

APPENDIX C
AIR QUALITY

**Metro's Regional Connector Transit Corridor
Supplemental Environmental Impact Study -
Air Quality Appendix**

Prepared June 2014

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Table 1-1: Summary of Maximum Daily Emissions

Alternative	Daily Emissions (lbs/day)					
	VOC	NOx	CO	SO2	PM10	PM2.5
Locally Preferred Alternative	32	124	257	1	6	3
Alternative A	47	316	375	2	11	1
Alternative B	38	195	266	1	7	5
Threshold of Significance	75	100	550	150	150	55

Note:

If threshold exceeded, then cell highlighted red.

Table 2-1: Hourly, Daily and Annual Emissions Summary (Construction Equipment) - Locally Preferred Alternative

Inputs: Locally Preferred Alternative/Baseline

Phase	Description	Hours per Day	Start Month	End Month	Duration (months)				Number of Equipment							
					2014	2015	2016	2017	Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	20	May-15	Nov-16	--	7	11	--	2	4	2	0	0	0	0	5
2	Cut & Cover Along Flower Street	20	Sep-14	Sep-17	4	12	12	9	2	4	2	1	0	0	0	5

**Table 2-1: Hourly, Daily and Annual Emissions Summary
(Construction Equipment) - Locally Preferred Alternative**

Hourly Emissions by Equipment

Phase	Description	Year	ROG Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.082	0.162	0.051	0.000	0.000	0.000	0.000	0.312
1	EPBM Flower	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
2	Cut & Cover Along Flower Street	2014	0.061	0.123	0.041	0.026	0.000	0.000	0.000	0.226
2	Cut & Cover Along Flower Street	2015	0.082	0.162	0.051	0.031	0.000	0.000	0.000	0.312
2	Cut & Cover Along Flower Street	2016	0.102	0.200	0.061	0.037	0.000	0.000	0.000	0.395
2	Cut & Cover Along Flower Street	2017	0.122	0.236	0.071	0.041	0.000	0.000	0.000	0.474

**Table 2-1: Hourly, Daily and Annual Emissions Summary
(Construction Equipment) - Locally Preferred Alternative**

Hourly Emissions by Equipment

Phase	Description	Year	CO Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.666	2.265	0.492	0.000	0.000	0.000	0.000	2.335
1	EPBM Flower	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
2	Cut & Cover Along Flower Street	2014	0.639	2.157	0.479	0.301	0.000	0.000	0.000	2.224
2	Cut & Cover Along Flower Street	2015	0.666	2.265	0.492	0.309	0.000	0.000	0.000	2.335
2	Cut & Cover Along Flower Street	2016	0.692	2.368	0.505	0.316	0.000	0.000	0.000	2.442
2	Cut & Cover Along Flower Street	2017	0.718	2.467	0.518	0.322	0.000	0.000	0.000	2.545

**Table 2-1: Hourly, Daily and Annual Emissions Summary
(Construction Equipment) - Locally Preferred Alternative**

Hourly Emissions by Equipment

Phase	Description	Year	NOx Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.181	1.714	0.135	0.000	0.000	0.000	0.000	0.631
1	EPBM Flower	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
2	Cut & Cover Along Flower Street	2014	0.176	1.673	0.132	0.083	0.000	0.000	0.000	0.609
2	Cut & Cover Along Flower Street	2015	0.181	1.714	0.135	0.085	0.000	0.000	0.000	0.631
2	Cut & Cover Along Flower Street	2016	0.186	1.754	0.137	0.086	0.000	0.000	0.000	0.652
2	Cut & Cover Along Flower Street	2017	0.191	1.791	0.140	0.087	0.000	0.000	0.000	0.672

**Table 2-1: Hourly, Daily and Annual Emissions Summary
(Construction Equipment) - Locally Preferred Alternative**

Hourly Emissions by Equipment

Phase	Description	Year	SO2 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
1	EPBM Flower	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
2	Cut & Cover Along Flower Street	2014	0.004	0.005	0.003	0.002	0.000	0.000	0.000	0.013
2	Cut & Cover Along Flower Street	2015	0.004	0.005	0.003	0.002	0.000	0.000	0.000	0.013
2	Cut & Cover Along Flower Street	2016	0.004	0.005	0.003	0.002	0.000	0.000	0.000	0.013
2	Cut & Cover Along Flower Street	2017	0.004	0.005	0.003	0.002	0.000	0.000	0.000	0.013

**Table 2-1: Hourly, Daily and Annual Emissions Summary
(Construction Equipment) - Locally Preferred Alternative**

Hourly Emissions by Equipment

Phase	Description	Year	PM10 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
1	EPBM Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
2	Cut & Cover Along Flower Street	2014	0.006	0.007	0.005	0.003	0.000	0.000	0.000	0.022
2	Cut & Cover Along Flower Street	2015	0.007	0.008	0.005	0.003	0.000	0.000	0.000	0.023
2	Cut & Cover Along Flower Street	2016	0.007	0.008	0.005	0.003	0.000	0.000	0.000	0.025
2	Cut & Cover Along Flower Street	2017	0.008	0.009	0.005	0.003	0.000	0.000	0.000	0.027

**Table 2-1: Hourly, Daily and Annual Emissions Summary
(Construction Equipment) - Locally Preferred Alternative**

Hourly Emissions by Equipment

Phase	Description	Year	PM2.5 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.006	0.007	0.004	0.000	0.000	0.000	0.000	0.022
1	EPBM Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
2	Cut & Cover Along Flower Street	2014	0.006	0.007	0.004	0.003	0.000	0.000	0.000	0.020
2	Cut & Cover Along Flower Street	2015	0.006	0.007	0.004	0.003	0.000	0.000	0.000	0.022
2	Cut & Cover Along Flower Street	2016	0.007	0.008	0.005	0.003	0.000	0.000	0.000	0.023
2	Cut & Cover Along Flower Street	2017	0.007	0.008	0.005	0.003	0.000	0.000	0.000	0.025

**Table 2-1: Hourly, Daily and Annual Emissions Summary
(Construction Equipment) - Locally Preferred Alternative**

Hourly Emissions by Equipment

Daily Emissions

Phase	Description	Year	Emissions (pounds per day)					
			ROG	CO	NOx	SO2	PM10	PM2.5
1	EPBM Flower	2015	12.14	115.15	53.21	0.48	0.85	0.78
1	EPBM Flower	2016	15.16	120.13	54.57	0.48	0.92	0.84
2	Cut & Cover Along Flower Street	2014	9.54	116.01	53.46	0.52	0.84	0.78
2	Cut & Cover Along Flower Street	2015	12.77	121.32	54.90	0.52	0.91	0.84
2	Cut & Cover Along Flower Street	2016	15.89	126.45	56.29	0.52	0.98	0.90
2	Cut & Cover Along Flower Street	2017	18.90	131.38	57.62	0.52	1.04	0.96

Annual Emissions

Phase	Description	Year	Emissions (tons per year)					
			ROG	CO	NOx	SO2	PM10	PM2.5
1	EPBM Flower	2015	0.94	8.87	4.10	0.04	0.07	0.06
1	EPBM Flower	2016	1.83	14.54	6.60	0.06	0.11	0.10
2	Cut & Cover Along Flower Street	2014	0.42	5.10	2.35	0.02	0.04	0.03
2	Cut & Cover Along Flower Street	2015	1.69	16.01	7.25	0.07	0.12	0.11
2	Cut & Cover Along Flower Street	2016	2.10	16.69	7.43	0.07	0.13	0.12
2	Cut & Cover Along Flower Street	2017	1.87	13.01	5.70	0.05	0.10	0.09

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Source:

