



APPENDIX **j**

Air Conformity Modeling

Site Summary

Site	Emissions Tab	Thornton Street (Akron, OH) - Lower Track ¹
Estimated total days for construction	All	60 days
Maximum hours worked per day		10
Seasonal construction activities		Yes
Equipment and Site mobilization and demobilization:	Construction	RR/Highway
How will equipment be brought and removed from the Site		LD-5; HD-10
Number of trucks to bring personnel and equipment onsite		4
How many days will site mobilization and de mobilization take		
Concrete/Asphalt Activities :	Concrete	N/A
Concrete mixed on site or offsite?		N/A
Type of concrete to be used?		N/A
Estimated number of concrete trucks coming on site/cubic yards of concrete needed?		N/A
Will a batch plant be on site?		N/A
Asphalting any surfaces?	Asphalt	N/A
Type of asphalt/cubic yards of asphalt planned?		N/A
Estimated number of asphalt trucks?		N/A
Grinding, sanding, braising activities:	Grinding	N/A
How many days of these operations?		
What materials will be sanded/grind/braised?		N/A
Welding Operations:	Welding	
Type of welding and Number of Welding operations		N/A
Track Lowering Activities:	Construction	Undercutter
Track Lowering process?		RR Undercutter
What type of equipment will be used		1.5 acre
How large of an area will be affected?		60 days
Length of time?	Coatings	
Coatings Usage:		N/A
What material will be used in coating?		
How will the coating be applied?	N/A	
Total coating usage		N/A

Site Summary

Site	Emissions Tab	Thornton Street (Akron, OH) - Lower Track ¹	
Earth Moving Activities:			
Type of Earth Moving activities over how many square feet			
Grading (area? Equipment used?)	Construction	Excavator/Loader	
Excavating (area? Equipment used?)		RR Undercutter	
Clearing (area? Equipment used?)		No	
Trenching (area? Equipment used?)		1200 LF	
Equipment to be used (type, model, size and number of each type/model onsite).		Backhoe	
Fuel type of the equipment and fuel tank size or estimated fuel use		Diesel	
Size of earth moved area, just project area or access roads to be installed?		1.5 acre/project area	
Any planned fugitive dust controls?		no	
Onsite equipment usage:			
Generators:			
Number of generators	Generators	N/A	
Model and Make		N/A	
Fuel type and tank size		N/A	
Hours of usage		N/A	
Compressors:			
Number of compressors	Compressors	N/A	
Model and Make		N/A	
Fuel type and tank size		N/A	
Hours of usage		N/A	
Landscaping:			
Hydro Seeding?	Construction	Yes	
Mulching?		No	
Tree removal/replacement?		No	
Type of equipment?		Hydroseeder	
Any planned fugitive dust controls?		Yes	
Watering truck?		Yes	
How many?		1	
Type of Truck?		Pick-up Truck with Water Tank	
Any utility crew activities?		Yes	
Moving utility lines/corridors?		Yes	
Type of utility? In ground/above ground?	UG/FOC		

¹Information provided from design engineer (AECOM or URS).

Fugitive Emissions from Construction

Project Site Name: Thornton Street (Akron, OH) - Lower Track¹

Emissions Tab		All	Construction Equipment	Fugitives	Concrete	Asphalt	Grinding	Welding	Coatings	Generators	Compressors	Storage Piles
VOC	Max lb/hour	1.00	0.17	-	-	-	-	-	-	-	-	-
	Tons/Year	0.30	0.30	-	-	-	-	-	-	-	-	-
PM2.5	Max lb/hour	1.73	0.11	0.57	-	-	-	-	-	-	-	0.26
	Tons/Year	0.52	0.19	0.17	-	-	-	-	-	-	-	0.16
PM10	Max lb/hour	3.32	0.11	2.16	-	-	-	-	-	-	-	0.26
	Tons/Year	1.00	0.19	0.65	-	-	-	-	-	-	-	0.16
NOx	Max lb/hour	13.59	2.27	-	-	-	-	-	-	-	-	-
	Tons/Year	4.08	4.08	-	-	-	-	-	-	-	-	-
SO2	Max lb/hour	0.44	0.07	-	-	-	-	-	-	-	-	-
	Tons/Year	0.13	0.13	-	-	-	-	-	-	-	-	-
CO	Max lb/hour	8.75	1.46	-	-	-	-	-	-	-	-	-
	Tons/Year	2.62	2.62	-	-	-	-	-	-	-	-	-

Total Days	60
Total Hours	600

Fugitive Emissions from Construction

Project Site Name: Thornton Street (Akron, OH) - Lower Track¹

Storage Piles Emissions

Emission factors for storage piles at concrete batch plants are taken from AP-42, Fifth Edition, Section 11.12, Table 11.12-2. Assuming the 3.5 lb/acre/day emission factor is for TSP emissions the wind blown PM10 emissions would be approximately 50% or 1.7 lb/acre day.

Acres of Storage Piles	1.5 acres
Number of Days	60 days

lbs PM10/Year	153.0
tons PM10/Year	0.1

lbs TSP/Year	315.0
tons TSP/Year	0.2

Footnotes

¹Information provided from design engineer (AECOM or URS).

Fugitive Emissions from Construction

Project Site Name: Thornton Street (Akron, OH) - Lower Track¹

CONCRETE BATCH PLANT EMISSION CALCULATIONS

Type of Plant: Central Mix w/pneumatic transfer to storage silos

Amount of Material Processed: 0 cubic yards/year

Emission factors for concrete batch plants are taken from the EPA guidance document AP-42, Fifth Edition, Section 11.12, Table 11.12-2. The permitting database uses the emission factors in lbs/yd³ which assume that a typical cubic yard of concrete is 1.818 kg or 4,000 lbs (containing 500 lbs of cement 1,240 lbs of sand, 1,900 lbs of coarse aggregate, and 360 lbs of water).

Annual Emissions Process	Emission Factor (lbs/yd ³)	Material Processed (yd ³ /yr)	Estimated PM10 Emissions (tons/year)
Sand and Aggregate Transfer		0.05	0 0.0
Pneumatic Unloading to elevated storage Silo		0.07	0 0.0
Weigh Hopper Loading		0.04	0 0.0
Central Mix - Mixer Loading		0.07	0 0.0
Total			0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Fugitive Emissions from Construction

Project Site Name: Thornton Street (Akron, OH) - Lower Track¹

ASPHALT PLANT EMISSION CALCULATIONS

Type: Conventional
 Total Production: 0 tons/year
 Hours Operated: 0 hours/year
 Days Opearated: 0 days/year
 Control Equipment:
 Control Efficiency: 0 Percent
 Acres of Storage Piles: 0 acres

Primary emissions consist of particulate matter and amounts of gaseous volatile organics which result from the heating and mixing of the asphalt cement. Criteria pollutants are also emitted from the various types of diesel equipment which are run in conjunction with the asphalt plant such as loaders or generators. This source is subject to an NSPS regulation for particulate emissions.

Emission factors for asphalt batching are from section 11.1 of AP-42 Volume I, Fifth Edition, emissions from diesel equipment are from Section 7.2 of AP-42 Volume II.

Asphalt Mixing Emissions

Emission factors from Section 11.1 of AP-42, Fifth Edition, Conventional Asphalt Plant uncontrolled emission

Operating Parameters		Criteria Pollutant Emission Factors					
Operating Hours	Usage	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hr/year	Tons/Year	lb/tons					
0	0.0	0.1	0.0	0.01	4.5E+00	4.5E+00	5.6E-02

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Fugitive Emissions from Construction

Project Site Name: Thornton Street (Akron, OH) - Lower Track¹

Stationary Combustion Engines (Generators)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
11	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Fugitive Emissions from Construction

Project Site Name: Thornton Street (Akron, OH) - Lower Track¹

Stationary Combustion Engines (Compressors)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Fugitive Emissions from Construction

Fugitive Emissions from Construction

Project Site Name: Thornton Street (Akron, OH) - Lower Track¹

Construction Daily Mobilization and Demobilization

Description:

Vehicles and other heavy equipment are needed to travel the roads and construction areas.

Assumptions:

Total Hours Traveled: 10
Total Days Traveled: 60

Vehicle Travel

References:

1. AP-42, Table 13.2.2-2, Unpaved Roads, November 2006, Constants for Equations 1a and 1b for Industrial Roads
2. AP-42, Table 13.2.2-1, Unpaved Roads, November 2006, Typical Silt Content Values of Surface Material on Industrial Unpaved Road
3. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP.

Pollutant	Size-Specific Emission Factor	k-factor	Surface Material Silt Content	a-factor	Mean Vehicle Weight	b-factor	Road Length	Total Road Length Traveled	Control?	Average Control Efficiency	Criteria Pollutant Emissions		
	E	k ¹	s ²	a ¹	W	b ¹	---	---	---	---	lb	lb/hr	lb/day
	lb/VMT	lb/VMT	%	---	tons	---	mi	mi	---	%			
TSP	9.3	4.9	8.5	0.90	25	0.45	0	0	Yes	50	2.1	0.0	0.0
PM ₁₀	2.9	1.5	8.5	0.90	25	0.45	0	0	Yes	50	0.6	0.0	0.0
PM _{2.5}	0.31	0.15	8.5	0.70	25	0.45	0	0	Yes	50	0.1	0.0	0.0

Surface Disturbances

Description:

Land will be disturbed through regrading and surfacing activities.

Assumptions:

Construction Area: 1.5 acres

References:

1. Chapter 13.2.3.3, Heavy Construction Operations, January 1995
2. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP
3. Assume that there are 30 days per month.
4. Dust abatement is used to control emissions utilizing a 50% average controlled emission factor

Pollutant	Road Construction Area	Construction Activity ³	Criteria Pollutant Emissions		
	acres	tons/acre-month ²	lb	lb/hr	lb/day
TSP	2	1.2	3,600.0	6.0	60.0
PM ₁₀	2	0.43	1,296.0	2.2	21.6
PM _{2.5}	2	0.11	342.0	0.6	5.7

Fugitive Emissions from Construction

Project Site Name: Thornton Street (Akron, OH) - Lower Track
Construction Equipment Emissions

Equipment	Number	HP (Each)	Total Hours Each (per year)	Total Hours (all Equipment)	Load Factor	VOC		Nox		CO		PM10		PM2.5		SO2	
						Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Hydromulching/Seeding ⁴	1	25	600	600	1	0.6	19.84	5	165.34	4.1	135.58	0.45	14.88	0.45	14.88	0.13	4.28
Fuel Truck ⁵		560		0	1	0.3	-	4.5	-	2.6	-	0.15	-	0.15	-	0.12	-
Tractor ^{2,5}		310		0	1	0.3	-	4.5	-	2.6	-	0.15	-	0.15	-	0.12	-
Grader ^{2,5}		533		0	1	0.3	-	4.5	-	2.6	-	0.15	-	0.15	-	0.12	-
Backhoe ^{2,6}	1	124	600	600	1	0.4	65.61	4.5	738.10	3.7	606.88	0.22	36.08	0.22	36.08	0.12	19.11
Soil Compactor ^{2,5}		173		0	1	0.4	-	4.5	-	3.7	-	0.22	-	0.22	-	0.12	-
Excavator ^{2,5}	1	513	600	600	1	0.3	203.57	4.5	3,053.57	2.6	1,764.29	0.15	101.79	0.15	101.79	0.12	79.07
Trenching ^{2,5}		540		0	1	0.3	-	4.5	-	2.6	-	0.15	-	0.15	-	0.12	-
Dump Truck ^{2,5}		505		0	1	0.3	-	4.5	-	2.6	-	0.15	-	0.15	-	0.12	-
Water Truck ^{3,5}	1	505	600	600	1	0.3	200.40	4.5	3,005.95	2.6	1,736.77	0.15	100.20	0.15	100.20	0.12	77.84
Dozer ^{2,5}		310		0	1	0.3	-	4.5	-	2.6	-	0.15	-	0.15	-	0.12	-
Undercutter ²	1	200	600	600	1	0.4	105.82	4.5	1,190.48	3.7	978.84	0.22	58.20	0.22	58.20	0.12	30.83
						Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Concrete/Asphalt Trucks ^{2,5}		350		0	1	1.10E-03	0.0	1.10E-03	0.0	1.10E-02	0.0	0.15	0.0	0.15	0.0	0.12	0.0
LD Truck ^{1,7} Used 10 hours for 4 days	5	350	40	200	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	23.1	0.15	23.1	0.12	18.0
HD Truck ^{1,7} Used 10 hours for 4 days	10	350	40	400	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	46.3	0.15	46.3	0.12	36.0
Total (lbs)							597.9		8156.1		5248.8		380.6		380.6		265.1
Total (lbs/hour)							0.2		2.3		1.5		0.1		0.1		0.1
Total (tons/year)							0.3		4.1		2.6		0.2		0.2		0.1

References:

1. All one ton utility trucks are assumed to be diesel, have a 350 hp engine, average of 8 MPG, and 30 MPH. The diesel combustion efficiency is assumed to be 30%. Pickup trucks are assumed to have a 300 hp engine based on Ford F150, average 30 MPH, and 13 MPG. The fuel efficiency is based on the light duty class low end average for 2008.
2. Construction equipment horsepower rating are based on Caterpillar equipment such as: Compactor (CAT CS-663E soil compactor); Dump truck (CAT 740 Articulated Truck); Backhoe / front-end loader (CAT 450E Backhoe Loader); Grader (CAT 24M Motor Grader); Track mounted-excavator (CAT385C L Hydraulic Excavator); Dozer (CAT D8T Track-Type Tractor); and
3. For fuel and water trucks, truck engines are proposed to be Detroit Diesel MM15 with a horsepower range from 455hp to 560hp. Project assumes mean of 505 hp.
4. EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling - Compression - Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
5. Emission Reference EPA Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A6.
6. Emission Reference EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
7. The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model, taking the weighted average of vehicle types and simplifying into two categories: Passenger Vehicles & Delivery Trucks.

Site Summary

Site	Emissions Tab	Overhead Walkway (Akron, OH) - Lower Track ¹
Estimated total days for construction	All	60 days
Maximum hours worked per day		10
Seasonal construction activities		Yes
Equipment and Site mobilization and demobilization:		
How will equipment be brought and removed from the Site	Construction	RR/Highway
Number of trucks to bring personnel and equipment onsite		LD-5; HD-10
How many days will site mobilization and de mobilization take		4
Concrete/Asphalt Activities :		
Concrete mixed on site or offsite?	Concrete	off-site
Type of concrete to be used?		Portland Cement
Estimated number of concrete trucks coming on site/cubic yards of concrete needed?		2
Will a batch plant be on site?		No
Asphalting any surfaces?	Asphalt	N/A
Type of asphalt/cubic yards of asphalt planned?		N/A
Estimated number of asphalt trucks?		N/A
Grinding, sanding, braising activities:		
How many days of these operations?	Grinding	N/A
What materials will be sanded/grind/braised?		N/A
Welding Operations:		
Type of welding and Number of Welding operations	Welding	N/A
Track Lowering Activities:		
Track Lowering process?	Construction	Undercutter
What type of equipment will be used		RR Undercutter
How large of an area will be affected?		1.91 acre
Length of time?		60 days
Coatings Usage:		
What material will be used in coating?	Coatings	N/A
How will the coating be applied?		N/A
Total coating usage		N/A

Site Summary

Site	Emissions Tab	Overhead Walkway (Akron, OH) - Lower Track ¹
Earth Moving Activities:		
Type of Earth Moving activities over how many square feet	Construction	
Grading (area? Equipment used?)		Excavator/Loader
Excavating (area? Equipment used?)		RR Undercutter
Clearing (area? Equipment used?)		No
Trenching (area? Equipment used?)		1500 LF
Equipment to be used (type, model, size and number of each type/model onsite).		Backhoe
Fuel type of the equipment and fuel tank size or estimated fuel use		Diesel
Size of earth moved area, just project area or access roads to be installed?		1.91 acre/project area
Any planned fugitive dust controls?		no
Onsite equipment usage:		
Generators:	Generators	
Number of generators		N/A
Model and Make		N/A
Fuel type and tank size		N/A
Hours of usage		N/A
Compressors:	Compressors	
Number of compressors		N/A
Model and Make		N/A
Fuel type and tank size		N/A
Hours of usage		N/A
Landscaping:	Construction	
Hydro Seeding?		Yes
Mulching?		No
Tree removal/replacement?		No
Type of equipment?		Hydroseeder
Any planned fugitive dust controls?		Yes
Watering truck?		Yes
How many?		1
Type of Truck?		Pick-up Truck with Water Tank
Any utility crew activities?		Yes
Moving utility lines/corridors?	Yes	
Type of utility? In ground/above ground?	UG/FOC	

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Overhead Walkway (Akron, OH) - Lower Track

Emissions Tab		All	Construction Equipment	Fugitives	Concrete	Asphalt	Grinding	Welding	Coatings	Generators	Compressors	Storage Piles
VOC	Max lb/hour	1.00	0.16	-	-	-	-	-	-	-	-	-
	Tons/Year	0.30	0.30	-	-	-	-	-	-	-	-	-
PM2.5	Max lb/hour	1.37	0.11	0.73	-	-	-	-	-	-	-	0.32
	Tons/Year	0.41	0.19	0.22	-	-	-	-	-	-	-	0.20
PM10	Max lb/hour	3.39	0.11	2.75	-	-	-	-	-	-	-	0.32
	Tons/Year	1.02	0.19	0.83	-	-	-	-	-	-	-	0.20
NOx	Max lb/hour	13.59	2.24	-	-	-	-	-	-	-	-	-
	Tons/Year	4.08	4.08	-	-	-	-	-	-	-	-	-
SO2	Max lb/hour	0.45	0.07	-	-	-	-	-	-	-	-	-
	Tons/Year	0.13	0.13	-	-	-	-	-	-	-	-	-
CO	Max lb/hour	8.76	1.44	-	-	-	-	-	-	-	-	-
	Tons/Year	2.63	2.63	-	-	-	-	-	-	-	-	-

Total Days	60
Total Hours	600

Total emissions

Project Site Name: Overhead Walkway (Akron, OH) - Lower Track¹

Storage Piles Emissions

Emission factors for storage piles at concrete batch plants are taken from AP-42, Fifth Edition, Section 11.12, Table 11.12-2. Assuming the 3.5 lb/acre/day emission factor is for TSP emissions the wind blown PM10 emissions would be approximately 50% or 1.7 lb/acre day.

Acres of Storage Piles	1.91 acres
Number of Days	60 days
lbs PM10/Year	194.8
tons PM10/Year	0.1
lbs TSP/Year	401.1
tons TSP/Year	0.2

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Overhead Walkway (Akron, OH) - Lower Track¹

CONCRETE BATCH PLANT EMISSION CALCULATIONS

Type of Plant: Central Mix w/pneumatic transfer to storage silos

Amount of Material Processed:

0 cubic yards/year

Emission factors for concrete batch plants are taken from the EPA guidance document AP-42, Fifth Edition, Section 11.12, Table 11.12-2. The permitting database uses the emission factors in lbs/yd³ which assume that a typical cubic yard of concrete is 1.818 kg or 4,000 lbs (containing 500 lbs of cement 1,240 lbs of sand, 1,900 lbs of coarse aggregate, and 360 lbs of water).

Annual Emissions Process	Emission Factor (lbs/yd ³)	Material Processed (yd ³ /yr)	Estimated PM10 Emissions (tons/yr)
Sand and Aggregate Transfer	0.05	0	0.0
Pneumatic Unloading to elevated storage Silo	0.07	0	0.0
Weigh Hopper Loading	0.04	0	0.0
Central Mix - Mixer Loading	0.07	0	0.0
Total			0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Overhead Walkway (Akron, OH) - Lower Track¹

ASPHALT PLANT EMISSION CALCULATIONS

Type: Conventional

Total Production: 0 tons/year
 Hours Operated: 0 hours/year
 Days Operated: 0 days/year
 Control Equipment:
 Control Efficiency: 0 Percent
 Acres of Storage Piles: 0 acres

Primary emissions consist of particulate matter and amounts of gaseous volatile organics which result from the heating and mixing of the asphalt cement. Criteria pollutants are also emitted from the various types of diesel equipment which are run in conjunction with the asphalt plant such as loaders or generators. This source is subject to an NSPS regulation for particulate emissions. Emission factors for asphalt batching are from section 11.1 of AP-42 Volume I, Fifth Edition, emissions from diesel equipment are from Section 7.2 of AP-42 Volume II.

