



**US Army Corps  
of Engineers®**  
New York District

---

**WESTCHESTER COUNTY STREAMS,  
BYRAM RIVER BASIN  
FLOOD RISK MANAGEMENT FEASIBILITY STUDY  
FAIRFIELD COUNTY, CONNECTICUT AND WESTCHESTER COUNTY, NEW YORK  
FINAL INTEGRATED FEASIBILITY REPORT &  
ENVIRONMENTAL IMPACT STATEMENT**

**APPENDIX A.8:  
General Conformity Analysis**

**RECORD OF NON-APPLICABILITY (RONA)**

Project Name: Byram River Flood Risk Management Study  
Reference: General Conformity Analysis (prepared by CDM Smith – 2018)

Project/Action Point of Contact: Kimberly Rightler, Project Biologist

Begin Date: October 2021

End Date: September 2023

1. The project described above has been evaluated for Section 176 of the Clean Air Act. Project related emissions associated with the federal action were estimated to evaluate the applicability of General Conformity regulations (40CFR§93 Subpart B).
2. The requirements of this rule do not apply because the total direct and indirect emissions from this project are significantly less than the 100 tons trigger levels for NO<sub>x</sub>, CO, and PM<sub>2.5</sub> and less than 50 tons for VOCs for each project year (40CFR§93.153(b)(1) & (2)). The estimated total annual NO<sub>x</sub> emissions for the project is 0.462 tons, estimated total annual emissions for CO is 0.653 and the total annual emissions of VOC and PM<sub>2.5</sub>, are all at or less than 0.50 tons per year for the project (see attached estimates).
3. The project is presumed to conform with the General Conformity requirements and is exempted from Subpart B under 40CFR§93.153(c)(1).

WEPLER.PETE : Digitally signed by  
WEPLER.PETER.M.122864  
R.M.122864735 7353  
3 Date: 2019.06.04 09:02:11  
-04'00'

Peter Wepler  
Chief, Environmental Analysis Branch

Enclosure

# 1. BACKGROUND

Section 176 (c) of the Clean Air Act (“Act”) requires any entity of the federal government that engages in, supports, or in any way provides financial support for, licenses or permits, or approves any activity demonstrate that the action conforms to the applicable state implementation plan (SIP) required under the Act. In this context, conformity means that such federal actions must be consistent with a SIP’s purpose of eliminating or reducing the severity and number of violations of national ambient air quality standards (NAAQS) and achieving expeditious attainment of those standards. In 1993, the U.S. Environmental Protection Agency (EPA) promulgated regulations prescribing general criteria and procedures for analysis of transportation and general conformity that apply in non-attainment and maintenance areas only.

On April 5, 2010, EPA promulgated revised general conformity requirements at 40 Code of Federal Regulations (CFR) 93 Subpart B (75 Federal Register [FR] 17254), with an effective date of July 6, 2010, to simplify and add flexibility to the requirements and reduce paperwork burdens. The general conformity regulations apply to a federal action (the portion of the action that the federal agency has control over) if the federal action is located in an region that has been designated as a non-attainment or maintenance area for at least one of the criteria air pollutants; if the total of direct and indirect emissions of a criteria pollutant from the action equals or exceeds the de minimis thresholds; and the action is not specifically exempted from general conformity regulations per 40 CFR 193(c). By requiring an analysis of direct and indirect emissions, EPA intended the federal agency to make sure that only those emissions that the federal agency can practicably control, and that are subject to that agency's continuing program responsibility, will be reasonably controlled.

# 2. APPLICABILITY CRITERIA

The Project is potentially subject to the general conformity rule since it is sponsored by (i.e., requires approval from) and partially funded by the U.S. Army Corps of Engineers; the project is in an area that has been designated as non-attainment or maintenance for at least one of the criteria air pollutants; and the project is not one of the listed exempt actions in 40 CFR 93.153(c). **Table 1** summarizes the applicable general conformity de minimis threshold by pollutant for the project area.