Construction equipment emission factors from OFFROAD2007

PM10 Size Fraction: CARB Speciation Profiles

<http://www.arb.ca.gov/ei/speciate/dnldopt.htm>

**Table 2-4: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative A**

Inputs: Alternative 3

Phase	Description	Hours per Day	Start Month	End Month	Duration (months)				Number of Equipment							
					2014	2015	2016	2017	Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower WB	20	Jun-15	Mar-16	--	7	3	--	2	4	2	0	0	0	0	5
2	EPBM Flower EB	20	Oct-16	May-17	--	--	3	5	2	4	2	0	0	0	0	5
3	Grouting on Flower	20	Nov-14	Nov-15	2	11	--	--	0	0	0	0	4	4	4	5
4	Open Face/Shield on Flower	20	Mar-16	Dec-16	--	--	9	--	2	4	2	0	0	0	0	5
5	SEM on Flower	20	Dec-16	Dec-17	--	--	1	12	2	4	2	0	0	0	0	5
6	Cut & Cover Along Flower Street	20	Dec-17	Feb-18	--	--	--	1	2	4	2	1	0	0	0	5
Work days per month		22														

**Table 2-4: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative A
Hourly Emissions by Equipment**

Phase	Description	Year	ROG Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower WB	2015	0.082	0.162	0.051	0.000	0.000	0.000	0.000	0.312
1	EPBM Flower WB	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
2	EPBM Flower EB	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
2	EPBM Flower EB	2017	0.122	0.236	0.071	0.000	0.000	0.000	0.000	0.474
3	Grouting on Flower	2014	0.000	0.000	0.000	0.000	0.573	0.055	0.182	0.226
3	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.701	0.065	0.215	0.312
4	Open Face/Shield on Flower	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
5	SEM on Flower	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
5	SEM on Flower	2017	0.122	0.236	0.071	0.000	0.000	0.000	0.000	0.474
6	Cut & Cover Along Flower Street	2017	0.122	0.236	0.071	0.041	0.000	0.000	0.000	0.474
2	Cut & Cover Along Flower Street	2015	0.082	0.162	0.051	0.000	0.000	0.000	0.000	0.312
2	Cut & Cover Along Flower Street	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
2	Cut & Cover Along Flower Street	2017	0.122	0.236	0.071	0.000	0.000	0.000	0.000	0.474

**Table 2-4: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative A
Hourly Emissions by Equipment**

Phase	Description	Year	CO Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower WB	2015	0.666	2.265	0.492	0.000	0.000	0.000	0.000	2.335
1	EPBM Flower WB	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
2	EPBM Flower EB	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
2	EPBM Flower EB	2017	0.718	2.467	0.518	0.000	0.000	0.000	0.000	2.545
3	Grouting on Flower	2014	0.000	0.000	0.000	0.000	4.695	0.694	2.310	2.224
3	Grouting on Flower	2015	0.000	0.000	0.000	0.000	4.713	0.707	2.352	2.335
4	Open Face/Shield on Flower	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
5	SEM on Flower	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
5	SEM on Flower	2017	0.718	2.467	0.518	0.000	0.000	0.000	0.000	2.545
6	Cut & Cover Along Flower Street	2017	0.718	2.467	0.518	0.322	0.000	0.000	0.000	2.545
2	Cut & Cover Along Flower Street	2015	0.666	2.265	0.492	0.000	0.000	0.000	0.000	2.335
2	Cut & Cover Along Flower Street	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
2	Cut & Cover Along Flower Street	2017	0.718	2.467	0.518	0.000	0.000	0.000	0.000	2.545

**Table 2-4: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative A
Hourly Emissions by Equipment**

Phase	Description	Year	NOx Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower WB	2015	0.181	1.714	0.135	0.000	0.000	0.000	0.000	0.631
1	EPBM Flower WB	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
2	EPBM Flower EB	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
2	EPBM Flower EB	2017	0.191	1.791	0.140	0.000	0.000	0.000	0.000	0.672
3	Grouting on Flower	2014	0.000	0.000	0.000	0.000	11.306	0.192	0.639	0.609
3	Grouting on Flower	2015	0.000	0.000	0.000	0.000	11.251	0.194	0.647	0.631
4	Open Face/Shield on Flower	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
5	SEM on Flower	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
5	SEM on Flower	2017	0.191	1.791	0.140	0.000	0.000	0.000	0.000	0.672
6	Cut & Cover Along Flower Street	2017	0.191	1.791	0.140	0.087	0.000	0.000	0.000	0.672
2	Cut & Cover Along Flower Street	2015	0.181	1.714	0.135	0.000	0.000	0.000	0.000	0.631
2	Cut & Cover Along Flower Street	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
2	Cut & Cover Along Flower Street	2017	0.191	1.791	0.140	0.000	0.000	0.000	0.000	0.672

**Table 2-4: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative A
Hourly Emissions by Equipment**

Phase	Description	Year	SO2 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower WB	2015	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
1	EPBM Flower WB	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
2	EPBM Flower EB	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
2	EPBM Flower EB	2017	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
3	Grouting on Flower	2014	0.000	0.000	0.000	0.000	0.028	0.004	0.014	0.013
3	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.028	0.004	0.014	0.013
4	Open Face/Shield on Flower	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
5	SEM on Flower	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
5	SEM on Flower	2017	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
6	Cut & Cover Along Flower Street	2017	0.004	0.005	0.003	0.002	0.000	0.000	0.000	0.013
2	Cut & Cover Along Flower Street	2015	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
2	Cut & Cover Along Flower Street	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
2	Cut & Cover Along Flower Street	2017	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013

**Table 2-4: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative A
Hourly Emissions by Equipment**

Phase	Description	Year	PM10 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower WB	2015	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
1	EPBM Flower WB	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
2	EPBM Flower EB	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
2	EPBM Flower EB	2017	0.008	0.009	0.005	0.000	0.000	0.000	0.000	0.027
3	Grouting on Flower	2014	0.000	0.000	0.000	0.000	0.269	0.007	0.022	0.022
3	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.277	0.007	0.022	0.023
4	Open Face/Shield on Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
5	SEM on Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
5	SEM on Flower	2017	0.008	0.009	0.005	0.000	0.000	0.000	0.000	0.027
6	Cut & Cover Along Flower Street	2017	0.008	0.009	0.005	0.003	0.000	0.000	0.000	0.027
2	Cut & Cover Along Flower Street	2015	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
2	Cut & Cover Along Flower Street	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
2	Cut & Cover Along Flower Street	2017	0.008	0.009	0.005	0.000	0.000	0.000	0.000	0.027

**Table 2-4: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative A
Hourly Emissions by Equipment**

Phase	Description	Year	PM2.5 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower WB	2015	0.006	0.007	0.004	0.000	0.000	0.000	0.000	0.022
1	EPBM Flower WB	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
2	EPBM Flower EB	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
2	EPBM Flower EB	2017	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
3	Grouting on Flower	2014	0.000	0.000	0.000	0.000	0.247	0.006	0.020	0.020
3	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.255	0.006	0.021	0.022
4	Open Face/Shield on Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
5	SEM on Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
5	SEM on Flower	2017	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
6	Cut & Cover Along Flower Street	2017	0.007	0.008	0.005	0.003	0.000	0.000	0.000	0.025
2	Cut & Cover Along Flower Street	2015	0.006	0.007	0.004	0.000	0.000	0.000	0.000	0.022
2	Cut & Cover Along Flower Street	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
2	Cut & Cover Along Flower Street	2017	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025

**Table 2-4: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative A
Daily Emissions**

Phase	Description	Year	Emissions (pounds per day)					
			ROG	CO	NOx	SO2	PM10	PM2.5
1	EPBM Flower WB	2015	12.14	115.15	53.21	0.48	0.85	0.78
1	EPBM Flower WB	2016	15.16	120.13	54.57	0.48	0.92	0.84
2	EPBM Flower EB	2016	15.16	120.13	54.57	0.48	0.92	0.84
2	EPBM Flower EB	2017	18.07	124.95	55.88	0.48	0.98	0.90
3	Grouting on Flower	2014	20.74	198.48	254.93	1.18	6.37	5.86
3	Grouting on Flower	2015	25.84	202.14	254.47	1.17	6.59	6.06
4	Open Face/Shield on Flower	2016	15.16	120.13	54.57	0.48	0.92	0.84
5	SEM on Flower	2016	15.16	120.13	54.57	0.48	0.92	0.84
5	SEM on Flower	2017	18.07	124.95	55.88	0.48	0.98	0.90
6	Cut & Cover Along Flower Street	2017	18.90	131.38	57.62	0.52	1.04	0.96

Annual Emissions - Alternative 3a (2nd/Hope Station (SEM))

