# Appendix G: Air Quality Technical Report

# Air Quality Technical Report

## Manassas Regional Airport (HEF)
## Part 139 Certification and
## Terminal Redevelopment
## Environmental Assessment (EA)

PREPARED BY:

CMT

FEBRUARY 2026

# Executive Summary

This document, referred to as the Air Quality Technical Report, describes the overall approach and methods to conducting the air emissions analysis prepared in support of the Manassas Regional Airport (HEF) Part 139 Certification and Terminal Redevelopment Environment Assessment (EA). Prepared in accordance with Federal Aviation Administration (FAA) orders for compliance with the National Environmental Policy Act (NEPA) and the Clean Air Act (CAA), the analysis includes the Affected Environment and the Environmental Consequences components of the EA. For the CAA General Conformity Rule, the aim was to demonstrate that project-related emissions conform to the applicable State Implementation Plan (SIP).

The analysis is aimed at developing and computing construction and operational emissions inventories associated with the Alternatives #1 and #2 referred to as Alternative #1 and Alternative #2 (both are described in detail in the EA). The construction-related sources analyzed are on-road motor vehicles (e.g., haul trucks, worker trips), off-road equipment (e.g., dozers, backhoes, tractors), and fugitives which result from site preparation, earth moving and asphalt paving activities. The operational-related sources include aircraft, auxiliary power units (APUs), ground support equipment (GSE), and motor vehicles.

For Alternative #1, construction emissions are expected to occur during the years 2027, 2028 and 2032 through 2034. Alternative #2 includes both construction and operational emissions to evaluate the addition of new commercial aircraft activities, with the analysis years spanning from 2026 through 2036. Notably, no construction activities are scheduled for 2031. Additionally, for Alternative #2, a five-year build-out year of 2041 is also analyzed for aircraft-related and motor vehicle operational emissions.

Other important features of the air quality analysis include the following:

- **Approach**: The overall approach follows FAA's 1050.1 *Desk Reference*, and the *Aviation Emissions and Air Quality Handbook*, Version 4.
- **Data and Models**: Aircraft-related sources included in the analysis consist of aircraft, APUs, and GSE. Emissions from these sources are assessed using the latest version of the FAA's Aviation Environmental Design Tool (AEDT) at the time of the analysis (AEDT version 3f). Emission factors for motor vehicles and construction equipment are derived from the U.S. Environmental Protection Agency (EPA) MOtor Vehicle Emissions Simulator (MOVES, Version 4). Construction equipment types and activity levels are obtained from the Airport Construction Emissions Inventory Tool (ACEIT). Fugitive emissions are based on EPA's AP-42: Compilation of Air Emissions Factors. In all cases, the most up-to-date model versions, at the onset of the analysis, were applied.
- **Pollutants**: The pollutants analyzed comprise the EPA criteria air pollutants: carbon monoxide (CO), particulate matter ($PM_{10/2.5}$), sulfur dioxide ($SO_2$) and ozone ($O_3$) precursors nitrogen oxides ($NO_x$) and volatile organic compounds (VOCs).
- **NEPA and CAA Compliance**: Conformance with NEPA is accomplished by disclosing in the EA the emissions associated with Alternatives #1 and #2. Because Alternatives #1 and #2 are within the City of Manassas, Virginia, which is currently designated as a "moderate" nonattainment area for the 2015 8-hour $O_3$ standard and a maintenance area for the 2008 8-hour $O_3$ standard the CAA General Conformity Rule applies. In nonattainment and maintenance areas, a proposed action's compliance with the CAA General Conformity Rule can be determined by demonstrating that project emissions are below (i.e., within) the CAA *de minimis* threshold levels for the applicable criteria air pollutants; and, therefore assumed to conform to the applicable EPA approved SIP.

- **CAA *de minimis* Threshold Levels:** Under General Conformity, the applicable *de minimis* thresholds are based on the pollutants for which the area is designated as nonattainment or maintenance. In this analysis, $O_3$ is the relevant pollutant, and its precursor pollutants, $NO_x$ and VOCs, are subject to thresholds of 100 and 50 tons per year for $NO_x$ and VOCs, respectively. These thresholds determine whether a conformity determination is required for the proposed federal action.

The main results of the analysis are summarized as follows:

- **NEPA Requirements**: Conformance with NEPA was accomplished by disclosing the potential impacts of all criteria air/precursor pollutants, associated with the construction and operational activities of Alternatives #1 and #2.
- **CAA General Conformity Requirements**: For $NO_x$ and VOCs, total construction and operational emissions associated with the Alternatives #1 and #2are all within the applicable CAA General Conformity Rule *de minimis* thresholds. Therefore, the project meets the rule's requirements, and no further analysis is needed.

# Table of Contents

# 1. Introduction

This document, referred to as the *Air Quality Technical Report,* provides the data, and describes the overall approach and methods to conducting the air quality analysis for the Environmental Assessment (EA) of the Manassas Regional Airport (HEF) Part 139 Certification and Terminal Redevelopment. The results are intended to demonstrate compliance with the two following regulations:

- National Environmental Policy Act (NEPA) – *"Federal agencies (including the FAA) shall disclose to the public…a clear and accurate description of potential environmental impacts (including Air Quality) …that those actions and alternatives…would cause"*.[1]
- Federal Clean Air Act (CAA) General Conformity Rule – *"No department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve, any activity which does not conform to an implementation plan"*.[2]

In addition, this report is designed to (i) identify the pertinent regulations and guidelines for conducting the analysis, (ii) describe the sources of data, information and assumptions used for the analysis, and (iii) present the results of the air quality analysis, which will serve as the basis of the information presented in the Air Quality Sections of the EA.

# 2. Regulatory Setting

The overall approach for conducting the air quality analysis, presented in **Section 3**, follows Federal Aviation Administration (FAA) orders and guidelines for preparing NEPA documents, which include:

- FAA 1050.1, Desk Reference - This document provides guidelines for air quality assessments of all airport-related projects or actions evaluated under NEPA.[3]
- Air Quality Handbook, *Aviation Emissions and Air Quality Handbook, Version 4* - This handbook is a comprehensive guide intended to assist the air quality analyst/environmental specialist in assessing air quality impacts of FAA actions at airports. It provides guidance, procedures, and methodologies for use in conducting NEPA and CAA-related assessments.[4]

In accordance with these orders and guidelines, **Section 4** of this report and the Air Quality sections of the EA present the potential air emissions associated with Alternatives #1 and #2.

## 2.1. Air Quality

As stated in **Section 1**, NEPA requires environmental review of federally funded projects that have the potential to affect the environment irrespective of location (i.e., nonattainment/maintenance areas). The emission inventories, which disclose project-related construction and operational emissions of criteria air/ precursor pollutants precursors were prepared for the required environmental review.

In addition, the General Conformity Rule of the Federal CAA prohibits federal agencies (including the FAA) from permitting or funding projects that do not conform to an applicable SIP. The General Conformity Rule applies only to areas that are designated nonattainment or maintenance. The results of the air quality analysis

[1] U.S. EPA, 42 U.S.C 4321 et. seq. (1969) National Environmental Policy Act (NEPA).
[2] U.S. EPA, 40 CFR Parts 51 & 93 *Revisions to the General Conformity Regulations*, April 2010.
[3] FAA. 1050.1 Desk Reference. [Online] July 7, 2025. https://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/faa_nepa_order/desk_ref.
[4] FAA Aviation Emissions and Air Quality Handbook, Version 4, https://www.faa.gov/regulations_policies/policy_guidance/envir_policy/airquality_handbook.

are used to demonstrate compliance with the SIP. If project-related emissions exceed the CAA *de minimis* thresholds, a formal Conformity Determination is required to demonstrate that the project conforms to the applicable SIP. Conversely, if project-related emissions are below *de minimis* thresholds the project is assumed to conform to the SIP.

In accordance with the CAA, the U.S. Environmental Protection Agency (EPA) sets standards and policies to achieve and maintain acceptable air quality conditions nationwide. Called the National Ambient Air Quality Standards (NAAQS), these standards apply to six air pollutants (known as "criteria air pollutants") that represent outdoor concentrations considered safe for the human and natural environments. The criteria air pollutants are carbon monoxide (CO), nitrogen dioxide ($NO_2$), ozone ($O_3$), particulate matter ($PM_{2.5}$ and $PM_{10}$), sulfur dioxide ($SO_2$) and lead (Pb). Ozone is a secondary pollutant, meaning it is formed from chemical reactions in the atmosphere of other pollutants, primarily nitrogen oxides ($NO_x$) and volatile organic compounds (VOCs). $NO_x$ and VOCs are referred to as $O_3$ precursor pollutants.

Under the CAA, areas having criteria air pollutant concentration levels that are either lower or meeting the NAAQS are designated as attainment, those that exceed the standards are designated as nonattainment. After air pollutant concentrations in a nonattainment area are reduced to levels that meet or are below the NAAQS, the EPA re-designates the area as maintenance for a period of 20 years. Furthermore, the EPA uses a classification system to indicate the severity of $O_3$ pollution in nonattainment areas. These classifications, in increasing order of seriousness, are marginal, moderate, serious, severe, and extreme.

Alternatives #1 and #2 are located within the City of Manassas, Virginia, which is currently designated as a "moderate" nonattainment area for the 2015 8-hour $O_3$ standard and a maintenance area for the 2008 8-hour $O_3$ standard as presented in **Table 1**.

**Table 1. Air Quality Designation Status for the City of Manassas, Virginia**

| Pollutant | | Status |
|---|---|---|
| Carbon Monoxide (CO) | | Attainment |
| Lead (Pb) | | Attainment |
| Nitrogen Dioxide ($NO_2$) | | Attainment |
| Ozone ($O_3$) | 8-Hour (2008) | Maintenance |
| | 8-Hour (2015) | Moderate Nonattainment |
| Particulate Matter ($PM_{10}$) | | Attainment |
| Particulate Matter ($PM_{2.5}$) | | Attainment |
| Sulfur Dioxide ($SO_2$) | | Attainment |
| Source: Nonattainment Areas for Criteria Pollutants (Green Book), EPA, 2025. | | |

Because Alternatives #1 and #2 are within an area designated as nonattainment for $O_3$, a General Conformity applicability analysis is required. An applicability analysis involves comparing project-related emissions of the pollutant for which an area is designated nonattainment and/or maintenance against the relevant *de minimis* threshold levels established under the CAA General Conformity Rule. Based on current air quality designations, $O_3$ is the pollutant of concern, and its precursor pollutants, $NO_x$ and VOCs, are subject to the following *de minimis* thresholds:

- $NO_x$: 100 tons per year
- VOC: 50 tons per year

# 3. Methodology

The following sections describe the sources of data, information, assumptions, and methodology used to estimate the emissions associated with the construction and operation of the two Build Alternatives. As previously noted, construction emissions are assessed for both Alternatives #1 and #2, while operational emissions are evaluated only for Alternative #2.

## 3.1. Construction Emissions Inventory

Construction Projects and Schedule

Construction-related emissions are based on the types of projects and associated activities, counts and types of equipment/vehicles used, activity levels, and the construction schedule. Construction of Alternatives #1 and #2 consists of multiple subcomponents occurring from 2026 through 2036, with no construction occurring in year 2031. Notably, projects are separated by Tiers, where Tier 1 projects occur from 2026 to 2030, and Tier 2 projects occur from 2032 to 2036.