Asphalt Mixing Emissions

Emission factors from Section 11.1 of AP-42, Fifth Edition, Conventional Asphalt Plant uncontrolled emission factors.

Operating Parameters		Criteria Pollutant Emission Factors					
Operating Hours	Usage	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hr/year	Tons/Year	lb/tons					
0	0.0	0.1	0.0	0.01	4.5E+00	4.5E+00	5.6E-02

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Overhead Walkway (Akron, OH) - Lower Track¹

Stationary Combustion Engines (Generators)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Overhead Walkway (Akron, OH) - Lower Track¹

Stationary Combustion Engines (Compressors)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Fugitive Emissions from Overhead Walkway (Akron, OH) - Lower Track
Project Site Name: Overhead Walkway (Akron, OH) - Lower Track¹

Construction Daily Mobilization and Demobilization

Description:

Vehicles and other heavy equipment are needed to travel the roads and construction areas.

Assumptions:

Total Hours Traveled: 10
 Total Days Traveled: 60

Vehicle Travel

References:

1. AP-42, Table 13.2.2-2, Unpaved Roads, November 2006, Constants for Equations 1a and 1b for Industrial Roads
2. AP-42, Table 13.2.2-1, Unpaved Roads, November 2006, Typical Silt Content Values of Surface Material on Industrial Unpaved Road
3. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP.

Pollutant	Size-Specific Emission Factor	k-factor	Surface Material Silt Content	a-factor	Mean Vehicle Weight	b-factor	Road Length	Total Road Length Traveled	Control?	Average Control Efficiency	Criteria Pollutant Emissions		
	E	k ¹	s ²	a ¹	W	b ¹	---	---	---	---	lb	lb/hr	lb/day
	lb/VMT	lb/VMT	%	---	tons	---	mi	mi	---	%			
TSP	9.3	4.9	8.5	0.90	25	0.45	0	0	Yes	50	0.0	0.0	0.0
PM ₁₀	2.9	1.5	8.5	0.90	25	0.45	0	0	Yes	50	0.0	0.0	0.0
PM _{2.5}	0.31	0.15	8.5	0.70	25	0.45	0	0	Yes	50	0.0	0.0	0.0

Surface Disturbances

Description:

Land will be disturbed through regrading and surfacing activities.

Assumptions:

Construction Area: 1.91 acres

References:

1. Chapter 13.2.3.3, Heavy Construction Operations, January 1995
2. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP
3. Assume that there are 30 days per month.
4. Dust abatement is used to control emissions utilizing a 50% average controlled emission factor

Pollutant	Road Construction Area	Construction Activity ³	Criteria Pollutant Emissions		
	acres	tons/acre-month ²	lb	lb/hr	lb/day
TSP	2	1.2	4,584.0	7.6	76.4
PM ₁₀	2	0.43	1,650.2	2.8	27.5
PM _{2.5}	2	0.11	435.5	0.7	7.3

Total emissions

Project Site Name: Overhead Walkway (Akron, OH) - Lower Track
Construction Equipment Emissions

Equipment	Number	HP (Each)	Total Hours Each (per year)	Total Hours (all Equipment)	Load Factor	VOC		NOx		CO		PM10		PM2.5		SO2	
						Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Hydromulching/Seeding ⁴	1	25	600	600	1	0.6	19.8	5.0	165.3	4.1	135.6	0.45	14.9	0.45	14.9	0.13	4.3
Fuel Truck ⁵		560		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Tractor ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Grader ^{2,5}		533		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Backhoe ^{2,6}	1	124	600	600	1	0.4	65.6	4.5	738.1	3.7	606.9	0.22	36.1	0.22	36.1	0.12	19.1
Soil Compactor ^{2,5}		173		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
Excavator ^{2,5}	1	513	600	600	1	0.3	203.6	4.5	3053.6	2.6	1764.3	0.15	101.8	0.15	101.8	0.12	79.1
Trenching ^{2,5}		540		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Dump Truck ^{2,5}		505		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Water Truck ^{4,5}	1	505	600	600	1	0.3	200.4	4.5	3006.0	2.6	1736.8	0.15	100.2	0.15	100.2	0.12	77.8
Dozer ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Undercutter ²	1	200	600	600	1	0.4	105.8	4.5	1190.5	3.7	978.8	0.22	58.2	0.22	58.2	0.12	30.8
						Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Concrete/Asphalt Trucks ^{1,7} Assumed 10 hrs for 2 days	2	350	20	40	1	1.10E-03	0.7	1.10E-03	0.7	1.10E-02	6.6	0.15	4.6	0.15	4.6	0.12	3.6
LD Truck ^{1,7} Used 10 hours for 4 days	5	350	40	200	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	23.1	0.15	23.1	0.12	18.0
HD Truck ^{1,7} Used 10 hours for 4 days	10	350	40	400	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	46.3	0.15	46.3	0.12	36.0
Total (lbs)							598.5		8156.7		5255.4		385.2		385.2		268.7
Total (lbs/hour)							0.2		2.2		1.4		0.1		0.1		0.1
Total (tons/year)							0.3		4.1		2.6		0.2		0.2		0.1

References:

- All one ton utility trucks are assumed to be diesel, have a 350 hp engine, average of 8 MPG, and 30 MPH. The diesel combustion efficiency is assumed to be 30%. Pickup trucks are assumed to have a 300 hp engine based on Ford F150, average 30 MPH, and 13 MPG. The fuel efficiency is based on the light duty class low end average for 2008.
- Construction equipment horsepower rating are based on Caterpillar equipment such as: Compactor (CAT CS-663E soil compactor); Dump truck (CAT 740 Articulated Truck); Backhoe / front-end loader (CAT 450E Backhoe Loader); Grader (CAT 24M Motor Grader); Track mounted-excavator (CAT385C L Hydraulic Excavator); Dozer (CAT D8T Track-Type Tractor); and Trenching machine (Rivard RIV 500 TR 250 with a CAT
- For fuel and water trucks, truck engines are proposed to be Detroit Diesel MM15 with a horsepower range from 455hp to 560hp. Project assumes mean of 505 hp.
- EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling - Compression - Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- Emission Reference EPA Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A6.
- Emission Reference EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model, taking the weighted average of vehicle types and simplifying into two categories Passenger Vehicles & Delivery Trucks.

Site Summary

Site	Emissions Tab	W&LE Railroad Bridge (Kent, OH) - Lower Track ¹
Estimated total days for construction	All	90
Maximum hours worked per day		10
Seasonal construction activities		Yes
Equipment and Site mobilization and demobilization:	Construction	
How will equipment be brought and removed from the Site		RR/Highway
Number of trucks to bring personnel and equipment onsite		LD-8; HD-12
How many days will site mobilization and demobilization take		4
Concrete/Asphalt Activities :	Concrete	
Concrete mixed on site or offsite?		N/A
Type of concrete to be used?		N/A
Estimated number of concrete trucks coming on site/cubic yards of concrete needed?		N/A
Will a batch plant be on site?		N/A
Asphalting any surfaces?	Asphalt	N/A
Type of asphalt/cubic yards of asphalt planned?		N/A
Estimated number of asphalt trucks?		N/A
Grinding, sanding, braising activities:	Grinding	
How many days of these operations?		N/A
What materials will be sanded/grind/braised?		N/A
Welding Operations:	Welding	
Type of welding and Number of Welding operations		N/A
Track Lowering Activities:	Construction	
Track Lowering process?		Staged Excavation
What type of equipment will be used		Excavator/Loader
How large of an area will be affected?		4.97 acre
Length of time?	90	
Coatings Usage:	Coatings	
What material will be used in coating?		N/A
How will the coating be applied?		N/A
Total coating usage		N/A

Site Summary

Site	Emissions Tab	W&LE Railroad Bridge (Kent, OH) - Lower Track ¹
Earth Moving Activities:	Construction	
Type of Earth Moving activities over how many square feet		
Grading (area? Equipment used?)		Excavator/Loader
Excavating (area? Equipment used?)		Excavator/Loader
Clearing (area? Equipment used?)		No
Trenching (area? Equipment used?)		2x3500 LF
Equipment to be used (type, model, size and number of each type/model onsite).		Backhoe
Fuel type of the equipment and fuel tank size or estimated fuel use		Diesel
Size of earth moved area, just project area or access roads to be installed?		4.97 acre/project area
Any planned fugitive dust controls?		No
Onsite equipment usage:		
Generators:	Generators	
Number of generators		N/A
Model and Make		N/A
Fuel type and tank size		N/A
Hours of usage		N/A
Compressors:	Compressors	
Number of compressors		N/A
Model and Make		N/A
Fuel type and tank size		N/A
Hours of usage		N/A
Landscaping:	Construction	
Hydro Seeding?		Yes
Mulching?		No
Tree removal/replacement?		No
Type of equipment?		Hydroseeder
Any planned fugitive dust controls?		Yes
Watering truck?		Yes
How many?		1
Type of Truck?		Pick-up Truck with Water Tank
Any utility crew activities?		Yes
Moving utility lines/corridors?		Yes
Type of utility? In ground/above ground?	UG/FOC	

¹Information provided from design engineer (AECOM or URS).

Site Summary

Project Site Name: W&LE Railroad Bridge (Kent, OH) - Lower Track¹

Emissions Tab		All	Construction Equipment	Fugitives	Concrete	Asphalt	Grinding	Welding	Coatings	Generators	Compressors	Storage Piles
VOC	Max lb/hour	0.82	0.17	-	-	-	-	-	-	-	-	-
	Tons/Year	0.37	0.37	-	-	-	-	-	-	-	-	-
PM2.5	Max lb/hour	4.15	0.11	1.89	-	-	-	-	-	-	-	0.84
	Tons/Year	1.87	0.24	0.85	-	-	-	-	-	-	-	0.78
PM10	Max lb/hour	9.42	0.11	7.16	-	-	-	-	-	-	-	0.84
	Tons/Year	4.24	0.24	3.22	-	-	-	-	-	-	-	0.78
NOx	Max lb/hour	11.61	2.37	-	-	-	-	-	-	-	-	-
	Tons/Year	5.22	5.22	-	-	-	-	-	-	-	-	-
SO2	Max lb/hour	0.38	0.08	-	-	-	-	-	-	-	-	-
	Tons/Year	0.17	0.17	-	-	-	-	-	-	-	-	-
CO	Max lb/hour	7.10	1.45	-	-	-	-	-	-	-	-	-
	Tons/Year	3.20	3.20	-	-	-	-	-	-	-	-	-

Total Days	90
Total Hours	900

Site Summary

Project Site Name: W&LE Railroad Bridge (Kent, OH) - Lower Track¹

Storage Piles Emissions

Emission factors for storage piles at concrete batch plants are taken from AP-42, Fifth Edition, Section 11.12, Table 11.12-2. Assuming the 3.5 lb/acre/day emission factor is for TSP emissions the wind blown PM10 emissions would be approximately 50% or 1.7 lb/acre day.

Acres of Storage Piles	4.97 acres
Number of Days	90 days
lbs PM10/Year	760.4
tons PM10/Year	0.4
lbs TSP/Year	1565.6
tons TSP/Year	0.8

Footnotes

¹Information provided from design engineer (AECOM or URS).

Site Summary

Project Site Name: W&LE Railroad Bridge (Kent, OH) - Lower Track¹

CONCRETE BATCH PLANT EMISSION CALCULATIONS

Type of Plant: Central Mix w/pneumatic transfer to storage silos

Amount of Material Processed: 0 cubic yards/year

Emission factors for concrete batch plants are taken from the EPA guidance document AP-42, Fifth Edition, Section 11.12, Table 11.12-2. The permitting database uses the emission factors in lbs/yd³ which assume that a typical cubic yard of concrete is 1,818 kg or 4,000 lbs (containing 500 lbs of cement 1,240 lbs of sand, 1,900 lbs of coarse aggregate, and 360 lbs of water).

Annual Emissions Process	Emission Factor (lbs/yd ³)	Material Processed (yd ³ /yr)	Estimated PM10 Emissions (tons/yr)
Sand and Aggregate Transfer	0.05	0	0.0
Pneumatic Unloading to elevated storage Silo	0.07	0	0.0
Weigh Hopper Loading	0.04	0	0.0
Central Mix - Mixer Loading	0.07	0	0.0
Total			0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Site Summary

Project Site Name: W&LE Railroad Bridge (Kent, OH) - Lower Track¹

ASPHALT PLANT EMISSION CALCULATIONS

Type: Conventional

Total Production: 0 tons/year

Hours Operated: 0 hours/year

Days Operated: 0 days/year

Control Equipment:

Control Efficiency: 0 Percent

Acres of Storage Piles: 0 acres

Primary emissions consist of particulate matter and amounts of gaseous volatile organics which result from the heating and mixing of the asphalt cement. Criteria pollutants are also emitted from the various types of diesel equipment which are run in conjunction with the asphalt plant such as loaders or generators. This source is subject to an NSPS regulation for particulate emissions.

Emission factors for asphalt batching are from section 11.1 of AP-42 Volume I, Fifth Edition, emissions from diesel equipment are from Section 7.2 of AP-42 Volume I.

Asphalt Mixing Emissions

Emission factors from Section 11.1 of AP-42, Fifth Edition, Conventional Asphalt Plant uncontrolled emission factors.

Operating Parameters		Criteria Pollutant Emission Factors					
Operating Hours	Usage	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hr/year	Tons/Year	lb/tons					
0	0.0	0.1	0.0	0.01	4.5E+00	4.5E+00	5.6E-02

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Site Summary

Project Site Name: W&LE Railroad Bridge (Kent, OH) - Lower Track¹

Stationary Combustion Engines (Generators)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Site Summary

Project Site Name: W&LE Railroad Bridge (Kent, OH) - Lower Track¹

Stationary Combustion Engines (Compressors)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Site Summary

Fugitive Emissions from Construction

Project Site Name: W&LE Railroad Bridge (Kent, OH) - Lower Track¹

Construction Daily Mobilization and Demobilization

Description:

Vehicles and other heavy equipment are needed to travel the roads and construction areas.

Assumptions:

Total Hours Traveled: 10
Total Days Traveled: 90

Vehicle Travel

References:

1. AP-42, Table 13.2.2-2, Unpaved Roads, November 2006, Constants for Equations 1a and 1b for Industrial Roads
2. AP-42, Table 13.2.2-1, Unpaved Roads, November 2006, Typical Silt Content Values of Surface Material on Industrial Unpaved Road
3. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP.

Pollutant	Size-Specific Emission Factor	k-factor	Surface Material Silt Content	a-factor	Mean Vehicle Weight	b-factor	Road Length	Total Road Length Traveled	Control?	Average Control Efficiency	Criteria Pollutant Emissions		
	E	k ¹	s ²	a ¹	W	b ¹	---	---	---	---	lb	lb/hr	lb/day
	lb/VMT	lb/VMT	%	---	tons	---	mi	mi	---	%			
TSP	9.3	4.9	8.5	0.90	25	0.45	2.65	3	Yes	50	12.3	0.0	0.1
PM ₁₀	2.9	1.5	8.5	0.90	25	0.45	2.65	3	Yes	50	3.8	0.0	0.0
PM _{2.5}	0.31	0.15	8.5	0.70	25	0.45	2.65	3	Yes	50	0.4	0.0	0.0

Surface Disturbances

Description:

Land will be disturbed through regrading and surfacing activities.

Assumptions:

Construction Area: 4.97 acres

References:

1. Chapter 13.2.3.3, Heavy Construction Operations, January 1995
2. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP
3. Assume that there are 30 days per month.
4. Dust abatement is used to control emissions utilizing a 50% average controlled emission factor

Pollutant	Road Construction Area	Construction Activity ³	Criteria Pollutant Emissions		
	acres	tons/acre-month ²	lb	lb/hr	lb/day
TSP	5	1.2	17,892.0	19.9	198.8
PM ₁₀	5	0.43	6,441.1	7.2	71.6
PM _{2.5}	5	0.11	1,699.7	1.9	18.9

Site Summary

Project Site Name: W&LE Railroad Bridge (Kent, OH) - Lower Track
Construction Equipment Emissions

Equipment	Number	HP (Each)	Total Hours Each (per year)	Total Hours (all Equipment)	Load Factor	VOC		Nox		CO		PM10		PM2.5		SO2	
						Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Hydromulching/Seeding ⁴	1	25	900	900	1	0.6	29.8	5	248.0	4.1	203.4	0.45	22.3	0.45	22.3	0.13	6.4
Fuel Truck ⁵		560		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Tractor ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Grader ^{2,5}		533		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Backhoe ^{2,6}	1	124	900	900	1	0.4	98.4	4.5	1,107.1	3.7	910.3	0.22	54.1	0.22	54.1	0.12	28.7
Soil Compactor ^{2,5}		173		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
Excavator ^{2,5}	1	513	900	900	1	0.3	305.4	4.5	4,580.4	2.6	2,646.4	0.15	152.7	0.15	152.7	0.12	118.6
Trenching ^{2,5}		540		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Dump Truck ^{2,5}		505		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Water Truck ^{3,5}	1	505	900	900	1	0.3	300.6	4.5	4,508.9	2.6	2,605.2	0.15	150.3	0.15	150.3	0.12	116.8
Dozer ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Undercutter ²		200		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
						Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Concrete/Asphalt Trucks ^{2,5}		350		0	1	1.10E-03	0.0	1.10E-03	0.0	1.10E-02	0.0	0.15	0.0	0.15	0.0	0.12	0.0
LD Truck ^{1,7} Used 10 hours for 4 days	8	350	40	320	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	37.0	0.15	37.0	0.12	28.8
HD Truck ^{1,7} Used 10 hours for 4 days	12	350	40	480	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	55.6	0.15	55.6	0.12	43.2
Total (lbs)							736.8		10447.1		6391.7		472.0		472.0		342.4
Total (lbs/hour)							0.2		2.4		1.5		0.1		0.1		0.1
Total (tons/year)							0.4		5.2		3.2		0.2		0.2		0.2

References:

- All one ton utility trucks are assumed to be diesel, have a 350 hp engine, average of 8 MPG, and 30 MPH. The diesel combustion efficiency is assumed to be 30%. Pickup trucks are assumed to have a 300 hp engine based on Ford F150, average 30 MPH, and 13 MPG. The fuel efficiency is based on the light duty class low end average for 2008.
- Construction equipment horsepower rating are based on Caterpillar equipment such as: Compactor (CAT CS-663E soil compactor); Dump truck (CAT 740 Articulated Truck); Backhoe / front end loader (CAT 450E Backhoe Loader); Grader (CAT 24M Motor Grader); Track mounted-excavator (CAT385C L Hydraulic Excavator); Dozer (CAT D8T Track-Type Tractor); and Trenching machine
- For fuel and water trucks, truck engines are proposed to be Detroit Diesel MM15 with a horsepower range from 455hp to 560hp. Project assumes mean of 505 hp.
- EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling - Compression - Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- Emission Reference EPA Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A6.
- Emission Reference EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model, taking the weighted average of vehicle types and simplifying into two categories: Passenger Vehicles & Delivery Trucks.