Phase	Description	Year	Emissions (tons per year)					
			ROG	CO	NOx	SO2	PM10	PM2.5
1	EPBM Flower WB	2015	0.94	8.87	4.10	0.04	0.07	0.06
1	EPBM Flower WB	2016	0.50	3.96	1.80	0.02	0.03	0.03
2	EPBM Flower EB	2016	0.50	3.96	1.80	0.02	0.03	0.03
2	EPBM Flower EB	2017	0.99	6.87	3.07	0.03	0.05	0.05
3	Grouting on Flower	2014	0.46	4.37	5.61	0.03	0.14	0.13
3	Grouting on Flower	2015	3.13	24.46	30.79	0.14	0.80	0.73
4	Open Face/Shield on Flower	2016	1.50	11.89	5.40	0.05	0.09	0.08
5	SEM on Flower	2016	0.17	1.32	0.60	0.01	0.01	0.01
5	SEM on Flower	2017	2.39	16.49	7.38	0.06	0.13	0.12
6	Cut & Cover Along Flower Street	2017	0.21	1.45	0.63	0.01	0.01	0.01

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Source:

Construction equipment emission factors from OFFROAD2007

PM10 Size Fraction: CARB Speciation Profiles

<http://www.arb.ca.gov/ei/speciate/dnldopt.htm>

**Table 2-5: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative B**

Inputs: Alternative 4

Phase	Description	Hours per Day	Start Month	End Month	Duration (months)				Number of Equipment							
					2014	2015	2016	2017	Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	20	Jun-15	Feb-17	--	7	12	2	2	4	2	0	0	0	0	5
2	Grouting on Flower	20	Feb-15	Oct-15	--	8	--	--	0	0	0	0	2	2	2	5
3	SEM on Flower	20	Apr-16	May-17	--	--	9	5	2	4	2	0	0	0	0	5
4	Cut & Cover Along Flower Street	20	May-17	Jul-17	--	--	--	2	2	4	2	1	0	0	0	5

Work days per month

22

**Table 2-5: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative B**

Hourly Emissions by Equipment

Phase	Description	Year	ROG Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.082	0.162	0.051	0.000	0.000	0.000	0.000	0.312
1	EPBM Flower	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
1	EPBM Flower	2017	0.122	0.236	0.071	0.000	0.000	0.000	0.000	0.474
2	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.350	0.032	0.107	0.312
3	SEM on Flower	2016	0.102	0.200	0.061	0.000	0.000	0.000	0.000	0.395
3	SEM on Flower	2017	0.122	0.236	0.071	0.000	0.000	0.000	0.000	0.474
4	Cut & Cover Along Flower Street	2017	0.122	0.236	0.071	0.041	0.000	0.000	0.000	0.474

**Table 2-5: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative B**

Hourly Emissions by Equipment

Phase	Description	Year	CO Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.666	2.265	0.492	0.000	0.000	0.000	0.000	2.335
1	EPBM Flower	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
1	EPBM Flower	2017	0.718	2.467	0.518	0.000	0.000	0.000	0.000	2.545
2	Grouting on Flower	2015	0.000	0.000	0.000	0.000	2.356	0.353	1.176	2.335
3	SEM on Flower	2016	0.692	2.368	0.505	0.000	0.000	0.000	0.000	2.442
3	SEM on Flower	2017	0.718	2.467	0.518	0.000	0.000	0.000	0.000	2.545
4	Cut & Cover Along Flower Street	2017	0.718	2.467	0.518	0.322	0.000	0.000	0.000	2.545

**Table 2-5: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative B**

Hourly Emissions by Equipment

Phase	Description	Year	NOx Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.181	1.714	0.135	0.000	0.000	0.000	0.000	0.631
1	EPBM Flower	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
1	EPBM Flower	2017	0.191	1.791	0.140	0.000	0.000	0.000	0.000	0.672
2	Grouting on Flower	2015	0.000	0.000	0.000	0.000	5.625	0.097	0.324	0.631
3	SEM on Flower	2016	0.186	1.754	0.137	0.000	0.000	0.000	0.000	0.652
3	SEM on Flower	2017	0.191	1.791	0.140	0.000	0.000	0.000	0.000	0.672
4	Cut & Cover Along Flower Street	2017	0.191	1.791	0.140	0.087	0.000	0.000	0.000	0.672

**Table 2-5: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative B**

Hourly Emissions by Equipment

Phase	Description	Year	SO2 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
1	EPBM Flower	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
1	EPBM Flower	2017	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
2	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.014	0.002	0.007	0.013
3	SEM on Flower	2016	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
3	SEM on Flower	2017	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.013
4	Cut & Cover Along Flower Street	2017	0.004	0.005	0.003	0.002	0.000	0.000	0.000	0.013

**Table 2-5: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative B**

Hourly Emissions by Equipment

Phase	Description	Year	PM10 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
1	EPBM Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
1	EPBM Flower	2017	0.008	0.009	0.005	0.000	0.000	0.000	0.000	0.027
2	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.138	0.003	0.011	0.023
3	SEM on Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
3	SEM on Flower	2017	0.008	0.009	0.005	0.000	0.000	0.000	0.000	0.027
4	Cut & Cover Along Flower Street	2017	0.008	0.009	0.005	0.003	0.000	0.000	0.000	0.027

**Table 2-5: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative B**

Hourly Emissions by Equipment

Phase	Description	Year	PM2.5 Emissions (pounds per hour)							
			Dozer	Excavator	Crane	Drill	Grout Drill	Grout Comp	Grout Gen	Flatbed
1	EPBM Flower	2015	0.006	0.007	0.004	0.000	0.000	0.000	0.000	0.022
1	EPBM Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
1	EPBM Flower	2017	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
2	Grouting on Flower	2015	0.000	0.000	0.000	0.000	0.127	0.003	0.010	0.022
3	SEM on Flower	2016	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.023
3	SEM on Flower	2017	0.007	0.008	0.005	0.000	0.000	0.000	0.000	0.025
4	Cut & Cover Along Flower Street	2017	0.007	0.008	0.005	0.003	0.000	0.000	0.000	0.025

**Table 2-5: Hourly, Daily and Annual Emissions
Summary (Construction Equipment) - Alternative B**
Daily Emissions

Phase	Description	Year	Emissions (pounds per day)					
			ROG	CO	NOx	SO2	PM10	PM2.5
1	EPBM Flower	2015	12.14	115.15	53.21	0.48	0.85	0.78
1	EPBM Flower	2016	15.16	120.13	54.57	0.48	0.92	0.84
1	EPBM Flower	2017	18.07	124.95	55.88	0.48	0.98	0.90
2	Grouting on Flower	2015	16.04	124.42	133.54	0.71	3.53	3.25
3	SEM on Flower	2016	15.16	120.13	54.57	0.48	0.92	0.84
3	SEM on Flower	2017	18.07	124.95	55.88	0.48	0.98	0.90
4	Cut & Cover Along Flower Street	2017	18.90	131.38	57.62	0.52	1.04	0.96

Annual Emissions - Alternative B

Phase	Description	Year	Emissions (tons per year)					
			ROG	CO	NOx	SO2	PM10	PM2.5
1	EPBM Flower	2015	0.94	8.87	4.10	0.04	0.07	0.06
1	EPBM Flower	2016	2.00	15.86	7.20	0.06	0.12	0.11
1	EPBM Flower	2017	0.40	2.75	1.23	0.01	0.02	0.02
2	Grouting on Flower	2015	1.41	10.95	11.75	0.06	0.31	0.29
3	SEM on Flower	2016	1.50	11.89	5.40	0.05	0.09	0.08
3	SEM on Flower	2017	0.99	6.87	3.07	0.03	0.05	0.05
4	Cut & Cover Along Flower Street	2017	0.42	2.89	1.27	0.01	0.02	0.02

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Source:

Construction equipment emission factors from OFFROAD2007

PM10 Size Fraction: CARB Speciation Profiles

<http://www.arb.ca.gov/ei/speciate/dnldopt.htm>

Table 2-6: Daily and Annual Emissions Summary (Haul Trucks) - Locally Preferred Alternative

