.68	0.49	0.41	0.04	0.26	0.85	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
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)

Per Day

Number of Trips	Trip Length	VMT
80	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

	Emission Factor (lbs/hour)				
	CO	ROG	Nox	PM10	Sox
Concrete Pump	1.56	0.36	3.21	0.36	0.18
Generator	6.05	1.1	9.3	0.55	1.1
Welder Station	0.18	0.03	0.26	0.03	0.01
Crane	1.746	0.582	4.467	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	0.076
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	1.9	0.17	0.182
Roller	0.3	0.065	0.87	0.05	0.087
Motor grader	0.151	0.039	0.713	0.061	0.096
Wheeled dozer	0.875	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)				
Concrete Pump	1	8.0	11.8	2.2	19.3	2.2	1.1
Generator	0	10.0	-	-	-	-	-
Welder Station	2	8.0	2.6	0.5	4.2	0.5	0.2
Crane	1	8.0	14.0	4.7	35.7	2.3	3.1
Backhoe	0	8.0	-	-	-	-	-
Tracked loader	0	8.0	-	-	-	-	-
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	8.0	-	-	-	-	-
Wheeled loader	0	8.0	-	-	-	-	-
Roller	0	8.0	-	-	-	-	-
Motor grader	0	8.0	-	-	-	-	-
Wheeled dozer	0	8.0	-	-	-	-	-
Miscellaneous	0	8.0	-	-	-	-	-
Total			39.49	10.87	90.82	5.96	4.34

Building Construction Emissions

Project	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	91	7	4
Total Project (lbs/day)	94	48	116	10	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)	(21.6)	(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)	**0.19**
Days of operation per month	22.5
Parking Lot Area (SF)	67,100
Debris Volume Factor[3] (SqFt per CuYd debris)	105
Debris Volume (CuYd)	621
Truck Capacity (CuYd)	15
Number of Hauls	41
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. 105 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 13.2.4-3

[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)	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, 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

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, AQMD)

Emission Factor	CO (gm/mile)	ROG (gm/mile)	Diurnal (gm/veh)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
	13.68	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	0.0086	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
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	-	-	-	11.00	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 (lbs/hour)				
Diesel	CO	ROC	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	0.369
Backhoe	0.572	0.23	1.9	0.17	0.182
Tracked Loador	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/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	0.051	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	ROC	Nox	PM10	Sox
Off highway Trucks	0	8.0	-	-	-	-	-
Scraper	0	8.0	-	-	-	-	-
Crane	0	8.0	-	-	-	-	-
Backhoe	2	10.0	11.44	4.60	38.00	3.40	3.64
Tracked Loader	1	10.0	2.01	0.85	8.30	0.59	0.78
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			25.92	9.35	82.30	7.09	7.65

Demolition Emissions (lbs/day)

Project	CO	ROG	NOx	PM10	SOx
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 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 (yd3)/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 (yd3)	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 (yd3)	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 2650 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	

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Excavator Emissions Caterpillar E140

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 (yd3)/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 (yd3)	26
Tons of Material Excavated	34.6
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 (yd3)	26
Tons of Material Excavated	34.6
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	50%
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	0.03
Number of Excavators	1
Excavator Emissions	0.03

Truck Capacity (yd3)	15
Number of Haul Trips	76.79

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

lbs of PM10/VMT	1.72
Control Efficiency	80%
lbs of PM10/day	0.084

(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

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

Duration (months)	2
Days worked per month	22.6
Number of Haul Trips per day	2
Average Haul Trip Length (miles)	15

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?

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	0.01

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	0.009	-	-
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	17.45695
	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	1.06

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

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

87.5

	Cycle times (minutes)	
Load Time	0.6	
Maneuver & dump	0.7	
Travel	1.5	
Total	2.8	
Distance (feet)/Cycle	3000	22.72727
Cycles/50 minute hour	17.85714286	
Distance travelled (miles)/hour	10.1461039	
Distance travelled (miles)/day	0	
Output (yd3)/cycle	27.77777778	75000 rated load divided by 2700 lbs/cy
Output (yd3)/hour	496.031746	
Output (yd3)/day	0	

		Emission Factor (lbs/hour)				
		CO	ROC	Nox	PM10	Sox
		1.8	0.19	4.17	0.26	0.45
		1.25	0.27	3.84	0.41	0.45
		1.746	0.582	4.462	0.291	0.388
		0.979	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
		0.35	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	0.086
		0.675	0.150	1.700	0.140	0.143
Vehicle	Hours/day	Emissions (lbs/day)				