**Table 2** presents the full construction projects list, associated project components, footprints, and approximate schedules for both Alternatives #1 and #2.

| Table 2. Construction Projects, Footprint, and Schedule | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **ID** | **Construction Project** | **Sub-Component (if applicable)** | **Tier** | **Alt. 1** | **Alt. 2** | **Footprint (Sq. Ft)** | **Start Year** | **End Year** |
| 1 | Terminal Building Expansion (north, south, and west) | Demolition of Building 13 | 1 | No | Yes | 13,000 | 2026 | 2026 |
| | | Terminal Building Expansion | | | | 75,099 | | |
| 2 | West Ramp General Aviation Tie-Down Relocation | | | | | [a] | | |
| 3 | East Ramp Strengthening, Reconfiguration, and Rehabilitation | Removal of existing asphalt and concrete | | No | Yes | 840,000 | 2026 | 2028 |
| | | Strengthening, Reconfiguration, and Rehabilitation | | | | | | |
| 4 | Terminal Parking Lot Rehabilitation and Expansion | | | No | Yes | 82,500 | 2026 | 2026 |
| 5 | Economy Parking Lot Construction | | | No | Yes | 590,000 | 2026 | 2026 |
| 6 | Bridge Rehabilitation - Runway 16L/34R and Taxiway Bravo | Bridge Strengthening | | No | Yes | 420,000 | 2026 | 2027 |
| | | Bypass Channel | | | | 660,000 | | |
| 7 | Construction of a new Snow Removal Equipment (SRE) Building | | | Yes | Yes | 12,000 | 2027 | 2028 |
| 8 | Taxiway Bravo Widening | | | Yes | Yes | 180,000 | 2027 | 2028 |
| 9 | Runway 16L/34R Reconstruction and Strengthening | Reconstruction and Strengthening | | No | Yes | 952,000 | 2027 | 2029 |
| | | Floodplain Offset System | | No | Yes | 168,500 | 2028 | 2028 |
| 10 | Taxiway Echo Fillet Widening | | | No | Yes | 2,400 | 2027 | 2029 |
| 11 | Taxiway B Reconstruction and Strengthening | | | No | Yes | 965,000 | 2029 | 2030 |
| 12 | Construction of a new East Ramp Taxiway | | 2 | Yes | Yes | 29,906 | 2032 | 2034 |
| 13 | Runway 16L/34R Widening | | | No | Yes | 325,000 | 2033 | 2033 |
| 14 | Construction of an Aircraft Deicing Pad and Apron Expansion between Taxiways Delta and Echo | Deicing Pad | | No | Yes | 141,900 | 2033 | 2034 |
| | | Apron Expansion | | | | 21,100 | | |
| 15 | Construction of New Expanded East Ramp and Taxilane between Taxiways Delta and Echo | | | No | Yes | 110,000 | 2033 | 2036 |
| 16 | Construction of new Aircraft Rescue and Fire Fighting (ARFF) Facility | | | No | Yes | 6,000 | 2035 | 2036 |

Notes: [a] No construction is required for this project. For additional information see Chapter 1 of the EA, *Introduction and Program Description.*
Source: HEF, 2025.

Modeling Approach

Construction emissions were developed using equipment and vehicle activity data from the Airport Construction Emissions Inventory Tool (ACEIT)[5] and emission factors from the EPA's MOtor Vehicle Emission Simulator (i.e., MOVES, Version 4)[6].

ACEIT is a tool developed by the Transportation Research Board (TRB), under the Airport Cooperative Research Program (ACRP). ACEIT provides data for the number and types of construction equipment, the horsepower of the equipment, and the operating hours, as well as the vehicle-miles travelled (VMT) of worker and haul trips based on the type and size of construction project(s). The tool provides default values for these inputs so that emissions can be estimated for projects that lack project-specific data due to the construction project being in the early stages of design.

MOVES is an emission modeling system that estimates emissions for mobile sources at the national, county, and project level for air pollutants. Emissions factors for both on-road vehicles (e.g., haul trucks, worker trips), and off-road construction equipment (e.g., dozers, backhoes, tractors), were developed using MOVES as those currently applied by ACEIT are outdated.

Fugitive dust emissions ($PM_{10}$/$PM_{2.5}$) were calculated using emission factors within EPA's Compilation of Air Pollutant Emission Factors (AP-42)[7] and fugitive evaporative emissions (VOCs) were developed using EPA guidance on asphalt paving.[8]

Construction Vehicles/Equipment Types and Activity Levels

The construction phases for Alternatives #1 and #2involved a variety of air emissions sources including on-road construction vehicles and off-road construction equipment. The activity levels for on-road construction vehicles and off-road construction equipment are represented in the analysis by VMTs and hours of operation, respectively.

**Table 3** presents the activity levels of on-road construction vehicles, expressed in VMT, categorized by construction project and year. For the purpose of this analysis, passenger cars were assumed to be fueled by gasoline, while all other on-road vehicles were assumed to operate on diesel fuel.

**Table 4** lists the off-road construction equipment developed for each construction project, including associated horsepower ratings, load factors, and hours of operation for the construction period. For this analysis, it was assumed that off-road construction equipment is fueled by diesel.

[5] ACEIT is the companion tool to the Airport Cooperative Research Program Report 102 - Guidance for Estimating Airport Construction Emissions, https://www.trb.org/Publications/Blurbs/170234.aspx.

[6] U.S. EPA's MOVES4 is the latest version of MOVES. Additional information on MOVES4, https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves.

[7] U.S. EPA, AP-42: Compilation of Air Emissions Factors, https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors.

[8] U.S. EPA, Emission Inventory Improvement Program, Asphalt Paving, Chapter 17, Volume III, April 2001.

| Table 3. On-Road Construction Vehicle Activity Levels (VMT) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| On-Road Vehicle Type | 2026 | 2027 | 2028 | 2029 | 2030 | 2032 | 2033 | 2034 | 2035 | 2036 |
| Project #1. Terminal Building Expansion (north, south, and west) | | | | | | | | | | |
| Dump Truck | 58,732 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cement Mixer | 17,368 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dump Truck Subbase Material | 9,262 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Passenger Car | 250,447 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Material Deliveries | 2,253 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Pickup Truck | 182 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Survey Crew Trucks | 372 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Tool Truck | 27,869 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Tractor Trailer | 33,055 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Project #3. East Ramp Strengthening, Reconfiguration, and Rehabilitation | | | | | | | | | | |
| Asphalt 18 Wheeler | 4,063 | 4,063 | 4,063 | -- | -- | -- | -- | -- | -- | -- |
| Cement Mixer | 64,750 | 64,750 | 64,750 | -- | -- | -- | -- | -- | -- | -- |
| Dump Truck - Asphalt | 5,757 | 5,757 | 5,757 | -- | -- | -- | -- | -- | -- | -- |
| Dump Truck Subbase Material | 34,532 | 34,532 | 34,532 | -- | -- | -- | -- | -- | -- | -- |
| Passenger Car | 536,963 | 493,425 | 493,425 | -- | -- | -- | -- | -- | -- | -- |
| Dump Truck | 176,312 | 57,053 | 57,053 | -- | -- | -- | -- | -- | -- | -- |
| Distributing Tanker | 1,243 | 1,243 | 1,243 | -- | -- | -- | -- | -- | -- | -- |
| Flatbed Truck | 9,600 | 9,600 | 9,600 | -- | -- | -- | -- | -- | -- | -- |
| Pickup Truck | 54,317 | 24,917 | 24,917 | -- | -- | -- | -- | -- | -- | -- |
| Project #4. Terminal Parking Lot Rehabilitation and Expansion | | | | | | | | | | |
| Cement Mixer | 19,082 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dump Truck - Asphalt | 1,700 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dump Truck Subbase Material | 10,172 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Passenger Car | 253,969 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Flat Bed or Dump Trucks | 4,950 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Line Painting Truck and Sprayer | 990 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Material Deliveries | 2,970 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Survey Crew Trucks | 495 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Ten Wheelers | 5,940 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Tractor Trailer | 11,385 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Project #5. Economy Parking Lot Construction | | | | | | | | | | |
| Cement Mixer | 136,467 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dump Truck - Asphalt | 12,154 | -- | -- | -- | -- | -- | -- | -- | -- | -- |

| Table 3. On-Road Construction Vehicle Activity Levels (VMT) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| On-Road Vehicle Type | 2026 | 2027 | 2028 | 2029 | 2030 | 2032 | 2033 | 2034 | 2035 | 2036 |
| Dump Truck Subbase Material | 72,747 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Passenger Car | 253,969 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Flat Bed or Dump Trucks | 35,400 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Line Painting Truck and Sprayer | 7,080 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Material Deliveries | 21,240 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Survey Crew Trucks | 3,540 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Ten Wheelers | 42,480 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Tractor Trailer | 81,420 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Project #6. Bridge Rehabilitation - Runway 16L/34R and Taxiway Bravo | | | | | | | | | | |
| Asphalt 18 Wheeler | 3,047 | 3,047 | -- | -- | -- | -- | -- | -- | -- | -- |
| Cement Mixer | 48,563 | 48,563 | -- | -- | -- | -- | -- | -- | -- | -- |
| Dump Truck - Asphalt | 4,317 | 4,317 | -- | -- | -- | -- | -- | -- | -- | -- |
| Dump Truck Subbase Material | 25,900 | 25,900 | -- | -- | -- | -- | -- | -- | -- | -- |
| Passenger Car | 696,600 | 696,600 | -- | -- | -- | -- | -- | -- | -- | -- |
| Cement Truck for Fencing | 76,313 | 76,313 | -- | -- | -- | -- | -- | -- | -- | -- |
| Dump Truck | 18,696 | 18,696 | -- | -- | -- | -- | -- | -- | -- | -- |
| Flatbed Truck | 7,290 | 7,290 | -- | -- | -- | -- | -- | -- | -- | -- |
| Pickup Truck | 23,537 | 23,537 | -- | -- | -- | -- | -- | -- | -- | -- |
| Water Truck | 2,139 | 2,139 | -- | -- | -- | -- | -- | -- | -- | -- |
| Project #7. Construction of a New Snow Removal Equipment (SRE) Building | | | | | | | | | | |
| Cement Mixer | -- | 1,388 | 1,388 | -- | -- | -- | -- | -- | -- | -- |
| Dump Truck Subbase Material | -- | 740 | 740 | -- | -- | -- | -- | -- | -- | -- |
| Passenger Car | -- | 181,406 | 181,406 | -- | -- | -- | -- | -- | -- | -- |
| Material Deliveries | -- | 72 | 72 | -- | -- | -- | -- | -- | -- | -- |
| Survey Crew Trucks | -- | 90 | 90 | -- | -- | -- | -- | -- | -- | -- |
| Tool Truck | -- | 3,600 | 3,600 | -- | -- | -- | -- | -- | -- | -- |
| Tractor Trailer | -- | 1,824 | 1,824 | -- | -- | -- | -- | -- | -- | -- |
| Project #8. Taxiway Bravo Widening | | | | | | | | | | |
| Asphalt 18 Wheeler | -- | 1,306 | 1,306 | -- | -- | -- | -- | -- | -- | -- |
| Cement Mixer | -- | 20,813 | 20,813 | -- | -- | -- | -- | -- | -- | -- |
| Dump Truck - Asphalt | -- | 1,850 | 1,850 | -- | -- | -- | -- | -- | -- | -- |
| Dump Truck Subbase Material | -- | 11,100 | 11,100 | -- | -- | -- | -- | -- | -- | -- |
| Passenger Car | -- | 529,706 | 529,706 | -- | -- | -- | -- | -- | -- | -- |
| Dump Truck | -- | 7,220 | 7,220 | -- | -- | -- | -- | -- | -- | -- |

| Table 3. On-Road Construction Vehicle Activity Levels (VMT) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| On-Road Vehicle Type | 2026 | 2027 | 2028 | 2029 | 2030 | 2032 | 2033 | 2034 | 2035 | 2036 |
| Flatbed Truck | -- | 3,086 | 3,086 | -- | -- | -- | -- | -- | -- | -- |
| Pickup Truck | -- | 9,068 | 9,036 | -- | -- | -- | -- | -- | -- | -- |
| Project #9. Runway 16L/34R Reconstruction and Strengthening | | | | | | | | | | |
| Asphalt 18 Wheeler | -- | 4,605 | 4,605 | 4,605 | -- | -- | -- | -- | -- | -- |
| Cement Mixer | -- | 73,383 | 73,383 | 73,383 | -- | -- | -- | -- | -- | -- |
| Dump Truck - Asphalt | -- | 6,523 | 6,523 | 6,523 | -- | -- | -- | -- | -- | -- |
| Dump Truck Subbase Material | -- | 39,138 | 39,138 | 39,138 | -- | -- | -- | -- | -- | -- |
| Passenger Car | -- | 457,144 | 457,144 | 457,144 | -- | -- | -- | -- | -- | -- |
| Dump Truck | -- | 22,872 | 22,998 | 22,872 | -- | -- | -- | -- | -- | -- |
| Flatbed Truck | -- | 11,016 | 11,016 | 11,016 | -- | -- | -- | -- | -- | -- |
| Pickup Truck | -- | 30,107 | 30,272 | 30,107 | -- | -- | -- | -- | -- | -- |
| Water Truck | -- | 1,057 | 1,057 | 1,057 | -- | -- | -- | -- | -- | -- |
| Project #10. Taxiway Echo Fillet Widening | | | | | | | | | | |
| Asphalt 18 Wheeler | -- | 12 | 12 | 12 | -- | -- | -- | -- | -- | -- |
| Cement Mixer | -- | 185 | 185 | 185 | -- | -- | -- | -- | -- | -- |
| Dump Truck - Asphalt | -- | 16 | 16 | 16 | -- | -- | -- | -- | -- | -- |
| Dump Truck Subbase Material | -- | 99 | 99 | 99 | -- | -- | -- | -- | -- | -- |
| Passenger Car | -- | 529,706 | 529,706 | 529,706 | -- | -- | -- | -- | -- | -- |
| Dump Truck | -- | 105 | 105 | 105 | -- | -- | -- | -- | -- | -- |
| Flatbed Truck | -- | 27 | 27 | 27 | -- | -- | -- | -- | -- | -- |
| Pickup Truck | -- | 123 | 123 | 123 | -- | -- | -- | -- | -- | -- |
| Project #11. Taxiway B Reconstruction and Strengthening (south of the bridge) | | | | | | | | | | |
| Asphalt 18 Wheeler | -- | -- | -- | 7,001 | 7,001 | -- | -- | -- | -- | -- |
| Cement Mixer | -- | -- | -- | 111,578 | 111,578 | -- | -- | -- | -- | -- |
| Dump Truck - Asphalt | -- | -- | -- | 9,919 | 9,919 | -- | -- | -- | -- | -- |
| Dump Truck Subbase Material | -- | -- | -- | 59,508 | 59,508 | -- | -- | -- | -- | -- |
| Passenger Car | -- | -- | -- | 529,706 | 529,706 | -- | -- | -- | -- | -- |
| Dump Truck | -- | -- | -- | 38,707 | 38,707 | -- | -- | -- | -- | -- |
| Flatbed Truck | -- | -- | -- | 16,543 | 16,543 | -- | -- | -- | -- | -- |
| Pickup Truck | -- | -- | -- | 48,612 | 48,612 | -- | -- | -- | -- | -- |
| Project #12. Construction of a New East Ramp Taxiway | | | | | | | | | | |
| Asphalt 18 Wheeler | -- | -- | -- | -- | -- | 202 | 202 | 202 | -- | -- |
| Cement Mixer | -- | -- | -- | -- | -- | 3,217 | 3,217 | 3,217 | -- | -- |
| Dump Truck - Asphalt | -- | -- | -- | -- | -- | 287 | 287 | 287 | -- | -- |