Site Summary

Site	Emissions Tab	Main Street (Kent, OH) - Lower Track ¹
Estimated total days for construction	All	90 days
Maximum hours worked per day		10
Seasonal construction activities		Yes
Equipment and Site mobilization and demobilization:		
How will equipment be brought and removed from the Site	Construction	RR/Highway
Number of trucks to bring personnel and equipment onsite		LD-8; HD-12
How many days will site mobilization and de mobilization take		4
Concrete/Asphalt Activities :		
Concrete mixed on site or offsite?	Concrete	N/A
Type of concrete to be used?		N/A
Estimated number of concrete trucks coming on site/cubic yards of concrete needed?		N/A
Will a batch plant be on site?		N/A
Asphalting any surfaces?	Asphalt	N/A
Type of asphalt/cubic yards of asphalt planned?		N/A
Estimated number of asphalt trucks?		N/A
Grinding, sanding, braising activities:		
How many days of these operations?	Grinding	N/A
What materials will be sanded/grind/braised?		N/A
Welding Operations:		
Type of welding and Number of Welding operations	Welding	N/A
Track Lowering Activities:		
Track Lowering process?	Construction	Staged Excavation
What type of equipment will be used		Excavator/Loader
How large of an area will be affected?		4.02 Acre
Length of time?		90
Coatings Usage:		
What material will be used in coating?	Coatings	N/A
How will the coating be applied?		N/A
Total coating usage		N/A
Earth Moving Activities:		
Type of Earth Moving activities over how many square feet	Construction	Excavator/Loader
Grading (area? Equipment used?)		Excavator/Loader
Excavating (area? Equipment used?)		No
Clearing (area? Equipment used?)		2x2800
Trenching (area? Equipment used?)		Backhoe
Equipment to be used (type, model, size and number of each type/model onsite).		Diesel
Fuel type of the equipment and fuel tank size or estimated fuel use		4.02 acre/Project area
Size of earth moved area, just project area or access roads to be installed?		no
Any planned fugitive dust controls?		
Onsite equipment usage:		
Generators:		
Number of generators	Generators	N/A
Model and Make		N/A
Fuel type and tank size		N/A
Hours of usage		N/A

Site Summary

Site	Emissions Tab	Main Street (Kent, OH) - Lower Track ¹
Compressors:	Compressors	
Number of compressors		N/A
Model and Make		N/A
Fuel type and tank size		N/A
Hours of usage		N/A
Landscaping:	Construction	
Hydro Seeding?		Yes
Mulching?		No
Tree removal/replacement?		No
Type of equipment?		Hydroseeder
Any planned fugitive dust controls?		Yes
Watering truck?		Yes
How many?		1
Type of Truck?		Pick-up Truck with Water Tank
Any utility crew activities?		Yes
Moving utility lines/corridors?		Yes
Type of utility? In ground/above ground?		UG/FOC

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Main Street (Kent, OH) - Lower Track¹

Emissions Tab		All	Construction Equipment	Fugitives	Concrete	Asphalt	Grinding	Welding	Coatings	Generators	Compressors	Storage Piles
VOC	Max lb/hour	0.82	0.17	-	-	-	-	-	-	-	-	-
	Tons/Year	0.37	0.37	-	-	-	-	-	-	-	-	-
PM2.5	Max lb/hour	3.46	0.11	1.53	-	-	-	-	-	-	-	0.68
	Tons/Year	1.56	0.24	0.69	-	-	-	-	-	-	-	0.63
PM10	Max lb/hour	7.72	0.11	5.79	-	-	-	-	-	-	-	0.68
	Tons/Year	3.47	0.24	2.60	-	-	-	-	-	-	-	0.63
NOx	Max lb/hour	11.61	2.37	-	-	-	-	-	-	-	-	-
	Tons/Year	5.22	5.22	-	-	-	-	-	-	-	-	-
SO2	Max lb/hour	0.38	0.08	-	-	-	-	-	-	-	-	-
	Tons/Year	0.17	0.17	-	-	-	-	-	-	-	-	-
CO	Max lb/hour	7.10	1.45	-	-	-	-	-	-	-	-	-
	Tons/Year	3.20	3.20	-	-	-	-	-	-	-	-	-

Total Days	90
Total Hours	900

Total emissions

Project Site Name: Main Street (Kent, OH) - Lower Track¹

Storage Piles Emissions

Emission factors for storage piles at concrete batch plants are taken from AP-42, Fifth Edition, Section 11.12, Table 11.12-2. Assuming the 3.5 lb/acre/day emission factor is for TSP emissions the wind blown PM10 emissions would be approximately 50% or 1.7 lb/acre day.

Acres of Storage Piles	4.02 acres
Number of Days	90 days
lbs PM10/Year	615.1
tons PM10/Year	0.3
lbs TSP/Year	1266.3
tons TSP/Year	0.6

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Main Street (Kent, OH) - Lower Track¹

CONCRETE BATCH PLANT EMISSION CALCULATIONS

Type of Plant: Central Mix w/pneumatic transfer to storage silos

Amount of Material Processed: 0 cubic yards/year

Emission factors for concrete batch plants are taken from the EPA guidance document AP-42, Fifth Edition, Section 11.12, Table 11.12-2. The permitting database uses the emission factors in lbs/yd³ which assume that a typical cubic yard of concrete is 1.818 kg or 4,000 lbs (containing 500 lbs of cement 1,240 lbs of sand, 1,900 lbs of coarse aggregate, and 360 lbs of water).

Annual Emissions Process	Emission Factor (lbs/yd ³)	Material Processed (yd ³ /yr)	Estimated PM10 Emissions (tons/year)	
Sand and Aggregate Transfer		0.05	0 0	
Pneumatic Unloading to elevated storage Silo		0.07	0 0	
Weigh Hopper Loading		0.04	0 0	
Central Mix - Mixer Loading		0.07	0 0	
Total			<table border="1"><tr><td>0</td></tr></table>	0
0				

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Main Street (Kent, OH) - Lower Track¹

ASPHALT PLANT EMISSION CALCULATIONS

Type: Conventional

Total Production: 0 tons/year
 Hours Operated: 0 hours/year
 Days Opearated: 0 days/year
 Control Equipment:
 Control Efficiency: 0 Percent
 Acres of Storage Piles: 0 acres

Primary emissions consist of particulate matter and amounts of gaseous volatile organics which result from the heating and mixing of the asphalt cement. Criteria pollutants are also emitted from the various types of diesel equipment which are run in conjunction with the asphalt plant such as loaders or generators. This source is subject to an NSPS regulation for particulate emissions. Emission factors for asphalt batching are from section 11.1 of AP-42 Volume I, Fifth Edition, emissions from diesel equipment are from Section 7.2 of AP-42 Volume II.

Asphalt Mixing Emissions

Emission factors from Section 11.1 of AP-42, Fifth Edition, Conventional Asphalt Plant uncontrolled emission factors.

Operating Parameters		Criteria Pollutant Emission Factors					
Operating Hours	Usage	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hr/year	Tons/Year	lb/tons					
0	0.0	0.1	0.0	0.01	4.5E+00	4.5E+00	5.6E-02

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0	0	0	0	0	0
lb/hr	0	0	0	0	0	0
lb/day	0	0	0	0	0	0
ton	0	0	0	0	0	0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Main Street (Kent, OH) - Lower Track¹

Stationary Combustion Engines (Generators)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0	0	0	0	0	0
lb/hr	0	0	0	0	0	0
lb/day	0	0	0	0	0	0
ton	0	0	0	0	0	0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Main Street (Kent, OH) - Lower Track¹

Stationary Combustion Engines (Compressors)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0	0	0	0	0	0
lb/hr	0	0	0	0	0	0
lb/day	0	0	0	0	0	0
ton	0	0	0	0	0	0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Fugitive Emissions from Construction

Project Site Name: Main Street (Kent, OH) - Lower Track¹

Construction Daily Mobilization and Demobilization

Description:

Vehicles and other heavy equipment are needed to travel the roads and construction areas.

Assumptions:

Total Hours Traveled: 10
Total Days Traveled: 90

Vehicle Travel

References:

1. AP-42, Table 13.2.2-2, Unpaved Roads, November 2006, Constants for Equations 1a and 1b for Industrial Roads
2. AP-42, Table 13.2.2-1, Unpaved Roads, November 2006, Typical Silt Content Values of Surface Material on Industrial Unpaved Road
3. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP.

Pollutant	Size-Specific Emission Factor	k-factor	Surface Material Silt Content	a-factor	Mean Vehicle Weight	b-factor	Road Length	Total Road Length Traveled	Control?	Average Control Efficiency	Criteria Pollutant Emissions		
	E	k ¹	s ²	a ¹	W	b ¹	---	---	---	---	lb	lb/hr	lb/day
	lb/VMT	lb/VMT	%	---	tons	---	mi	mi	---	%			
TSP	9.3	4.9	8.5	0.90	25	0.45	0	0	Yes	50	0	0	0
PM ₁₀	2.9	1.5	8.5	0.90	25	0.45	0	0	Yes	50	0	0	0
PM _{2.5}	0.31	0.15	8.5	0.70	25	0.45	0	0	Yes	50	0	0	0

Surface Disturbances

Description:

Land will be disturbed through regrading and surfacing activities.

Assumptions:

Construction Area: 4.02 acres

References:

1. Chapter 13.2.3.3, Heavy Construction Operations, January 1995
2. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP
3. Assume that there are 30 days per month.
4. Dust abatement is used to control emissions utilizing a 50% average controlled emission factor

Pollutant	Road Construction Area	Construction Activity ³	Criteria Pollutant Emissions		
	acres	tons/acre-month ²	lb	lb/hr	lb/day
TSP	4	1.2	14,472	16	161
PM ₁₀	4	0.43	5,210	6	58
PM _{2.5}	4	0.11	1,375	2	15

Total emissions

Project Site Name: Main Street (Kent, OH) - Lower Track
Construction Equipment Emissions

Equipment	Number	HP (Each)	Total Hours Each (per year)	Total Hours (all Equipment)	Load Factor	VOC		NOx		CO		PM10		PM2.5		SO2	
						Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Hydromulching/Seeding ⁴	1	25	900	900	1	0.6	29.8	5	248.0	4.1	203.4	0.45	22.3	0.45	22.3	0.13	6.4
Fuel Truck ⁵		560		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Tractor ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Grader ^{2,5}		533		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Backhoe ^{2,6}	1	124	900	900	1	0.4	98.4	4.5	1107.1	3.7	910.3	0.22	54.1	0.22	54.1	0.12	28.7
Soil Compactor ^{2,5}		173		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
Excavator ^{2,5}	1	513	900	900	1	0.3	305.4	4.5	4580.4	2.6	2646.4	0.15	152.7	0.15	152.7	0.12	118.6
Trenching ^{2,5}		540		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Dump Truck ^{2,5}		505		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Water Truck ^{2,5}	1	505	900	900	1	0.3	300.6	4.5	4508.9	2.6	2605.2	0.15	150.3	0.15	150.3	0.12	116.8
Dozer ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Undercutter ²		200		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
						Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Concrete/Asphalt Trucks ^{2,5}		350			1	1.10E-03	0.0	1.10E-03	0.0	1.10E-02	0.0	0.15	0.0	0.15	0.0	0.12	0.0
LD Truck ^{1,7} Used 10 hours for 4 days	8	350	40	320	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	37.0	0.15	37.0	0.12	28.8
HD Truck ^{1,7} Used 10 hours for 4 days	12	350	40	480	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	55.555556	0.15	55.555556	0.12	43.1592
Total (lbs)							736.8		10447.1		6391.7		472.0		472.0		342.4
Total (lbs/hour)							0.2		2.4		1.5		0.1		0.1		0.1
Total (tons/year)							0.4		5.2		3.2		0.2		0.2		0.2

References:

- All one ton utility trucks are assumed to be diesel, have a 350 hp engine, average of 8 MPG, and 30 MPH. The diesel combustion efficiency is assumed to be 30%. Pickup trucks are assumed to have a 300 hp engine based on Ford F150, average 30 MPH, and 13 MPG. The fuel efficiency is based on the light duty class low end average for 2008.
- Construction equipment horsepower rating are based on Caterpillar equipment such as: Compactor (CAT CS-663E soil compactor); Dump truck (CAT 740 Articulated Truck); Backhoe / frontend loader (CAT 450E Backhoe Loader); Grader (CAT 24M Motor Grader); Track mounted-excavator (CAT385C L Hydraulic Excavator); Dozer (CAT D8T Track-Type Tractor); and Trenching machine (Rivard RIV 500 TR 250 with a CAT Backhoe Loader).
- For fuel and water trucks, truck engines are proposed to be Detroit Diesel MM15 with a horsepower range from 455hp to 560hp. Project assumes mean of 505 hp.
- EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling - Compression - Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
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- Emission Reference EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model, taking the weighted average of vehicle types and simplifying into two categories: Passenger Vehicles & Delivery Trucks.

Site Summary

Site	Emissions Tab	Recreational Trail and W&LE Railroad Bridge (Kent, OH) - Raise Bridge ¹
Estimated total days for construction	All	53 Days
Maximum hours worked per day		8
Seasonal construction activities		1 Construction season shall complete all work
Equipment and Site mobilization and demobilization:	Construction	
How will equipment be brought and removed from the Site		Semi - low boy
Number of trucks to bring personnel and equipment onsite		2 heavy duty utility trucks and 3 regular pickup trucks
How many days will site mobilization and de mobilization take		3 mobilization and 2 demobilization
Concrete/Asphalt Activities :	Concrete	
Concrete mixed on site or offsite?		Offsite
Type of concrete to be used?		Structural - portland cement
Estimated number of concrete trucks coming on site/cubic yards of concrete needed?		86 cy required, 11 truck loads
Will a batch plant be on site?		no
Asphalting any surfaces?	Asphalt	yes
Type of asphalt/cubic yards of asphalt planned?		hot mix asphalt
Estimated number of asphalt trucks?		24 truck loads
Grinding, sanding, braising activities:	Grinding	
How many days of these operations?		Grinding - 4 days
What materials will be sanded/grind/braised?		Concrete and steel
Welding Operations:	Welding	
Type of welding and Number of Welding operations		Arc welding - 1 operation
Track Lowering Activities:	Construction	
Track Lowering process?		Track will be raised
What type of equipment will be used		Caterpillar backhoe loader 420 E and Tamper
How large of an area will be affected?		1100 LF of Track or 0.25 Acres
Length of time?		3 Days
Coatings Usage:	Coatings	
What material will be used in coating?		Emulsified asphalt and concrete curing compound
How will the coating be applied?		Truck sprayer (emulsified asphalt) and hand sprayer (concrete curing compound)
Total coating usage		Emulsified asphalt = 50 gallons and concrete curing compound = 5 gallons
Earth Moving Activities:	Construction	
Type of Earth Moving activities over how many square feet		
Grading (area? Equipment used?)		4,300 sf, Caterpillar D4 bulldozer
Excavating (area? Equipment used?)		4,300 sf, Caterpillar backhoe loader 420E and Mack tri-axle dump truck
Clearing (area? Equipment used?)		4,300 sf, Caterpillar backhoe loader 420 E, Mack tri-axle dump truck and Caterpillar D4 bulldozer
Trenching (area? Equipment used?)		None
Equipment to be used (type, model, size and number of each type/model onsite).		Caterpillar backhoe loader 420 E – 1 onsite, Caterpillar D4 bulldozer – 1 onsite and Mack tri-axle dump truck – 1 onsite.
Fuel type of the equipment and fuel tank size or estimated fuel use		Total amount of fuel to be used onsite estimated to be 2,100 Gallons.
Size of earth moved area, just project area or access roads to be installed?		90605 SF or 2.08 Acres. (LOD limits)
Any planned fugitive dust controls?		None

Site Summary

Site	Emissions Tab	Recreational Trail and W&LE Railroad Bridge (Kent, OH) - Raise Bridge ¹
Onsite equipment usage:		
Generators:		
Number of generators	Generators	1
Model and Make		Briggs and Stratton Elite 8750 Watt - 11 HP
Fuel type and tank size		Gasoline, 5 gallon tank
Hours of usage		32 hours
Compressors:		
Number of compressors	Compressors	1
Model and Make		Ingersoll Rand 10 hp, 120 gallon tank
Fuel type and tank size		Gasoline, 5 gallon tank
Hours of usage		20 hours
Landscaping:		
Hydro Seeding?	Construction	Yes, 1 acre
Mulching?		Yes, 1 acre
Tree removal/replacement?		Tree removal and brush clearing, 0.10 acre
Type of equipment?		Caterpillar D4 bulldozer, Caterpillar backhoe loader 420 E and Mack tri-axle dump truck
Any planned fugitive dust controls?		Yes
Watering truck?		Yes
How many?		1
Type of Truck?		Mack CH612, 2800 gallon tank
Any utility crew activities?		None
Moving utility lines/corridors?		N/A
Type of utility? In ground/above ground?	N/A	

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Recreational Trail and W&LE Railroad Bridge (Kent, OH) - Raise Bridge¹

Emissions Tab		All	Construction Equipment	Fugitives	Concrete	Asphalt	Grinding	Welding	Coatings	Generators	Compressors	Storage Piles
VOC	Max lb/hour	1.02	0.04	-	-	-	-	-	-	0.01	0.01	-
	Tons/Year	0.22	0.22	-	-	-	-	-	-	0.00	0.00	-
PM2.5	Max lb/hour	5.33	0.12	0.99	-	-	0.21	-	-	0.00	0.00	0.44
	Tons/Year	1.13	0.68	0.21	-	-	0.04	-	-	0.00	0.00	0.19
PM10	Max lb/hour	8.09	0.12	3.74	-	-	0.21	-	-	0.00	0.00	0.44
	Tons/Year	1.71	0.68	0.79	-	-	0.04	-	-	0.00	0.00	0.19
NOx	Max lb/hour	14.44	0.52	-	-	-	-	-	-	0.16	0.15	-
	Tons/Year	3.06	3.06	-	-	-	-	-	-	0.00	0.00	-
SO2	Max lb/hour	2.49	0.09	-	-	-	-	-	-	0.00	0.00	-
	Tons/Year	0.53	0.53	-	-	-	-	-	-	0.00	0.00	-
CO	Max lb/hour	8.91	0.32	-	-	-	-	-	-	0.15	0.14	-
	Tons/Year	1.89	1.89	-	-	-	-	-	-	0.00	0.00	-

Total Days	53
Total Hours	424

Total emissions

Project Site Name: Recreational Trail and W&LE Railroad Bridge (Kent, OH) - Raise Bridge¹

Storage Piles Emissions

Emission factors for storage piles at concrete batch plants are taken from AP-42, Fifth Edition, Section 11.12, Table 11.12-2. Assuming the 3.5 lb/acre/day emission factor is for TSP emissions the wind blown PM10 emissions would be approximately 50% or 1.7 lb/acre day.

Acres of Storage Piles	2.08 acres
Number of Days	53 days
lbs PM10/Year	187.4
tons PM10/Year	0.1
lbs TSP/Year	385.8
tons TSP/Year	0.2

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Recreational Trail and W&LE Railroad Bridge (Kent, OH) - Raise Bridge¹

CONCRETE BATCH PLANT EMISSION CALCULATIONS

Type of Plant: Central Mix w/pneumatic transfer to storage silos

Amount of Material Processed: 0 cubic yards/year

Emission factors for concrete batch plants are taken from the EPA guidance document AP-42, Fifth Edition, Section 11.12, Table 11.12-2. The permitting database uses the emission factors in lbs/yd³ which assume that a typical cubic yard of concrete is 1.818 kg or 4,000 lbs (containing 500 lbs of cement 1,240 lbs of sand, 1,900 lbs of coarse aggregate, and 360 lbs of water).

Annual Emissions Process	Emission Factor (lbs/yd ³)	Material Processed (yd ³ /yr)	Estimated PM10 Emissions (tons/yr)	
Sand and Aggregate Transfer		0.05	0 0	
Pneumatic Unloading to elevated storage Silo		0.07	0 0	
Weigh Hopper Loading		0.04	0 0	
Central Mix - Mixer Loading		0.07	0 0	
Total			<table border="1"><tr><td>0</td></tr></table>	0
0				

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Recreational Trail and W&LE Railroad Bridge (Kent, OH) - Raise Bridge¹

ASPHALT PLANT EMISSION CALCULATIONS

Type: Conventional

Total Production: 0 tons/year
 Hours Operated: 0 hours/year
 Days Operated: 0 days/year
 Control Equipment:
 Control Efficiency: 0 Percent
 Acres of Storage Piles: 0 acres

Primary emissions consist of particulate matter and amounts of gaseous volatile organics which result from the heating and mixing of the asphalt cement. Criteria pollutants are also emitted from the various types of diesel equipment which are run in conjunction with the asphalt plant such as loaders or generators. This source is subject to an NSPS regulation for particulate emissions.

Emission factors for asphalt batching are from section 11.1 of AP-42 Volume I, Fifth Edition, emissions from diesel equipment are from Section 7.2 of AP-42 Volume II.

Asphalt Mixing Emissions

Emission factors from Section 11.1 of AP-42, Fifth Edition, Conventional Asphalt Plant uncontrolled emission factors.