0	8.0	-	-	-	-	-
0	8.0	-	-	-	-	-
0	8.0	-	-	-	-	-
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	8.0	-	-	-	-	-
0	8.0	-	-	-	-	-
1	10.0	3.5	1.2	12.6	1.1	1.4
0	8.0	-	-	-	-	-
0	8.0	-	-	-	-	-
1	10.0	1.5	0.4	7.1	0.6	0.9
1	8.0	5.4	1.2	13.6	1.1	1.1
		27.93	6.93	81.99	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	6	68	21	7
550	75	100	150	150
(521)	(69)	(32)	(129)	(143)
NO	NO	NO	NO	NO

Construction Employees

Building Area	#REF!		#REF!
Employment Factor	8.78		8.78
Percent of construction	0.456		0.456
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, Section13.2.4, eqn 1

Parking Structure

Excavation

Site Characteristics

Size of Site (sqft)	87,120
Area of Excavation (sqft)	36,000
Cut (ft)	15
Total Volume moved (CY)	20,333
Volume Filled (yd3)	-
Silt Content (%)	7.5
Mean wind speed (mph)	3.7
Moisture content (%)	3
Excavation Duration (months)	4.00
Workdays/month	22.5
Excavation Volume (CY/day)	5,650

Transportation on Unpaved Surfaces (On-site)
Haul Trucks

Capacity (CY)	15
Distance traveled (miles/day)	9.20
Moisture Content (%M/T)	7.5
Particle Size Multiplier for PM10 (k)	2.6
Silt Content (% w/t) (s)	7.5
Mean Vehicle Weight (Tons) (W)	20.0
lbs of PM10/VMT	1.81
Control Efficiency	80%
lbs of PM10/day	0.073

(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 trucks	400
On-Site Haul Truck Emissions	14.57

Excavation Equipment
Caterpillar 320

Cycle Time (Minutes)	0.28
Distance (feet)/Cycle	6.5
Cycles/50 minute hour	217.50
Distance traveled (miles)/hour	0.03
Distance traveled (miles)/day	0.21
Output (yd3/day)	[illegible]
Excavator Operation (hrs/day)	10

Batch-Drop

K	0.35
Mean Wind Speed (mph) (U)	3.7
Moisture Content (%M/T)	15
lbs of PM10/Ton of Material (lbs/ton)	[illegible]
Volume Excavated (yd3)	3000
Tons of Material Excavated	4050
Control Efficiency	50%
Batch-Drop Emissions (lbs/day)	[illegible]

Empirical formula from AP-42, Compilation of Air Pollutant Emission Factors 13.2.4
Emission Factor (lbs/ton) = k(0.0032)(U/5)^1.3/(M/2)^1.4
Soil materials assumed to weigh 2700 lbs/yd3 - Caterpillar Performance Handbook, Edition 28, 1997

Transportation on Unpaved Surfaces (On-site) Excavators
Excavator

Moisture Content (%M/T)	3.5
Particle Size Multiplier for PM10 (k)	2.6
Silt Content (% M/T) (s)	7.5
Mean Vehicle Weight (Tons) (W)	20.3
lbs of PM10/VMT	1.80
Control Efficiency	50%
lbs of PM10/day	[illegible]

(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	0.26
Number of Excavators	1
Excavator Emissions	0.26

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-J, 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)
13.85	0.49	0.11	0.04	0.74	0.88	0.01

Emission factors from the CARB emission factor model EMFAC7F (Year 2006, 73% LDA, 27% LDT, 100% cold starts)

Emissions (lbs/day)
Per Day for Quarter

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
D	18	6.1	0.2	0.0400	0.0000	0.0100	0.38	0.0047
Total		6.1	0.2	0.0400	0.0007	0.0110	0.3859	0.0046

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/trip)	Nox (gm/mile)	PM10 (gm/mile)
14.88	2.48	-	-	-	11.10	1.08

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

Haul Truck Emissions (lbs/day)

	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	138.8	23.2	-	-	-	108.4	10.2
Total	138.9	23.2	-	-	-	108.4	10.6

		Emission Factor (lbs/hour)				
		CO	ROC	Nox	PM10	Sox
Off-highway Trucks		1.8	0.19	4.17	0.26	0.43
Scraper		1.25	0.27	3.84	0.41	0.46
Crane		1.144	0.062	1.482	0.231	0.344
Backhoe		0.573	0.53	1.1	0.17	0.182
Tracked excavator		0.417	0.074	1.782	0.111	[illegible]
Tracked loader		[illegible]	[illegible]	0.63	0.058	0.076
Fork Lift 60 HP		0.98	0.053	0.441	0.003	0
Fork Lift - 175 HP		0.92	0.17	1.54	0.080	0
Tracked tractor		0.35	0.13	1.28	0.112	0.14
Wheeled loader		0.572	0.23	1.6	0.17	0.262
Roller		0.5	0.065	0.87	0.05	0.067
Motor grader		0.151	0.039	0.713	0.061	0.086
Wheeled dozer		0.816	0.15	3.7	0.14	0.143
Miscellaneous		0.675	0.156	1.760	0.140	0.141
Vehicle	Hours/day	Emissions (lbs/day)				