| Table 3. On-Road Construction Vehicle Activity Levels (VMT) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| On-Road Vehicle Type | 2026 | 2027 | 2028 | 2029 | 2030 | 2032 | 2033 | 2034 | 2035 | 2036 |
| Dump Truck Subbase Material | -- | -- | -- | -- | -- | 1,715 | 1,715 | 1,715 | -- | -- |
| Passenger Car | -- | -- | -- | -- | -- | 529,706 | 529,706 | 529,706 | -- | -- |
| Dump Truck | -- | -- | -- | -- | -- | 1,215 | 1,215 | 1,215 | -- | -- |
| Flatbed Truck | -- | -- | -- | -- | -- | 318 | 318 | 318 | -- | -- |
| Pickup Truck | -- | -- | -- | -- | -- | 1,421 | 1,421 | 1,421 | -- | -- |
| Project #13. Runway 16L/34R Widening | | | | | | | | | | |
| Asphalt 18 Wheeler | -- | -- | -- | -- | -- | -- | 4,716 | -- | -- | -- |
| Cement Mixer | -- | -- | -- | -- | -- | -- | 75,156 | -- | -- | -- |
| Dump Truck - Asphalt | -- | -- | -- | -- | -- | -- | 6,681 | -- | -- | -- |
| Dump Truck Subbase Material | -- | -- | -- | -- | -- | -- | 40,083 | -- | -- | -- |
| Passenger Car | -- | -- | -- | -- | -- | -- | 457,144 | -- | -- | -- |
| Dump Truck | -- | -- | -- | -- | -- | -- | 23,425 | -- | -- | -- |
| Flatbed Truck | -- | -- | -- | -- | -- | -- | 11,282 | -- | -- | -- |
| Pickup Truck | -- | -- | -- | -- | -- | -- | 30,834 | -- | -- | -- |
| Water Truck | -- | -- | -- | -- | -- | -- | 1,082 | -- | -- | -- |
| Project #14. Construction of an Aircraft Deicing Pad and Apron Expansion between Taxiways Delta and Echo | | | | | | | | | | |
| Asphalt 18 Wheeler | -- | -- | -- | -- | -- | -- | 1,183 | 1,183 | -- | -- |
| Cement Mixer | -- | -- | -- | -- | -- | -- | 18,847 | 18,847 | -- | -- |
| Dump Truck - Asphalt | -- | -- | -- | -- | -- | -- | 1,676 | 1,676 | -- | -- |
| Dump Truck Subbase Material | -- | -- | -- | -- | -- | -- | 10,051 | 10,051 | -- | -- |
| Passenger Car | -- | -- | -- | -- | -- | -- | 986,850 | 986,850 | -- | -- |
| Distributing Tanker | -- | -- | -- | -- | -- | -- | 362 | 362 | -- | -- |
| Dump Truck | -- | -- | -- | -- | -- | -- | 6,555 | 6,555 | -- | -- |
| Flatbed Truck | -- | -- | -- | -- | -- | -- | 2,794 | 2,794 | -- | -- |
| Pickup Truck | -- | -- | -- | -- | -- | -- | 7,253 | 7,253 | -- | -- |
| Project #15. Construction of New Expanded East Ramp and Taxilane between Taxiways Delta and Echo | | | | | | | | | | |
| Asphalt 18 Wheeler | -- | -- | -- | -- | -- | -- | 532 | 532 | 532 | 532 |
| Cement Mixer | -- | -- | -- | -- | -- | -- | 8,479 | 8,479 | 8,479 | 8,479 |
| Dump Truck - Asphalt | -- | -- | -- | -- | -- | -- | 754 | 754 | 754 | 754 |
| Dump Truck Subbase Material | -- | -- | -- | -- | -- | -- | 4,522 | 4,522 | 4,522 | 4,522 |
| Passenger Car | -- | -- | -- | -- | -- | -- | 493,425 | 493,425 | 493,425 | 493,425 |
| Distributing Tanker | -- | -- | -- | -- | -- | -- | 163 | 163 | 163 | 163 |
| Dump Truck | -- | -- | -- | -- | -- | -- | 2,949 | 2,949 | 2,949 | 2,949 |
| Flatbed Truck | -- | -- | -- | -- | -- | -- | 1,257 | 1,257 | 1,257 | 1,257 |

| Table 3. On-Road Construction Vehicle Activity Levels (VMT) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| On-Road Vehicle Type | 2026 | 2027 | 2028 | 2029 | 2030 | 2032 | 2033 | 2034 | 2035 | 2036 |
| Pickup Truck | -- | -- | -- | -- | -- | -- | 3,263 | 3,263 | 3,263 | 3,263 |
| Project #16. Construction of new Aircraft Rescue and Fire Fighting (ARFF) Facility | | | | | | | | | | |
| Cement Mixer | -- | -- | -- | -- | -- | -- | -- | -- | 3,701 | 3,701 |
| Dump Truck Subbase Material | -- | -- | -- | -- | -- | -- | -- | -- | 1,973 | 1,973 |
| Passenger Car | -- | -- | -- | -- | -- | -- | -- | -- | 181,406 | 181,406 |
| Material Deliveries | -- | -- | -- | -- | -- | -- | -- | -- | 192 | 192 |
| Survey Crew Trucks | -- | -- | -- | -- | -- | -- | -- | -- | 240 | 240 |
| Tool Truck | -- | -- | -- | -- | -- | -- | -- | -- | 9,600 | 9,600 |
| Tractor Trailer | -- | -- | -- | -- | -- | -- | -- | -- | 4,864 | 4,864 |

Notes: VMT = vehicle-mile-traveled.
No construction anticipated in 2031 (see *Table 2 - Construction Projects, Footprint, and Schedule)*, therefore no activity levels presented in table for this year.
Sources: ACRP Report 102 – Guidance for Estimating Airport Construction Emissions, CMT and HEF, 2025.

| Table 4. Off-Road Construction Equipment Activity Levels (Hours) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Off-Road Equipment Type | HP | LF | 2026 | 2027 | 2028 | 2029 | 2030 | 2032 | 2033 | 2034 | 2035 | 2036 |
| Project #1. Terminal Building Expansion (north, south, and west) | | | | | | | | | | | | |
| Backhoe | 100 | 0.21 | 801 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Concrete Ready Mix Trucks | 600 | 0.59 | 150 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fork Truck | 100 | 0.59 | 8,512 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Generator | 40 | 0.43 | 751 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Man Lift | 75 | 0.21 | 7,510 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| High Lift | 100 | 0.59 | 2,303 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Man Lift (Fascia Const.) | 75 | 0.21 | 60 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 90 Ton Crane | 300 | 0.43 | 801 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Concrete Pump | 11 | 0.43 | 30 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Concrete Truck | 600 | 0.59 | 60 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Trowel Machine | 600 | 0.59 | 30 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bob Cat | 75 | 0.21 | 312 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Excavator with Bucket | 175 | 0.59 | 156 | -- | -- | -- | -- | -- | -- | -- | -- | -- |

| Table 4. Off-Road Construction Equipment Activity Levels (Hours) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **HP** | **LF** | **2026** | **2027** | **2028** | **2029** | **2030** | **2032** | **2033** | **2034** | **2035** | **2036** |
| Generator Sets | 40 | 0.43 | 156 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Project #3. East Ramp Strengthening, Reconfiguration, and Rehabilitation | | | | | | | | | | | | |
| Asphalt Paver | 175 | 0.59 | 39 | 39 | 39 | -- | -- | -- | -- | -- | -- | -- |
| Other General Equipment | 175 | 0.43 | 1,136 | 1,136 | 1,136 | -- | -- | -- | -- | -- | -- | -- |
| Roller | 100 | 0.59 | 411 | 411 | 411 | -- | -- | -- | -- | -- | -- | -- |
| Skid Steer Loader | 75 | 0.21 | 204 | 204 | 204 | -- | -- | -- | -- | -- | -- | -- |
| Surfacing Equip. (Grooving) | 25 | 0.59 | 50 | 50 | 50 | -- | -- | -- | -- | -- | -- | -- |
| Chain Saw | 11 | 0.7 | 87 | 87 | 87 | -- | -- | -- | -- | -- | -- | -- |
| Chipper/Stump Grinder | 100 | 0.43 | 87 | 87 | 87 | -- | -- | -- | -- | -- | -- | -- |
| Dozer | 175 | 0.59 | 618 | 618 | 618 | -- | -- | -- | -- | -- | -- | -- |
| Excavator | 175 | 0.59 | 194 | 194 | 194 | -- | -- | -- | -- | -- | -- | -- |
| Loader | 175 | 0.59 | 182 | 182 | 182 | -- | -- | -- | -- | -- | -- | -- |
| Tractors/Loader/Backhoe | 100 | 0.21 | 245 | 245 | 245 | -- | -- | -- | -- | -- | -- | -- |
| Scraper | 600 | 0.59 | 130 | 130 | 130 | -- | -- | -- | -- | -- | -- | -- |
| Concrete Truck | 600 | 0.59 | 31 | 31 | 31 | -- | -- | -- | -- | -- | -- | -- |
| Grader | 300 | 0.59 | 35 | 35 | 35 | -- | -- | -- | -- | -- | -- | -- |
| Hydroseeder | 600 | 0.59 | 31 | 31 | 31 | -- | -- | -- | -- | -- | -- | -- |
| Off-Road Truck | 600 | 0.59 | 31 | 31 | 31 | -- | -- | -- | -- | -- | -- | -- |
| Pumps | 11 | 0.43 | 29 | 29 | 29 | -- | -- | -- | -- | -- | -- | -- |
| Dozer | 175 | 0.59 | 420 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Excavator | 175 | 0.59 | 420 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Excavator with Bucket | 175 | 0.59 | 560 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Excavator with Hoe Ram | 175 | 0.59 | 560 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Project #4. Terminal Parking Lot Rehabilitation and Expansion | | | | | | | | | | | | |
| Paving Machine | 175 | 0.59 | 264 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bob Cat | 75 | 0.21 | 198 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Concrete Ready Mix Trucks | 600 | 0.59 | 198 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bulldozer | 175 | 0.59 | 462 | -- | -- | -- | -- | -- | -- | -- | -- | -- |