**Table 1. General Conformity De Minimis Thresholds**

Pollutant	Attainment Designation	General Conformity De Minimis Threshold (tons per year) <sup>[1]</sup>
Carbon monoxide (CO)	Maintenance	100
Nitrogen dioxide (NO <sub>2</sub> )	Attainment	N/A
Ozone (O <sub>3</sub> ) <sup>[2]</sup>	Nonattainment, Moderate	

Pollutant	Attainment Designation	General Conformity De Minimis Threshold (tons per year) <sup>[1]</sup>
Nitrogen oxides (NOx)		100
Volatile organic compounds (VOC)		100
Lead (Pb)	Attainment	N/A
Inhalable particulate matter (PM <sub>10</sub> )	Attainment <sup>[3]</sup>	N/A
Fine particulate matter (PM <sub>2.5</sub> )	Maintenance	100
Sulfur dioxide (SO <sub>2</sub> )	Attainment	100 <sup>[4]</sup>

Source: CT DEEP, 2016; EPA, 2017; 40 CFR 93.153(b)

Notes:

<sup>[1]</sup> A general conformity determination must be prepared if the total of direct and indirect emissions in a nonattainment or maintenance area caused by a federal action exceed the de minimis threshold. If construction and operations occur in the same year, then the sum of both activities is compared to the thresholds.

<sup>[2]</sup> O<sub>3</sub> is a secondary pollutant, meaning that it is formed in the atmosphere from reactions of precursor compounds under certain conditions. Primary precursor compounds that lead to O<sub>3</sub> formation include volatile organic compounds (VOCs) and nitrogen oxides (NOx). Therefore, the general conformity de minimis threshold for O<sub>3</sub> applies to VOC and NOx emissions.

<sup>[3]</sup> The City of New Haven is designated as a maintenance area in the State; however, the project area is located outside of the maintenance area boundaries.

<sup>[4]</sup> Although the region is designated as an attainment area for SO<sub>2</sub>, SO<sub>2</sub> is a precursor to PM<sub>2.5</sub> formation. Because the region is designated maintenance for the PM<sub>2.5</sub> NAAQS, SO<sub>2</sub> emissions must be considered in the general conformity applicability evaluation.

Key:

N/A = not applicable

### 3. GENERAL CONFORMITY APPLICABILITY ANALYSIS

The proposed project involves the replacement of two bridges for the purposes of flood risk management. Construction of the project would produce temporary emissions from construction equipment, construction-related vehicle and fugitive dust from earth moving activities, and possibly volatile organic compound (VOC) emissions due to paving, painting or coating operations. These temporary emissions would be direct emissions that the U.S. Army Corps of Engineers has control over, and they are required to be considered in comparison with the de minimis general conformity thresholds. Once construction is complete, this alternative would not produce direct or indirect emissions.

#### 3.1 Emission Calculation Methodology

##### *On-Site Construction Equipment Engines*

The construction-related equipment and vehicle activity levels were provided (in terms of hours of operation, quantities of materials hauled, and round-trip mileage) by the U.S. Army Corps of Engineers. **Attachment A (Table 1)** of this Appendix A8 summarizes the total hours of

operation for each piece of equipment used on-site for the project. The EPA's program MOVES Version 2014a was used to develop emission hourly rates (in grams/hour) for each piece of equipment. The emission rates used are presented in **Attachment A (Table 2)** of this Appendix A8.

#### *Construction Dust*

Construction dust emissions associated with bulldozing, grading, and material handling were estimated based on quantities of material and debris moved on the site. Emission factors in pounds per hour (bulldozing), pounds per mile (grading), and pounds per ton of material (material handling) were estimated using the EPA Compilation of Emission Factors (AP-42) publication and website, and are shown in **Attachment A (Table 3)**. The material quantities were provided by U.S. Army Corps of Engineers.

#### *Asphalt Paving*

Emissions associated with paving (VOC emissions from asphalt) were estimated for final roadway paving emissions factors based on the California Air Pollution Control Officers Association CalEEMod program (shown in **Attachment A, Table 3**).

#### *Off-Site Truck Hauling*

Truck hauling of material and debris to and from the site was estimated based on the quantities of construction material (in cubic yards) and debris (in tons) moved, approximate distances traveled, and assumed truck capacities. The quantities were provided by U.S. Army Corps of Engineers. Hauling capacities were assumed to be 16 cubic yards or 20 tons for dump and delivery trucks, and 9 cubic yards for concrete trucks. All hauling distances were based on 20-mile round trips, and the average speed assumed was 35 mph. The EPA's program MOVES Version 2014a was used to develop emission factors (in grams/mile) for these truck trips. These emission factors are presented in **Attachment A (Table 4)**, which also includes the factors for worker vehicle trips and paved road dust.