Inputs: Locally Preferred Alternative/Baseline

Phase	Description	Truck Trips	Daily VMT	Start Month	End Month	Total	Duration (months)			
							2014	2015	2016	2017
1	EPBM Flower	20	400	May-15	Nov-16	19	--	8	11	--
2	Cut & Cover Along Flower Street	20	400	Sep-14	Sep-17	37	4	12	12	9

Daily vehicle miles traveled (round-trip) 20 (estimated value) Default value from URBEMIS

Daily Emissions

Phase	Description	Year	Emissions (lb/day)													
							PM10					PM2.5				
			ROG	CO	NOx	SO2	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower	2015	0.63	2.84	7.39	0.02	0.65	0.27	0.03	0.02	0.33	0.31	0.25	0.01	0.01	0.05
1	EPBM Flower	2016	0.57	2.52	6.54	0.02	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05
2	Cut & Cover Along Flower Street	2014	0.71	3.24	8.46	0.02	0.69	0.31	0.03	0.02	0.33	0.35	0.29	0.01	0.01	0.05
2	Cut & Cover Along Flower Street	2015	0.63	2.84	7.39	0.02	0.65	0.27	0.03	0.02	0.33	0.31	0.25	0.01	0.01	0.05
2	Cut & Cover Along Flower Street	2016	0.57	2.52	6.54	0.02	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05
2	Cut & Cover Along Flower Street	2017	0.53	2.26	5.84	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05

Annual Emissions

Phase	Description	Year	Emissions (tons per year)													
							PM10					PM2.5				
			ROG	CO	NOx	SO2	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower	2015	5.57E-02	2.50E-01	6.50E-01	1.40E-03	5.71E-02	2.34E-02	2.79E-03	2.17E-03	2.87E-02	2.75E-02	2.16E-02	6.98E-04	9.31E-04	4.31E-03
1	EPBM Flower	2016	6.95E-02	3.05E-01	7.91E-01	1.92E-03	7.43E-02	2.80E-02	3.84E-03	2.99E-03	3.95E-02	3.39E-02	2.57E-02	9.60E-04	1.28E-03	5.92E-03
2	Cut & Cover Along Flower Street	2014	3.11E-02	1.43E-01	3.72E-01	6.98E-04	3.06E-02	1.37E-02	1.40E-03	1.09E-03	1.44E-02	1.56E-02	1.26E-02	3.49E-04	4.66E-04	2.15E-03
2	Cut & Cover Along Flower Street	2015	8.36E-02	3.75E-01	9.75E-01	2.10E-03	8.57E-02	3.52E-02	4.19E-03	3.26E-03	4.31E-02	4.13E-02	3.24E-02	1.05E-03	1.40E-03	6.46E-03
2	Cut & Cover Along Flower Street	2016	7.58E-02	3.33E-01	8.63E-01	2.10E-03	8.10E-02	3.05E-02	4.19E-03	3.26E-03	4.31E-02	3.70E-02	2.81E-02	1.05E-03	1.40E-03	6.46E-03
2	Cut & Cover Along Flower Street	2017	5.20E-02	2.24E-01	5.78E-01	1.57E-03	5.78E-02	1.99E-02	3.14E-03	2.44E-03	3.23E-02	2.50E-02	1.83E-02	7.86E-04	1.05E-03	4.85E-03

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.
MATCH formula used to identify row number and column number for each year-pollutant combination.

Paved Road PM10 Emission Factors

Condition	Emission Factor (g/VMT)		
	High-ADT	Low-ADT	Average
Average	0.37	1.3	0.81
Worst-Case	0.64	3.9	2.1

PM Size Fractions

PM10	0.4572
PM2.5	0.0686
PM2.5 EF	0.06

Source:

Midwest Research Institute (MRI), 1996. *Improvement of Specific Emission Factors (BADM Project No. 1)*. Final Report. March 29. Table ES-3.

PM10 and PM 2.5 Size Fractions: CARB Speciation Profiles. Profile Number 471 (PAVED ROAD DUST, 97 N AFTER)

<http://www.arb.ca.gov/ei/speciate/dnldopt.htm>

Table 2-9: Daily and Annual Emissions Summary (Haul Trucks) - Alternative A

Inputs: Alternative 3

Phase	Description	Truck Trips	Daily VMT	Start Month	End Month	Total	Duration (months)			
							2014	2015	2016	2017
1	EPBM Flower WB	20	400	Jun-15	Mar-16	10	--	7	3	--
2	EPBM Flower EB	20	400	Oct-16	May-17	8	--	--	3	5
3	Grouting on Flower	0	0	Nov-14	Nov-15	13	2	11	--	--
4	Open Face/Shield on Flower	20	400	Mar-16	Dec-16	10	--	--	10	--
5	SEM on Flower	20	400	Dec-16	Dec-17	13	--	--	1	12
6	Cut & Cover Along Flower Street	20	400	Dec-17	Feb-18	3	--	--	--	1

Daily vehicle miles traveled (round-trip) 20 (estimated value) Default value from URBEMIS

Daily Emissions

Phase	Description	Year	Emissions (lb/day)															
			PM10						PM2.5									
			ROG	CO	NOx	SO2	CO2	CH4	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower WB	2015	0.63	2.84	7.39	0.02	1696.86	0.03	0.65	0.27	0.03	0.02	0.33	0.31	0.25	0.01	0.01	0.05
1	EPBM Flower WB	2016	0.57	2.52	6.54	0.02	1696.86	0.03	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05
2	EPBM Flower EB	2016	0.57	2.52	6.54	0.02	1696.86	0.03	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05
2	EPBM Flower EB	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05
3	Grouting on Flower	2014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Grouting on Flower	2015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Open Face/Shield on Flower	2016	0.57	2.52	6.54	0.02	1696.86	0.03	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05
5	SEM on Flower	2016	0.57	2.52	6.54	0.02	1696.86	0.03	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05
5	SEM on Flower	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05
6	Cut & Cover Along Flower Street	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05

Annual Emissions

Phase	Description	Year	Emissions (tons per year)															
			PM10						PM2.5									
			ROG	CO	NOx	SO2	CO2	CH4	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower WB	2015	4.88E-02	2.19E-01	5.69E-01	1.22E-03	130.66	2.24E-03	5.00E-02	2.05E-02	2.44E-03	1.90E-03	2.51E-02	2.41E-02	1.89E-02	6.11E-04	8.15E-04	3.77E-03
1	EPBM Flower WB	2016	1.89E-02	8.33E-02	2.16E-01	5.24E-04	56.00	8.73E-04	2.03E-02	7.62E-03	1.05E-03	8.15E-04	1.08E-02	9.24E-03	7.01E-03	2.62E-04	3.49E-04	1.62E-03
2	EPBM Flower EB	2016	1.89E-02	8.33E-02	2.16E-01	5.24E-04	56.00	8.73E-04	2.03E-02	7.62E-03	1.05E-03	8.15E-04	1.08E-02	9.24E-03	7.01E-03	2.62E-04	3.49E-04	1.62E-03
2	EPBM Flower EB	2017	2.89E-02	1.25E-01	3.21E-01	8.73E-04	93.33	1.36E-03	3.21E-02	1.11E-02	1.75E-03	1.36E-03	1.79E-02	1.39E-02	1.02E-02	4.37E-04	5.82E-04	2.69E-03
3	Grouting on Flower	2014	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Grouting on Flower	2015	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Open Face/Shield on Flower	2016	6.31E-02	2.78E-01	7.19E-01	1.75E-03	186.65	2.91E-03	6.75E-02	2.54E-02	3.49E-03	2.72E-03	3.59E-02	3.08E-02	2.34E-02	8.73E-04	1.16E-03	5.39E-03
5	SEM on Flower	2016	6.31E-03	2.78E-02	7.19E-02	1.75E-04	18.67	2.91E-04	6.75E-03	2.54E-03	3.49E-04	2.72E-04	3.59E-03	3.08E-03	2.34E-03	8.73E-05	1.16E-04	5.39E-04
5	SEM on Flower	2017	6.94E-02	2.99E-01	7.71E-01	2.10E-03	223.98	3.26E-03	7.71E-02	2.65E-02	4.19E-03	3.26E-03	4.31E-02	3.34E-02	2.44E-02	1.05E-03	1.40E-03	6.46E-03
6	Cut & Cover Along Flower Street	2017	5.78E-03	2.49E-02	6.42E-02	1.75E-04	18.67	2.72E-04	6.42E-03	2.21E-03	3.49E-04	2.72E-04	3.59E-03	2.78E-03	2.04E-03	8.73E-05	1.16E-04	5.39E-04

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.
MATCH formula used to identify row number and column number for each year-pollutant combination.