| Table 4. Off-Road Construction Equipment Activity Levels (Hours) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **HP** | **LF** | **2026** | **2027** | **2028** | **2029** | **2030** | **2032** | **2033** | **2034** | **2035** | **2036** |
| Front Loader | 100 | 0.21 | 330 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Auger Drill | 175 | 0.43 | 198 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fork Truck | 100 | 0.59 | 396 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chain Saws | 11 | 0.7 | 198 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Log Chipper | 100 | 0.43 | 198 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Mulcher | 100 | 0.43 | 198 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Tractor | 100 | 0.21 | 330 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Compacting Equipment | 6 | 0.43 | 132 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Small Dozer | 175 | 0.59 | 132 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 40 Ton Rough Terrain Crane | 300 | 0.43 | 132 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| High Lift | 100 | 0.59 | 132 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Backhoe | 100 | 0.21 | 330 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Roller | 100 | 0.59 | 132 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Project #5. Economy Parking Lot Construction | | | | | | | | | | | | |
| Paving Machine | 175 | 0.59 | 1,888 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bob Cat | 75 | 0.21 | 1,416 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Concrete Ready Mix Trucks | 600 | 0.59 | 1,416 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bulldozer | 175 | 0.59 | 3,304 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Front Loader | 100 | 0.21 | 2,360 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Auger Drill | 175 | 0.43 | 1,416 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fork Truck | 100 | 0.59 | 2,832 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chain Saws | 11 | 0.7 | 1,416 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Log Chipper | 100 | 0.43 | 1,416 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Mulcher | 100 | 0.43 | 1,416 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Tractor | 100 | 0.21 | 2,360 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Compacting Equipment | 6 | 0.43 | 944 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Small Dozer | 175 | 0.59 | 944 | -- | -- | -- | -- | -- | -- | -- | -- | -- |

| Table 4. Off-Road Construction Equipment Activity Levels (Hours) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **HP** | **LF** | **2026** | **2027** | **2028** | **2029** | **2030** | **2032** | **2033** | **2034** | **2035** | **2036** |
| 40 Ton Rough Terrain Crane | 300 | 0.43 | 944 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| High Lift | 100 | 0.59 | 944 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Backhoe | 100 | 0.21 | 2,360 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Roller | 100 | 0.59 | 944 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Project #6. Bridge Rehabilitation - Runway 16L/34R and Taxiway Bravo | | | | | | | | | | | | |
| Asphalt Paver | 175 | 0.59 | 29 | 29 | -- | -- | -- | -- | -- | -- | -- | -- |
| Other General Equipment | 175 | 0.43 | 1,153 | 1,153 | -- | -- | -- | -- | -- | -- | -- | -- |
| Roller | 100 | 0.59 | 98 | 98 | -- | -- | -- | -- | -- | -- | -- | -- |
| Skid Steer Loader | 75 | 0.21 | 58 | 58 | -- | -- | -- | -- | -- | -- | -- | -- |
| Surfacing Equipment | 25 | 0.59 | 115 | 115 | -- | -- | -- | -- | -- | -- | -- | -- |
| Cold Planer | 175 | 0.59 | 47 | 47 | -- | -- | -- | -- | -- | -- | -- | -- |
| Sweepers | 175 | 0.43 | 47 | 47 | -- | -- | -- | -- | -- | -- | -- | -- |
| Concrete Saws | 40 | 0.59 | 498 | 498 | -- | -- | -- | -- | -- | -- | -- | -- |
| Excavator | 175 | 0.59 | 436 | 436 | -- | -- | -- | -- | -- | -- | -- | -- |
| Hydraulic Hammer | 175 | 0.59 | 420 | 420 | -- | -- | -- | -- | -- | -- | -- | -- |
| Air Compressor | 100 | 0.43 | 78 | 78 | -- | -- | -- | -- | -- | -- | -- | -- |
| Concrete Truck | 600 | 0.59 | 324 | 324 | -- | -- | -- | -- | -- | -- | -- | -- |
| Rubber Tired Loader | 175 | 0.59 | 78 | 78 | -- | -- | -- | -- | -- | -- | -- | -- |
| Slip Form Paver | 175 | 0.59 | 78 | 78 | -- | -- | -- | -- | -- | -- | -- | -- |
| Dozer | 175 | 0.59 | 89 | 89 | -- | -- | -- | -- | -- | -- | -- | -- |
| Grader | 300 | 0.59 | 5 | 5 | -- | -- | -- | -- | -- | -- | -- | -- |
| Hydroseeder | 600 | 0.59 | 1 | 1 | -- | -- | -- | -- | -- | -- | -- | -- |
| Off-Road Truck | 600 | 0.59 | 1 | 1 | -- | -- | -- | -- | -- | -- | -- | -- |
| Loader | 175 | 0.59 | 29 | 29 | -- | -- | -- | -- | -- | -- | -- | -- |
| Tractors/Loader/Backhoe | 100 | 0.21 | 33 | 33 | -- | -- | -- | -- | -- | -- | -- | -- |
| Crack Cleaner | 40 | 0.59 | 6 | 6 | -- | -- | -- | -- | -- | -- | -- | -- |
| Crack Filler | 100 | 0.43 | 6 | 6 | -- | -- | -- | -- | -- | -- | -- | -- |

| Table 4. Off-Road Construction Equipment Activity Levels (Hours) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **HP** | **LF** | **2026** | **2027** | **2028** | **2029** | **2030** | **2032** | **2033** | **2034** | **2035** | **2036** |
| Pumps | 11 | 0.43 | 4 | 4 | -- | -- | -- | -- | -- | -- | -- | -- |
| Grader | 300 | 0.59 | 5 | 5 | -- | -- | -- | -- | -- | -- | -- | -- |
| Chain Saw | 11 | 0.7 | 97 | 97 | -- | -- | -- | -- | -- | -- | -- | -- |
| Chipper/Stump Grinder | 100 | 0.43 | 97 | 97 | -- | -- | -- | -- | -- | -- | -- | -- |
| Excavator | 175 | 0.59 | 1,105 | 1,105 | -- | -- | -- | -- | -- | -- | -- | -- |
| Dozer | 175 | 0.59 | 1,493 | 1,493 | -- | -- | -- | -- | -- | -- | -- | -- |
| Loader | 175 | 0.59 | 128 | 128 | -- | -- | -- | -- | -- | -- | -- | -- |
| Other General Equipment | 175 | 0.43 | 249 | 249 | -- | -- | -- | -- | -- | -- | -- | -- |
| Roller | 100 | 0.59 | 1,105 | 1,105 | -- | -- | -- | -- | -- | -- | -- | -- |
| Scraper | 600 | 0.59 | 1,221 | 1,221 | -- | -- | -- | -- | -- | -- | -- | -- |
| Concrete Truck | 600 | 0.59 | 22 | 22 | -- | -- | -- | -- | -- | -- | -- | -- |
| Skid Steer Loader | 75 | 0.21 | 89 | 89 | -- | -- | -- | -- | -- | -- | -- | -- |
| Tractors/Loader/Backhoe | 100 | 0.21 | 121 | 121 | -- | -- | -- | -- | -- | -- | -- | -- |
| Hydroseeder | 600 | 0.59 | 35 | 35 | -- | -- | -- | -- | -- | -- | -- | -- |
| Off-Road Truck | 600 | 0.59 | 35 | 35 | -- | -- | -- | -- | -- | -- | -- | -- |
| Pumps | 11 | 0.43 | 32 | 32 | -- | -- | -- | -- | -- | -- | -- | -- |
| Project #7. Construction of a new Snow Removal Equipment (SRE) Building | | | | | | | | | | | | |
| Backhoe | 100 | 0.21 | -- | 192 | 192 | -- | -- | -- | -- | -- | -- | -- |
| Concrete Ready Mix Trucks | 600 | 0.59 | -- | 36 | 36 | -- | -- | -- | -- | -- | -- | -- |
| Fork Truck | 100 | 0.59 | -- | 984 | 984 | -- | -- | -- | -- | -- | -- | -- |
| Man Lift | 75 | 0.21 | -- | 720 | 720 | -- | -- | -- | -- | -- | -- | -- |
| High Lift | 100 | 0.59 | -- | 264 | 264 | -- | -- | -- | -- | -- | -- | -- |
| Man Lift (Fascia Constr.) | 75 | 0.21 | -- | 72 | 72 | -- | -- | -- | -- | -- | -- | -- |
| 40 Ton Crane | 300 | 0.43 | -- | 144 | 144 | -- | -- | -- | -- | -- | -- | -- |
| Project 8. Taxiway Bravo Widening | | | | | | | | | | | | |
| Asphalt Paver | 175 | 0.59 | -- | 12 | 12 | -- | -- | -- | -- | -- | -- | -- |
| Other General Equipment | 175 | 0.43 | -- | 404 | 404 | -- | -- | -- | -- | -- | -- | -- |

| Table 4. Off-Road Construction Equipment Activity Levels (Hours) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **HP** | **LF** | **2026** | **2027** | **2028** | **2029** | **2030** | **2032** | **2033** | **2034** | **2035** | **2036** |
| Roller | 100 | 0.59 | -- | 132 | 132 | -- | -- | -- | -- | -- | -- | -- |
| Skid Steer Loader | 75 | 0.21 | -- | 65 | 65 | -- | -- | -- | -- | -- | -- | -- |
| Surfacing Equip. (Grooving) | 25 | 0.59 | -- | 49 | 49 | -- | -- | -- | -- | -- | -- | -- |
| Chain Saw | 11 | 0.7 | -- | 27 | 27 | -- | -- | -- | -- | -- | -- | -- |
| Chipper/Stump Grinder | 100 | 0.43 | -- | 27 | 27 | -- | -- | -- | -- | -- | -- | -- |
| Air Compressor | 100 | 0.43 | -- | 33 | 33 | -- | -- | -- | -- | -- | -- | -- |
| Concrete Saws | 40 | 0.59 | -- | 33 | 33 | -- | -- | -- | -- | -- | -- | -- |
| Concrete Truck | 600 | 0.59 | -- | 149 | 149 | -- | -- | -- | -- | -- | -- | -- |
| Rubber Tired Loader | 175 | 0.59 | -- | 33 | 33 | -- | -- | -- | -- | -- | -- | -- |
| Slip Form Paver | 175 | 0.59 | -- | 33 | 33 | -- | -- | -- | -- | -- | -- | -- |
| Dozer | 175 | 0.59 | -- | 198 | 198 | -- | -- | -- | -- | -- | -- | -- |
| Excavator | 175 | 0.59 | -- | 62 | 62 | -- | -- | -- | -- | -- | -- | -- |
| Loader | 175 | 0.59 | -- | 57 | 57 | -- | -- | -- | -- | -- | -- | -- |
| Tractors/Loader/Backhoe | 100 | 0.21 | -- | 78 | 78 | -- | -- | -- | -- | -- | -- | -- |
| Scraper | 600 | 0.59 | -- | 42 | 42 | -- | -- | -- | -- | -- | -- | -- |
| Grader | 300 | 0.59 | -- | 11 | 11 | -- | -- | -- | -- | -- | -- | -- |
| Hydroseeder | 600 | 0.59 | -- | 10 | 10 | -- | -- | -- | -- | -- | -- | -- |
| Off-Road Truck | 600 | 0.59 | -- | 10 | 10 | -- | -- | -- | -- | -- | -- | -- |
| Pumps | 11 | 0.43 | -- | 9 | 9 | -- | -- | -- | -- | -- | -- | -- |
| Project #9. Runway 16L/34R Reconstruction and Strengthening | | | | | | | | | | | | |
| Asphalt Paver | 175 | 0.59 | -- | 44 | 44 | 44 | -- | -- | -- | -- | -- | -- |
| Other General Equipment | 175 | 0.43 | -- | 1,742 | 1,849 | 1,742 | -- | -- | -- | -- | -- | -- |
| Roller | 100 | 0.59 | -- | 148 | 225 | 148 | -- | -- | -- | -- | -- | -- |
| Skid Steer Loader | 75 | 0.21 | -- | 88 | 88 | 88 | -- | -- | -- | -- | -- | -- |
| Surfacing Equip. (Grooving) | 25 | 0.59 | -- | 174 | 174 | 174 | -- | -- | -- | -- | -- | -- |
| Cold Planer | 175 | 0.59 | -- | 70 | 70 | 70 | -- | -- | -- | -- | -- | -- |
| Sweepers | 175 | 0.43 | -- | 70 | 70 | 70 | -- | -- | -- | -- | -- | -- |