#### *Worker Vehicle Trips*

Emissions from workers traveling to the project site were estimated assuming the following: 15 worker vehicle trips per day; 260 work days per year; 20-mile one-way trips for worker commutes; and 2 one-way trips per day. The EPA's program MOVES Version 2014a was used to develop emission factors (in grams/mile) for these worker commute trips.

#### *Paved Road Dust*

Dust emissions from the roadway travel of haul trucks and worker commutes were estimated based on travel distance and paved road emission factors developed from the EPA's AP-42 publication and website.

### **3.2 Emission Results and Analysis**

To develop a conservative estimate of the annual project emissions under Alternative 5, it was assumed that total project activity was completed in one year. The actual construction schedule is

assumed to be approximately two years, which would spread the activity over a longer period and reduce the peak annual emissions relative to assuming all work completed in one year. Total project emissions were then compared to the general conformity de minimis thresholds to determine if a conformity determination would need to be completed. **Table 2** provides a summary of the total project emissions, by major source type. The results indicate that all criteria pollutant emissions are less than the general conformity de minimis thresholds. Therefore, the general conformity regulations do not apply to the project.

**Table 2. Project Emissions and Comparison to the General Conformity De Minimis Thresholds**

Source	Project Emissions (tons per year)					
	VOC	NOx	CO	SO2	PM10	PM2.5
Construction Equipment Engines	0.0756	0.3877	0.1737	0.0013	0.0206	0.0199
Truck Hauling	0.0056	0.0474	0.0302	0.0003	0.0094	0.0029
Worker Commuting	0.0320	0.0269	0.4492	0.0004	0.0209	0.0053
Fugitive Emissions:						
Bulldozing	n/a	n/a	n/a	n/a	0.0544	0.0297
Grading	n/a	n/a	n/a	n/a	0.2396	0.0272
Material Handling	n/a	n/a	n/a	n/a	0.0019	0.0003
Asphalt Paving	0.0019	n/a	n/a	n/a	n/a	n/a
<b>Totals</b>	<b>0.1151</b>	<b>0.4620</b>	<b>0.6530</b>	<b>0.0019</b>	<b>0.3467</b>	<b>0.0853</b>
<b>Conformity de minimis (tons/year)</b>	100	100	100	100	N/A	100
<b>Is Conformity Applicable?</b>	No	No	No	No	No	No

Source: CDM Smith, 2018.

## 4. REFERENCES

- Connecticut Department of Energy & Environmental Protection (CT DEEP). 2016. Attainment and Non-Attainment of the National Ambient Air Quality Standards in Connecticut. Available online at: <http://www.ct.gov/deep/cwp/view.asp?A=2684&Q=321762> [Accessed on March 27, 2018].
- U.S. Environmental Protection Agency (EPA). 2017. Nonattainment Areas for Criteria Pollutants (Green Book). Available online at: <https://www.epa.gov/green-book> [Accessed on March 27, 2018].