Operating Parameters		Criteria Pollutant Emission Factors					
Operating Hours	Usage	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hr/year	Tons/Year	lb/tons					
0	0.0	0.1	0.0	0.01	4.5E+00	4.5E+00	5.6E-02

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0	0	0	0	0	0
lb/hr	0	0	0	0	0	0
lb/day	0	0	0	0	0	0
ton	0	0	0	0	0	0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Recreational Trail and W&LE Railroad Bridge (Kent, OH) - Raise Bridge¹

Grinding Emission Calculations

Hours worked per day: 8

Total days worked: 53

Assumptions:

Grains per dry standard cubic foot of exhaust air: 0.02

Cubic feet per minute: 1200

1 grain = 1/7000 lb

Pollutant	Criteria Pollutant Emissions	
	PM _{2.5}	PM ₁₀
lbs	87.2	87.2
lb/hr	0.2	0.2
lb/day	1.6	1.6
ton	0.04	0.04

Total emissions

Project Site Name: Recreational Trail and W&LE Railroad Bridge (Kent, OH) - Raise Bridge¹

Stationary Combustion Engines (Generators)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
11	32	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	1.6	1.5	0.3	0.0002	0.0002	0.002
lb/hr	0.2	0.2	0.01	0.00001	0.00001	0.00005
lb/day	3.9	3.7	0.2	0.0002	0.0002	0.001
ton	0.0008	0.0007	0.0002	0.0000001	0.0000001	0.0000008

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Recreational Trail and W&LE Railroad Bridge (Kent, OH) - Raise Bridge¹

Stationary Combustion Engines (Compressors)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
10	20	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.9	0.8	0.2	0.0001	0.0001	0.0009
lb/hr	0.1	0.1	0.009	0.000006	0.000006	0.00004
lb/day	3.6	3.4	0.2	0.0001	0.0001	0.001
ton	0.0004	0.0004	0.00009	0.0000001	0.0000001	0.0000004

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Fugitive Emissions from Construction

Project Site Name: Recreational Trail and W&LE Railroad Bridge (Kent, OH) - Raise Bridge¹

Construction Daily Mobilization and Demobilization

Description:

Vehicles and other heavy equipment are needed to travel the roads and construction areas.

Assumptions:

Total Hours Traveled: 8
Total Days Traveled: 53

Vehicle Travel

References:

1. AP-42, Table 13.2.2-2, Unpaved Roads, November 2006, Constants for Equations 1a and 1b for Industrial Roads
2. AP-42, Table 13.2.2-1, Unpaved Roads, November 2006, Typical Silt Content Values of Surface Material on Industrial Unpaved Road
3. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP.

Pollutant	Size-Specific Emission Factor	k-factor	Surface Material Silt Content	a-factor	Mean Vehicle Weight	b-factor	Road Length	Total Road Length Traveled	Control?	Average Control Efficiency	Criteria Pollutant Emissions		
	E	k ¹	s ²	a ¹	W	b ¹	---	---	---	---	lb	lb/hr	lb/day
	lb/VMT	lb/VMT	%	---	tons	---	mi	mi	---	%			
TSP	9.3	4.9	8.5	0.90	25	0.45	0	0	Yes	50	0	0	0
PM ₁₀	2.9	1.5	8.5	0.90	25	0.45	0	0	Yes	50	0	0	0
PM _{2.5}	0.31	0.15	8.5	0.70	25	0.45	0	0	Yes	50	0	0	0

Surface Disturbances

Description:

Land will be disturbed through regrading and surfacing activities.

Assumptions:

Construction Area: 2.08 acres

References:

1. Chapter 13.2.3.3, Heavy Construction Operations, January 1995
2. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP
3. Assume that there are 30 days per month.
4. Dust abatement is used to control emissions utilizing a 50% average controlled emission factor

Pollutant	Road Construction Area	Construction Activity ³	Criteria Pollutant Emissions		
	acres	tons/acre-month ²	lb	lb/hr	lb/day
TSP	2	1.2	4,410	10	83
PM ₁₀	2	0.43	1,587	4	30
PM _{2.5}	2	0.11	419	1	8

Total emissions

Project Site Name: Recreational Trail and W&LE Railroad Bridge (Kent, OH) - Raise Bridge
Construction Equipment Emissions

Equipment	Number	HP (Each)	Total Hours Each (per year)	Total Hours (all Equipment)	Load Factor	VOC		Nox		CO		PM10		PM2.5		SO2	
						Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Hydromulching/Seeding ⁴		25		0	1	0.6	0	5	0	4.1	0	0.45	0	0.45	0	0.13	0
Fuel Truck ⁵		560		0	1	0.3	0	4.5	0	2.6	0	0.15	0	0.15	0	0.12	0
Tractor ^{2,5}		310		0	1	0.3	0	4.5	0	2.6	0	0.15	0	0.15	0	0.12	0
Grader ^{2,5}		533		0	1	0.3	0	4.5	0	2.6	0	0.15	0	0.15	0	0.12	0
Backhoe ^{2,6}	1	124	424	424	1	0.4	46.4	4.5	521.6	3.7	428.9	0.22	25.5	0.22	25.5	0.12	13.5
Soil Compactor ^{2,5}		173		0	1	0.4	0.0	4.5	0	3.7	0	0.22	0	0.22	0	0.12	0
Excavator ^{2,5}	1	513	424	424	1	0.3	143.9	4.5	2157.9	2.6	1246.8	0.15	71.9	0.15	71.9	0.12	55.9
Trenching ^{2,5}		540		0	1	0.3	0.0	4.5	0	2.6	0	0.15	0	0.15	0	0.12	0
Dump Truck ^{2,5}	1	505	424	424	1	0.3	141.6	4.5	2124.2	2.6	1227.3	0.15	70.806878	0.15	70.8	0.12	55.0
Water Truck ^{3,5}	1	505		0	1	0.3	0.0	4.5	0	2.6	0	0.15	0	0.15	0	0.12	0
Dozer ^{2,5}	1	310	424	424	1	0.3	86.9	4.5	1304.0	2.6	753.4	0.15	43.5	0.15	43.5	0.12	33.8
Undercutter ²		200		0	1	0.4	0	4.5	0	3.7	0	0.22	0	0.22	0	0.12	0
Semi - low boy ^{1,7}	1	530	424														0.12
						Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Concrete/Asphalt Trucks ^{1,7} Assumed 8 hrs for 35 days	35	350	280	9800	1	1.10E-03	9.2	1.10E-03	9.2	1.10E-02	92.4	0.15	1134.3	0.15	1134.3	0.12	881.2
LD Truck ^{1,7} Used an 8 hour day for 5 days	3	350	40	120	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	13.888889	0.15	13.888889	0.12	10.7898
HD Truck ^{1,7} Used an 8 hour day for 5 days	2	350	40	80	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	9.2592593	0.15	9.2592593	0.12	7.1932
Total (lbs)							430.6		6119.5		3775.1		1369.1		1369.1		1057.3
Total (lbs/hour)							0.04		0.5		0.3		0.12		0.12		0.09
Total (tons/year)							0.2		3.1		1.9		0.7		0.7		0.53

References:

- All one ton utility trucks are assumed to be diesel, have a 350 hp engine, average of 8 MPG, and 30 MPH. The diesel combustion efficiency is assumed to be 30%. Pickup trucks are assumed to have a 300 hp engine based on Ford F150, average 30 MPH, and 13 MPG. The fuel efficiency is based on the light duty class low end average for 2008.
- Construction equipment horsepower rating are based on Caterpillar equipment such as: Compactor (CAT CS-663E soil compactor); Dump truck (CAT 740 Articulated Truck); Backhoe / front-end loader (CAT 450E Backhoe Loader); Grader (CAT 24M Motor Grader); Track mounted-excavator (CAT385C L Hydraulic Excavator); Dozer (CAT D8T Track-Type Tractor); and Trenching machine (Rivard RIV 500 TR 250 with a CAT Backhoe Loader).
- For fuel and water trucks, truck engines are proposed to be Detroit Diesel MM15 with a horsepower range from 455hp to 560hp. Project assumes mean of 505 hp.
- EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling - Compression - Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- Emission Reference EPA Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A6.
- Emission Reference EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model, taking the weighted average of vehicle types and simplifying into two categories: Passenger Vehicles & Delivery Trucks.

Site Summary

Site	Emissions Tab	NS Railroad Bridge (Ravenna, OH) ¹
Estimated total days for construction	All	60 days
Maximum hours worked per day		10
Seasonal construction activities		Yes
Equipment and Site mobilization and demobilization:		
How will equipment be brought and removed from the Site	Construction	RR/Highway
Number of trucks to bring personnel and equipment onsite		LD-5; HD-10
How many days will site mobilization and demobilization take		4
Concrete/Asphalt Activities :		
Concrete mixed on site or offsite?	Concrete	N/A
Type of concrete to be used?		N/A
Estimated number of concrete trucks coming on site/cubic yards of concrete needed?		N/A
Will a batch plant be on site?		N/A
Asphalting any surfaces?	Asphalt	N/A
Type of asphalt/cubic yards of asphalt planned?		N/A
Estimated number of asphalt trucks?		N/A
Grinding, sanding, braising activities:		
How many days of these operations?	Grinding	N/A
What materials will be sanded/grind/braised?		N/A
Welding Operations:		
Type of welding and Number of Welding operations	Welding	N/A
Track Lowering Activities:		
Track Lowering process?	Construction	Staged Excavation
What type of equipment will be used		Excavator/Loader
How large of an area will be affected?		4.90 Acre
Length of time?		60 days
Coatings Usage:		
What material will be used in coating?	Coatings	N/A
How will the coating be applied?		N/A
Total coating usage		N/A

Site Summary

Site	Emissions Tab	NS Railroad Bridge (Ravenna, OH) ¹
Earth Moving Activities:		
Type of Earth Moving activities over how many square feet	Construction	
Grading (area? Equipment used?)		Excavator/Loader
Excavating (area? Equipment used?)		Excavator/Loader
Clearing (area? Equipment used?)		No
Trenching (area? Equipment used?)		2x2700 LF
Equipment to be used (type, model, size and number of each type/model onsite).		Backhoe
Fuel type of the equipment and fuel tank size or estimated fuel use		Diesel
Size of earth moved area, just project area or access roads to be installed?		4.90 acre/Project Area
Any planned fugitive dust controls?		No
Onsite equipment usage:		
Generators:		
Number of generators	Generators	N/A
Model and Make		N/A
Fuel type and tank size		N/A
Hours of usage		N/A
Compressors:		
Number of compressors	Compressors	N/A
Model and Make		N/A
Fuel type and tank size		N/A
Hours of usage		N/A
Boilers:		
Number of boilers	Boilers	N/A
Model and Make		N/A
Fuel type and tank size		N/A
Hours of usage		N/A

Site Summary

Site	Emissions Tab	NS Railroad Bridge (Ravenna, OH) ¹
Landscaping:		
Hydro Seeding?	Construction	Yes
Mulching?		No
Tree removal/replacement?		No
Type of equipment?		Hydroseeder
Any planned fugitive dust controls?		Yes
Watering truck?		Yes
How many?		1
Type of Truck?		Pick-up Truck with Water Tank
Any utility crew activities?		Yes
Moving utility lines/corridors?		Yes
Type of utility? In ground/above ground?		UG/FOC

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: **NS Railroad Bridge (Ravenna, OH)¹**

Emissions Tab		All	Construction Equipment	Fugitives	Concrete	Asphalt	Grinding	Welding	Coatings	Generators	Compressors	Storage Piles
VOC	Max lb/hour	0.82	0.16	-	-	-	-	-	-	-	-	-
	Tons/Year	0.25	0.25	-	-	-	-	-	-	-	-	-
PM2.5	Max lb/hour	4.11	0.11	1.86	-	-	-	-	-	-	-	0.83
	Tons/Year	1.23	0.16	0.56	-	-	-	-	-	-	-	0.51
PM10	Max lb/hour	9.31	0.11	7.06	-	-	-	-	-	-	-	0.83
	Tons/Year	2.79	0.16	2.12	-	-	-	-	-	-	-	0.51
NOx	Max lb/hour	11.61	2.32	-	-	-	-	-	-	-	-	-
	Tons/Year	3.48	3.48	-	-	-	-	-	-	-	-	-
SO2	Max lb/hour	0.39	0.08	-	-	-	-	-	-	-	-	-
	Tons/Year	0.12	0.12	-	-	-	-	-	-	-	-	-
CO	Max lb/hour	7.12	1.42	-	-	-	-	-	-	-	-	-
	Tons/Year	2.13	2.13	-	-	-	-	-	-	-	-	-

Total Days	60
Total Hours	600

Total emissions

Project Site Name: NS Railroad Bridge (Ravenna, OH)¹

Storage Piles Emissions

Emission factors for storage piles at concrete batch plants are taken from AP-42, Fifth Edition, Section 11.12, Table 11.12-2. Assuming the 3.5 lb/acre/day emission factor is for TSP emissions the wind blown PM10 emissions would be approximately 50% or 1.7 lb/acre day.

Acres of Storage Piles	4.9 acres
Number of Days	60 days
lbs PM10/Year	499.8
tons PM10/Year	0.2
lbs TSP/Year	1029.0
tons TSP/Year	0.5

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: NS Railroad Bridge (Ravenna, OH)¹

CONCRETE BATCH PLANT EMISSION CALCULATIONS

Type of Plant: Central Mix w/pneumatic transfer to storage silos

Amount of Material Processed:

0 cubic yards/year

Emission factors for concrete batch plants are taken from the EPA guidance document AP-42, Fifth Edition, Section 11.12, Table 11.12-2. The permitting database uses the emission factors in lbs/yd³ which assume that a typical cubic yard of concrete is 1,818 kg or 4,000 lbs (containing 500 lbs of cement, 1,240 lbs of sand, 1,900 lbs of coarse aggregate, and 360 lbs of water).

Annual Emissions Process	Emission Factor (lbs/yd ³)	Material Processed (yd ³ /yr)	Estimated PM10 Emissions (tons/yr)
Sand and Aggregate Transfer		0.05	0 0.0
Pneumatic Unloading to elevated storage Silo		0.07	0 0.0
Weigh Hopper Loading		0.04	0 0.0
Central Mix - Mixer Loading		0.07	0 0.0
Total			0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: NS Railroad Bridge (Ravenna, OH)¹

ASPHALT PLANT EMISSION CALCULATIONS

Type: Conventional

Total Production: 0 tons/year

Hours Operated: 0 hours/year

Days Operated: 0 days/year

Control Equipment:

Control Efficiency: 0 Percent

Acres of Storage Piles: 0 acres

Primary emissions consist of particulate matter and amounts of gaseous volatile organics which result from the heating and mixing of the asphalt cement. Criteria pollutants are also emitted from the various types of diesel equipment which are run in conjunction with the asphalt plant such as loaders or generators. This source is subject to an NSPS regulation for particulate emissions.

Emission factors for asphalt batching are from section 11.1 of AP-42 Volume I, Fifth Edition, emissions from diesel equipment are from Section 7.2 of AP-42 Volume I.

Asphalt Mixing Emissions

Emission factors from Section 11.1 of AP-42, Fifth Edition, Conventional Asphalt Plant uncontrolled emission factors.

Operating Parameters		Criteria Pollutant Emission Factors					
Operating Hours	Usage	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hr/year	Tons/Year	lb/tons					
0	0.0	0.1	0.0	0.01	4.5E+00	4.5E+00	5.6E-02

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: NS Railroad Bridge (Ravenna, OH)¹

Stationary Combustion Engines (Generators)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: NS Railroad Bridge (Ravenna, OH)¹

Stationary Combustion Engines (Compressors)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr			lb/MMBTU		
	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Fugitive Emissions from Construction

Project Site Name: NS Railroad Bridge (Ravenna, OH)¹

Construction Daily Mobilization and Demobilization

Description:

Vehicles and other heavy equipment are needed to travel the roads and construction areas.

Assumptions:

Total Hours Traveled: 10
Total Days Traveled: 60

Vehicle Travel

References:

1. AP-42, Table 13.2.2-2, Unpaved Roads, November 2006, Constants for Equations 1a and 1b for Industrial Roads
2. AP-42, Table 13.2.2-1, Unpaved Roads, November 2006, Typical Silt Content Values of Surface Material on Industrial Unpaved Road
3. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP.

Pollutant	Size-Specific Emission Factor	k-factor	Surface Material Silt Content	a-factor	Mean Vehicle Weight	b-factor	Road Length	Total Road Length Traveled	Control?	Average Control Efficiency	Criteria Pollutant Emissions		
	E	k ¹	s ²	a ¹	W	b ¹	---	---	---	---	lb	lb/hr	lb/day
	lb/VMT	lb/VMT	%	---	tons	---	mi	mi	---	%			
TSP	9.3	4.9	8.5	0.90	25	0.45	2	2	Yes	50	9.5	0.0	0.2
PM ₁₀	2.9	1.5	8.5	0.90	25	0.45	2	2	Yes	50	3.0	0.0	0.0
PM _{2.5}	0.31	0.15	8.5	0.70	25	0.45	2	2	Yes	50	0.3	0.0	0.0

Surface Disturbances

Description:

Land will be disturbed through regrading and surfacing activities.

Assumptions:

Construction Area: 4.9 acres

References:

1. Chapter 13.2.3.3, Heavy Construction Operations, January 1995
2. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP
3. Assume that there are 30 days per month.
4. Dust abatement is used to control emissions utilizing a 50% average controlled emission factor

Pollutant	Road Construction Area	Construction Activity ³	Criteria Pollutant Emissions		
	acres	tons/acre-month ²	lb	lb/hr	lb/day
TSP	5	1.2	11,760.0	19.6	196.0
PM ₁₀	5	0.43	4,233.6	7.1	70.6
PM _{2.5}	5	0.11	1,117.2	1.9	18.6

Total emissions

Project Site Name: NS Railroad Bridge (Ravenna, OH)
Construction Equipment Emissions

Equipment	Number	HP (Each)	Total Hours Each (per year)	Total Hours (all Equipment)	Load Factor	VOC		Nox		CO		PM10		PM2.5		SO2	
						Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Hydromulching/Seeding ⁴	1	25	600	600	1	0.6	19.8	5	165.3	4.1	135.6	0.45	14.9	0.45	14.9	0.13	4.3
Fuel Truck ⁵		560		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Tractor ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Grader ^{2,5}		533		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Backhoe ^{2,6}	1	124	600	600	1	0.4	65.6	4.5	738.1	3.7	606.9	0.22	36.1	0.22	36.1	0.12	19.1
Soil Compactor ^{2,5}		173		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
Excavator ^{2,5}	1	513	600	600	1	0.3	203.6	4.5	3053.6	2.6	1764.3	0.15	101.8	0.15	101.8	0.12	79.1
Trenching ^{2,5}		540		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Dump Truck ^{2,5}		505		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Water Truck ^{3,5}	1	505	600	600	1	0.3	200.4	4.5	3006.0	2.6	1736.8	0.15	100.2	0.15	100.2	0.12	77.8
Dozer ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Undercutter ²		200		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
						Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Concrete/Asphalt Trucks ^{2,5}		350		0	1	1.10E-03	0.0	1.10E-03	0.0	1.10E-02	0.0	0.15	0.0	0.15	0.0	0.12	0.0
LD Truck ^{1,7 Used 10 hours for 4 days}	5	350	40	200	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	23.1	0.15	23.1	0.12	18.0
HD Truck ^{1,7 Used 10 hours for 4 days}	10	350	40	400	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	46.3	0.15	46.3	0.12	36.0
Total (lbs)							492.1		6965.6		4269.9		322.4		322.4		234.3
Total (lbs/hour)							0.2		2.3		1.4		0.1		0.1		0.1
Total (tons/year)							0.2		3.5		2.1		0.2		0.2		0.1

References:

- All one ton utility trucks are assumed to be diesel, have a 350 hp engine, average of 8 MPG, and 30 MPH. The diesel combustion efficiency is assumed to be 30%. Pickup trucks are assumed to have a 300 hp engine based on Ford F150, average 30 MPH, and 13 MPG. The fuel efficiency is based on the light duty class low end average for 2008.
- Construction equipment horsepower rating are based on Caterpillar equipment such as: Compactor (CAT CS-663E soil compactor); Dump truck (CAT 740 Articulated Truck); Backhoe / front end loader (CAT 450E Backhoe Loader); Grader (CAT 24M Motor Grader); Track mounted-excavator (CAT385C L Hydraulic Excavator); Dozer (CAT D8T Track-Type Tractor); and Trenching machine
- For fuel and water trucks, truck engines are proposed to be Detroit Diesel MM15 with a horsepower range from 455hp to 560hp. Project assumes mean of 505 hp.
- EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling - Compression - Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- Emission Reference EPA Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A6.
- Emission Reference EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model, taking the weighted average of vehicle types and simplifying into two categories: Passenger Vehicles & Delivery Trucks.