| Table 4. Off-Road Construction Equipment Activity Levels (Hours) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **HP** | **LF** | **2026** | **2027** | **2028** | **2029** | **2030** | **2032** | **2033** | **2034** | **2035** | **2036** |
| Concrete Saws | 40 | 0.59 | -- | 752 | 752 | 752 | -- | -- | -- | -- | -- | -- |
| Excavator | 175 | 0.59 | -- | 658 | 742 | 658 | -- | -- | -- | -- | -- | -- |
| Hydraulic Hammer | 175 | 0.59 | -- | 635 | 635 | 635 | -- | -- | -- | -- | -- | -- |
| Air Compressor | 100 | 0.43 | -- | 117 | 117 | 117 | -- | -- | -- | -- | -- | -- |
| Concrete Truck | 600 | 0.59 | -- | 489 | 489 | 489 | -- | -- | -- | -- | -- | -- |
| Rubber Tired Loader | 175 | 0.59 | -- | 117 | 117 | 117 | -- | -- | -- | -- | -- | -- |
| Slip Form Paver | 175 | 0.59 | -- | 117 | 117 | 117 | -- | -- | -- | -- | -- | -- |
| Dozer | 175 | 0.59 | -- | 134 | 253 | 134 | -- | -- | -- | -- | -- | -- |
| Grader | 300 | 0.59 | -- | 8 | 8 | 8 | -- | -- | -- | -- | -- | -- |
| Hydroseeder | 600 | 0.59 | -- | 1 | 18 | 1 | -- | -- | -- | -- | -- | -- |
| Off-Road Truck | 600 | 0.59 | -- | 1 | 18 | 1 | -- | -- | -- | -- | -- | -- |
| Loader | 175 | 0.59 | -- | 44 | 121 | 44 | -- | -- | -- | -- | -- | -- |
| Tractors/Loader/Backhoe | 100 | 0.21 | -- | 50 | 66 | 50 | -- | -- | -- | -- | -- | -- |
| Crack Cleaner | 40 | 0.59 | -- | 9 | 9 | 9 | -- | -- | -- | -- | -- | -- |
| Crack Filler | 100 | 0.43 | -- | 9 | 9 | 9 | -- | -- | -- | -- | -- | -- |
| Pumps | 11 | 0.43 | -- | 6 | 22 | 6 | -- | -- | -- | -- | -- | -- |
| Project #10. Taxiway Echo Fillet Widening | | | | | | | | | | | | |
| Asphalt Paver | 175 | 0.59 | -- | <1 | <1 | <1 | -- | -- | -- | -- | -- | -- |
| Other General Equipment | 175 | 0.43 | -- | 6 | 6 | 6 | -- | -- | -- | -- | -- | -- |
| Roller | 100 | 0.59 | -- | 2 | 2 | 2 | -- | -- | -- | -- | -- | -- |
| Skid Steer Loader | 75 | 0.21 | -- | 2 | 2 | 2 | -- | -- | -- | -- | -- | -- |
| Surfacing Equip. (Grooving) | 25 | 0.59 | -- | 1 | 1 | 1 | -- | -- | -- | -- | -- | -- |
| Chain Saw | 11 | 0.7 | -- | 1 | 1 | 1 | -- | -- | -- | -- | -- | -- |
| Chipper/Stump Grinder | 100 | 0.43 | -- | 1 | 1 | 1 | -- | -- | -- | -- | -- | -- |
| Air Compressor | 100 | 0.43 | -- | 1 | 1 | 1 | -- | -- | -- | -- | -- | -- |
| Concrete Saws | 40 | 0.59 | -- | 1 | 1 | 1 | -- | -- | -- | -- | -- | -- |
| Concrete Truck | 600 | 0.59 | -- | 2 | 2 | 2 | -- | -- | -- | -- | -- | -- |

| Table 4. Off-Road Construction Equipment Activity Levels (Hours) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **HP** | **LF** | **2026** | **2027** | **2028** | **2029** | **2030** | **2032** | **2033** | **2034** | **2035** | **2036** |
| Rubber Tired Loader | 175 | 0.59 | -- | 1 | 1 | 1 | -- | -- | -- | -- | -- | -- |
| Slip Form Paver | 175 | 0.59 | -- | 1 | 1 | 1 | -- | -- | -- | -- | -- | -- |
| Dozer | 175 | 0.59 | -- | 3 | 3 | 3 | -- | -- | -- | -- | -- | -- |
| Excavator | 175 | 0.59 | -- | 1 | 1 | 1 | -- | -- | -- | -- | -- | -- |
| Loader | 175 | 0.59 | -- | 2 | 2 | 2 | -- | -- | -- | -- | -- | -- |
| Tractors/Loader/Backhoe | 100 | 0.21 | -- | 3 | 3 | 3 | -- | -- | -- | -- | -- | -- |
| Scraper | 600 | 0.59 | -- | 1 | 1 | 1 | -- | -- | -- | -- | -- | -- |
| Grader | 300 | 0.59 | -- | 1 | 1 | 1 | -- | -- | -- | -- | -- | -- |
| Hydroseeder | 600 | 0.59 | -- | 1 | 1 | 1 | -- | -- | -- | -- | -- | -- |
| Off-Road Truck | 600 | 0.59 | -- | 1 | 1 | 1 | -- | -- | -- | -- | -- | -- |
| Pumps | 11 | 0.43 | -- | 1 | 1 | 1 | -- | -- | -- | -- | -- | -- |
| Project #11. Taxiway B Reconstruction and Strengthening (south of the bridge) | | | | | | | | | | | | |
| Asphalt Paver | 175 | 0.59 | -- | -- | -- | 67 | 67 | -- | -- | -- | -- | -- |
| Other General Equipment | 175 | 0.43 | -- | -- | -- | 2,165 | 2,165 | -- | -- | -- | -- | -- |
| Roller | 100 | 0.59 | -- | -- | -- | 707 | 707 | -- | -- | -- | -- | -- |
| Skid Steer Loader | 75 | 0.21 | -- | -- | -- | 348 | 348 | -- | -- | -- | -- | -- |
| Surfacing Equip. (Grooving) | 25 | 0.59 | -- | -- | -- | 264 | 264 | -- | -- | -- | -- | -- |
| Chain Saw | 11 | 0.7 | -- | -- | -- | 147 | 147 | -- | -- | -- | -- | -- |
| Chipper/Stump Grinder | 100 | 0.43 | -- | -- | -- | 147 | 147 | -- | -- | -- | -- | -- |
| Air Compressor | 100 | 0.43 | -- | -- | -- | 179 | 179 | -- | -- | -- | -- | -- |
| Concrete Saws | 40 | 0.59 | -- | -- | -- | 179 | 179 | -- | -- | -- | -- | -- |
| Concrete Truck | 600 | 0.59 | -- | -- | -- | 797 | 797 | -- | -- | -- | -- | -- |
| Rubber Tired Loader | 175 | 0.59 | -- | -- | -- | 179 | 179 | -- | -- | -- | -- | -- |
| Slip Form Paver | 175 | 0.59 | -- | -- | -- | 179 | 179 | -- | -- | -- | -- | -- |
| Dozer | 175 | 0.59 | -- | -- | -- | 1,063 | 1,063 | -- | -- | -- | -- | -- |
| Excavator | 175 | 0.59 | -- | -- | -- | 333 | 333 | -- | -- | -- | -- | -- |
| Loader | 175 | 0.59 | -- | -- | -- | 307 | 307 | -- | -- | -- | -- | -- |

| Table 4. Off-Road Construction Equipment Activity Levels (Hours) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **HP** | **LF** | **2026** | **2027** | **2028** | **2029** | **2030** | **2032** | **2033** | **2034** | **2035** | **2036** |
| Tractors/Loader/Backhoe | 100 | 0.21 | -- | -- | -- | 416 | 416 | -- | -- | -- | -- | -- |
| Scraper | 600 | 0.59 | -- | -- | -- | 223 | 223 | -- | -- | -- | -- | -- |
| Grader | 300 | 0.59 | -- | -- | -- | 59 | 59 | -- | -- | -- | -- | -- |
| Hydroseeder | 600 | 0.59 | -- | -- | -- | 53 | 53 | -- | -- | -- | -- | -- |
| Off-Road Truck | 600 | 0.59 | -- | -- | -- | 53 | 53 | -- | -- | -- | -- | -- |
| Pumps | 11 | 0.43 | -- | -- | -- | 49 | 49 | -- | -- | -- | -- | -- |
| Project #12. Construction of a New East Ramp Taxiway | | | | | | | | | | | | |
| Asphalt Paver | 175 | 0.59 | -- | -- | -- | -- | -- | 1 | 1 | 1 | -- | -- |
| Other General Equipment | 175 | 0.43 | -- | -- | -- | -- | -- | 72 | 72 | 72 | -- | -- |
| Roller | 100 | 0.59 | -- | -- | -- | -- | -- | 23 | 23 | 23 | -- | -- |
| Skid Steer Loader | 75 | 0.21 | -- | -- | -- | -- | -- | 23 | 23 | 23 | -- | -- |
| Surfacing Equipment (Grooving) | 25 | 0.59 | -- | -- | -- | -- | -- | 5 | 5 | 5 | -- | -- |
| Chain Saw | 11 | 0.7 | -- | -- | -- | -- | -- | 3 | 3 | 3 | -- | -- |
| Chipper/Stump Grinder | 100 | 0.43 | -- | -- | -- | -- | -- | 3 | 3 | 3 | -- | -- |
| Air Compressor | 100 | 0.43 | -- | -- | -- | -- | -- | 3 | 3 | 3 | -- | -- |
| Concrete Saws | 40 | 0.59 | -- | -- | -- | -- | -- | 3 | 3 | 3 | -- | -- |
| Concrete Truck | 600 | 0.59 | -- | -- | -- | -- | -- | 18 | 18 | 18 | -- | -- |
| Rubber Tired Loader | 175 | 0.59 | -- | -- | -- | -- | -- | 3 | 3 | 3 | -- | -- |
| Slip Form Paver | 175 | 0.59 | -- | -- | -- | -- | -- | 3 | 3 | 3 | -- | -- |
| Dozer | 175 | 0.59 | -- | -- | -- | -- | -- | 31 | 31 | 31 | -- | -- |
| Excavator | 175 | 0.59 | -- | -- | -- | -- | -- | 16 | 16 | 16 | -- | -- |
| Loader | 175 | 0.59 | -- | -- | -- | -- | -- | 24 | 24 | 24 | -- | -- |
| Tractors/Loader/Backhoe | 100 | 0.21 | -- | -- | -- | -- | -- | 30 | 30 | 30 | -- | -- |
| Scraper | 600 | 0.59 | -- | -- | -- | -- | -- | 4 | 4 | 4 | -- | -- |
| Grader | 300 | 0.59 | -- | -- | -- | -- | -- | 1 | 1 | 1 | -- | -- |
| Hydroseeder | 600 | 0.59 | -- | -- | -- | -- | -- | 1 | 1 | 1 | -- | -- |
| Off-Road Truck | 600 | 0.59 | -- | -- | -- | -- | -- | 1 | 1 | 1 | -- | -- |

| Table 4. Off-Road Construction Equipment Activity Levels (Hours) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **HP** | **LF** | **2026** | **2027** | **2028** | **2029** | **2030** | **2032** | **2033** | **2034** | **2035** | **2036** |
| Pumps | 11 | 0.43 | -- | -- | -- | -- | -- | 1 | 1 | 1 | -- | -- |
| Project #13. Runway 16L/34R Widening | | | | | | | | | | | | |
| Asphalt Paver | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 45 | -- | -- | -- |
| Other General Equipment | 175 | 0.43 | -- | -- | -- | -- | -- | -- | 1,784 | -- | -- | -- |
| Roller | 100 | 0.59 | -- | -- | -- | -- | -- | -- | 151 | -- | -- | -- |
| Skid Steer Loader | 75 | 0.21 | -- | -- | -- | -- | -- | -- | 90 | -- | -- | -- |
| Surfacing Equip. (Grooving) | 25 | 0.59 | -- | -- | -- | -- | -- | -- | 178 | -- | -- | -- |
| Cold Planer | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 72 | -- | -- | -- |
| Sweepers | 175 | 0.43 | -- | -- | -- | -- | -- | -- | 72 | -- | -- | -- |
| Concrete Saws | 40 | 0.59 | -- | -- | -- | -- | -- | -- | 770 | -- | -- | -- |
| Excavator | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 674 | -- | -- | -- |
| Hydraulic Hammer | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 650 | -- | -- | -- |
| Air Compressor | 100 | 0.43 | -- | -- | -- | -- | -- | -- | 120 | -- | -- | -- |
| Concrete Truck | 600 | 0.59 | -- | -- | -- | -- | -- | -- | 501 | -- | -- | -- |
| Rubber Tired Loader | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 120 | -- | -- | -- |
| Slip Form Paver | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 120 | -- | -- | -- |
| Dozer | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 137 | -- | -- | -- |
| Grader | 300 | 0.59 | -- | -- | -- | -- | -- | -- | 8 | -- | -- | -- |
| Hydroseeder | 600 | 0.59 | -- | -- | -- | -- | -- | -- | 1 | -- | -- | -- |
| Off-Road Truck | 600 | 0.59 | -- | -- | -- | -- | -- | -- | 1 | -- | -- | -- |
| Loader | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 45 | -- | -- | -- |
| Tractors/Loader/Backhoe | 100 | 0.21 | -- | -- | -- | -- | -- | -- | 51 | -- | -- | -- |
| Crack Cleaner | 40 | 0.59 | -- | -- | -- | -- | -- | -- | 9 | -- | -- | -- |
| Crack Filler | 100 | 0.43 | -- | -- | -- | -- | -- | -- | 9 | -- | -- | -- |
| Pumps | 11 | 0.43 | -- | -- | -- | -- | -- | -- | 7 | -- | -- | -- |
| Project #14. Construction of an Aircraft Deicing Pad and Apron Expansion between Taxiways Delta and Echo | | | | | | | | | | | | |
| Asphalt Paver | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 11 | 11 | -- | -- |