# Attachment A

Tables

# Attachment A

**Table 1. Alternative 5 On-Site Construction Equipment Operating Hours**

Equipment Report Designation and Description	Project Op Hours
<b><u>Prime Contractor</u></b>	
GEN B20Z0890 BRUSH CHIPPER, 12" (305 MM) DIA LOG DISC TYPE CUTTER, TRAILER MOUNTED	7
GEN C05Z1210 CHAIN SAW, 17"-59" (43CM-150CM) GUIDE BAR	13
GEN C85Z2380 CRANE, MECHANICAL, LATTICE BOOM, CRAWLER, DRAGLINE/CLAMSHELL, 1.0 CY (0.8 M3), 25 TON (23 MT), 100' (30.5 M) BOOM (ADD BUCKET)	29
GEN C85Z2395 CRANE, MECHANICAL, LATTICE BOOM, CRAWLER, DRAGLINE/CLAMSHELL, 2.0 CY (1.5 M3), 50 TON (45 MT), 100' (30.5 M) BOOM (ADD BUCKET)	143
GEN G10Z3065 GENERATOR SET, SKID MOUNTED, 35 KW, VARIABLE POWER SETTINGS, RECONNECTIBLE	143
GEN G15Z3080 GRADER, MOTOR, ARTICULATED, 138 HP (103 KW), 12' (3.6 M) BLADE WIDTH	15
GEN H25Z3320 HYDRAULIC EXCAVATOR, ATTACHMENT, MATERIAL HANDLING, 1.25 CY (1.0 M3) BUCKET, W/TIPS (ADD TO 40,000 LB (18,144 KG) HYDRAULIC EXCAVATOR)	29
GEN L35Z4240 LOADER, FRONT END, CRAWLER, 2.3 CY (1.7 M3) BUCKET	15
GEN L35Z4260 LOADER, FRONT END, CRAWLER, 2.60 CY (2.0 M3) BUCKET	7
GEN L50Z4640 LOADER/BACKHOE, WHEEL, 1.10 CY (0.84 M3) FRONT END BUCKET, 14.6' (3.7 M) DEPTH OF HOE, 24" (0.61 M) DIPPER, 4X4	68
GEN P30Z4930 PILE HAMMER, DRIVER/EXTRACTOR, VIBRATORY, 107 TON (97 MT) FORCE DRIVE (ADD LEADS & CRANE)	143
GEN R50Z5820 ROLLER, VIBRATORY, SELF-PROPELLED, SINGLE DRUM, SMOOTH, 22 TON (20.0 MT), 84" (1.2 M) WIDE, SOIL COMPACTOR	15
GEN T15Z6570 TRACTOR, CRAWLER (DOZER), 300-340 HP (224-254 KW), POWERSHIFT, W/UNIVERSAL BLADE	15
GEN T45Z7280 TRUCK TRAILER, WATER TANKER, 5,000 GAL (18,927 L) (ADD 50,000 LB (22,680 KG) GVW TRUCK)	15
GEN T50Z7600 TRUCK, HIGHWAY, 50,000 LB (22,680 KG) GVW, 6X4, 3 AXLE (ADD ACCESSORIES)	15
GEN P10Z4840 PILE HAMMER ACCESSORIES, PILE LEADS, SWING 26" (660 MM) x 8" (660 MM), 86' (26.2 M) LENGTH <sup>1</sup>	143



<b>Equipment Report Designation and Description</b>	<b>Project Op Hours</b>
GEN T45Z7280 TRUCK TRAILER, WATER TANKER, 5,000 GAL (18,927 L) (ADD 50,000 LB (22,680 KG) GVW TRUCK) <sup>1</sup>	15
<b>PRIME Contractor Subtotal</b>	<b>815</b>
<b>Sub-Contractor</b>	
EP A35AE002 ASPHALT/PAVEMENT KETTLE, 115 GAL, TRAILER W/PUMP & HOSE	2
GEN A15Z0140 AIR COMPRESSOR, 250 CFM ( 7 CMM), 100 PSI (689 KPA) (ADD HOSE)	9
GEN A30Z0640 ASPHALT PAVER, 10.0' (3.1 M) WIDE, SELF PROPELLED, W/19' (5.8 M) SCREED EXTENSION, WHEEL	16
GEN C55Z1960 CONCRETE PUMP, PUMP & BOOM, 117 CY/HR (89 M3/HR), 75' (23 M) BOOM, TRUCK MOUNTED	23
GEN C60Z1980 CONCRETE SAW, 12" (305 MM) DEPTH, SELF PROPELLED (ADD WATER AND COST FOR SAWBLADE WEAR)	12
GEN C80Z2190 CRANE, HYDRAULIC, TRUCK MOUNTED, 80 TON (72.6 MT), 128' (39 M) BOOM	1,021
GEN C80Z2300 CRANES, HYDRAULIC, TRUCK MTD, ALL TERRAIN, 110 TON (99.8MG), 168' (51.2M) BOOM, 8X6	888
GEN C85Z2398 CRANE, MECHANICAL, LATTICE BOOM, CRAWLER, DRAGLINE/CLAMSHELL, 2.5 CY (1.9 M3), 60 TON (54 MT), 50' (15.2 M) BOOM (ADD BUCKET)	115
GEN G15Z3079 GRADER, MOTOR, ARTICULATED, 215 HP (160 KW), 14' (4.3 M) BLADE WIDTH	30
GEN H25Z3210 HYDRAULIC EXCAVATOR, CRAWLER, 140,000 LB (65,503 KG), 3.50 CY (2.7 M3) BUCKET, 31.4' (9.6 M) MAX DIGGING DEPTH	51
GEN H25Z3680 HYDRAULIC EXCAVATOR, ATTACHMENT, MATERIAL HANDLING, BUCKET, 36" (914 MM) PAVEMENT REMOVAL (ADD TO 75,000 LB (34,019 KG) HYDRAULIC EXCAVATOR)	35
GEN H25Z3685 HYDRAULIC EXCAVATOR, ATTACHMENT, CONCRETE PULVERIZER, 3,000 LB (1360 KG) W/POINT (ADD TO 26,000-36,000 LB (11,793-16,329 KG) HYDRAULIC EXCAVATOR)	35
GEN L25Z4120 LINE STRIPING EQUIPMENT, STRIPER, THERMAL 120 GAL (454 L), TRUCK MOUNTED	2
GEN L35Z4260 LOADER, FRONT END, CRAWLER, 2.60 CY (2.0 M3) BUCKET	108
GEN L40Z4400 LOADER, FRONT END, WHEEL, ARTICULATED, 3.50 CY (2.7 M3) BUCKET, 4X4	35