Site Summary

Site	Emissions Tab	Overhead Walkway (Coraopolis, PA) ¹
Estimated total days for construction	All	60 days
Maximum hours worked per day		10
Seasonal construction activities		
Equipment and Site mobilization and demobilization:	Construction	
How will equipment be brought and removed from the Site		Trucks
Number of trucks to bring personnel and equipment onsite		2
How many days will site mobilization and demobilization take		5 each
Concrete/Asphalt Activities :	Concrete	
Concrete mixed on site or offsite?		N/A
Type of concrete to be used?		N/A
Estimated number of concrete trucks coming on site/cubic yards of concrete needed?		N/A
Will a batch plant be on site?		N/A
Asphalting any surfaces?	Asphalt	No
Type of asphalt/cubic yards of asphalt planned?		N/A
Estimated number of asphalt trucks?		N/A
Grinding, sanding, braising activities:	Grinding	
How many days of these operations?		0
What materials will be sanded/grind/braised?		N/A
Welding Operations:	Welding	
Type of welding and Number of Welding operations		N/A
Track Lowering Activities:	Construction	
Track Lowering process?		N/A
What type of equipment will be used		N/A
How large of an area will be affected?		N/A
Length of time?		N/A
Coatings Usage:	Coatings	
What material will be used in coating?		N/A
How will the coating be applied?		N/A
Total coating usage		N/A
Earth Moving Activities:	Construction	
Type of Earth Moving activities over how many square feet		
Grading (area? Equipment used?)		N/A
Excavating (area? Equipment used?)		N/A
Clearing (area? Equipment used?)		N/A
Trenching (area? Equipment used?)		N/A
Equipment to be used (type, model, size and number of each type/model onsite).		N/A
Fuel type of the equipment and fuel tank size or estimated fuel use		N/A
Size of earth moved area, just project area or access roads to be installed?		N/A
Any planned fugitive dust controls?	N/A	
Onsite equipment usage:	Generators	
Generators:		
Number of generators		1
Model and Make		
Fuel type and tank size		Diesel/100 gallons
Hours of usage	100	
Compressors:	Compressors	
Number of compressors		1
Model and Make		
Fuel type and tank size		Diesel/100 gallons
Hours of usage		50

Site Summary

Site	Emissions Tab	Overhead Walkway (Coraopolis, PA) ¹
Landscaping:	Construction	
Hydro Seeding?		N/A
Mulching?		N/A
Tree removal/replacement?		N/A
Type of equipment?		N/A
Any planned fugitive dust controls?		N/A
Watering truck?		N/A
How many?		N/A
Type of Truck?		N/A
Any utility crew activities?		N/A
Moving utility lines/corridors?		N/A
Type of utility? In ground/above ground?		N/A

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Overhead Walkway (Coraopolis, PA)¹

Emissions Tab		All	Construction Equipment	Fugitives	Concrete	Asphalt	Grinding	Welding	Coatings	Generators	Compressors	Storage Piles
VOC	Max lb/hour	0.01	0.02	-	-	-	-	-	-	0.01	0.04	-
	Tons/Year	0.00	0.00	-	-	-	-	-	-	0.00	0.00	-
PM2.5	Max lb/hour	0.04	0.12	-	-	-	-	-	-	0.00	0.00	-
	Tons/Year	0.01	0.01	-	-	-	-	-	-	0.00	0.00	-
PM10	Max lb/hour	0.04	0.12	-	-	-	-	-	-	0.00	0.00	-
	Tons/Year	0.01	0.01	-	-	-	-	-	-	0.00	0.00	-
NOx	Max lb/hour	0.03	0.02	-	-	-	-	-	-	0.16	0.74	-
	Tons/Year	0.01	0.00	-	-	-	-	-	-	0.00	0.01	-
SO2	Max lb/hour	0.03	0.09	-	-	-	-	-	-	0.00	0.00	-
	Tons/Year	0.01	0.01	-	-	-	-	-	-	0.00	0.00	-
CO	Max lb/hour	0.08	0.17	-	-	-	-	-	-	0.15	0.70	-
	Tons/Year	0.02	0.02	-	-	-	-	-	-	0.00	0.01	-

Total Days	60
Total Hours	600

Total emissions

Project Site Name: Overhead Walkway (Coraopolis, PA)¹

Storage Piles Emissions

Emission factors for storage piles at concrete batch plants are taken from AP-42, Fifth Edition, Section 11.12, Table 11.12-2. Assuming the 3.5 lb/acre/day emission factor is for TSP emissions the wind blown PM10 emissions would be approximately 50% or 1.7 lb/acre day.

Acres of Storage Piles	0 acres
Number of Days	0 days
lbs PM10/Year	0.0
tons PM10/Year	0.0
lbs TSP/Year	0.0
tons TSP/Year	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Overhead Walkway (Coraopolis, PA)¹

CONCRETE BATCH PLANT EMISSION CALCULATIONS

Type of Plant: Central Mix w/pneumatic transfer to storage silos

Amount of Material Processed:

0 cubic yards/year

Emission factors for concrete batch plants are taken from the EPA guidance document AP-42, Fifth Edition, Section 11.12, Table 11.12-2. The permitting database uses the emission factors in lbs/yd³ which assume that a typical cubic yard of concrete is 1.818 kg or 4,000 lbs (containing 500 lbs of cement 1,240 lbs of sand, 1,900 lbs of coarse aggregate, and 360 lbs of water).

Annual Emissions Process	Emission Factor (lbs/yd ³)	Material Processed (yd ³ /yr)	Estimated PM10 Emissions (tons/year)
Sand and Aggregate Transfer	0.05	0	0.0
Pneumatic Unloading to elevated storage Silo	0.07	0	0.0
Weigh Hopper Loading	0.04	0	0.0
Central Mix - Mixer Loading	0.07	0	0.0
Total			0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Overhead Walkway (Coraopolis, PA)¹

ASPHALT PLANT EMISSION CALCULATIONS

Type: Conventional

Total Production: 0 tons/year
 Hours Operated: 0 hours/year
 Days Opearated: 0 days/year
 Control Equipment:
 Control Efficiency: 0 Percent
 Acres of Storage Piles: 0 acres

Primary emissions consist of particulate matter and amounts of gaseous volatile organics which result from the heating and mixing of the asphalt cement. Criteria pollutants are also emitted from the various types of diesel equipment which are run in conjunction with the asphalt plant such as loaders or generators. This source is subject to an NSPS regulation for particulate emissions. Emission factors for asphalt batching are from section 11.1 of AP-42 Volume I, Fifth Edition, emissions from diesel equipment are from Section 7.2 of AP-42 Volume II.

Asphalt Mixing Emissions

Emission factors from Section 11.1 of AP-42, Fifth Edition, Conventional Asphalt Plant uncontrolled emission factors.

Operating Parameters		Criteria Pollutant Emission Factors					
Operating Hours	Usage	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hr/year	Tons/Year	lb/tons					
0	0.0	0.1	0.0	0.01	4.5E+00	4.5E+00	5.6E-02

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Overhead Walkway (Coraopolis, PA)¹

Stationary Combustion Engines (Generators)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
11	100	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	4.9	4.6	1.0	0.001	0.001	0.005
lb/hr	0.2	0.2	0.01	0.00001	0.00001	0.00005
lb/day	3.9	3.7	0.2	0.0002	0.0002	0.001
ton	0.0	0.0	0.0	0.0000003	0.0000003	0.000002

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Overhead Walkway (Coraopolis, PA)¹

Stationary Combustion Engines (Compressors)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
50	50	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	11.0	10.4	2.2	0.001	0.001	0.01
lb/hr	0.7	0.7	0.04	0.00003	0.00003	0.0002
lb/day	17.8	16.8	1.0	0.001	0.001	0.005
ton	0.0	0.0	0.0	0.000001	0.000001	0.000005

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Fugitive Emissions from Construction

Project Site Name: Overhead Walkway (Coraopolis, PA)

Construction Daily Mobilization and Demobilization

Description:

Vehicles and other heavy equipment are needed to travel the roads and construction areas.

Assumptions:

Total Hours Traveled: 10
Total Days Traveled: 60

Vehicle Travel

References:

1. AP-42, Table 13.2.2-2, Unpaved Roads, November 2006, Constants for Equations 1a and 1b for Industrial Roads
2. AP-42, Table 13.2.2-1, Unpaved Roads, November 2006, Typical Silt Content Values of Surface Material on Industrial Unpaved Road
3. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM_{10} is estimated to be 36% of TSP and $PM_{2.5}$ is estimated to be 9.5% of TSP.

Pollutant	Size-Specific Emission Factor	k-factor	Surface Material Silt Content	a-factor	Mean Vehicle Weight	b-factor	Road Length	Total Road Length Traveled	Control?	Average Control Efficiency	Criteria Pollutant Emissions		
	E	k^1	s^2	a^1	W	b^1	---	---	---	---	lb	lb/hr	lb/day
	lb/VMT	lb/VMT	%	---	tons	---	mi	mi	---	%			
TSP	9.3	4.9	8.5	0.90	25	0.45	0	0	Yes	50	0.0	0.0	0.0
PM_{10}	2.9	1.5	8.5	0.90	25	0.45	0	0	Yes	50	0.0	0.0	0.0
$PM_{2.5}$	0.31	0.15	8.5	0.70	25	0.45	0	0	Yes	50	0.0	0.0	0.0

Surface Disturbances

Description:

Land will be disturbed through regrading and surfacing activities.

Assumptions:

Construction Area: 0 acres

References:

1. Chapter 13.2.3.3, Heavy Construction Operations, January 1995
2. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM_{10} is estimated to be 36% of TSP and $PM_{2.5}$ is estimated to be 9.5% of TSP
3. Assume that there are 30 days per month.
4. Dust abatement is used to control emissions utilizing a 50% average controlled emission factor

Pollutant	Road Construction Area	Construction Activity ³	Criteria Pollutant Emissions		
	acres	tons/acre-month ²	lb	lb/hr	lb/day
TSP	0.0	1.2	0.0	0.0	0.0
PM_{10}	0.0	0.43	0.0	0.0	0.0
$PM_{2.5}$	0.0	0.11	0.0	0.0	0.0

Total emissions

Project Site Name: Overhead Walkway (Coraopolis, PA)
Construction Equipment Emissions

Equipment	Number	HP (Each)	Total Hours Each (per year)	Total Hours (all Equipment)	Load Factor	VOC		Nox		CO		PM10		PM2.5		SO2	
						Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Hydromulching/Seeding ⁴		25		0	1	0.6	0.0	5	0.0	4.1	0.0	0.45	0.0	0.45	0.0	0.13	0.0
Fuel Truck ⁵		560		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Tractor ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Grader ^{2,5}		533		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Backhoe ^{2,6}		124		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
Soil Compactor ^{2,5}		173		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
Excavator ^{2,5}		513		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Trenching ^{2,5}		540		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Dump Truck ^{2,5}		505		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Water Truck ^{3,5}		505		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Dozer ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Undercutter ²		200		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
						Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Concrete/Asphalt Trucks ^{2,5}		350		0	1	1.10E-03	0.0	1.10E-03	0.0	1.10E-02	0.0	0.15	0.0	0.15	0.0	0.12	0.0
LD Truck ^{1,7}		350		0	1	1.10E-03	0.0	1.10E-03	0.0	1.10E-02	0.0	0.15	0.0	0.15	0.0	0.12	0.0
HD Truck ^{1,7} Used a 10 hour day for 10 day	2	350	100	200	1	1.10E-03	3.3	1.10E-03	3.3	1.10E-02	33.0	0.15	23.1	0.15	23.1	0.12	18.0
Total (lbs)							3.3		3.3		33.0		23.1		23.1		18.0
Total (lbs/hour)							0.0		0.0		0.2		0.1		0.1		0.1
Total (tons/year)							0.0		0.0		0.0		0.0		0.0		0.0

References:

- All one ton utility trucks are assumed to be diesel, have a 350 hp engine, average of 8 MPG, and 30 MPH. The diesel combustion efficiency is assumed to be 30%. Pickup trucks are assumed to have a 300 hp engine based on Ford F150, average 30 MPH, and 13 MPG. The fuel efficiency is based on the light duty class low end average for 2008.
- Construction equipment horsepower rating are based on Caterpillar equipment such as: Compactor (CAT CS-663E soil compactor); Dump truck (CAT 740 Articulated Truck); Backhoe / front end loader (CAT 450E Backhoe Loader); Grader (CAT 24M Motor Grader); Track mounted-excavator (CAT385C L Hydraulic Excavator); Dozer (CAT D8T Track-Type Tractor); and Trenching machine
- For fuel and water trucks, truck engines are proposed to be Detroit Diesel MM15 with a horsepower range from 455hp to 560hp. Project assumes mean of 505 hp.
- EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling - Compression - Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- Emission Reference EPA Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A6.
- Emission Reference EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model, taking the weighted average of vehicle types and simplifying into two categories: Passenger Vehicles & Delivery Trucks.

Site Summary

Site	Emissions Tab	Ohio Central Railroad (McKees Rocks, PA) ¹
Estimated total days for construction	All	180 days
Maximum hours worked per day		10
Seasonal construction activities		
Equipment and Site mobilization and demobilization:	Construction	
How will equipment be brought and removed from the Site		Trucks
Number of trucks to bring personnel and equipment onsite		3 light/3 heavy
How many days will site mobilization and de mobilization take		5 each
Concrete/Asphalt Activities :	Concrete	
Concrete mixed on site or offsite?		offsite
Type of concrete to be used?		Class A/Class C
Estimated number of concrete trucks coming on site/cubic yards of concrete needed?		100 trucks/900 cy
Will a batch plant be on site?		no
Asphalting any surfaces?	Asphalt	no
Type of asphalt/cubic yards of asphalt planned?		N/A
Estimated number of asphalt trucks?		N/A
Grinding, sanding, braising activities:		Grinding
How many days of these operations?	N/A	
What materials will be sanded/grind/braised?	N/A	
Welding Operations:	Welding	
Type of welding and Number of Welding operations		N/A
Track Lowering Activities:	Construction	
Track Lowering process?		N/A
What type of equipment will be used		N/A
How large of an area will be affected?		N/A
Length of time?		N/A
Coatings Usage:	Coatings	
What material will be used in coating?		None onsite
How will the coating be applied?		N/A
Total coating usage		N/A
Earth Moving Activities:	Construction	
Type of Earth Moving activities over how many square feet		
Grading (area? Equipment used?)		20,000 sf - dozer/grader
Excavating (area? Equipment used?)		20,000 sf - back hoe/end loader
Clearing (area? Equipment used?)		0
Trenching (area? Equipment used?)		0
Equipment to be used (type, model, size and number of each type/model onsite).		Unknown
Fuel type of the equipment and fuel tank size or estimated fuel use		Assumed diesel/tank size & use unknown
Size of earth moved area, just project area or access roads to be installed?		Project Area
Any planned fugitive dust controls?		None
Onsite equipment usage:	Generators	
Generators:		
Number of generators		0
Model and Make		N/A
Fuel type and tank size		N/A
Hours of usage	N/A	
Compressors:	Compressors	
Number of compressors		0
Model and Make		N/A
Fuel type and tank size		N/A
Hours of usage		N/A

Site Summary

Site	Emissions Tab	Ohio Central Railroad (McKees Rocks, PA) ¹
Landscaping:	Construction	
Hydro Seeding?		Yes
Mulching?		Yes
Tree removal/replacement?		No
Type of equipment?		N/A
Any planned fugitive dust controls?		No
Watering truck?		N/A
How many?		N/A
Type of Truck?		N/A
Any utility crew activities?		No
Moving utility lines/corridors?		N/A
Type of utility? In ground/above ground?		N/A

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Ohio Central Railroad (McKees Rocks, PA)¹

Emissions Tab		All	Construction Equipment	Fugitives	Concrete	Asphalt	Grinding	Welding	Coatings	Generators	Compressors	Storage Piles
VOC	Max lb/hour	0.34	0.01	-	-	-	-	-	-	-	-	-
	Tons/Year	0.30	0.30	-	-	-	-	-	-	-	-	-
PM2.5	Max lb/hour	6.97	0.11	0.17	-	-	-	-	-	-	-	0.08
	Tons/Year	6.27	5.97	0.16	-	-	-	-	-	-	-	0.14
PM10	Max lb/hour	7.45	0.11	0.66	-	-	-	-	-	-	-	0.08
	Tons/Year	6.71	5.97	0.60	-	-	-	-	-	-	-	0.14
NOx	Max lb/hour	4.33	0.07	-	-	-	-	-	-	-	-	-
	Tons/Year	3.89	3.89	-	-	-	-	-	-	-	-	-
SO2	Max lb/hour	5.14	0.09	-	-	-	-	-	-	-	-	-
	Tons/Year	4.62	4.62	-	-	-	-	-	-	-	-	-
CO	Max lb/hour	3.01	0.05	-	-	-	-	-	-	-	-	-
	Tons/Year	2.71	2.71	-	-	-	-	-	-	-	-	-

Total Days	180
Total Hours	1800

Total emissions

Project Site Name: Ohio Central Railroad (McKees Rocks, PA)¹

Storage Piles Emissions

Emission factors for storage piles at concrete batch plants are taken from AP-42, Fifth Edition, Section 11.12, Table 11.12-2. Assuming the 3.5 lb/acre/day emission factor is for TSP emissions the wind blown PM10 emissions would be approximately 50% or 1.7 lb/acre day.

Acres of Storage Piles	0.46 acres	Grading/excavating area is 20,000 sf
Number of Days	180 days	
lbs PM10/Year	140.8	
tons PM10/Year	0.1	
lbs TSP/Year	289.8	
tons TSP/Year	0.1	

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Ohio Central Railroad (McKees Rocks, PA)¹

CONCRETE BATCH PLANT EMISSION CALCULATIONS

Type of Plant: Central Mix w/pneumatic transfer to storage silos

Amount of Material Processed:

0 cubic yards/year

Concrete is mixed offsite

Emission factors for concrete batch plants are taken from the EPA guidance document AP-42, Fifth Edition, Section 11.12, Table 11.12-2. The permitting database uses the emission factors in lbs/yd³ which assume that a typical cubic yard of concrete is 1.818 kg or 4,000 lbs (containing 500 lbs of cement, 1,240 lbs of sand, 1,900 lbs of coarse aggregate, and 360 lbs of water).

Annual Emissions Process	Emission Factor (lbs/yd ³)	Material Processed (yd ³ /yr)	Estimated PM10 Emissions (tons/year)
Sand and Aggregate Transfer	0.05	0	0.0
Pneumatic Unloading to elevated storage Silo	0.07	0	0.0
Weigh Hopper Loading	0.04	0	0.0
Central Mix - Mixer Loading	0.07	0	0.0
Total			0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Ohio Central Railroad (McKees Rocks, PA)¹

ASPHALT PLANT EMISSION CALCULATIONS

Type: Conventional

Total Production: 0 tons/year
 Hours Operated: 0 hours/year
 Days Opearated: 0 days/year
 Control Equipment:
 Control Efficiency: 0 Percent
 Acres of Storage Piles: 0 acres

Primary emissions consist of particulate matter and amounts of gaseous volatile organics which result from the heating and mixing of the asphalt cement. Criteria pollutants are also emitted from the various types of diesel equipment which are run in conjunction with the asphalt plant such as loaders or generators. This source is subject to an NSPS regulation for particulate emissions. Emission factors for asphalt batching are from section 11.1 of AP-42 Volume I, Fifth Edition, emissions from diesel equipment are from Section 7.2 of AP-42 Volume II.