| Table 4. Off-Road Construction Equipment Activity Levels (Hours) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **HP** | **LF** | **2026** | **2027** | **2028** | **2029** | **2030** | **2032** | **2033** | **2034** | **2035** | **2036** |
| Other General Equipment | 175 | 0.43 | -- | -- | -- | -- | -- | -- | 331 | 331 | -- | -- |
| Roller | 100 | 0.59 | -- | -- | -- | -- | -- | -- | 120 | 120 | -- | -- |
| Skid Steer Loader | 75 | 0.21 | -- | -- | -- | -- | -- | -- | 59 | 59 | -- | -- |
| Surfacing Equip. (Grooving) | 25 | 0.59 | -- | -- | -- | -- | -- | -- | 14 | 14 | -- | -- |
| Chain Saw | 11 | 0.7 | -- | -- | -- | -- | -- | -- | 25 | 25 | -- | -- |
| Chipper/Stump Grinder | 100 | 0.43 | -- | -- | -- | -- | -- | -- | 25 | 25 | -- | -- |
| Dozer | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 180 | 180 | -- | -- |
| Excavator | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 56 | 56 | -- | -- |
| Loader | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 53 | 53 | -- | -- |
| Tractors/Loader/Backhoe | 100 | 0.21 | -- | -- | -- | -- | -- | -- | 71 | 71 | -- | -- |
| Scraper | 600 | 0.59 | -- | -- | -- | -- | -- | -- | 38 | 38 | -- | -- |
| Concrete Truck | 600 | 0.59 | -- | -- | -- | -- | -- | -- | 9 | 9 | -- | -- |
| Grader | 300 | 0.59 | -- | -- | -- | -- | -- | -- | 10 | 10 | -- | -- |
| Hydroseeder | 600 | 0.59 | -- | -- | -- | -- | -- | -- | 9 | 9 | -- | -- |
| Off-Road Truck | 600 | 0.59 | -- | -- | -- | -- | -- | -- | 9 | 9 | -- | -- |
| Pumps | 11 | 0.43 | -- | -- | -- | -- | -- | -- | 9 | 9 | -- | -- |
| Project #15. Construction of New Expanded East Ramp and Taxilane Between Taxiways Delta and Echo | | | | | | | | | | | | |
| Asphalt Paver | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 5 | 5 | 5 | 5 |
| Other General Equipment | 175 | 0.43 | -- | -- | -- | -- | -- | -- | 149 | 149 | 149 | 149 |
| Roller | 100 | 0.59 | -- | -- | -- | -- | -- | -- | 54 | 54 | 54 | 54 |
| Skid Steer Loader | 75 | 0.21 | -- | -- | -- | -- | -- | -- | 27 | 27 | 27 | 27 |
| Surfacing Equip. (Grooving) | 25 | 0.59 | -- | -- | -- | -- | -- | -- | 7 | 7 | 7 | 7 |
| Chain Saw | 11 | 0.7 | -- | -- | -- | -- | -- | -- | 11 | 11 | 11 | 11 |
| Chipper/Stump Grinder | 100 | 0.43 | -- | -- | -- | -- | -- | -- | 11 | 11 | 11 | 11 |
| Dozer | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 81 | 81 | 81 | 81 |
| Excavator | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 25 | 25 | 25 | 25 |
| Loader | 175 | 0.59 | -- | -- | -- | -- | -- | -- | 24 | 24 | 24 | 24 |

| Table 4. Off-Road Construction Equipment Activity Levels (Hours) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **HP** | **LF** | **2026** | **2027** | **2028** | **2029** | **2030** | **2032** | **2033** | **2034** | **2035** | **2036** |
| Tractors/Loader/Backhoe | 100 | 0.21 | -- | -- | -- | -- | -- | -- | 32 | 32 | 32 | 32 |
| Scraper | 600 | 0.59 | -- | -- | -- | -- | -- | -- | 17 | 17 | 17 | 17 |
| Concrete Truck | 600 | 0.59 | -- | -- | -- | -- | -- | -- | 4 | 4 | 4 | 4 |
| Grader | 300 | 0.59 | -- | -- | -- | -- | -- | -- | 5 | 5 | 5 | 5 |
| Hydroseeder | 600 | 0.59 | -- | -- | -- | -- | -- | -- | 4 | 4 | 4 | 4 |
| Off-Road Truck | 600 | 0.59 | -- | -- | -- | -- | -- | -- | 4 | 4 | 4 | 4 |
| Pumps | 11 | 0.43 | -- | -- | -- | -- | -- | -- | 4 | 4 | 4 | 4 |
| Project #16. Construction of new Aircraft Rescue and Fire Fighting (ARFF) Facility | | | | | | | | | | | | |
| Backhoe | 100 | 0.21 | -- | -- | -- | -- | -- | -- | -- | -- | 512 | 512 |
| Concrete Ready Mix Trucks | 600 | 0.59 | -- | -- | -- | -- | -- | -- | -- | -- | 96 | 96 |
| Fork Truck | 100 | 0.59 | -- | -- | -- | -- | -- | -- | -- | -- | 2,624 | 2,624 |
| Man Lift | 75 | 0.21 | -- | -- | -- | -- | -- | -- | -- | -- | 1,920 | 1,920 |
| High Lift | 100 | 0.59 | -- | -- | -- | -- | -- | -- | -- | -- | 704 | 704 |
| Man Lift (Fascia Const.) | 75 | 0.21 | -- | -- | -- | -- | -- | -- | -- | -- | 192 | 192 |
| 40 Ton Crane | 300 | 0.43 | -- | -- | -- | -- | -- | -- | -- | -- | 384 | 384 |

Notes: HP = horsepower and LF = load factor.
No construction anticipated in 2031 (see *Table 2 - Construction Projects, Footprint, and Schedule)*, therefore no activity levels presented in table for this year.
Sources: ACRP Report 102 – Guidance for Estimating Airport Construction Emissions, CMT and HEF, 2025.

## On-Road and Off-Road Emission Factors

### *Criteria Air/Precursor Pollutants*

As stated, for both on-road construction vehicles and off-road construction equipment, emission factors for the criteria air/precursor pollutants were developed using MOVES. The MOVES model input data were developed based on county-specific information (e.g., vehicle/fuel mix, fuel specifications, inspection maintenance program, meteorology data, etc.).

**Table 5** and **Table 6** present the MOVES emission factors for on-road vehicles and off-road construction equipment, respectively, by vehicle/equipment type. The emission factors of on-road vehicles are expressed in grams per mile (g/mile) and the emission factors for off-road construction equipment are expressed in grams per horsepower-hour (g/hp-hr). These factors are derived from the MOVES model and cover criteria and precursor air pollutants for relevant construction years.

| Table 5. On-Road Vehicle Emission Factors (g/mile) | | | | | | | |
|---|---|---|---|---|---|---|---|
| On-Road Vehicle Type | Fuel Type | CO | $NO_x$ | $SO_2$ | VOC | $PM_{10}$ | $PM_{2.5}$ |
| 2026 | | | | | | | |
| Passenger Car | Gasoline | 4.21 | 0.09 | <0.01 | 0.03 | 0.05 | 0.01 |
| Dump Truck/Water Truck/Cement Mixer | Diesel | 1.16 | 1.76 | <0.01 | 0.04 | 0.04 | 0.09 |
| Pickup Truck/Tool and Survey Crew Trucks/Line Painting and Sprayer Trucks | | 2.51 | 1.63 | <0.01 | 0.07 | 0.07 | 0.22 |
| Flatbed Truck/Distributing Tanker/Tractor Trailers/10 and 18 Wheelers | | 2.18 | 4.24 | 0.01 | 0.29 | 0.08 | 0.10 |
| 2027 | | | | | | | |
| Passenger Car | Gasoline | 4.08 | 0.08 | <0.01 | 0.02 | 0.05 | 0.01 |
| Dump Truck/Water Truck/Cement Mixer | Diesel | 1.12 | 1.59 | <0.01 | 0.03 | 0.03 | 0.08 |
| Pickup Truck/Tool and Survey Crew Trucks/Line Painting and Sprayer Trucks | | 2.37 | 1.47 | <0.01 | 0.06 | 0.06 | 0.19 |
| Flatbed Truck/Distributing Tanker/Tractor Trailers/10 and 18 Wheelers | | 2.12 | 3.87 | 0.01 | 0.28 | 0.07 | 0.09 |
| 2028 | | | | | | | |
| Passenger Car | Gasoline | 3.93 | 0.07 | <0.01 | 0.02 | 0.05 | 0.01 |
| Dump Truck/Water Truck/Cement Mixer | Diesel | 1.09 | 1.45 | <0.01 | 0.03 | 0.02 | 0.07 |
| Pickup Truck/Tool and Survey Crew Trucks/Line Painting and Sprayer Trucks | | 1.99 | 1.24 | <0.01 | 0.04 | 0.04 | 0.15 |
| Flatbed Truck/Distributing Tanker/Tractor Trailers/10 and 18 Wheelers | | 2.07 | 3.51 | 0.01 | 0.27 | 0.06 | 0.08 |
| 2029 | | | | | | | |
| Passenger Car | Gasoline | 3.73 | 0.06 | <0.01 | 0.02 | 0.05 | 0.01 |
| Dump Truck/Water Truck/Cement Mixer | Diesel | 1.06 | 1.29 | <0.01 | 0.02 | 0.02 | 0.06 |
| Pickup Truck/Tool and Survey Crew Trucks/Line Painting and Sprayer Trucks | | 2.01 | 1.24 | <0.01 | 0.04 | 0.04 | 0.16 |
| Flatbed Truck/Distributing Tanker/Tractor Trailers/10 and 18 Wheelers | | 2.02 | 3.17 | 0.01 | 0.27 | 0.06 | 0.07 |
| 2030 | | | | | | | |
| Passenger Car | Gasoline | 3.55 | 0.05 | <0.01 | 0.02 | 0.05 | 0.01 |
| Dump Truck/Water Truck/Cement Mixer | Diesel | 1.04 | 1.19 | <0.01 | 0.02 | 0.02 | 0.05 |
| Pickup Truck/Tool and Survey Crew Trucks/Line Painting and Sprayer Trucks | | 1.88 | 1.09 | <0.01 | 0.03 | 0.03 | 0.13 |
| Flatbed Truck/Distributing Tanker/Tractor Trailers/10 and 18 Wheelers | | 1.98 | 2.88 | 0.01 | 0.26 | 0.05 | 0.06 |
| 2032 | | | | | | | |
| Passenger Car | Gasoline | 3.16 | 0.02 | <0.01 | 0.01 | 0.05 | 0.01 |
| Dump Truck/Water Truck/Cement Mixer | Diesel | 0.99 | 0.98 | <0.01 | 0.01 | 0.01 | 0.04 |
| Pickup Truck/Tool and Survey Crew Trucks/Line Painting and Sprayer Trucks | | 1.73 | 0.91 | <0.01 | 0.03 | 0.02 | 0.10 |
| Flatbed Truck/Distributing Tanker/Tractor Trailers/10 and 18 Wheelers | | 1.90 | 2.33 | 0.01 | 0.25 | 0.05 | 0.05 |
| 2033 | | | | | | | |