<b>Equipment Report Designation and Description</b>	<b>Project Op Hours</b>
GEN L50Z4640 LOADER/BACKHOE, WHEEL, 1.10 CY (0.84 M3) FRONT END BUCKET, 14.6' (3.7 M) DEPTH OF HOE, 24" (0.61 M) DIPPER, 4X4	35
GEN P20Z4880 PILE HAMMER, DOUBLE ACTING, DIESEL, 18,100 FT-LBS (2,502 KGF-M) (ADD LEADS & CRANE)	115
GEN R30Z5640 ROLLER, STATIC, SELF-PROPELLED, PNEUMATIC, 14.3 TON (13 MT), 68" (1.7M) WIDE, 9 TIRE, ASPHALT COMPACTOR	16
GEN T50Z7310 TRUCK, HIGHWAY, CONVENTIONAL, 8,600 LB ( 3,901 KG) GVW, 4X2, 2 AXLE, 3/4 TON (0.68 MT) - PICKUP	5
GEN T50Z7400 TRUCK, HIGHWAY, 25,000 LB (11,340 KG) GVW, 4X2, 2 AXLE (ADD ACCESSORIES)	14
GEN T50Z7710 DUMP TRUCK, HIGHWAY, 16 - 20 CY (12.2 - 15.3 M3) DUMP BODY, 75,000 LBS (34,000 KG) GVW, 2 AXLE, 6X4	198
GEN XMEZ9480 TORCH, OXYGEN/ACETYLENE, W/TANKS & HOSES	1,758
GEN XMEZ9520 CONCRETE VIBRATOR, 2.5" (63.5 MM) DIA, W/7.5 HP (5.6 KW) GENERATOR	416
MAP R45BO007 ROLLER, VIBRATORY, SELF-PROPELLED, DOUBLE DRUM, SMOOTH, 10.4 TON, 66.1" WIDE, 2X1, ASPHALT COMPACTOR	32
MAP T50XX027 TRUCK, HIGHWAY, 35,000 LBS GVW, 2 AXLE, 4X2 (CHASSIS ONLY-ADD OPTIONS)	1,335
GEN A20Z0400 PAVING BREAKER, 66 LB (30 KG) (ADD 100 CFM (2.8 CMM) COMPRESSOR) <sup>1</sup>	19
GEN A20Z0480 AIR HOSE, 1.5" (38 MM) DIA x 100' (31 M) LENGTH, HARDROCK (USE AS DRILLING ACCESSORY) <sup>1</sup>	19
GEN P10Z4850 PILE HAMMER ACCESSORIES, PILE LEADS, SWING 32" (813 MM) x 10" (254 MM), 88' (26.8 M) LENGTH <sup>1</sup>	230
GEN T40Z6960 TRUCK OPTION, FLATBED, 8' (2.4M) x 12' (3.7 M) (ADD 25,000 LB (11,340 KG) GVW TRUCK) <sup>1</sup>	14
GEN XMEZ9560 WATER TANK, 500 GAL ( 1,893 L) PORTABLE <sup>1</sup>	12
MAP T40MY004 TRUCK OPTIONS, DUMP BODY, REAR, 10.0 CY, AIR GATE (W/HOIST) (ADD 35,000 GVW TRUCK) <sup>1</sup>	1,335
<b>Sub-Contractor Subtotal</b>	<b>7,935</b>
<b>GRAND TOTAL</b>	<b>8,750</b>

Source: U.S. Army Corps of Engineers. 2017. Equipment by Contractor Report. October 1.