Paved Road PM10 Emission Factors

Condition	Emission Factor (g/VMT)		
	High-ADT	Low-ADT	Average
Average	0.37	1.3	0.81
Worst-Case	0.64	3.9	2.1

PM Size Fractions	
PM10	0.4572
PM2.5	0.0686
PM2.5 EF	0.06

Source:

Midwest Research Institute (MRI). 1996. Improvement of Specific Emission Factors (BADM Project No. 1) . Final Report. March 29. Table ES-3.

PM10 and PM 2.5 Size Fractions: CARB Speciation Profiles. Profile Number 471 (PAVED ROAD DUST, 97 N AFTER)

<http://www.arb.ca.gov/ei/speciate/dnldopt.htm>

Table 2-10: Daily and Annual Emissions Summary (Haul Trucks) - Alternative B

Inputs: Alternative 4

Phase	Description	Truck Trips	Daily VMT	Start Month	End Month	Total	Duration (months)			
							2014	2015	2016	2017
1	EPBM Flower	20	400	Jun-15	Feb-17	21	--	7	12	2
2	Grouting on Flower	0	0	Feb-15	Oct-15	9	--	9	--	--
3	SEM on Flower	20	400	Apr-16	May-17	14	--	--	9	5
4	Cut & Cover Along Flower Street	20	400	May-17	Jul-17	3	--	--	--	3
5	SEM on Flower	20	400	Dec-16	Dec-17	13	--	--	1	12
6	Cut & Cover Along Flower Street	20	400	Dec-17	Feb-18	3	--	--	--	1

Daily vehicle miles traveled (round-trip) 20 (estimated value) Default value from URBEMIS

Daily Emissions

Phase	Description	Year	Emissions (lb/day)																
			PM10							PM2.5					Paved Road Dust				
			ROG	CO	NOx	SO2	CO2	CH4	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	
1	EPBM Flower	2015	0.63	2.84	7.39	0.02	1696.86	0.03	0.65	0.27	0.03	0.02	0.33	0.31	0.25	0.01	0.01	0.05	
1	EPBM Flower	2016	0.57	2.52	6.54	0.02	1696.86	0.03	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05	
1	EPBM Flower	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05	
2	Grouting on Flower	2015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3	SEM on Flower	2016	0.57	2.52	6.54	0.02	1696.86	0.03	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05	
3	SEM on Flower	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05	
4	Cut & Cover Along Flower Street	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05	
5	SEM on Flower	2016	0.57	2.52	6.54	0.02	1696.86	0.03	0.61	0.23	0.03	0.02	0.33	0.28	0.21	0.01	0.01	0.05	
5	SEM on Flower	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05	
6	Cut & Cover Along Flower Street	2017	0.53	2.26	5.84	0.02	1696.86	0.02	0.58	0.20	0.03	0.02	0.33	0.25	0.19	0.01	0.01	0.05	

Annual Emissions

Phase	Description	Year	Emissions (tons per year)																
			PM10							PM2.5					Paved Road Dust				
			ROG	CO	NOx	SO2	CO2	CH4	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	
1	EPBM Flower	2015	4.88E-02	2.19E-01	5.69E-01	1.22E-03	130.66	2.24E-03	5.00E-02	2.05E-02	2.44E-03	1.90E-03	2.51E-02	2.41E-02	1.89E-02	6.11E-04	8.15E-04	3.77E-03	
1	EPBM Flower	2016	7.58E-02	3.33E-01	8.63E-01	2.10E-03	223.98	3.49E-03	8.10E-02	3.05E-02	4.19E-03	3.26E-03	4.31E-02	3.70E-02	2.81E-02	1.05E-03	1.40E-03	6.46E-03	
1	EPBM Flower	2017	1.16E-02	4.98E-02	1.28E-01	3.49E-04	37.33	5.43E-04	1.28E-02	4.42E-03	6.98E-04	5.43E-04	7.18E-03	5.56E-03	4.07E-03	1.75E-04	2.33E-04	1.08E-03	
2	Grouting on Flower	2015	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
3	SEM on Flower	2016	5.68E-02	2.50E-01	6.47E-01	1.57E-03	167.99	2.62E-03	6.08E-02	2.29E-02	3.14E-03	2.44E-03	3.23E-02	2.77E-02	2.10E-02	7.86E-04	1.05E-03	4.85E-03	
3	SEM on Flower	2017	2.89E-02	1.25E-01	3.21E-01	8.73E-04	93.33	1.36E-03	3.21E-02	1.11E-02	1.75E-03	1.36E-03	1.79E-02	1.39E-02	1.02E-02	4.37E-04	5.82E-04	2.69E-03	
4	Cut & Cover Along Flower Street	2017	1.73E-02	7.47E-02	1.93E-01	5.24E-04	56.00	8.15E-04	1.93E-02	6.63E-03	1.05E-03	8.15E-04	1.08E-02	8.34E-03	6.11E-03	2.62E-04	3.49E-04	1.62E-03	
5	SEM on Flower	2016	5.68E-02	2.50E-01	6.47E-01	1.57E-03	167.99	2.62E-03	6.08E-02	2.29E-02	3.14E-03	2.44E-03	3.23E-02	2.77E-02	2.10E-02	7.86E-04	1.05E-03	4.85E-03	
5	SEM on Flower	2017	2.89E-02	1.25E-01	3.21E-01	8.73E-04	93.33	1.36E-03	3.21E-02	1.11E-02	1.75E-03	1.36E-03	1.79E-02	1.39E-02	1.02E-02	4.37E-04	5.82E-04	2.69E-03	
6	Cut & Cover Along Flower Street	2017	1.73E-02	7.47E-02	1.93E-01	5.24E-04	56.00	8.15E-04	1.93E-02	6.63E-03	1.05E-03	8.15E-04	1.08E-02	8.34E-03	6.11E-03	2.62E-04	3.49E-04	1.62E-03	

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.

MATCH formula used to identify row number and column number for each year-pollutant combination.

Paved Road PM10 Emission Factors

Condition	Emission Factor (g/VMT)		
	High-ADT	Low-ADT	Average
Average	0.37	1.3	0.81
Worst-Case	0.64	3.9	2.1

PM Size Fractions

PM10	0.4572
PM2.5	0.0686
PM2.5 EF	0.06

Source:

Midwest Research Institute (MRI). 1996. *Improvement of Specific Emission Factors (BADM Project No. 1)*. Final Report. March 29. Table ES-3.

PM10 and PM 2.5 Size Fractions: CARB Speciation Profiles. Profile Number 471 (PAVED ROAD DUST, 97 N AFTER)

<http://www.arb.ca.gov/ei/speciate/dndopt.htm>

Table 2-11: Daily and Annual Emissions Summary (Worker Commute) - Locally Preferred Alternative

Inputs: Locally Preferred Alternative/Baseline

Phase	Description	No. of Crew	Daily VMT	Start Month	End Month	Total	Duration (months)			
							2014	2015	2016	2017
1	EPBM Flower	20	600	May-15	Nov-16	19	--	8	11	--
2	Cut & Cover Along Flower Street	30	900	Sep-14	Sep-17	37	4	12	12	9

Daily vehicle miles traveled (round-trip) 30 (estimated value)