| Table 5. On-Road Vehicle Emission Factors (g/mile) | | | | | | | |
|---|---|---|---|---|---|---|---|
| On-Road Vehicle Type | Fuel Type | CO | $NO_x$ | $SO_2$ | VOC | $PM_{10}$ | $PM_{2.5}$ |
| Passenger Car | Gasoline | 2.96 | 0.02 | <0.01 | 0.01 | 0.05 | 0.01 |
| Dump Truck/Water Truck/Cement Mixer | Diesel | 0.96 | 0.88 | <0.01 | 0.01 | 0.01 | 0.03 |
| Pickup Truck/Tool and Survey Crew Trucks/Line Painting and Sprayer Trucks | | 1.59 | 0.75 | <0.01 | 0.02 | 0.02 | 0.08 |
| Flatbed Truck/Distributing Tanker/Tractor Trailers/10 and 18 Wheelers | | 1.87 | 2.14 | 0.01 | 0.25 | 0.05 | 0.04 |
| 2034 | | | | | | | |
| Passenger Car | Gasoline | 2.77 | 0.02 | <0.01 | 0.01 | 0.05 | 0.01 |
| Dump Truck/Water Truck/Cement Mixer | Diesel | 0.94 | 0.81 | <0.01 | 0.01 | 0.01 | 0.03 |
| Pickup Truck/Tool and Survey Crew Trucks/Line Painting and Sprayer Trucks | | 1.53 | 0.68 | <0.01 | 0.02 | 0.02 | 0.07 |
| Flatbed Truck/Distributing Tanker/Tractor Trailers/10 and 18 Wheelers | | 1.86 | 2.01 | 0.01 | 0.25 | 0.04 | 0.04 |
| 2035 | | | | | | | |
| Passenger Car | Gasoline | 2.59 | 0.02 | <0.01 | 0.01 | 0.05 | 0.01 |
| Dump Truck/Water Truck/Cement Mixer | Diesel | 0.93 | 0.76 | <0.01 | 0.01 | 0.01 | 0.03 |
| Pickup Truck/Tool and Survey Crew Trucks/Line Painting and Sprayer Trucks | | 1.46 | 0.61 | <0.01 | 0.01 | 0.01 | 0.05 |
| Flatbed Truck/Distributing Tanker/Tractor Trailers/10 and 18 Wheelers | | 1.86 | 2.01 | 0.01 | 0.25 | 0.04 | 0.04 |
| 2036 | | | | | | | |
| Passenger Car | Gasoline | 2.42 | 0.01 | <0.01 | 0.01 | 0.05 | 0.01 |
| Dump Truck/Water Truck/Cement Mixer | Diesel | 0.92 | 0.71 | <0.01 | 0.01 | 0.01 | 0.03 |
| Pickup Truck/Tool and Survey Crew Trucks/Line Painting and Sprayer Trucks | | 1.43 | 0.59 | <0.01 | 0.01 | 0.01 | 0.05 |
| Flatbed Truck/Distributing Tanker/Tractor Trailers/10 and 18 Wheelers | | 1.84 | 1.80 | <0.01 | 0.24 | 0.04 | 0.04 |

Notes: CO = carbon monoxide, $NO_x$ = nitrogen oxide, $SO_2$ = sulfur dioxide, VOC = volatile organic compounds, $PM_{10}$ = particulate matter with a diameter of 10 microns or smaller, and $PM_{2.5}$ = particulate matter with a diameter of 2.5 microns or smaller.
No construction anticipated in 2031 (see *Table 2 - Construction Projects, Footprint, and Schedule*), therefore no emission factors presented in table for this year.
Source: U.S. EPA MOVES4, 2024.

| Table 6. Off-Road Construction Equipment Emission Factors (g/hp-hr) | | | | | | |
|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **CO** | **$NO_x$** | **$SO_2$** | **VOC** | **$PM_{10}$** | **$PM_{2.5}$** |
| 2026 | | | | | | |
| 40 Ton Rough Terrain Crane | 0.14 | 0.61 | <0.01 | 0.03 | 0.03 | 0.03 |
| Air Compressor | 0.33 | 1.54 | <0.01 | 0.06 | 0.05 | 0.05 |
| Asphalt Paver | 0.12 | 0.66 | <0.01 | 0.02 | 0.02 | 0.02 |
| Auger Drill | 1.07 | 3.93 | <0.01 | 0.27 | 0.19 | 0.18 |
| Backhoe | 1.84 | 2.46 | <0.01 | 0.40 | 0.29 | 0.28 |
| Bob Cat | 1.84 | 2.46 | <0.01 | 0.40 | 0.29 | 0.28 |
| Bulldozer | 0.12 | 0.60 | <0.01 | 0.02 | 0.02 | 0.02 |
| Caisson Drilling Rig | 1.07 | 3.93 | <0.01 | 0.27 | 0.19 | 0.18 |
| Chain Saw | 0.45 | 2.02 | <0.01 | 0.09 | 0.05 | 0.05 |
| Chipper/Stump Grinder | 0.82 | 2.57 | <0.01 | 0.18 | 0.15 | 0.14 |
| Cold Planer | 0.57 | 1.40 | <0.01 | 0.08 | 0.08 | 0.08 |
| Compacting Equipment | 2.21 | 4.08 | <0.01 | 0.68 | 0.23 | 0.23 |
| Concrete Boom Pump | 0.93 | 2.55 | <0.01 | 0.22 | 0.16 | 0.15 |
| Concrete Pump | 0.93 | 2.55 | <0.01 | 0.22 | 0.16 | 0.15 |
| Concrete Ready-Mix Trucks | 0.08 | 1.40 | <0.01 | 0.03 | 0.02 | 0.02 |
| Concrete Saws | 0.45 | 2.02 | <0.01 | 0.09 | 0.05 | 0.05 |
| Concrete Truck | 0.08 | 1.40 | <0.01 | 0.03 | 0.02 | 0.02 |
| Crack Cleaner | 0.57 | 1.40 | <0.01 | 0.08 | 0.08 | 0.08 |
| Crack Filler | 0.57 | 1.40 | <0.01 | 0.08 | 0.08 | 0.08 |
| Cranes | 0.14 | 0.61 | <0.01 | 0.03 | 0.03 | 0.03 |
| Curb/Gutter Paver | 0.12 | 0.66 | <0.01 | 0.02 | 0.02 | 0.02 |
| Dozer | 0.12 | 0.60 | <0.01 | 0.02 | 0.02 | 0.02 |
| Excavator | 0.07 | 0.37 | <0.01 | 0.02 | 0.02 | 0.01 |
| Fork Truck | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Forklift | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Front Loader | 1.84 | 2.46 | <0.01 | 0.40 | 0.29 | 0.28 |
| Generator | 0.91 | 2.60 | <0.01 | 0.22 | 0.15 | 0.14 |
| Grader | 0.06 | 0.22 | <0.01 | 0.01 | 0.01 | 0.01 |
| High Lift | 0.57 | 1.40 | <0.01 | 0.08 | 0.08 | 0.08 |
| Hydraulic Hammer | 0.57 | 1.40 | <0.01 | 0.08 | 0.08 | 0.08 |
| Hydroseeder | 0.78 | 1.80 | <0.01 | 0.15 | 0.14 | 0.14 |
| Loader | 1.84 | 2.46 | <0.01 | 0.40 | 0.29 | 0.28 |
| Log Chipper | 0.82 | 2.57 | <0.01 | 0.18 | 0.15 | 0.14 |
| Man Lift | 0.57 | 1.40 | <0.01 | 0.08 | 0.08 | 0.08 |
| Mulcher | 0.78 | 1.80 | <0.01 | 0.15 | 0.14 | 0.14 |
| Off-Road Truck | 0.08 | 1.40 | <0.01 | 0.03 | 0.02 | 0.02 |
| Other General Equipment | 0.17 | 0.73 | <0.01 | 0.03 | 0.03 | 0.03 |
| Paving Machine | 0.12 | 0.66 | <0.01 | 0.02 | 0.02 | 0.02 |
| Pumps | 0.93 | 2.55 | <0.01 | 0.22 | 0.16 | 0.15 |
| Roller | 0.22 | 0.88 | <0.01 | 0.04 | 0.03 | 0.03 |

| Table 6. Off-Road Construction Equipment Emission Factors (g/hp-hr) | | | | | | |
|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **CO** | **$NO_x$** | **$SO_2$** | **VOC** | **$PM_{10}$** | **$PM_{2.5}$** |
| Rubber Tired Loader | 0.20 | 0.80 | <0.01 | 0.04 | 0.04 | 0.03 |
| Scraper | 0.14 | 0.36 | <0.01 | 0.02 | 0.02 | 0.02 |
| Skid Steer Loader | 4.93 | 4.87 | <0.01 | 0.95 | 0.70 | 0.68 |
| Slip Form Paver | 0.12 | 0.66 | <0.01 | 0.02 | 0.02 | 0.02 |
| Small Dozer | 0.12 | 0.60 | <0.01 | 0.02 | 0.02 | 0.02 |
| Surfacing Equip. (Grooving) | 0.86 | 2.34 | <0.01 | 0.13 | 0.11 | 0.11 |
| Sweepers | 0.57 | 1.40 | <0.01 | 0.08 | 0.08 | 0.08 |
| Tractor | 0.12 | 0.60 | <0.01 | 0.02 | 0.02 | 0.02 |
| Tractors/Loader/Backhoe | 1.84 | 2.46 | <0.01 | 0.40 | 0.29 | 0.28 |
| Trencher | 0.41 | 1.88 | <0.01 | 0.08 | 0.05 | 0.05 |
| Trowel Machine | 0.86 | 2.34 | <0.01 | 0.13 | 0.11 | 0.11 |
| Truck for Topsoil & Seed Del&Spread | 0.78 | 1.80 | <0.01 | 0.15 | 0.14 | 0.14 |
| 2027 | | | | | | |
| 40 Ton Rough Terrain Crane | 0.12 | 0.52 | <0.01 | 0.03 | 0.02 | 0.02 |
| Air Compressor | 0.28 | 1.46 | <0.01 | 0.05 | 0.04 | 0.04 |
| Asphalt Paver | 0.11 | 0.63 | <0.01 | 0.02 | 0.02 | 0.02 |
| Auger Drill | 0.96 | 3.56 | <0.01 | 0.24 | 0.17 | 0.16 |
| Backhoe | 1.57 | 2.20 | <0.01 | 0.34 | 0.25 | 0.24 |
| Bob Cat | 1.57 | 2.20 | <0.01 | 0.34 | 0.25 | 0.24 |
| Bulldozer | 0.10 | 0.55 | <0.01 | 0.02 | 0.02 | 0.02 |
| Caisson Drilling Rig | 0.96 | 3.56 | <0.01 | 0.24 | 0.17 | 0.16 |
| Chain Saw | 0.40 | 1.97 | <0.01 | 0.09 | 0.05 | 0.04 |
| Chipper/Stump Grinder | 0.74 | 2.35 | <0.01 | 0.16 | 0.13 | 0.13 |
| Cold Planer | 0.48 | 1.21 | <0.01 | 0.07 | 0.07 | 0.06 |
| Compacting Equipment | 2.20 | 4.06 | <0.01 | 0.68 | 0.23 | 0.22 |
| Concrete Boom Pump | 0.86 | 2.42 | <0.01 | 0.20 | 0.14 | 0.14 |
| Concrete Pump | 0.86 | 2.42 | <0.01 | 0.20 | 0.14 | 0.14 |
| Concrete Ready-Mix Trucks | 0.07 | 1.39 | <0.01 | 0.03 | 0.02 | 0.02 |
| Concrete Saws | 0.40 | 1.97 | <0.01 | 0.09 | 0.05 | 0.04 |
| Concrete Truck | 0.07 | 1.39 | <0.01 | 0.03 | 0.02 | 0.02 |
| Crack Cleaner | 0.48 | 1.21 | <0.01 | 0.07 | 0.07 | 0.06 |
| Crack Filler | 0.48 | 1.21 | <0.01 | 0.07 | 0.07 | 0.06 |
| Cranes | 0.12 | 0.52 | <0.01 | 0.03 | 0.02 | 0.02 |
| Curb/Gutter Paver | 0.11 | 0.63 | <0.01 | 0.02 | 0.02 | 0.02 |
| Dozer | 0.10 | 0.55 | <0.01 | 0.02 | 0.02 | 0.02 |
| Excavator | 0.06 | 0.34 | <0.01 | 0.02 | 0.01 | 0.01 |
| Fork Truck | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Forklift | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Front Loader | 1.57 | 2.20 | <0.01 | 0.34 | 0.25 | 0.24 |
| Generator | 0.84 | 2.47 | <0.01 | 0.20 | 0.13 | 0.13 |
| Grader | 0.05 | 0.20 | <0.01 | 0.01 | 0.01 | 0.01 |