Notes:

<sup>1</sup> Specific equipment is not motorized; therefore, no emissions are calculated for this piece of equipment.

**Table 2. Alternative 5 On-Site Construction Equipment Emission Factors**

Equipment Description	Emission Factors (grams/hour)					
	VOC	NOx	CO	SO2	PM10	PM2.5
GEN B20Z0890 BRUSH CHIPPER	14.1523	122.0429	45.4181	0.1875	7.2295	7.0127
GEN C05Z1210 CHAIN SAW	180.3483	4.0407	643.8541	0.0109	23.4137	21.5406
GEN C85Z2380 CRANE, MECHANICAL	16.0160	67.8365	18.4379	0.2647	2.6886	2.6079
GEN C85Z2395 CRANE, MECHANICAL	16.0160	67.8365	18.4379	0.2647	2.6886	2.6079
GEN G10Z3065 GENERATOR SET, SKID MOUNTED	6.1253	59.7140	23.3506	0.0687	3.5343	3.4283
GEN G15Z3080 GRADER, MOTOR, ARTICULATED	18.8368	42.3805	18.0416	0.3143	1.6658	1.6158
GEN H25Z3320 HYDRAULIC EXCAVATOR	15.9076	47.4411	17.7303	0.2653	1.5190	1.4734
GEN L35Z4240 LOADER, FRONT END, CRAWLER	24.6597	108.1615	36.6747	0.4051	3.6248	3.5160
GEN L35Z4260 LOADER, FRONT END, CRAWLER	24.6597	108.1615	36.6747	0.4051	3.6248	3.5160
GEN L50Z4640 LOADER/BACKHOE, WHEEL	7.0697	37.0483	36.1245	0.0706	5.0498	4.8983
GEN P10Z4840 PILE HAMMER ACCESSORIES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GEN P30Z4930 PILE HAMMER, DRIVER/EXTRACTOR, VIBRATORY	33.9463	235.0839	104.5070	0.5476	13.5998	13.1918
GEN R50Z5820 ROLLER, VIBRATORY, SELF-PROPELLED	9.0664	50.2810	19.9082	0.1510	1.9945	1.9347
GEN T15Z6570 TRACTOR, CRAWLER (DOZER)	24.6597	108.1615	36.6747	0.4051	3.6248	3.5160
GEN T45Z7280 TRUCK TRAILER, WATER TANKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GEN T50Z7600 TRUCK, HIGHWAY, 50,000 LB	2.1174	17.8216	11.3466	0.1228	0.5969	0.5491
EP A35AE002 ASPHALT/PAVEMENT KETTLE W/PUMP	6.5507	60.9608	26.3581	0.0730	3.9448	3.8265
GEN A15Z0140 AIR COMPRESSOR	5.9933	51.9403	15.0032	0.1029	1.6705	1.6204
GEN A20Z0400 PAVING BREAKER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GEN A20Z0480 AIR HOSE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Description	Emission Factors (grams/hour)					
	VOC	NOx	CO	SO2	PM10	PM2.5
GEN A30Z0640 ASPHALT PAVER	11.4875	57.7886	17.7456	0.1973	1.6491	1.5997
GEN C55Z1960 CONCRETE PUMP	6.5507	60.9608	26.3581	0.0730	3.9448	3.8265
GEN C60Z1980 CONCRETE SAW	5.0382	59.2839	18.5564	0.0837	1.8571	1.8014
GEN C80Z2190 CRANE, HYDRAULIC	16.0160	67.8365	18.4379	0.2647	2.6886	2.6079
GEN C80Z2300 CRANES, HYDRAULIC	16.0160	67.8365	18.4379	0.2647	2.6886	2.6079
GEN C85Z2398 CRANE, MECHANICAL	16.0160	67.8365	18.4379	0.2647	2.6886	2.6079
GEN G15Z3079 GRADER, MOTOR, ARTICULATED	18.8368	42.3805	18.0416	0.3143	1.6658	1.6158
GEN H25Z3210 HYDRAULIC EXCAVATOR, CRAWLER	15.9076	47.4411	17.7303	0.2653	1.5190	1.4734
GEN H25Z3680 HYDRAULIC EXCAVATOR	15.9076	47.4411	17.7303	0.2653	1.5190	1.4734
GEN H25Z3685 HYDRAULIC EXCAVATOR	15.9076	47.4411	17.7303	0.2653	1.5190	1.4734
GEN L25Z4120 LINE STRIPING EQUIPMENT	7.5356	47.2941	20.8316	0.1156	2.3606	2.2898
GEN L35Z4260 LOADER, FRONT END, CRAWLER,	24.6597	108.1615	36.6747	0.4051	3.6248	3.5160
GEN L40Z4400 LOADER, FRONT END, WHEEL	23.5959	125.7592	43.4321	0.3854	5.2233	5.0666
GEN L50Z4640 LOADER/BACKHOE, WHEEL	7.0697	37.0483	36.1245	0.0706	5.0498	4.8983
GEN P10Z4850 PILE HAMMER ACCESSORIES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GEN P20Z4880 PILE HAMMER, DOUBLE ACTING	33.9463	235.0839	104.5070	0.5476	13.5998	13.1918
GEN R30Z5640 ROLLER, STATIC, SELF-PROPELLED	9.0664	50.2810	19.9082	0.1510	1.9945	1.9347
GEN T40Z6960 TRUCK OPTION, FLATBED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GEN T50Z7310 TRUCK, HIGHWAY, CONVENTIONAL	2.1174	17.8216	11.3466	0.1228	0.5969	0.5491
GEN T50Z7400 TRUCK, HIGHWAY, 25,000 LBS	2.1174	17.8216	11.3466	0.1228	0.5969	0.5491
GEN T50Z7710 DUMP TRUCK, HIGHWAY, 75,000 LBS	2.1174	17.8216	11.3466	0.1228	0.5969	0.5491
GEN XMEZ9480 TORCH, OXYGEN/ACETYLENE	4.4589	33.5741	21.9543	0.0365	2.9360	2.8479
GEN XMEZ9520 CONCRETE VIBRATOR	1.8847	14.1704	12.1567	0.0129	1.1413	1.1071