Daily Emissions

Phase	Description	Year	Emissions (lb/day)													
			ROG	CO	NOx	SO2	PM10					PM2.5				
							Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower	2015	0.07	2.53	0.20	0.00	1.11	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
1	EPBM Flower	2016	0.06	2.33	0.18	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16
2	Cut & Cover Along Flower Street	2014	0.12	4.17	0.34	0.01	1.67	0.02	0.02	0.03	1.61	0.28	0.02	0.00	0.01	0.24
2	Cut & Cover Along Flower Street	2015	0.10	3.80	0.30	0.01	1.67	0.02	0.02	0.03	1.61	0.28	0.02	0.00	0.01	0.24
2	Cut & Cover Along Flower Street	2016	0.09	3.49	0.27	0.01	1.67	0.02	0.02	0.03	1.61	0.28	0.02	0.00	0.01	0.24
2	Cut & Cover Along Flower Street	2017	0.07	3.19	0.25	0.01	1.67	0.02	0.02	0.03	1.61	0.28	0.02	0.00	0.01	0.24

Annual Emissions

Phase	Description	Year	Emissions (tons per year)													
			ROG	CO	NOx	SO2	PM10					PM2.5				
							Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower	2015	5.94E-03	2.23E-01	1.78E-02	4.07E-04	9.81E-02	1.34E-03	9.31E-04	1.51E-03	9.43E-02	1.62E-02	1.28E-03	2.33E-04	5.82E-04	1.41E-02
1	EPBM Flower	2016	6.96E-03	2.82E-01	2.22E-02	5.60E-04	1.35E-01	1.92E-03	1.28E-03	2.08E-03	1.30E-01	2.23E-02	1.76E-03	3.20E-04	8.00E-04	1.95E-02
2	Cut & Cover Along Flower Street	2014	5.28E-03	1.83E-01	1.48E-02	3.06E-04	7.36E-02	1.00E-03	6.98E-04	1.13E-03	7.07E-02	1.22E-02	9.60E-04	1.75E-04	4.37E-04	1.06E-02
2	Cut & Cover Along Flower Street	2015	1.34E-02	5.02E-01	3.99E-02	9.17E-04	2.21E-01	3.01E-03	2.10E-03	3.40E-03	2.12E-01	3.65E-02	2.88E-03	5.24E-04	1.31E-03	3.18E-02
2	Cut & Cover Along Flower Street	2016	1.14E-02	4.61E-01	3.63E-02	9.17E-04	2.21E-01	3.14E-03	2.10E-03	3.40E-03	2.12E-01	3.65E-02	2.88E-03	5.24E-04	1.31E-03	3.18E-02
2	Cut & Cover Along Flower Street	2017	7.07E-03	3.16E-01	2.47E-02	6.88E-04	1.66E-01	2.36E-03	1.57E-03	2.55E-03	1.59E-01	2.74E-02	2.16E-03	3.93E-04	9.82E-04	2.39E-02

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.

MATCH formula used to identify row number and column number for each year-pollutant combination.

Paved Road PM10 Emission Factors

Condition	Emission Factor (g/VMT)		
	High-ADT	Low-ADT	Average
Average	0.37	1.3	0.81
Worst-Case	0.64	3.9	2.1

PM Size Fractions

PM10	0.4572
PM2.5	0.0686
PM2.5 EF	0.12

Source:

Midwest Research Institute (MRI). 1996. *Improvement of Specific Emission Factors (BADM Project No. 1)*. Final Report. March 29. Table ES-3.

PM10 and PM 2.5 Size Fractions: CARB Speciation Profiles. Profile Number 471 (PAVED ROAD DUST, 97 N AFTER)

<http://www.arb.ca.gov/ei/speciate/dnldopt.htm>

Table 2-14: Daily and Annual Emissions Summary (Worker Commute) - Alternative A

Inputs: Alternative 3

Phase	Description	No. of Crew	Daily VMT	Start Month	End Month	Total	Duration (months)			
							2014	2015	2016	2017
1	EPBM Flower WB	20	600	Jun-15	Mar-16	10	--	7	3	--
2	EPBM Flower EB	20	600	Oct-16	May-17	8	--	--	3	5
3	Grouting on Flower	40	1,200	Nov-14	Nov-15	13	2	11	--	--
4	Open Face/Shield on Flower	20	600	Mar-16	Dec-16	10	--	--	10	--
5	SEM on Flower	20	600	Dec-16	Dec-17	13	--	--	1	12
6	Cut & Cover Along Flower Street	30	900	Dec-17	Feb-18	3	--	--	--	1

Daily vehicle miles traveled (round-trip) 30 (estimated value)

Daily Emissions

Phase	Description	Year	Emissions (lb/day)														
								PM10					PM2.5				
			ROG	CO	NOx	SO2	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	
1	EPBM Flower WB	2015	0.07	2.53	0.20	0.00	1.11	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16	
1	EPBM Flower WB	2016	0.06	2.33	0.18	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16	
2	EPBM Flower EB	2016	0.06	2.33	0.18	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16	
2	EPBM Flower EB	2017	0.05	2.13	0.17	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16	
3	Grouting on Flower	2014	0.16	5.56	0.45	0.01	2.23	0.03	0.02	0.03	2.14	0.37	0.03	0.01	0.01	0.32	
3	Grouting on Flower	2015	0.13	5.07	0.40	0.01	2.23	0.03	0.02	0.03	2.14	0.37	0.03	0.01	0.01	0.32	
4	Open Face/Shield on Flower	2016	0.06	2.33	0.18	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16	
5	SEM on Flower	2016	0.06	2.33	0.18	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16	
5	SEM on Flower	2017	0.05	2.13	0.17	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16	
6	Cut & Cover Along Flower Street	2017	0.07	3.19	0.25	0.01	1.67	0.02	0.02	0.03	1.61	0.28	0.02	0.00	0.01	0.24	

Table 2-14: Daily and Annual Emissions Summary (Worker Commute) - Alternative A

Annual Emissions

Phase	Description	Year	Emissions (tons per year)													
			ROG	CO	NOx	SO2	PM10					PM2.5				
							Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower WB	2015	5.19E-03	1.95E-01	1.55E-02	3.56E-04	8.58E-02	1.17E-03	8.15E-04	1.32E-03	8.25E-02	1.42E-02	1.12E-03	2.04E-04	5.09E-04	1.24E-02
1	EPBM Flower WB	2016	1.90E-03	7.68E-02	6.05E-03	1.53E-04	3.68E-02	5.24E-04	3.49E-04	5.67E-04	3.54E-02	6.09E-03	4.80E-04	8.73E-05	2.18E-04	5.31E-03
2	EPBM Flower EB	2016	1.90E-03	7.68E-02	6.05E-03	1.53E-04	3.68E-02	5.24E-04	3.49E-04	5.67E-04	3.54E-02	6.09E-03	4.80E-04	8.73E-05	2.18E-04	5.31E-03
2	EPBM Flower EB	2017	2.62E-03	1.17E-01	9.13E-03	2.55E-04	6.13E-02	8.73E-04	5.82E-04	9.46E-04	5.89E-02	1.02E-02	8.00E-04	1.46E-04	3.64E-04	8.84E-03
3	Grouting on Flower	2014	3.52E-03	1.22E-01	9.84E-03	2.04E-04	4.90E-02	6.69E-04	4.66E-04	7.57E-04	4.71E-02	8.12E-03	6.40E-04	1.16E-04	2.91E-04	7.07E-03
3	Grouting on Flower	2015	1.63E-02	6.13E-01	4.88E-02	1.12E-03	2.70E-01	3.68E-03	2.56E-03	4.16E-03	2.59E-01	4.47E-02	3.52E-03	6.40E-04	1.60E-03	3.89E-02
4	Open Face/Shield on Flower	2016	6.33E-03	2.56E-01	2.02E-02	5.09E-04	1.23E-01	1.75E-03	1.16E-03	1.89E-03	1.18E-01	2.03E-02	1.60E-03	2.91E-04	7.28E-04	1.77E-02
5	SEM on Flower	2016	6.33E-04	2.56E-02	2.02E-03	5.09E-05	1.23E-02	1.75E-04	1.16E-04	1.89E-04	1.18E-02	2.03E-03	1.60E-04	2.91E-05	7.28E-05	1.77E-03
5	SEM on Flower	2017	6.29E-03	2.81E-01	2.19E-02	6.11E-04	1.47E-01	2.10E-03	1.40E-03	2.27E-03	1.41E-01	2.44E-02	1.92E-03	3.49E-04	8.73E-04	2.12E-02
6	Cut & Cover Along Flower Street	2017	7.86E-04	3.51E-02	2.74E-03	7.64E-05	1.84E-02	2.62E-04	1.75E-04	2.84E-04	1.77E-02	3.05E-03	2.40E-04	4.37E-05	1.09E-04	2.65E-03

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.