Side calculations (right margin):

426	128.6446		
[illegible]	[illegible]		
2.10	20.6	5 mile round trip	
0.17	19.1	10 mile round trip	
1/2 of trips	[illegible]		
[illegible]	[illegible]		

1.83E-05 g/s-m^2

27.4
[illegible] g/s-m^2

4.09E-05 g/s-m^2

0.001174

			CO	ROG	NOx	PM10	SOx
Off-highway Trucks	0	10.0			-	-	
Scraper	0	10.0			-		
Crane	0	10.0			-	-	
Backhoe	0	10.0	-	-	-	-	-
Tracked excavator	1	4.0	6.5	0.8	14.5	0.6	1.2
Tracked loader	1	10.0	2.2	1.0	8.3	0.6	0.8
Fork Lift-50 HP	0	10.0	-	-	-	-	-
Fork Lift - 175 HP	0	10.0		-	-	-	
Tracked tractor	0	10.0	-	-		-	-
Wheeled loader	0	10.0	-	-	-	-	-
Roller	0	10.0		-		-	
Motor grader	0	10.0	-	-	-	-	-
Wheeled dozer	0	10.0		-	-	-	
Miscellaneous	0	10.0	-	-		-	-
Total			8.54	1.51	22.85	1.86	1.96

1.4E-06

Building Construction Emissions

Project	CO	ROG	NOx	PM10	SOx
Fugitive Emissions				45	
Employee Emissions	0	0	0	0	
Haul Truck Emissions (lbs/day)	126.02	23.98	108.38	8.68	
Construction equipment	9	2	23	1	3
Total Phase (lbs/day)	161	26	132	25	3
SCAQMD Daily Threshold	550	75	100	150	150
Difference	(389)	(50)	32	(124)	(148)
Significant?	NO	NO	YES	NO	NO
Quarterly Emissions (tons/quarter)	8.1	0.8	4.8	0.9	0.1
SCAQMD Quarterly Threshold (tons/quarter)	24.75	2.5	2.5	6.75	6.75
Difference	(16.6)	(1.7)	2.3	(5.8)	(6.7)
Significant?	NO	NO	YES	NO	NO

Site Preparation Emissions (Hauling for Placement of Bearm)

Transportation on Unpaved Surface (On-Site)
Haul Trucks Bringing Material (Bearm) for placement

Distance traveled (miles/day)	0.30
Moisture Content (%/VMT)	15
Percent time traveled on Roads (s)	2.6
Silt Content (% Wt) (s)	1.5
Mean Vehicle Weight (Tons) (W)	27.5
lbs of PM10/VMT	1.06
Control Efficiency	80%
lbs of PM10/day	0.063

(1) Emissions formula from AP-42, Compilation of Air Pollutant Emission Factors 11.2.3.2
(2) Emission Factor (lbs/VMT) [illegible]

Number of Hauls	7
On-Site Haul Truck Emissions (lbs/day)	4.25

0.10 0.7 5 mile round trip
0.17 1.2 10 mile round trip
1% of trips (North/South) E.F.
#DIV/0! g/s

Construction Employee Trips

Employees	4
Number of Trips per vehicle	2.3
Trip Distance	11.54
Average Vehicle Ridership	1.5
Total Trips	9

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

Emission Factors	CO (grams/mile)	ROG (grams/mile)	Diurnal (grams/day)	Resting (grams/hr)	Soak (grams/trip)	NOx (grams/mile)	PM10 (grams/mile)
	13.56	0.89	0.41	0.04	0.36	0.88	0.01

Emission factors from the CARB emission factor model EMFAC7F (Year 2006, 73% LDA, 27% LDT, 100% cold starts)

Emissions (lbs/day)
Max Day 1st Quarter

	Trips	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
9	9	0.5	0.1	-	-	0.0	-	-
Total		0.5	0.1				-	-

Number of Haul Trips (Materials Transport)

Number of Trips	Trip Length	VMT
	Per Day	
9	31.54	80.24
	11.54	0
	11.54	0

Haul Truck Emission Factors

CO (grams/mile)	ROG (grams/mile)	Diurnal (grams/day)	Resting (grams/hr)	Soak (grams/trip)	Nox (grams/mile)	PM10 (grams/mile)
14.54	2.45	-	-	-	11.80	1.05