Asphalt Mixing Emissions

Emission factors from Section 11.1 of AP-42, Fifth Edition, Conventional Asphalt Plant uncontrolled emission factors.

Operating Parameters		Criteria Pollutant Emission Factors					
Operating Hours	Usage	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hr/year	Tons/Year	lb/tons					
0	0.0	0.1	0.0	0.01	4.5E+00	4.5E+00	5.6E-02

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Ohio Central Railroad (McKees Rocks, PA)¹

Stationary Combustion Engines (Generators)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Ohio Central Railroad (McKees Rocks, PA)¹

Stationary Combustion Engines (Compressors)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Fugitive Emissions from Construction

Project Site Name: Ohio Central Railroad (McKees Rocks, PA)

Construction Daily Mobilization and Demobilization

Description:

Vehicles and other heavy equipment are needed to travel the roads and construction areas.

Assumptions:

Total Hours Traveled: 10
Total Days Traveled: 180

Vehicle Travel

References:

1. AP-42, Table 13.2.2-2, Unpaved Roads, November 2006, Constants for Equations 1a and 1b for Industrial Roads
2. AP-42, Table 13.2.2-1, Unpaved Roads, November 2006, Typical Silt Content Values of Surface Material on Industrial Unpaved Road
3. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM_{10} is estimated to be 36% of TSP and $PM_{2.5}$ is estimated to be 9.5% of TSP.

Pollutant	Size-Specific Emission Factor	k-factor	Surface Material Silt Content	a-factor	Mean Vehicle Weight	b-factor	Road Length	Total Road Length Traveled	Control?	Average Control Efficiency	Criteria Pollutant Emissions		
	E	k^1	s^2	a^1	W	b^1	---	---	---	---	lb	lb/hr	lb/day
	lb/VMT	lb/VMT	%	---	tons	---	mi	mi	---	%			
TSP	9.3	4.9	8.5	0.90	25	0.45	0	0	Yes	50	0	0	0
PM_{10}	2.9	1.5	8.5	0.90	25	0.45	0	0	Yes	50	0	0	0
$PM_{2.5}$	0.31	0.15	8.5	0.70	25	0.45	0	0	Yes	50	0	0	0

Surface Disturbances

Description:

Land will be disturbed through regrading and surfacing activities.

Assumptions:

Construction Area: 0.46 acres Grading/excavating area is 20,000 sf

References:

1. Chapter 13.2.3.3, Heavy Construction Operations, January 1995
2. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM_{10} is estimated to be 36% of TSP and $PM_{2.5}$ is estimated to be 9.5% of TSP
3. Assume that there are 30 days per month.
4. Dust abatement is used to control emissions utilizing a 50% average controlled emission factor

Pollutant	Road Construction Area	Construction Activity ³	Criteria Pollutant Emissions		
	acres	tons/acre-month ²	lb	lb/hr	lb/day
TSP	0.5	1.2	3,312.0	1.8	18.4
PM_{10}	0.5	0.43	1,192.3	0.7	6.6
$PM_{2.5}$	0.5	0.11	314.6	0.2	1.7

Total emissions

Project Site Name: Ohio Central Railroad (McKees Rocks, PA)
Construction Equipment Emissions

Equipment	Number	HP (Each)	Total Hours Each (per year)	Total Hours (all Equipment)	Load Factor	VOC		Nox		CO		PM10		PM2.5		SO2	
						Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Hydromulching/Seeding ⁴		25		0	1	0.6	0.0	5	0.0	4.1	0.0	0.45	0.0	0.45	0.0	0.13	0.0
Fuel Truck ⁵		560		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Tractor ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Grader ^{2,5}		533		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Backhoe ^{2,6}	1	124	1800	1800	1	0.4	196.8	4.5	2214.3	3.7	1820.6	0.22	108.3	0.22	108.3	0.12	57.3
Soil Compactor ^{2,5}		173		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
Excavator ^{2,5}		513		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Trenching ^{2,5}		540		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Dump Truck ^{2,5}		505		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Water Truck ^{4,5}		505		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Dozer ^{2,5}	1	310	1800	1800	1	0.3	369.0	4.5	5535.7	2.6	3198.4	0.15	184.5	0.15	184.5	0.12	143.4
Undercutter ²		200		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
						Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Concrete/Asphalt Trucks ^{1,7} Assumed 10 hour day for 100 days	100	350	1000	100000	1	1.10E-03	33.0	1.10E-03	33.0	1.10E-02	330.0	0.15	11574.1	0.15	11574.1	0.12	8991.5
LD Truck ^{1,7} Used a 10 hour day for 10 days	3	350	100	300	1	1.10E-03	3.3	1.10E-03	3.3	1.10E-02	33.0	0.15	34.7	0.15	34.7	0.12	27.0
HD Truck ^{1,7} Used a 10 hour day for 10 days	3	350	100	300	1	1.10E-03	3.3	1.10E-03	3.3	1.10E-02	33.0	0.15	34.7	0.15	34.7	0.12	27.0
Total (lbs)							605.5		7789.6		5415.0		11936.3		11936.3		9246.1
Total (lbs/hour)							0.01		0.1		0.1		0.1		0.1		0.1
Total (tons/year)							0.3		3.9		2.7		6.0		6.0		4.6

References:

- All one ton utility trucks are assumed to be diesel, have a 350 hp engine, average of 8 MPG, and 30 MPH. The diesel combustion efficiency is assumed to be 30%. Pickup trucks are assumed to have a 300 hp engine based on Ford F150, average 30 MPH, and 13 MPG. The fuel efficiency is based on the light duty class low end average for 2008.
- Construction equipment horsepower rating are based on Caterpillar equipment such as: Compactor (CAT CS-663E soil compactor); Dump truck (CAT 740 Articulated Truck); Backhoe / front-end loader (CAT 450E Backhoe Loader); Grader (CAT 24M Motor Grader); Track mounted-excavator (CAT385C L Hydraulic Excavator); Dozer (CAT D8T Track-Type Tractor); and Trenching machine (Rivard RIV 500 TR 250 with a CAT 540Hp Backhoe Loader).
- For fuel and water trucks, truck engines are proposed to be Detroit Diesel MM15 with a horsepower range from 455hp to 560hp. Project assumes mean of 505 hp.
- EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling - Compression - Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- Emission Reference EPA Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A6.
- Emission Reference EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model, taking the weighted average of vehicle types and simplifying into two categories: Passenger Vehicles & Delivery Trucks.

Site Summary

Site	Emissions Tab	Chartiers Creek (Pittsburgh, PA) ¹
Estimated total days for construction	All	60 days
Maximum hours worked per day		10
Seasonal construction activities		
Equipment and Site mobilization and demobilization:		
How will equipment be brought and removed from the Site	Construction	Trucks
Number of trucks to bring personnel and equipment onsite		2
How many days will site mobilization and demobilization take		5 each
Concrete/Asphalt Activities :		
Concrete mixed on site or offsite?	Concrete	N/A
Type of concrete to be used?		N/A
Estimated number of concrete trucks coming on site/cubic yards of concrete needed?		N/A
Will a batch plant be on site?		N/A
Asphalting any surfaces?	Asphalt	no
Type of asphalt/cubic yards of asphalt planned?		N/A
Estimated number of asphalt trucks?		N/A
Grinding, sanding, braising activities:		
How many days of these operations?	Grinding	3
What materials will be sanded/grind/braised?		Remaining portions of 3/2" knee brace connection plates to be ground flush to verticals and low chord members
Welding Operations:		
Type of welding and Number of Welding operations	Welding	SMAW, SAW, FCAW or GMAW / groove weld at butt joint / 6 locations (4 – 14" long and 2 – 22" long welds)
Track Lowering Activities:		
Track Lowering process?	Construction	N/A
What type of equipment will be used		N/A
How large of an area will be affected?		N/A
Length of time?		N/A
Coatings Usage:		
What material will be used in coating?	Coatings	
How will the coating be applied?		
Total coating usage		
Earth Moving Activities:		
Type of Earth Moving activities over how many square feet	Construction	
Grading (area? Equipment used?)		N/A
Excavating (area? Equipment used?)		N/A
Clearing (area? Equipment used?)		N/A
Trenching (area? Equipment used?)		N/A
Equipment to be used (type, model, size and number of each type/model onsite).		N/A
Fuel type of the equipment and fuel tank size or estimated fuel use		N/A
Size of earth moved area, just project area or access roads to be installed?		N/A
Any planned fugitive dust controls?		N/A
Onsite equipment usage:		
Generators:	Generators	
Number of generators		1
Model and Make		
Fuel type and tank size		diesel/100 gallons
Hours of usage	100	
Compressors:	Compressors	
Number of compressors		1
Model and Make		
Fuel type and tank size		diesel/100 gallons
Hours of usage	50	

Site Summary

Site	Emissions Tab	Chartiers Creek (Pittsburgh, PA) ¹
Landscaping:	Construction	
Hydro Seeding?		N/A
Mulching?		N/A
Tree removal/replacement?		N/A
Type of equipment?		N/A
Any planned fugitive dust controls?		N/A
Watering truck?		N/A
How many?		N/A
Type of Truck?		N/A
Any utility crew activities?		N/A
Moving utility lines/corridors?		N/A
Type of utility? In ground/above ground?		N/A

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Chartiers Creek (Pittsburgh, PA)¹

Emissions Tab		All	Construction Equipment	Fugitives	Concrete	Asphalt	Grinding	Welding	Coatings	Generators	Compressors	Storage Piles
VOC	Max lb/hour	0.01	0.00	-	-	-	-	-	-	0.01	0.04	-
	Tons/Year	0.00	0.00	-	-	-	-	-	-	0.00	0.00	-
PM2.5	Max lb/hour	6.91	0.12	-	-	-	0.21	-	-	0.00	0.00	-
	Tons/Year	2.07	0.01	-	-	-	0.06	-	-	1.00	1.00	-
PM10	Max lb/hour	0.24	0.12	-	-	-	0.21	-	-	0.00	0.00	-
	Tons/Year	0.07	0.01	-	-	-	0.06	-	-	0.00	0.00	-
NOx	Max lb/hour	0.03	Yes	-	-	-	-	-	-	0.16	0.74	-
	Tons/Year	0.01	0.00	-	-	-	-	-	-	0.00	0.01	-
SO2	Max lb/hour	0.03	0.09	-	-	-	-	-	-	0.00	0.00	-
	Tons/Year	0.01	0.01	-	-	-	-	-	-	0.00	0.00	-
CO	Max lb/hour	0.08	0.17	-	-	-	-	-	-	0.15	0.70	-
	Tons/Year	0.02	0.02	-	-	-	-	-	-	0.00	0.01	-

Total Days	60
Total Hours	600

Total emissions

Project Site Name: Chartiers Creek (Pittsburgh, PA)¹

Storage Piles Emissions

Emission factors for storage piles at concrete batch plants are taken from AP-42, Fifth Edition, Section 11.12, Table 11.12-2. Assuming the 3.5 lb/acre/day emission factor is for TSP emissions the wind blown PM10 emissions would be approximately 50% or 1.7 lb/acre day.

Acres of Storage Piles	0 acres
Number of Days	60 days
lbs PM10/Year	0.0
tons PM10/Year	0.0
lbs TSP/Year	0.0
tons TSP/Year	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Chartiers Creek (Pittsburgh, PA)¹

CONCRETE BATCH PLANT EMISSION CALCULATIONS

Type of Plant: Central Mix w/pneumatic transfer to storage silos

Amount of Material Processed:

0 cubic yards/year

Emission factors for concrete batch plants are taken from the EPA guidance document AP-42, Fifth Edition, Section 11.12, Table 11.12-2. The permitting database uses the emission factors in lbs/yd³ which assume that a typical cubic yard of concrete is 1.818 kg or 4,000 lbs (containing 500 lbs of cement, 1,240 lbs of sand, 1,900 lbs of coarse aggregate, and 360 lbs of water).

Annual Emissions Process	Emission Factor (lbs/yd ³)	Material Processed (yd ³ /yr)	Estimated PM10 Emissions (tons/year)
Sand and Aggregate Transfer	0.05	0	0.0
Pneumatic Unloading to elevated storage Silo	0.07	0	0.0
Weigh Hopper Loading	0.04	0	0.0
Central Mix - Mixer Loading	0.07	0	0.0
Total			0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Chartiers Creek (Pittsburgh, PA)¹

ASPHALT PLANT EMISSION CALCULATIONS

Type: Conventional
 Total Production: 0 tons/year
 Hours Operated: 0 hours/year
 Days Operated: 0 days/year
 Control Equipment:
 Control Efficiency: 0 Percent
 Acres of Storage Piles: 0 acres

Primary emissions consist of particulate matter and amounts of gaseous volatile organics which result from the heating and mixing of the asphalt cement. Criteria pollutants are also emitted from the various types of diesel equipment which are run in conjunction with the asphalt plant such as loaders or generators. This source is subject to an NSPS regulation for particulate emissions. Emission factors for asphalt batching are from section 11.1 of AP-42 Volume I, Fifth Edition, emissions from diesel equipment are from Section 7.2 of AP-42 Volume I, Fifth Edition.

Asphalt Mixing Emissions
 Emission factors from Section 11.1 of AP-42, Fifth Edition, Conventional Asphalt Plant uncontrolled emission factors.

Operating Parameters		Criteria Pollutant Emission Factors					
Operating Hours	Usage	NOx	CO	VOC	1	PM _{2.5}	SO ₂
hr/year	Tons/Year	lb/tons					
0	0.0	0.1	0.0	0.01	4.5E+00	4.5E+00	5.6E-02

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Chartiers Creek (Pittsburgh, PA)¹

Grinding Emission Calculations

Hours worked per day: 10

Total days worked: 60

Assumptions:

Grains per dry standard cubic foot of exhaust air: 0.02

Cubic feet per minute: 1200

1 grain = 1/7000 lb

Pollutant	Criteria Pollutant Emissions	
	PM _{2.5}	PM ₁₀
lbs	123.4	123.4
lb/hr	0.2	0.2
lb/day	2.1	2.1
ton	0.1	0.1

Total emissions

Project Site Name: Chartiers Creek (Pittsburgh, PA)¹

Stationary Combustion Engines (Generators)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
11	100	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	4.9	4.6	1.0	0.0	0.0	0.0
lb/hr	0.2	0.2	0.0	0.0	0.0	0.0
lb/day	3.9	3.7	0.2	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	1.0	0.0

Footnotes

Cells filled with yellow are input values from information received from AECOM

Cells filled with red are data gaps

Green text notes questions and/or assumptions for input values

⁴ Taken from General Conformity Project Activity Memo provided by Darren Kredel (AECOM)

Total emissions

Project Site Name: Chartiers Creek (Pittsburgh, PA)¹

Stationary Combustion Engines (Compressors)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
50	50	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	11.0	10.4	2.2	0.0	0.0	0.0
lb/hr	0.7	0.7	0.0	0.0	0.0	0.0
lb/day	17.8	16.8	1.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	1.0	0.0

Footnotes

Cells filled with yellow are input values from information received from AECOM

Cells filled with red are data gaps

Green text notes questions and/or assumptions for input values

⁴ Taken from General Conformity Project Activity Memo provided by Darren Kredel (AECOM)

Total emissions

Fugitive Emissions from Construction

Project Site Name: Chartiers Creek (Pittsburgh, PA)

Construction Daily Mobilization and Demobilization

Description:

Vehicles and other heavy equipment are needed to travel the roads and construction areas.

Assumptions:

Total Hours Traveled: 10

Total Days Traveled: 60

Vehicle Travel

References:

1. AP-42, Table 13.2.2-2, Unpaved Roads, November 2006, Constants for Equations 1a and 1b for Industrial Roads
2. AP-42, Table 13.2.2-1, Unpaved Roads, November 2006, Typical Silt Content Values of Surface Material on Industrial Unpaved Road
3. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM_{10} is estimated to be 36% of TSP and $PM_{2.5}$ is estimated to be 9.5% of TSP.

Pollutant	Size-Specific Emission Factor	k-factor	Surface Material Silt Content	a-factor	1	b-factor	Road Length	Total Road Length Traveled	Control?	Average Control Efficiency	Criteria Pollutant Emissions		
	E	k^1	s^2	a^1	W	b^1	---	---	---	---	lb	lb/hr	lb/day
	lb/VMT	lb/VMT	%	---	tons	---	mi	mi	---	%			
TSP	9.3	4.9	8.5	0.90	25	0.45	0	0	Yes	50	0.0	0.0	0.0
PM_{10}	2.9	1.5	8.5	0.90	25	0.45	0	0	Yes	50	0.0	0.0	0.0
$PM_{2.5}$	0.31	0.15	8.5	0.70	25	0.45	0	0	Yes	50	0.0	0.0	0.0

Surface Disturbances

Description:

Land will be disturbed through regrading and surfacing activities.

Assumptions:

Construction Area: 0 acres

References:

1. Chapter 13.2.3.3, Heavy Construction Operations, January 1995
2. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM_{10} is estimated to be 36% of TSP and $PM_{2.5}$ is estimated to be 9.5% of TSP
3. Assume that there are 30 days per month.
4. Dust abatement is used to control emissions utilizing a 50% average controlled emission factor

Pollutant	Road Construction Area	Construction Activity ³	Criteria Pollutant Emissions		
	acres	tons/acre-month ²	lb	lb/hr	lb/day
TSP	0.0	1.2	0.0	0.0	0.0
PM_{10}	0.0	0.43	0.0	0.0	0.0
$PM_{2.5}$	0.0	0.11	0.0	0.0	0.0

Total emissions

Project Site Name: Chartiers Creek (Pittsburgh, PA)
Construction Equipment Emissions

Equipment	Number	HP (Each)	Total Hours Each (per year)	Total Hours (all Equipment)	Load Factor	VOC		Nox		CO		PM10		PM2.5		SO2	
						Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Hydromulching/Seeding ⁴		25		0	1	0.6	0.0	5	0.0	4.1	0.0	0.45	0.0	0.45	0.0	0.13	0.0
Fuel Truck ⁵		560		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Tractor ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Grader ^{2,5}		533		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Backhoe ^{2,6}		124		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
Soil Compactor ^{2,5}		173		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
Excavator ^{2,5}		513		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Trenching ^{2,5}		540		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Dump Truck ^{2,5}		505		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Water Truck ^{3,5}		505		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Dozer ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Undercutter ²		200		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
						Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Concrete/Asphalt Trucks ^{2,5}		350		0	1	1.10E-03	0.0	1.10E-03	0.0	1.10E-02	0.0	0.15	0.0	0.15	0.0	0.12	0.0
LD Truck ^{1,7} Used a 10 hour day for 10 days		350		0	1	1.10E-03	0.0	1.10E-03	0.0	1.10E-02	0.0	0.15	0.0	0.15	0.0	0.12	0.0
HD Truck ^{1,7} Used a 10 hour day for 10 days	2	350	100	200	1	1.10E-03	3.3	1.10E-03	3.3	1.10E-02	33.0	0.15	23.1	0.15	23.1	0.12	18.0
Total (lbs)							3.3		3.3		33.0		23.1		23.1		18.0
Total (lbs/hour)			8.5				0.0	0.0	Yes	50.0	0.2		0.1		0.1		0.1
Total (tons/year)							0.0		0.0		0.0		0.0		0.0		0.0

References:

1. All one ton utility trucks are assumed to be diesel, have a 350 hp engine, average of 8 MPG, and 30 MPH. The diesel combustion efficiency is assumed to be 30%. Pickup trucks are assumed to have a 300 hp engine based on Ford F150, average 30 MPH, and 13 MPG. The fuel efficiency is based on the light duty class low end average for 2008.
2. Construction equipment horsepower rating are based on Caterpillar equipment such as: Compactor (CAT CS-663E soil compactor); Dump truck (CAT 740 Articulated Truck); Backhoe / front end loader (CAT 450E Backhoe Loader); Grader (CAT 24M Motor Grader); Track mounted-excavator (CAT385C L Hydraulic Excavator); Dozer (CAT D8T Track-Type Tractor); and Trenching machine
3. For fuel and water trucks, truck engines are proposed to be Detroit Diesel MM15 with a horsepower range from 455hp to 560hp. Project assumes mean of 505 hp.
4. EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling - Compression - Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
5. Emission Reference EPA Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A6.
6. Emission Reference EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
7. The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model, taking the weighted average of vehicle types and simplifying into two categories: Passenger Vehicles & Delivery Trucks.