MATCH formula used to identify row number and column number for each year-pollutant combination.

Paved Road PM10 Emission Factors

Condition	Emission Factor (g/VMT)		
	High-ADT	Low-ADT	Average
Average	0.37	1.3	0.81
Worst-Case	0.64	3.9	2.1

PM Size Fractions

PM10	0.4572
PM2.5	0.0686
PM2.5 EF	0.12

Source:

Midwest Research Institute (MRI). 1996. *Improvement of Specific Emission Factors (BADM Project No. 1)*. Final Report. March 29. Table ES-3.

PM10 and PM 2.5 Size Fractions: CARB Speciation Profiles. Profile Number 471 (PAVED ROAD DUST, 97 N AFTER)

<http://www.arb.ca.gov/ei/speciate/dnldopt.htm>

Table 2-15: Daily and Annual Emissions Summary (Worker Commute) - Alternative B

Inputs: Alternative 4

Phase	Description	No. of Crew	Daily VMT	Start Month	End Month	Total	Duration (months)			
							2014	2015	2016	2017
1	EPBM Flower	20	600	Jun-15	Feb-17	21	--	7	12	2
2	Grouting on Flower	20	600	Feb-15	Oct-15	9	--	9	--	--
3	SEM on Flower	20	600	Apr-16	May-17	14	--	--	9	5
4	Cut & Cover Along Flower Street	30	900	May-17	Jul-17	3	--	--	--	3
5	SEM on Flower	20	600	Dec-16	Dec-17	13	--	--	1	12
6	Cut & Cover Along Flower Street	20	600	Dec-17	Feb-18	3	--	--	--	1

Daily vehicle miles traveled (round-trip) 30 (estimated value)

Daily Emissions

Phase	Description	Year	Emissions (lb/day)														
								PM10					PM2.5				
			ROG	CO	NOx	SO2	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	
1	EPBM Flower	2015	0.07	2.53	0.20	0.00	1.11	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16	
1	EPBM Flower	2016	0.06	2.33	0.18	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16	
1	EPBM Flower	2017	0.05	2.13	0.17	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16	
2	Grouting on Flower	2015	0.07	2.53	0.20	0.00	1.11	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16	
3	SEM on Flower	2016	0.06	2.33	0.18	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16	
3	SEM on Flower	2017	0.05	2.13	0.17	0.00	1.12	0.02	0.01	0.02	1.07	0.18	0.01	0.00	0.01	0.16	
4	Cut & Cover Along Flower Street	2017	0.07	3.19	0.25	0.01	1.67	0.02	0.02	0.03	1.61	0.28	0.02	0.00	0.01	0.24	
5	SEM on Flower	2016	0.86	3.79	9.81	0.02	0.92	0.35	0.05	0.04	0.49	0.51	0.32	0.01	0.02	0.16	
5	SEM on Flower	2017	0.79	3.40	8.76	0.02	0.88	0.30	0.05	0.04	0.49	0.47	0.28	0.01	0.02	0.16	
6	Cut & Cover Along Flower Street	2017	0.79	3.40	8.76	0.02	0.88	0.30	0.05	0.04	0.49	0.47	0.28	0.01	0.02	0.16	

Table 2-15: Daily and Annual Emissions Summary (Worker Commute) - Alternative B

Annual Emissions

Phase	Description	Year	Emissions (tons per year)													
							PM10					PM2.5				
			ROG	CO	NOx	SO2	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust	Total	Exhaust	Tire Wear	Brake Wear	Paved Road Dust
1	EPBM Flower	2015	5.19E-03	1.95E-01	1.55E-02	3.56E-04	8.58E-02	1.17E-03	8.15E-04	1.32E-03	8.25E-02	1.42E-02	1.12E-03	2.04E-04	5.09E-04	1.24E-02
1	EPBM Flower	2016	7.60E-03	3.07E-01	2.42E-02	6.11E-04	1.47E-01	2.10E-03	1.40E-03	2.27E-03	1.41E-01	2.44E-02	1.92E-03	3.49E-04	8.73E-04	2.12E-02
1	EPBM Flower	2017	1.05E-03	4.68E-02	3.65E-03	1.02E-04	2.45E-02	3.49E-04	2.33E-04	3.78E-04	2.36E-02	4.06E-03	3.20E-04	5.82E-05	1.46E-04	3.54E-03
2	Grouting on Flower	2015	6.68E-03	2.51E-01	2.00E-02	4.58E-04	1.10E-01	1.51E-03	1.05E-03	1.70E-03	1.06E-01	1.83E-02	1.44E-03	2.62E-04	6.55E-04	1.59E-02
3	SEM on Flower	2016	5.70E-03	2.30E-01	1.81E-02	4.58E-04	1.10E-01	1.57E-03	1.05E-03	1.70E-03	1.06E-01	1.83E-02	1.44E-03	2.62E-04	6.55E-04	1.59E-02
3	SEM on Flower	2017	2.62E-03	1.17E-01	9.13E-03	2.55E-04	6.13E-02	8.73E-04	5.82E-04	9.46E-04	5.89E-02	1.02E-02	8.00E-04	1.46E-04	3.64E-04	8.84E-03
4	Cut & Cover Along Flower Street	2017	2.36E-03	1.05E-01	8.22E-03	2.29E-04	5.52E-02	7.86E-04	5.24E-04	8.51E-04	5.30E-02	9.14E-03	7.20E-04	1.31E-04	3.27E-04	7.96E-03
5	SEM on Flower	2016	8.53E-02	3.75E-01	9.71E-01	2.36E-03	9.11E-02	3.43E-02	4.71E-03	3.67E-03	4.85E-02	5.02E-02	3.16E-02	1.18E-03	1.57E-03	1.59E-02
5	SEM on Flower	2017	4.34E-02	1.87E-01	4.82E-01	1.31E-03	4.82E-02	1.66E-02	2.62E-03	2.04E-03	2.69E-02	2.56E-02	1.53E-02	6.55E-04	8.73E-04	8.84E-03
6	Cut & Cover Along Flower Street	2017	2.60E-02	1.12E-01	2.89E-01	7.86E-04	2.89E-02	9.95E-03	1.57E-03	1.22E-03	1.62E-02	1.54E-02	9.17E-03	3.93E-04	5.24E-04	5.31E-03

Note: Construction assumed to occur 22 days per month (i.e., 5 days per week).

Comments:

INDEX formula used to look-up emission factor from "EMFAC_Construction.xlsx" spreadsheet.

MATCH formula used to identify row number and column number for each year-pollutant combination.

Paved Road PM10 Emission Factors

Condition	Emission Factor (g/VMT)		
	High-ADT	Low-ADT	Average
Average	0.37	1.3	0.81
Worst-Case	0.64	3.9	2.1

PM Size Fractions

PM10	0.4572
PM2.5	0.0686
PM2.5 EF	0.12

Source:

Midwest Research Institute (MRI). 1996. *Improvement of Specific Emission Factors (BADM Project No. 1)*. Final Report. March 29. Table ES-3.

PM10 and PM 2.5 Size Fractions: CARB Speciation Profiles. Profile Number 471 (PAVED ROAD DUST, 97 N AFTER)

<http://www.arb.ca.gov/ei/speciate/dnldopt.htm>

Table 2-16: Daily and Annual Fugitive Dust Emissions Summary - Locally Preferred Alternative

Locally Preferred Alternative

Description	Soil (cy)	Start Month	End Month	Duration (months)					Duration (days)				
				Total	2014	2015	2016	2017	Total	2014	2015	2016	2017
EPBM Flower	27,834	May-15	Nov-16	19	--	8	11	--	418	n/a	176	242	n/a
Cut & Cover Along Flower Street	118,231	Sep-14	Sep-17	37	4	9	--	--	814	88	198	n/a	n/a

Note:
Construction Schedule: 22 days/month
(assumes 5 days per week)

Material Hauling Emissions

Description	PM10 Annual Emissions (tons per year)					PM2.5 Annual Emissions (tons per year)					Daily Emissions (lbs/day)	
	Total	2014	2015	2016	2017	Total	2014	2015	2016	2017	PM10	PM2.5
EPBM Flower	1.13E-02	n/a	4.78E-03	6.57E-03	n/a	1.72E-03	n/a	7.23E-04	9.94E-04	n/a	5.43E-02	8.22E-03
Cut & Cover Along Flower Street	4.82E-02	5.21E-03	1.17E-02	n/a	n/a	7.30E-03	7.89E-04	1.77E-03	n/a	n/a	1.18E-01	1.79E-02
Total	5.95E-02	5.21E-03	1.65E-02	6.57E-03	0.00E+00	9.01E-03	7.89E-04	2.50E-03	9.94E-04	0.00E+00	1.73E-01	2.61E-02

Number of drops: 3

Note:
Yellow text - assumed value.
Daily emission calculations assume that emissions are spread evenly throughout construction period.