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

Haul Truck Emissions (lbs/day)

	CO	ROG	Diurnal	Resting	Soak	Nox	PM10
	3.2	0.4	-	-	-	1.6	0.2
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
Total	3.2	0.4	-	-	-	1.6	0.2

	Vehicles	Hours/day	CO	ROG	Nox	PM10	Sox
			Emission Factors (lbs/hour)				
Off-highway Trucks			1.8	0.19	4.17	0.26	0.45
Scraper			1.28	0.27	3.84	0.41	0.46
Crane			1.746	0.582	4.002	0.291	0.308
Backhoe			0.673	0.23	1.3	0.17	0.180
Tracked excavator			0.847	0.074	1.762	0.114	0.143
Tracked loader			0.291	0.086	0.82	0.058	0.074
Fork Lift-50 HP			0.18	0.459	0.441	0.031	0
Fork Lift - 175 HP			0.52	0.17	1.54	0.090	0
Tracked tractor			0.36	0.12	1.26	0.112	0.14
Wheeled loader			0.572	0.23	1.9	0.17	0.182
Roller			0.3	0.098	0.87	0.05	0.067
Motor grader			0.151	0.039	0.315	0.04	0.0[illegible]
Wheeled dozer			0.475	0.19	1.7	0.14	0.143
Bore/Drill Rig			3.175	0.470	3.702	0.726	0.314
			Emissions (lbs/day)				
Off-highway Trucks	0	10.0	-	-	-	-	-
Scraper	0	10.0	-	-	-	-	-
Crane	1	8.0	14.0	4.7	32.1	2.3	3.1
Backhoe	0	8.0	-	-	-	-	-
Tracked excavator	0	8.0	-	-	-	-	-
Tracked loader	1	8.0	2.3	0.8	6.6	0.5	0.6
Fork Lift-50 HP	0	8.0	-	-	-	-	-
Fork Lift - 175 HP	0	8.0	-	-	-	-	-
Tracked tractor	0	8.0	-	-	-	-	-
Wheeled loader	1	4.0	2.3	0.9	7.6	0.7	0.7
Roller	0	10.0	-	-	-	-	-
Motor grader	0	10.0	-	-	-	-	-
Wheeled dozer	0	10.0	-	-	-	-	-
Bore Rig	1	8.0	25.4	3.8	30.1	1.8	2.5
Total			42.25	10.1	69.84	5.38	6.89

#DIV/0! g/s
m3
#DIV/0! g-s-m2

Total Excavation/Bearm Placement Emissions

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 (ft2)	150,000	-	
Coating Requirements (sq/ft/gal)	500	300	
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)	**5.78**	**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/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)	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)	Resting (gm/veh)	Soak (gm/trip)	Nox (gm/mile)	PM10 (gm/mile)
	13.88	0.49	0.41	0.04	0.26	0.88	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
0	31	10.9	0.4	0.0	-	0.0	0.7	0.0
Total		10.9	0.4				0.7	0.01

Number of Haul Trips (Materials Transport)

Per Day

Number of Trips	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	2.46	-	-	-	11.00	1.05

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

	Emission Factor (lbs/hour)				
	CO	ROC	Nox	PM10	Sox
Concrete Pump	1.66	0.36	3.21	0.35	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	4.462	0.291	0.368
Backhoe	0.572	0.23	1.9	0.17	0.162
Tracked loader	0.201	0.095	0.93	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	0.095	0.87	0.05	0.087
Motor grader	0.151	0.038	0.713	0.061	0.038
Wheeled dozer	0.875	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)				
Concrete Pump	1	6.0	11.8	2.2	19.3	2.2	1.1
Generator	0	10.0	-	-	-	-	-
Welder Station	1	8.0	1.3	0.2	2.1	0.2	0.1
Crane	1	6.0	10.5	3.5	26.8	1.8	2.2
Backhoe	0	6.0	-	-	-	-	-
Tracked loader	0	6.0	-	-	-	-	-
Fork Lift-50 HP	1	6.0	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	-	-	-	-	-
Wheeled loader	0	6.0	-	-	-	-	-
Roller	0	6.0	-	-	-	-	-
Motor grader	0	6.0	-	-	-	-	-
Wheeled dozer	0	6.0	-	-	-	-	-
Miscellaneous	1	8.0	5.4	1.2	13.6	1.1	1.1
Total			34.52	8.87	77.56	6.26	4.63

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	10.94	0.42	0.68	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	6
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	5.75	5.75
Tons/Quarter Over (Under)	(22.0)	(1.8)	1.1	(5.4)	(5.6)
Significant?	NO	NO	YES	NO	NO