Site Summary

Site	Emissions Tab	Smithfield Street (Pittsburgh, PA) ¹
Estimated total days for construction	All	60 days
Maximum hours worked per day		10
Seasonal construction activities		Yes
Equipment and Site mobilization and demobilization:		
How will equipment be brought and removed from the Site	Construction	RR/Highway
Number of trucks to bring personnel and equipment onsite		LD-4; HD-10
How many days will site mobilization and de mobilization take		4
Concrete/Asphalt Activities :		
Concrete mixed on site or offsite?	Concrete	N/A
Type of concrete to be used?		N/A
Estimated number of concrete trucks coming on site/cubic yards of concrete needed?		N/A
Will a batch plant be on site?		N/A
Asphalting any surfaces?	Asphalt	N/A
Type of asphalt/cubic yards of asphalt planned?		N/A
Estimated number of asphalt trucks?		N/A
Grinding, sanding, braising activities:		
How many days of these operations?	Grinding	N/A
What materials will be sanded/grind/braised?		N/A
Welding Operations:		
Type of welding and Number of Welding operations	Welding	None
Track Lowering Activities:		
Track Lowering process?	Construction	Undercutter
What type of equipment will be used		Excavator/Loader
How large of an area will be affected?		4.9 acre
Length of time?		60
Coatings Usage:		
What material will be used in coating?	Coatings	N/A
How will the coating be applied?		N/A
Total coating usage		N/A
Earth Moving Activities:		
Type of Earth Moving activities over how many square feet	Construction	Excavator/Loader
Grading (area? Equipment used?)		Excavator/Loader
Excavating (area? Equipment used?)		No
Clearing (area? Equipment used?)		2x2700 LF
Trenching (area? Equipment used?)		Backhoe
Equipment to be used (type, model, size and number of each type/model onsite).		Diesel
Fuel type of the equipment and fuel tank size or estimated fuel use		4.90/Project Area
Size of earth moved area, just project area or access roads to be installed?		No
Any planned fugitive dust controls?		
Onsite equipment usage:		
Generators:		
Number of generators	Generators	N/A
Model and Make		N/A
Fuel type and tank size		N/A
Hours of usage		N/A
Compressors:		
Number of compressors	Compressors	N/A
Model and Make		N/A
Fuel type and tank size		N/A
Hours of usage		N/A

Site Summary

Site	Emissions Tab	Smithfield Street (Pittsburgh, PA) ¹
Landscaping:	Construction	
Hydro Seeding?		Yes
Mulching?		No
Tree removal/replacement?		No
Type of equipment?		
Any planned fugitive dust controls?		Yes
Watering truck?		Yes
How many?		1
Type of Truck?		
Any utility crew activities?		Yes
Moving utility lines/corridors?		Yes
Type of utility? In ground/above ground?		UG/FOC

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: **Smithfield Street (Pittsburgh, PA)¹**

Emissions Tab		All	Construction Equipment	Fugitives	Concrete	Asphalt	Grinding	Welding	Coatings	Generators	Compressors	Storage Piles
VOC	Max lb/hour	0.96	0.20	-	-	-	-	-	-	-	-	-
	Tons/Year	0.29	0.29	-	-	-	-	-	-	-	-	-
PM2.5	Max lb/hour	4.18	0.12	1.86	-	-	-	-	-	-	-	0.83
	Tons/Year	1.25	0.18	0.56	-	-	-	-	-	-	-	0.51
PM10	Max lb/hour	9.37	0.12	7.06	-	-	-	-	-	-	-	0.83
	Tons/Year	2.81	0.18	2.12	-	-	-	-	-	-	-	0.51
NOx	Max lb/hour	13.32	2.70	-	-	-	-	-	-	-	-	-
	Tons/Year	4.00	4.00	-	-	-	-	-	-	-	-	-
SO2	Max lb/hour	0.43	0.09	-	-	-	-	-	-	-	-	-
	Tons/Year	0.13	0.13	-	-	-	-	-	-	-	-	-
CO	Max lb/hour	8.52	1.73	-	-	-	-	-	-	-	-	-
	Tons/Year	2.56	2.56	-	-	-	-	-	-	-	-	-

Total Days	60
Total Hours	600

Total emissions

Project Site Name: Smithfield Street (Pittsburgh, PA)¹

Storage Piles Emissions

Emission factors for storage piles at concrete batch plants are taken from AP-42, Fifth Edition, Section 11.12, Table 11.12-2. Assuming the 3.5 lb/acre/day emission factor is for TSP emissions the wind blown PM10 emissions would be approximately 50% or 1.7 lb/acre day.

Acres of Storage Piles	4.9 acres
Number of Days	60 days
lbs PM10/Year	499.8
tons PM10/Year	0.2
lbs TSP/Year	1029.0
tons TSP/Year	0.5

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Smithfield Street (Pittsburgh, PA)¹

CONCRETE BATCH PLANT EMISSION CALCULATIONS

Type of Plant: Central Mix w/pneumatic transfer to storage silos

Amount of Material Processed:

0 cubic yards/year

Emission factors for concrete batch plants are taken from the EPA guidance document AP-42, Fifth Edition, Section 11.12, Table 11.12-2. The permitting database uses the emission factors in lbs/yd³ which assume that a typical cubic yard of concrete is 1.818 kg or 4,000 lbs (containing 500 lbs of cement 1,240 lbs of sand, 1,900 lbs of coarse aggregate, and 360 lbs of water).

Annual Emissions Process	Emission Factor (lbs/yd ³)	Material Processed (yd ³ /yr)	Estimated PM10 Emissions (tons/year)
Sand and Aggregate Transfer	0.05	0	0.0
Pneumatic Unloading to elevated storage Silo	0.07	0	0.0
Weigh Hopper Loading	0.04	0	0.0
Central Mix - Mixer Loading	0.07	0	0.0
Total			0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Smithfield Street (Pittsburgh, PA)¹

ASPHALT PLANT EMISSION CALCULATIONS

Type: Conventional
 Total Production: 0 tons/year
 Hours Operated: 0 hours/year
 Days Operated: 0 days/year
 Control Equipment:
 Control Efficiency 0 Percent
 Acres of Storage Piles: 0 acres

Primary emissions consist of particulate matter and amounts of gaseous volatile organics which result from the heating and mixing of the asphalt cement. Criteria pollutants are also emitted from the various types of diesel equipment which are run in conjunction with the asphalt plant such as loaders or generators. This source is subject to an NSPS regulation for particulate emissions. Emission factors for asphalt batching are from section 11.1 of AP-42 Volume I, Fifth Edition, emissions from diesel equipment are from Section 7.2 of AP-42 Volum

Asphalt Mixing Emissions
 Emission factors from Section 11.1 of AP-42, Fifth Edition, Conventional Asphalt Plant uncontrolled emission factors.

Operating Parameters		Criteria Pollutant Emission Factors					
Operating Hours	Usage	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hr/year	Tons/Year	lb/tons					
0	0.0	0.1	0.0	0.01	4.5E+00	4.5E+00	5.6E-02

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Smithfield Street (Pittsburgh, PA)¹

Stationary Combustion Engines (Generators)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Smithfield Street (Pittsburgh, PA)¹

Stationary Combustion Engines (Compressors)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Fugitive Emissions from Construction

Project Site Name: Smithfield Street (Pittsburgh, PA)¹

Construction Daily Mobilization and Demobilization

Description:

Vehicles and other heavy equipment are needed to travel the roads and construction areas.

Assumptions:

Total Hours Traveled: 10
Total Days Traveled: 60

Vehicle Travel

References:

1. AP-42, Table 13.2.2-2, Unpaved Roads, November 2006, Constants for Equations 1a and 1b for Industrial Roads
2. AP-42, Table 13.2.2-1, Unpaved Roads, November 2006, Typical Silt Content Values of Surface Material on Industrial Unpaved Road
3. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP.

Pollutant	Size-Specific Emission Factor	k-factor	Surface Material Silt Content	a-factor	Mean Vehicle Weight	b-factor	Road Length	Total Road Length Traveled	Control?	Average Control Efficiency	Criteria Pollutant Emissions		
	E	k ¹	s ²	a ¹	W	b ¹	---	---	---	---	lb	lb/hr	lb/day
	lb/VMT	lb/VMT	%	---	tons	---	mi	mi	---	%			
TSP	9.3	4.9	8.5	0.90	25	0.45	0	0	yes	50	0.0	0.0	0.0
PM ₁₀	2.9	1.5	8.5	0.90	25	0.45	0	0	yes	50	0.0	0.0	0.0
PM _{2.5}	0.31	0.15	8.5	0.70	25	0.45	0	0	yes	50	0.0	0.0	0.0

Surface Disturbances

Description:

Land will be disturbed through regrading and surfacing activities.

Assumptions:

Construction Area: 4.9 acres

References:

1. Chapter 13.2.3.3, Heavy Construction Operations, January 1995
2. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP
3. Assume that there are 30 days per month.
4. Dust abatement is used to control emissions utilizing a 50% average controlled emission factor

Pollutant	Road Construction Area	Construction Activity ³	Criteria Pollutant Emissions		
	acres	tons/acre-month ²	lb	lb/hr	lb/day
TSP	5	1.2	11,760.0	19.6	196.0
PM ₁₀	5	0.43	4,233.6	7.1	70.6
PM _{2.5}	5	0.11	1,117.2	1.9	18.6

Total emissions

Project Site Name: Smithfield Street (Pittsburgh, PA)
Construction Equipment Emissions

Equipment	Number	HP (Each)	Total Hours Each (per year)	Total Hours (all Equipment)	Load Factor	VOC		Nox		CO		PM10		PM2.5		SO2	
						Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Hydromulching/Seeding ⁴		25		0	1	0.6	0.0	5	0.0	4.1	0.0	0.45	0.0	0.45	0.0	0.13	0.0
Fuel Truck ⁵		560		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Tractor ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Grader ^{2,5}		533		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Backhoe ^{2,6}	1	124	600	600	1	0.4	65.6	4.5	738.1	3.7	606.9	0.22	36.1	0.22	36.1	0.12	19.1
Soil Compactor ^{2,5}		173		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
Excavator ^{2,5}	1	513	600	600	1	0.3	203.6	4.5	3053.6	2.6	1764.3	0.15	101.8	0.15	101.8	0.12	79.1
Trenching ^{2,5}		540		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Dump Truck ^{2,5}		505		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Water Truck ^{3,5}	1	505	600	600	1	0.3	200.4	4.5	3006.0	2.6	1736.8	0.15	100.2	0.15	100.2	0.12	77.8
Dozer ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Undercutter ²	1	200	600	600	1	0.4	105.8	4.5	1190.5	3.7	978.8	0.22	58.2	0.22	58.2	0.12	30.8
						Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Concrete/Asphalt Trucks ^{2,5}		350		0	1	1.10E-03	0.0	1.10E-03	0.0	1.10E-02	0.0	0.15	0.0	0.15	0.0	0.12	0.0
LD Truck ^{1,7} Used an 10 hour day for 4 days	4	350	40	160	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	18.518519	0.15	18.518519	0.12	14.3864
HD Truck ^{1,7} Used an 10 hour day for 4 days	10	350	40	400	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	46.296296	0.15	46.296296	0.12	35.966
Total (lbs)							578.0		7990.7		5113.2		361.1		361.1		257.2
Total (lbs/hour)							0.2		2.7		1.7		0.1		0.1		0.1
Total (tons/year)							0.3		4.0		2.6		0.2		0.2		0.1

References:

- All one ton utility trucks are assumed to be diesel, have a 350 hp engine, average of 8 MPG, and 30 MPH. The diesel combustion efficiency is assumed to be 30%. Pickup trucks are assumed to have a 300 hp engine based on Ford F150, average 30 MPH, and 13 MPG. The fuel efficiency is based on the light duty class low end average for 2008.
- Construction equipment horsepower rating are based on Caterpillar equipment such as: Compactor (CAT CS-663E soil compactor); Dump truck (CAT 740 Articulated Truck); Backhoe / front end loader (CAT 450E Backhoe Loader); Grader (CAT 24M Motor Grader); Track mounted-excavator (CAT385C L Hydraulic Excavator); Dozer (CAT D8T Track-Type Tractor); and Trenching machine
- For fuel and water trucks, truck engines are proposed to be Detroit Diesel MM15 with a horsepower range from 455hp to 560hp. Project assumes mean of 505 hp.
- EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling - Compression - Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- Emission Reference EPA Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A6.
- Emission Reference EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model, taking the weighted average of vehicle types and simplifying into two categories: Passenger Vehicles & Delivery Trucks.

Site Summary

Site	Emissions Tab	J&L Tunnel (Pittsburgh, PA) ¹
Estimated total days for construction	All	515 days
Maximum hours worked per day		10
Seasonal construction activities		
Equipment and Site mobilization and demobilization:	Construction	
How will equipment be brought and removed from the Site		Trucks
Number of trucks to bring personnel and equipment onsite		5 light duty and 7 heavy duty
How many days will site mobilization and de mobilization take		5 (mobilization) and 5 (demobilization)
Concrete/Asphalt Activities :	Concrete	
Concrete mixed on site or offsite?		offsite
Type of concrete to be used?		Class A/Class C
Estimated number of concrete trucks coming on site/cubic yards of concrete needed?		125 trucks/1150 cy concrete
Will a batch plant be on site?		no
Asphalting any surfaces?		yes
Type of asphalt/cubic yards of asphalt planned?	Asphalt	approximately 70 cy
Estimated number of asphalt trucks?		7
Grinding, sanding, braising activities:		
How many days of these operations?	Grinding	0
What materials will be sanded/grind/braised?		N/A
Welding Operations:	Welding	
Type of welding and Number of Welding operations		N/A
Track Lowering Activities:	Construction	
Track Lowering process?		N/A
What type of equipment will be used		N/A
How large of an area will be affected?		N/A
Length of time?		N/A
Coatings Usage:	Coatings	
What material will be used in coating?		None
How will the coating be applied?		N/A
Total coating usage		N/A

Site Summary

Site	Emissions Tab	J&L Tunnel (Pittsburgh, PA) ¹
Earth Moving Activities:	Construction	
Type of Earth Moving activities over how many square feet		
Grading (area? Equipment used?)		APPROX. 144,870 SF – MOTOR GRADER / DOZER
Excavating (area? Equipment used?)		APPROX. 144,870 SF – EXCAVATOR / END LOADERS
Clearing (area? Equipment used?)		0 – AREA IS CURRENTLY LANDSCAPED.
Trenching (area? Equipment used?)		0
Equipment to be used (type, model, size and number of each type/model onsite).		Unknown during design
Fuel type of the equipment and fuel tank size or estimated fuel use		Assumed diesel/tank size & use unknown
Size of earth moved area, just project area or access roads to be installed?		Project Area
Any planned fugitive dust controls?		Yes
Onsite equipment usage:	Generators	
Generators:		
Number of generators		3
Model and Make		
Fuel type and tank size		diesel/100 gallons
Hours of usage		2000
Compressors:	Compressors	
Number of compressors		3
Model and Make		
Fuel type and tank size		diesel/100 gallons
Hours of usage	1000	
Landscaping:	Construction	
Hydro Seeding?		Yes
Mulching?		Yes
Tree removal/replacement?		Yes
Type of equipment?		Work Truck/Back Hoe
Any planned fugitive dust controls?		Yes
Watering truck?		Yes
How many?		5/day
Type of Truck?		unknown
Any utility crew activities?		No
Moving utility lines/corridors?	No	
Type of utility? In ground/above ground?	N/A	

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: **J&L Tunnel (Pittsburgh, PA)¹**

Emissions Tab		All	Construction Equipment	Fugitives	Concrete	Asphalt	Grinding	Welding	Coatings	Generators	Compressors	Storage Piles
VOC	Max lb/hour	1.69	0.04	-	-	-	-	NOx		0.01	0.13	-
	Tons/Year	4.36	4.27	-	-	-	-	-		0.03	0.07	-
PM2.5	Max lb/hour	7.20	0.12	1.27	-	-	-	-	-	0.00	0.00	0.57
	Tons/Year	18.54	12.28	3.26	-	-	-	-	-	0.00	0.00	3.00
PM10	Max lb/hour	10.73	0.12	4.80	-	-			-	0.00	0.00	0.57
	Tons/Year	27.63	12.28	12.35	-	-			-	0.00	0.00	3.00
NOx	Max lb/hour	24.61	0.61	-	-	-	-	-	-	0.16	0.66	-
	Tons/Year	63.36	62.89	-	-	-	-	-	-	0.15	0.33	-
SO2	Max lb/hour	3.70	0.09	-	-	-	-	-	-	0.00	0.00	-
	Tons/Year	9.52	9.52	-	-	-	-	-	-	0.00	0.00	-
CO	Max lb/hour	14.59	0.36	-	-	-	-	-	-	0.15	0.63	-
	Tons/Year	37.57	37.12	-	-	-	-	-	-	0.14	0.31	-

Total Days	515
Total Hours	5150

Total emissions

Project Site Name: J&L Tunnel (Pittsburgh, PA)¹

Storage Piles Emissions

Emission factors for storage piles at concrete batch plants are taken from AP-42, Fifth Edition, Section 11.12, Table 11.12-2. Assuming the 3.5 lb/acre/day emission factor is for TSP emissions the wind blown PM10 emissions would be approximately 50% or 1.7 lb/acre day.

Acres of Storage Piles	3.33 acres	Excavating/grading area
Number of Days	515 days	
lbs PM10/Year	2915.4	
tons PM10/Year	1.5	
lbs TSP/Year	6002.3	
tons TSP/Year	3.0	

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: J&L Tunnel (Pittsburgh, PA)¹

CONCRETE BATCH PLANT EMISSION CALCULATIONS

Type of Plant: Central Mix w/pneumatic transfer to storage silos

Amount of Material Processed:

0 cubic yards/year

Concrete is mixed offsite

Emission factors for concrete batch plants are taken from the EPA guidance document AP-42, Fifth Edition, Section 11.12, Table 11.12-2. The permitting database uses the emission factors in lbs/yd³ which assume that a typical cubic yard of concrete is 1.818 kg or 4,000 lbs (containing 500 lbs of cement, 1,240 lbs of sand, 1,900 lbs of coarse aggregate, and 360 lbs of water).

Annual Emissions Process	Emission Factor (lbs/yd ³)	Material Processed (yd ³ /yr)	Estimated PM10 Emissions (tons/year)
Sand and Aggregate Transfer	0.05	0	0.0
Pneumatic Unloading to elevated storage Silo	0.07	0	0.0
Weigh Hopper Loading	0.04	0	0.0
Central Mix - Mixer Loading	0.07	0	0.0
Total			0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: J&L Tunnel (Pittsburgh, PA)¹

ASPHALT PLANT EMISSION CALCULATIONS

NOx

Type: Conventional
 Total Production: 0 tons/year
 Hours Operated: 0 hours/year
 Days Operated: 0 days/year
 Control Equipment:
 Control Efficiency: 0 Percent
 Acres of Storage Piles: 0 acres

Primary emissions consist of particulate matter and amounts of gaseous volatile organics which result from the heating and mixing of the asphalt cement. Criteria pollutants are also emitted from the various types of diesel equipment which are run in conjunction with the asphalt plant such as loaders or generators. This source is subject to an NSPS regulation for particulate emissions. Emission factors for asphalt batching are from section 11.1 of AP-42 Volume I, Fifth Edition, emissions from diesel equipment are from Section 7.2 of AP-42 Volum

Asphalt Mixing Emissions
 Emission factors from Section 11.1 of AP-42, Fifth Edition, Conventional Asphalt Plant uncontrolled emission factors.