Table 2-19: Daily and Annual Fugitive Dust Emissions Summary - Alternative A

Alternative A

Description	Soil (cy)	Start Month	End Month	Duration (months)					Duration (days)				
				Total	2014	2015	2016	2017	Total	2014	2015	2016	2017
EPBM Flower WB	13,917	Jun-15	Mar-16	10	--	7	3	--	220	n/a	154	66	n/a
EPBM Flower EB	13,917	Oct-16	May-17	8	--	--	3	5	176	n/a	n/a	66	110
Grouting on Flower	0	Nov-14	Nov-15	13	2	11	--	--	286	44	242	n/a	n/a
Open Face/Shield on Flower	17,373	Mar-16	Dec-16	10	--	--	10	--	220	n/a	n/a	220	n/a
SEM on Flower	19,097	Dec-16	Dec-17	13	--	--	1	12	286	n/a	n/a	22	264
Cut & Cover Along Flower Street	20,925	Dec-17	Feb-18	3	--	--	--	1	66	n/a	n/a	n/a	22

Note:

Construction Schedule: 22 days/month
(assumes 5 days per week)

Material Hauling Emissions

Description	PM10 Annual Emissions (tons per year)					PM2.5 Annual Emissions (tons per year)					Daily Emissions (lbs/day)	
	Total	2014	2015	2016	2017	Total	2014	2015	2016	2017	PM10	PM2.5
EPBM Flower WB	5.67E-03	n/a	3.97E-03	1.70E-03	n/a	8.59E-04	n/a	6.01E-04	2.58E-04	n/a	5.16E-02	7.81E-03
EPBM Flower EB	5.67E-03	n/a	n/a	2.13E-03	3.54E-03	8.59E-04	n/a	n/a	3.22E-04	5.37E-04	6.45E-02	9.76E-03
Grouting on Flower	0.00E+00	0.00E+00	0.00E+00	n/a	n/a	0.00E+00	0.00E+00	0.00E+00	n/a	n/a	0.00E+00	0.00E+00
Open Face/Shield on Flower	7.08E-03	n/a	n/a	7.08E-03	n/a	1.07E-03	n/a	n/a	1.07E-03	n/a	6.44E-02	9.75E-03
SEM on Flower	7.78E-03	n/a	n/a	5.99E-04	7.18E-03	1.18E-03	n/a	n/a	9.07E-05	1.09E-03	5.44E-02	8.24E-03
Cut & Cover Along Flower Street	8.53E-03	n/a	n/a	n/a	2.84E-03	1.29E-03	n/a	n/a	n/a	4.30E-04	2.58E-01	3.91E-02
Total	3.47E-02	0.00E+00	3.97E-03	1.15E-02	1.36E-02	5.26E-03	0.00E+00	6.01E-04	1.74E-03	2.06E-03	4.93E-01	7.47E-02

Number of drops: 3

Note:

Yellow text - assumed value.

Daily emission calculations assume that emissions are spread evenly throughout construction period.

Table 2-20: Daily and Annual Fugitive Dust Emissions Summary - Alternative B

Alternative B

Description	Soil (cy)	Start Month	End Month	Duration (months)					Duration (days)				
				Total	2014	2015	2016	2017	Total	2014	2015	2016	2017
EPBM Flower	44,292	Jun-15	Feb-17	21	--	7	12	2	462	n/a	154	264	44
Grouting on Flower	0	Feb-15	Oct-15	9	--	9	--	--	198	n/a	198	n/a	n/a
SEM on Flower	22,487	Apr-16	May-17	14	--	--	9	5	308	n/a	n/a	198	110
Cut & Cover Along Flower Street	16,231	May-17	Jul-17	3	--	--	--	3	66	n/a	n/a	n/a	66
SEM on Flower	19,097	Dec-16	Dec-17	13	--	--	1	12	286	n/a	n/a	22	264
Cut & Cover Along Flower Street	20,925	Dec-17	Feb-18	3	--	--	--	1	66	n/a	n/a	n/a	22

Note:

Construction Schedule: 22 days/month
(assumes 5 days per week)

Material Hauling Emissions

Description	PM10 Annual Emissions (tons per year)					PM2.5 Annual Emissions (tons per year)					Daily Emissions (lbs/day)	
	Total	2014	2015	2016	2017	Total	2014	2015	2016	2017	PM10	PM2.5
EPBM Flower	1.81E-02	n/a	6.02E-03	1.03E-02	1.72E-03	2.73E-03	n/a	9.11E-04	1.56E-03	2.60E-04	7.81E-02	1.18E-02
Grouting on Flower	0.00E+00	n/a	0.00E+00	n/a	n/a	0.00E+00	n/a	0.00E+00	n/a	n/a	0.00E+00	0.00E+00
SEM on Flower	9.16E-03	n/a	n/a	5.89E-03	3.27E-03	1.39E-03	n/a	n/a	8.92E-04	4.96E-04	5.95E-02	9.01E-03
Cut & Cover Along Flower Street	6.61E-03	n/a	n/a	n/a	6.61E-03	1.00E-03	n/a	n/a	n/a	1.00E-03	2.00E-01	3.04E-02
SEM on Flower	7.78E-03	n/a	n/a	5.99E-04	7.18E-03	1.18E-03	n/a	n/a	9.07E-05	1.09E-03	5.44E-02	8.24E-03
Cut & Cover Along Flower Street	8.53E-03	n/a	n/a	n/a	2.84E-03	1.29E-03	n/a	n/a	n/a	4.30E-04	2.58E-01	3.91E-02
Total	5.01E-02	0.00E+00	6.02E-03	1.68E-02	2.16E-02	7.59E-03	0.00E+00	9.11E-04	2.54E-03	3.28E-03	6.51E-01	9.86E-02

Number of drops: 3

Note:

Yellow text - assumed value.

Daily emission calculations assume that emissions are spread evenly throughout construction period.

Localized Air Quality Impact Assessment - Localized Significance Thresholds (LST)

Table 3-1: LST Analysis - Locally Preferred Alternative/Baseline

ID	Phase	Mitigated			
		Maximum Daily Onsite Emissions (lbs/day)			
		NOx	CO	PM10	PM2.5
1	EPBM Flower	55	120	1	1
2	Cut & Cover Along Flower Street	58	131	1	1
Allowable Emissions		74	680	5	3



Table 3-4: LST Analysis - Alternative A

ID	Phase	Mitigated			
		Maximum Daily Onsite Emissions (lbs/day)			
		NOx	CO	PM10	PM2.5
1	EPBM Flower WB	55	120	1	1
2	EPBM Flower EB	56	125	1	1
3	Grouting on Flower	64	51	2	2
4	Open Face/Shield on Flower	55	120	1	1
5	SEM on Flower	56	125	1	1
6	Cut & Cover Along Flower Street	58	131	1	1
Allowable Emissions		74	680	5	3

Table 3-5: LST Analysis - Alternative B

ID	Phase	Mitigated			
		Maximum Daily Onsite Emissions (lbs/day)			
		NOx	CO	PM10	PM2.5
1	EPBM Flower	56	125	1	1
2	Grouting on Flower	67	62	2	2
3	SEM on Flower	56	125	1	1
4	Cut & Cover Along Flower Street	58	131	1	1
Allowable Emissions		74	680	5	3