Equipment Description	Emission Factors (grams/hour)					
	VOC	NOx	CO	SO2	PM10	PM2.5
GEN XMEZ9560 WATER TANK, 500 GAL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MAP R45BO007 ROLLER, VIBRATORY, SELF-PROPELLED	9.0664	50.2810	19.9082	0.1510	1.9945	1.9347
MAP T40MY004 TRUCK OPTIONS, DUMP BODY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MAP T50XX027 TRUCK, HIGHWAY, 35,000 LBS	2.1174	17.8216	11.3466	0.1228	0.5969	0.5491

Source: U.S. Environmental Protection Agency, MOVES, Version 2014a.

**Table 3. Construction Dust and Asphalt Paving Emission Factors**

Dust Source	Source Activity	Emission Factors		
		VOC	PM10	PM2.5
Bulldozing	145 hours	N/A	0.75 lb/hr	0.41 lb/hr
Grading	319.5 miles	N/A	1.5 lb/mile	0.17 lb/mile
Material Handling	13,446 tons		0.00014 lb/ton	0.000021 lb/ton
Asphalt Paving	1.45 acres	2.62 lbs/acre		

Sources: U.S. Environmental Protection Agency, AP-42, Chapters 11 and 13; and California Air Pollution Control Officers Association, CalEEMod User's Guide, Version 2016.3.2.

**Table 4. On-Road Travel Emission Factors**

Vehicle Type	Fuel Type	Emission Factors (grams/mile)					
		VOC	NOx	CO	SO2	PM10 <sup>2</sup>	PM2.5 <sup>2</sup>
Worker Commuting <sup>1</sup>	Aggregate <sup>1</sup>	0.1860	0.1562	2.6123	0.0021	0.1213	0.0310
Single Unit Short-Haul Truck	Diesel Fuel	0.1412	1.1881	0.7564	0.0082	0.2348	0.0719

Source: U.S. Environmental Protection Agency, MOVES, Version 2014a and U.S. Environmental Protection Agency, AP-42, Chapter 13.

Notes:

<sup>[1]</sup> Aggregate of Passenger Car, Passenger Truck, and Light Commercial Truck, gasoline and diesel fueled.

<sup>[2]</sup> PM factors include engine exhaust, tire wear, brake wear, and paved road dust.