Operating Parameters		Criteria Pollutant Emission Factors					
Operating Hours	Usage	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hr/year	Tons/Year	lb/tons					
0	0.0	0.1	0.0	0.01	4.5E+00	4.5E+00	5.6E-02

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: J&L Tunnel (Pittsburgh, PA)¹

Stationary Combustion Engines (Generators)

NOx

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
11	6,000	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

3 Generators at
2,000 hours each

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	291.0	275.0	57.7	0.0	0.0	0.3
lb/hr	0.2	0.2	0.0	0.0	0.0	0.0
lb/day	3.9	3.7	0.2	0.0	0.0	0.0
ton	0.1	0.1	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: J&L Tunnel (Pittsburgh, PA)¹

Stationary Combustion Engines (Compressors)

NOx

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
50	3,000	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

3 compressors at
1,000 hours each

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	661.4	625.0	131.1	0.1	0.1	0.7
lb/hr	0.7	0.6	0.1	0.0	0.0	0.0
lb/day	1.8	1.7	0.4	0.0	0.0	0.0
ton	0.3	0.3	0.1	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Fugitive Emissions from Construction

Project Site Name: J&L Tunnel (Pittsburgh, PA)¹

Construction Daily Mobilization and Demobilization

NOx

Description:

Vehicles and other heavy equipment are needed to travel the roads and construction areas.

Assumptions:

Total Hours Traveled: 10
Total Days Traveled: 515

Vehicle Travel

References:

1. AP-42, Table 13.2.2-2, Unpaved Roads, November 2006, Constants for Equations 1a and 1b for Industrial Roads
2. AP-42, Table 13.2.2-1, Unpaved Roads, November 2006, Typical Silt Content Values of Surface Material on Industrial Unpaved Road
3. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP.

Pollutant	Size-Specific Emission Factor	k-factor	Surface Material Silt Content	a-factor	Mean Vehicle Weight	b-factor	Road Length	Fu	Control?	Average Control Efficiency	Criteria Pollutant Emissions		
	E	k ¹	s ²	a ¹	W	b ¹	---	---	---	---	lb	lb/hr	lb/day
	lb/VMT	lb/VMT	%	---	tons	---	mi	mi	---	%			
TSP	9.3	4.9	8.5	0.90	25	0.45	0	0	Yes	50	0.0	0.0	0.0
PM ₁₀	2.9	1.5	8.5	0.90	25	0.45	0	0	Yes	50	0.0	0.0	0.0
PM _{2.5}	0.31	0.15	8.5	0.70	25	0.45	0	0	Yes	50	0.0	0.0	0.0

Surface Disturbances

Description:

Land will be disturbed through regrading and surfacing activities.

Assumptions:

Construction Area: 3.33 acres

References:

1. Chapter 13.2.3.3, Heavy Construction Operations, January 1995
2. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP
3. Assume that there are 30 days per month.
4. Dust abatement is used to control emissions utilizing a 50% average controlled emission factor

Pollutant	Road Construction Area	Construction Activity ³	Criteria Pollutant Emissions		
	acres	tons/acre-month ²	lb	lb/hr	lb/day
TSP	3	1.2	68,598.0	13.3	133.2
PM ₁₀	3	0.43	24,695.3	4.8	48.0
PM _{2.5}	3	0.11	6,516.8	1.3	12.7

Total emissions

Project Site Name: J&L Tunnel (Pittsburgh, PA)¹
Construction Equipment Emissions

Equipment	Number	HP (Each)	Total Hours Each (per year)	Total Hours (all Equipment)	Load Factor	VOC		NOx		CO		PM10		PM2.5		SO2	
						Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Hydromulching/Seeding ⁴		25		0	1	0.6	0.0	5	0.0	4.1	0.0	0.45	0.0	0.45	0.0	0.13	0.0
Fuel Truck ⁵		560		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Tractor ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Grader ^{2,5}		533		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Backhoe ^{2,6}	1	124	3650	3650	1	0.4	399.1	4.5	4490.1	3.7	3691.8	0.22	219.5	0.22	219.5	0.12	116.3
Soil Compactor ^{2,5}		173		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
Excavator ^{2,5}	1	513	3650	3650	1	0.3	1238.4	4.5	18575.9	2.6	10732.7	0.15	619.2	0.15	619.2	0.12	481.0
Trenching ^{2,5}		540		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Dump Truck ^{2,5}		505		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Water Truck ^{3,5}	5	505	3650	18250	1	0.3	6095.4	4.5	91431.1	2.6	52826.8	0.15	3047.7	0.15	3047.7	0.12	2367.7
Dozer ^{2,5}	1	310	3650	3650	1	0.3	748.3	4.5	11225.2	2.6	6485.7	0.15	374.2	0.15	374.2	0.12	290.7
Undercutter ²		200		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
						Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Concrete/Asphalt Trucks ^{2,5} Assumed 10 hrs for 132 days	132	350	1320	174240	1	1.10E-03	43.6	1.10E-03	43.6	1.10E-02	435.6	0.15	20166.7	0.15	20166.7	0.12	15666.8
LD Truck ^{1,7} Used 10 hour days for 10 days	5	350	100	500	1	1.10E-03	3.3	1.10E-03	3.3	1.10E-02	33.0	0.15	57.9	0.15	57.9	0.12	45.0
HD Truck ^{1,7} Used 10 hour days for 10 days	7	350	100	700	1	1.10E-03	3.3	1.10E-03	3.3	1.10E-02	33.0	0.15	81.0	0.15	81.0	0.12	62.9
Total (lbs)							8531.4		125772.4		74238.7		24566.1		24566.1		19030.3
Total (lbs/hour)							0.0		0.6		0.4		0.1		0.1		0.1
Total (tons/year)							4.3		62.9		37.1		12.3		12.3		9.5

References:

- All one ton utility trucks are assumed to be diesel, have a 350 hp engine, average of 8 MPG, and 30 MPH. The diesel combustion efficiency is assumed to be 30%. Pickup trucks are assumed to have a 300 hp engine based on Ford F150, average 30 MPH, and 13 MPG. The fuel efficiency is based on the light duty class low end average for 2008.
- Construction equipment horsepower rating are based on Caterpillar equipment such as: Compactor (CAT CS-663E soil compactor); Dump truck (CAT 740 Articulated Truck); Backhoe / frontend loader (CAT 450E Backhoe Loader); Grader (CAT 24M Motor Grader); Track mounted-excavator (CAT385C L Hydraulic Excavator); Dozer (CAT D8T Track-Type Tractor); and Trenching machine (Rivard RIV 500 TR 250 with a CAT
- For fuel and water trucks, truck engines are proposed to be Detroit Diesel MM15 with a horsepower range from 455hp to 560hp. Project assumes mean of 505 hp.
- EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling - Compression - Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
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- Emission Reference EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model, taking the weighted average of vehicle types and simplifying into two categories: Passenger Vehicles & Delivery Trucks.

Site Summary

Site	Emissions Tab	Walnut Street (McKeesport, PA) ¹
Estimated total days for construction	All	60 days
Maximum hours worked per day		10
Seasonal construction activities		Yes
Equipment and Site mobilization and demobilization:		
How will equipment be brought and removed from the Site	Construction	trucks
Number of trucks to bring personnel and equipment onsite		LD-4; HD-10
How many days will site mobilization and de mobilization take		4
Concrete/Asphalt Activities :		
Concrete mixed on site or offsite?	Concrete	N/A
Type of concrete to be used?		N/A
Estimated number of concrete trucks coming on site/cubic yards of concrete needed?		N/A
Will a batch plant be on site?		N/A
Asphalting any surfaces?		N/A
Type of asphalt/cubic yards of asphalt planned?	Asphalt	N/A
Estimated number of asphalt trucks?		N/A
Grinding, sanding, braising activities:		
How many days of these operations?	Grinding	N/A
What materials will be sanded/grind/braised?		N/A
Welding Operations:		
Type of welding and Number of Welding operations	Welding	N/A
Track Lowering Activities:		
Track Lowering process?	Construction	Undercutter
What type of equipment will be used		RR Undercutter
How large of an area will be affected?		9,000 sy
Length of time?		10
Coatings Usage:		
What material will be used in coating?	Coatings	N/A
How will the coating be applied?		N/A
Total coating usage		N/A

Site Summary

Site	Emissions Tab	Walnut Street (McKeesport, PA) ¹
Earth Moving Activities:	Construction	
Type of Earth Moving activities over how many square feet		
Grading (area? Equipment used?)		Excavator/Loader
Excavating (area? Equipment used?)		RR Undercutter
Clearing (area? Equipment used?) Trenching (area? Equipment used?)		No
Equipment to be used (type, model, size and number of each type/model onsite).		
Fuel type of the equipment and fuel tank size or estimated fuel use		Diesel
Size of earth moved area, just project area or access roads to be installed?		
Any planned fugitive dust controls?		No
Onsite equipment usage:		
Generators:	Generators	
Number of generators		N/A
Model and Make		N/A
Fuel type and tank size		N/A
Hours of usage		N/A
Compressors:	Compressors	
Number of compressors		N/A
Model and Make		N/A
Fuel type and tank size		N/A
Hours of usage		N/A
Landscaping:	Construction	
Hydro Seeding?		Yes
Mulching?		No
Tree removal/replacement?		No
Type of equipment?		
Any planned fugitive dust controls?		Yes
Watering truck?		Yes
How many?		1
Type of Truck?		
Any utility crew activities?		Yes
Moving utility lines/corridors?	Yes	
Type of utility? In ground/above ground?	UG/FOC	

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Walnut Street (McKeesport, PA)¹

Emissions Tab		All	Construction Equipment	Fugitives	Concrete	Asphalt	Grinding	Welding	Coatings	Generators	Compressors	Storage Piles
VOC	Max lb/hour	0.85	0.22	-	-	-	-	-	-	-	-	-
	Tons/Year	0.26	0.26	-	-	-	-	-	-	-	-	-
PM2.5	Max lb/hour	0.63	0.14	0.08	-	-	-	-	-	-	-	0.01
	Tons/Year	0.19	0.16	0.02	-	-	-	-	-	-	-	0.00
PM10	Max lb/hour	0.86	0.14	0.30	-	-	-	-	-	-	-	0.01
	Tons/Year	0.26	0.16	0.09	-	-	-	-	-	-	-	0.00
NOx	Max lb/hour	12.09	3.07	-	-	-	-	-	-	-	-	-
	Tons/Year	3.63	3.63	-	-	-	-	-	-	-	-	-
SO2	Max lb/hour	0.40	0.10	-	-	-	-	-	-	-	-	-
	Tons/Year	0.12	0.12	-	-	-	-	-	-	-	-	-
CO	Max lb/hour	7.51	1.91	-	-	-	-	-	-	-	-	-
	Tons/Year	2.25	2.25	-	-	-	-	-	-	-	-	-

Total Days	60
Total Hours	600

Total emissions

Project Site Name: Walnut Street (McKeesport, PA)¹

Storage Piles Emissions

Emission factors for storage piles at concrete batch plants are taken from AP-42, Fifth Edition, Section 11.12, Table 11.12-2. Assuming the 3.5 lb/acre/day emission factor is for TSP emissions the wind blown PM10 emissions would be approximately 50% or 1.7 lb/acre day.

Acres of Storage Piles	0.21 acres
Number of Days	10 days
lbs PM10/Year	3.6
tons PM10/Year	0.002
lbs TSP/Year	7.4
tons TSP/Year	0.004

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Walnut Street (McKeesport, PA)¹

CONCRETE BATCH PLANT EMISSION CALCULATIONS

Type of Plant: Central Mix w/pneumatic transfer to storage silos

Amount of Material Processed: 0 cubic yards/year

Emission factors for concrete batch plants are taken from the EPA guidance document AP-42, Fifth Edition, Section 11.12, Table 11.12-2. The permitting database uses the emission factors in lbs/yd³ which assume that a typical cubic yard of concrete is 1.818 kg or 4,000 lbs (containing 500 lbs of cement, 1,240 lbs of sand, 1,900 lbs of coarse aggregate, and 360 lbs of water).

Annual Emissions Process	Emission Factor (lbs/yd ³)	Material Processed (yd ³ /yr)	Estimated PM10 Emissions (tons/year)
Sand and Aggregate Transfer	0.05	0	0.0
Pneumatic Unloading to elevated storage Silo	0.07	0	0.0
Weigh Hopper Loading	0.04	0	0.0
Central Mix - Mixer Loading	0.07	0	0.0
Total			0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Walnut Street (McKeesport, PA)¹

ASPHALT PLANT EMISSION CALCULATIONS

Type: Conventional
 Total Production: 0 tons/year
 Hours Operated: 0 hours/year
 Days Operated: 0 days/year
 Control Equipment:
 Control Efficiency 0 Percent
 Acres of Storage Piles: 0 acres

Primary emissions consist of particulate matter and amounts of gaseous volatile organics which result from the heating and mixing of the asphalt cement. Criteria pollutants are also emitted from the various types of diesel equipment which are run in conjunction with the asphalt plant such as loaders or generators. This source is subject to an NSPS regulation for particulate emissions. Emission factors for asphalt batching are from section 11.1 of AP-42 Volume I, Fifth Edition, emissions from diesel equipment are from Section 7.2 of AP-42 Volum

Asphalt Mixing Emissions
 Emission factors from Section 11.1 of AP-42, Fifth Edition, Conventional Asphalt Plant uncontrolled emission factors.

Operating Parameters		Criteria Pollutant Emission Factors					
Operating Hours	Usage	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hr/year	Tons/Year	lb/tons					
0	0.0	0.1	0.0	0.01	4.5E+00	4.5E+00	5.6E-02

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Walnut Street (McKeesport, PA)¹

Stationary Combustion Engines (Generators)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Project Site Name: Walnut Street (McKeesport, PA)¹

Stationary Combustion Engines (Compressors)

Basis:

1. NOx and CO emission factors are based on Caterpillar Technical Specification Sheet for G3516-DM-8541-00 Gas Petroleum Engine, which consumes gas at a rate of 7407 BTU/bhp-hr at 100% load.
2. All other Criteria Pollutant emission factors are based on EPA AP-42, Ch 3.2, Table 3.2-2.

Operating Parameters			Criteria Pollutant Emission Factors ^{1&2}					
Horsepower	Operating Hours	Load Factor	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
hp	hr/year	---	g/hp-hr		lb/MMBTU			
	0	1.0	2.0	1.9	0.12	7.7E-05	7.7E-05	5.9E-04

Pollutant	Criteria Pollutant Emissions					
	NOx	CO	VOC	PM ₁₀	PM _{2.5}	SO ₂
lbs	0.0	0.0	0.0	0.0	0.0	0.0
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0
lb/day	0.0	0.0	0.0	0.0	0.0	0.0
ton	0.0	0.0	0.0	0.0	0.0	0.0

Footnotes

¹Information provided from design engineer (AECOM or URS).

Total emissions

Fugitive Emissions from Construction

Project Site Name: Walnut Street (McKeesport, PA)¹

Construction Daily Mobilization and Demobilization

Description:

Vehicles and other heavy equipment are needed to travel the roads and construction areas.

Assumptions:

Total Hours Traveled: 10
Total Days Traveled: 60

Vehicle Travel

References:

1. AP-42, Table 13.2.2-2, Unpaved Roads, November 2006, Constants for Equations 1a and 1b for Industrial Roads
2. AP-42, Table 13.2.2-1, Unpaved Roads, November 2006, Typical Silt Content Values of Surface Material on Industrial Unpaved Road
3. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP.

Pollutant	Size-Specific Emission Factor	k-factor	Surface Material Silt Content	a-factor	Mean Vehicle Weight	b-factor	Road Length	Total Road Length Traveled	Control?	Average Control Efficiency	Criteria Pollutant Emissions		
	E	k ¹	s ²	a ¹	W	b ¹	---	---	---	---	lb	lb/hr	lb/day
	lb/VMT	lb/VMT	%	---	tons	---	mi	mi	---	%			
TSP	9.3	4.9	8.5	0.90	25	0.45	0	0	Yes	50	0.0	0.0	0.0
PM ₁₀	2.9	1.5	8.5	0.90	25	0.45	0	0	Yes	50	0.0	0.0	0.0
PM _{2.5}	0.31	0.15	8.5	0.70	25	0.45	0	0	Yes	50	0.0	0.0	0.0

Surface Disturbances

Description:

Land will be disturbed through regrading and surfacing activities.

Assumptions:

Construction Area: 0.21 acres

References:

1. Chapter 13.2.3.3, Heavy Construction Operations, January 1995
2. Per AP-42, Section 13.2.2, Unpaved Roads, November 2006, PM₁₀ is estimated to be 36% of TSP and PM_{2.5} is estimated to be 9.5% of TSP
3. Assume that there are 30 days per month.
4. Dust abatement is used to control emissions utilizing a 50% average controlled emission factor

Pollutant	Road Construction Area	Construction Activity ³	Criteria Pollutant Emissions		
	acres	tons/acre-month ²	lb	lb/hr	lb/day
TSP	0.2	1.2	504.0	0.8	8.4
PM ₁₀	0.2	0.43	181.4	0.3	3.0
PM _{2.5}	0.2	0.11	47.9	0.1	0.8

Total emissions

Project Site Name: Walnut Street (McKeesport, PA)
Construction Equipment Emissions

Equipment	Number	HP (Each)	Total Hours Each (per year)	Total Hours (all Equipment)	Load Factor	VOC		Nox		CO		PM10		PM2.5		SO2	
						Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Hydromulching/Seeding ⁴		25		0	1	0.6	0.0	5	0.0	4.1	0.0	0.45	0.0	0.45	0.0	0.13	0.0
Fuel Truck ⁵		560		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Tractor ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Grader ^{2,5}		533		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Backhoe ^{2,6}		124		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
Soil Compactor ^{2,5}		173		0	1	0.4	0.0	4.5	0.0	3.7	0.0	0.22	0.0	0.22	0.0	0.12	0.0
Excavator ^{2,5}	1	513	600	600	1	0.3	203.6	4.5	3053.6	2.6	1764.3	0.15	101.8	0.15	101.8	0.12	79.1
Trenching ^{2,5}		540		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Dump Truck ^{2,5}		505		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Water Truck ^{3,5}	1	505	600	600	1	0.3	200.4	4.5	3006.0	2.6	1736.8	0.15	100.2	0.15	100.2	0.12	77.8
Dozer ^{2,5}		310		0	1	0.3	0.0	4.5	0.0	2.6	0.0	0.15	0.0	0.15	0.0	0.12	0.0
Undercutter ²	1	200	600	600	1	0.4	105.8	4.5	1190.5	3.7	978.8	0.22	58.2	0.22	58.2	0.12	30.8
						Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (lbs/mile)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs	Emission Factor (g/bhp-hr)	Lbs
Concrete/Asphalt Trucks ^{2,5}		350		0	1	1.10E-03	0.0	1.10E-03	0.0	1.10E-02	0.0	0.15	0.0	0.15	0.0	0.12	0.0
LD Truck ^{1,7} Used a 10 hour day for 4 day:	4	350	40	160	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	18.5	0.15	18.5	0.12	14.4
HD Truck ^{1,7} Used a 10 hour day for 4 day:	10	350	40	400	1	1.10E-03	1.3	1.10E-03	1.3	1.10E-02	13.2	0.15	46.3	0.15	46.3	0.12	36.0
Total (lbs)							512.4		7252.6		4506.3		325.0		325.0		238.1
Total (lbs/hour)							0.2		3.1		1.9		0.1		0.1		0.1
Total (tons/year)							0.3		3.6		2.3		0.2		0.2		0.1

References:

- All one ton utility trucks are assumed to be diesel, have a 350 hp engine, average of 8 MPG, and 30 MPH. The diesel combustion efficiency is assumed to be 30%. Pickup trucks are assumed to have a 300 hp engine based on Ford F150, average 30 MPH, and 13 MPG. The fuel efficiency is based on the light duty class low end average for 2008.
- Construction equipment horsepower rating are based on Caterpillar equipment such as: Compactor (CAT CS-663E soil compactor); Dump truck (CAT 740 Articulated Truck); Backhoe / front end loader (CAT 450E Backhoe Loader); Grader (CAT 24M Motor Grader); Track mounted-excavator (CAT385C L Hydraulic Excavator); Dozer (CAT D8T Track-Type Tractor); and Trenching machine
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- Emission Reference EPA Exhaust and crankcase Emission Factors for Nonroad Engine Modeling-- Compression- Ignition EPA 420-P-04-009 Revised April 2004, Table A.2 Page A5
- The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model, taking the weighted average of vehicle types and simplifying into two categories: Passenger Vehicles & Delivery Trucks.