| Table 6. Off-Road Construction Equipment Emission Factors (g/hp-hr) | | | | | | |
|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **CO** | **$NO_x$** | **$SO_2$** | **VOC** | **$PM_{10}$** | **$PM_{2.5}$** |
| High Lift | 0.48 | 1.21 | <0.01 | 0.07 | 0.07 | 0.06 |
| Hydraulic Hammer | 0.48 | 1.21 | <0.01 | 0.07 | 0.07 | 0.06 |
| Hydroseeder | 0.68 | 1.61 | <0.01 | 0.13 | 0.12 | 0.12 |
| Loader | 1.57 | 2.20 | <0.01 | 0.34 | 0.25 | 0.24 |
| Log Chipper | 0.74 | 2.35 | <0.01 | 0.16 | 0.13 | 0.13 |
| Man Lift | 0.48 | 1.21 | <0.01 | 0.07 | 0.07 | 0.06 |
| Mulcher | 0.68 | 1.61 | <0.01 | 0.13 | 0.12 | 0.12 |
| Off-Road Truck | 0.07 | 1.39 | <0.01 | 0.03 | 0.02 | 0.02 |
| Other General Equipment | 0.14 | 0.66 | <0.01 | 0.03 | 0.03 | 0.03 |
| Paving Machine | 0.11 | 0.63 | <0.01 | 0.02 | 0.02 | 0.02 |
| Pumps | 0.86 | 2.42 | <0.01 | 0.20 | 0.14 | 0.14 |
| Roller | 0.17 | 0.82 | <0.01 | 0.03 | 0.03 | 0.03 |
| Rubber Tired Loader | 0.16 | 0.71 | <0.01 | 0.03 | 0.03 | 0.03 |
| Scraper | 0.11 | 0.30 | <0.01 | 0.02 | 0.02 | 0.02 |
| Skid Steer Loader | 4.53 | 4.60 | <0.01 | 0.86 | 0.64 | 0.62 |
| Slip Form Paver | 0.11 | 0.63 | <0.01 | 0.02 | 0.02 | 0.02 |
| Small Dozer | 0.10 | 0.55 | <0.01 | 0.02 | 0.02 | 0.02 |
| Surfacing Equip. (Grooving) | 0.71 | 2.04 | <0.01 | 0.11 | 0.10 | 0.09 |
| Sweepers | 0.48 | 1.21 | <0.01 | 0.07 | 0.07 | 0.06 |
| Tractor | 0.10 | 0.55 | <0.01 | 0.02 | 0.02 | 0.02 |
| Tractors/Loader/Backhoe | 1.57 | 2.20 | <0.01 | 0.34 | 0.25 | 0.24 |
| Trencher | 0.35 | 1.79 | <0.01 | 0.07 | 0.04 | 0.04 |
| Trowel Machine | 0.71 | 2.04 | <0.01 | 0.11 | 0.10 | 0.09 |
| Truck for Topsoil & Seed Del&Spread | 0.68 | 1.61 | <0.01 | 0.13 | 0.12 | 0.12 |
| 2028 | | | | | | |
| 40 Ton Rough Terrain Crane | 0.10 | 0.45 | <0.01 | 0.02 | 0.02 | 0.02 |
| Air Compressor | 0.24 | 1.39 | <0.01 | 0.04 | 0.04 | 0.04 |
| Asphalt Paver | 0.10 | 0.61 | <0.01 | 0.02 | 0.02 | 0.02 |
| Auger Drill | 0.84 | 3.15 | <0.01 | 0.21 | 0.14 | 0.14 |
| Backhoe | 1.37 | 2.01 | <0.01 | 0.30 | 0.22 | 0.21 |
| Bob Cat | 1.37 | 2.01 | <0.01 | 0.30 | 0.22 | 0.21 |
| Bulldozer | 0.08 | 0.52 | <0.01 | 0.02 | 0.02 | 0.02 |
| Caisson Drilling Rig | 0.84 | 3.15 | <0.01 | 0.21 | 0.14 | 0.14 |
| Chain Saw | 0.35 | 1.93 | <0.01 | 0.08 | 0.04 | 0.04 |
| Chipper/Stump Grinder | 0.65 | 2.12 | <0.01 | 0.14 | 0.12 | 0.11 |
| Cold Planer | 0.41 | 1.07 | <0.01 | 0.06 | 0.06 | 0.06 |
| Compacting Equipment | 2.19 | 4.05 | <0.01 | 0.68 | 0.23 | 0.22 |
| Concrete Boom Pump | 0.81 | 2.32 | <0.01 | 0.19 | 0.13 | 0.13 |
| Concrete Pump | 0.81 | 2.32 | <0.01 | 0.19 | 0.13 | 0.13 |
| Concrete Ready-Mix Trucks | 0.06 | 1.38 | <0.01 | 0.03 | 0.02 | 0.02 |
| Concrete Saws | 0.35 | 1.93 | <0.01 | 0.08 | 0.04 | 0.04 |

| Table 6. Off-Road Construction Equipment Emission Factors (g/hp-hr) | | | | | | |
|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **CO** | **$NO_x$** | **$SO_2$** | **VOC** | **$PM_{10}$** | **$PM_{2.5}$** |
| Concrete Truck | 0.06 | 1.38 | <0.01 | 0.03 | 0.02 | 0.02 |
| Crack Cleaner | 0.41 | 1.07 | <0.01 | 0.06 | 0.06 | 0.06 |
| Crack Filler | 0.41 | 1.07 | <0.01 | 0.06 | 0.06 | 0.06 |
| Cranes | 0.10 | 0.45 | <0.01 | 0.02 | 0.02 | 0.02 |
| Curb/Gutter Paver | 0.10 | 0.61 | <0.01 | 0.02 | 0.02 | 0.02 |
| Dozer | 0.08 | 0.52 | <0.01 | 0.02 | 0.02 | 0.02 |
| Excavator | 0.05 | 0.32 | <0.01 | 0.01 | 0.01 | 0.01 |
| Fork Truck | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Forklift | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Front Loader | 1.37 | 2.01 | <0.01 | 0.30 | 0.22 | 0.21 |
| Generator | 0.78 | 2.37 | <0.01 | 0.19 | 0.12 | 0.12 |
| Grader | 0.05 | 0.18 | <0.01 | 0.01 | 0.01 | 0.01 |
| High Lift | 0.41 | 1.07 | <0.01 | 0.06 | 0.06 | 0.06 |
| Hydraulic Hammer | 0.41 | 1.07 | <0.01 | 0.06 | 0.06 | 0.06 |
| Hydroseeder | 0.60 | 1.47 | <0.01 | 0.11 | 0.11 | 0.10 |
| Loader | 1.37 | 2.01 | <0.01 | 0.30 | 0.22 | 0.21 |
| Log Chipper | 0.65 | 2.12 | <0.01 | 0.14 | 0.12 | 0.11 |
| Man Lift | 0.41 | 1.07 | <0.01 | 0.06 | 0.06 | 0.06 |
| Mulcher | 0.60 | 1.47 | <0.01 | 0.11 | 0.11 | 0.10 |
| Off-Road Truck | 0.06 | 1.38 | <0.01 | 0.03 | 0.02 | 0.02 |
| Other General Equipment | 0.12 | 0.60 | <0.01 | 0.02 | 0.02 | 0.02 |
| Paving Machine | 0.10 | 0.61 | <0.01 | 0.02 | 0.02 | 0.02 |
| Pumps | 0.81 | 2.32 | <0.01 | 0.19 | 0.13 | 0.13 |
| Roller | 0.15 | 0.80 | <0.01 | 0.03 | 0.02 | 0.02 |
| Rubber Tired Loader | 0.14 | 0.66 | <0.01 | 0.03 | 0.02 | 0.02 |
| Scraper | 0.09 | 0.24 | <0.01 | 0.02 | 0.02 | 0.01 |
| Skid Steer Loader | 4.08 | 4.30 | <0.01 | 0.77 | 0.57 | 0.55 |
| Slip Form Paver | 0.10 | 0.61 | <0.01 | 0.02 | 0.02 | 0.02 |
| Small Dozer | 0.08 | 0.52 | <0.01 | 0.02 | 0.02 | 0.02 |
| Surfacing Equip. (Grooving) | 0.59 | 1.82 | <0.01 | 0.10 | 0.08 | 0.08 |
| Sweepers | 0.41 | 1.07 | <0.01 | 0.06 | 0.06 | 0.06 |
| Tractor | 0.08 | 0.52 | <0.01 | 0.02 | 0.02 | 0.02 |
| Tractors/Loader/Backhoe | 1.37 | 2.01 | <0.01 | 0.30 | 0.22 | 0.21 |
| Trencher | 0.30 | 1.73 | <0.01 | 0.06 | 0.04 | 0.03 |
| Trowel Machine | 0.59 | 1.82 | <0.01 | 0.10 | 0.08 | 0.08 |
| Truck for Topsoil & Seed Del&Spread | 0.60 | 1.47 | <0.01 | 0.11 | 0.11 | 0.10 |
| 2029 | | | | | | |
| 40 Ton Rough Terrain Crane | 0.09 | 0.40 | <0.01 | 0.02 | 0.02 | 0.02 |
| Air Compressor | 0.20 | 1.34 | <0.01 | 0.04 | 0.03 | 0.03 |
| Asphalt Paver | 0.09 | 0.60 | <0.01 | 0.02 | 0.02 | 0.01 |
| Auger Drill | 0.71 | 2.71 | <0.01 | 0.18 | 0.12 | 0.12 |

| Table 6. Off-Road Construction Equipment Emission Factors (g/hp-hr) | | | | | | |
|---|---|---|---|---|---|---|
| Off-Road Equipment Type | CO | $NO_x$ | $SO_2$ | VOC | $PM_{10}$ | $PM_{2.5}$ |
| Backhoe | 1.20 | 1.85 | <0.01 | 0.26 | 0.19 | 0.19 |
| Bob Cat | 1.20 | 1.85 | <0.01 | 0.26 | 0.19 | 0.19 |
| Bulldozer | 0.07 | 0.48 | <0.01 | 0.02 | 0.01 | 0.01 |
| Caisson Drilling Rig | 0.71 | 2.71 | <0.01 | 0.18 | 0.12 | 0.12 |
| Chain Saw | 0.32 | 1.89 | <0.01 | 0.08 | 0.03 | 0.03 |
| Chipper/Stump Grinder | 0.57 | 1.91 | <0.01 | 0.13 | 0.10 | 0.10 |
| Cold Planer | 0.36 | 0.95 | <0.01 | 0.05 | 0.05 | 0.05 |
| Compacting Equipment | 2.17 | 4.05 | <0.01 | 0.68 | 0.22 | 0.22 |
| Concrete Boom Pump | 0.75 | 2.20 | <0.01 | 0.18 | 0.12 | 0.12 |
| Concrete Pump | 0.75 | 2.20 | <0.01 | 0.18 | 0.12 | 0.12 |
| Concrete Ready-Mix Trucks | 0.05 | 1.37 | <0.01 | 0.03 | 0.02 | 0.02 |
| Concrete Saws | 0.32 | 1.89 | <0.01 | 0.08 | 0.03 | 0.03 |
| Concrete Truck | 0.05 | 1.37 | <0.01 | 0.03 | 0.02 | 0.02 |
| Crack Cleaner | 0.36 | 0.95 | <0.01 | 0.05 | 0.05 | 0.05 |
| Crack Filler | 0.36 | 0.95 | <0.01 | 0.05 | 0.05 | 0.05 |
| Cranes | 0.09 | 0.40 | <0.01 | 0.02 | 0.02 | 0.02 |
| Curb/Gutter Paver | 0.09 | 0.60 | <0.01 | 0.02 | 0.02 | 0.01 |
| Dozer | 0.07 | 0.48 | <0.01 | 0.02 | 0.01 | 0.01 |
| Excavator | 0.05 | 0.31 | <0.01 | 0.01 | 0.01 | 0.01 |
| Fork Truck | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Forklift | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Front Loader | 1.20 | 1.85 | <0.01 | 0.26 | 0.19 | 0.19 |
| Generator | 0.72 | 2.26 | <0.01 | 0.17 | 0.11 | 0.11 |
| Grader | 0.04 | 0.16 | <0.01 | 0.01 | 0.01 | 0.01 |
| High Lift | 0.36 | 0.95 | <0.01 | 0.05 | 0.05 | 0.05 |
| Hydraulic Hammer | 0.36 | 0.95 | <0.01 | 0.05 | 0.05 | 0.05 |
| Hydroseeder | 0.54 | 1.35 | <0.01 | 0.10 | 0.09 | 0.09 |
| Loader | 1.20 | 1.85 | <0.01 | 0.26 | 0.19 | 0.19 |
| Log Chipper | 0.57 | 1.91 | <0.01 | 0.13 | 0.10 | 0.10 |
| Man Lift | 0.36 | 0.95 | <0.01 | 0.05 | 0.05 | 0.05 |
| Mulcher | 0.54 | 1.35 | <0.01 | 0.10 | 0.09 | 0.09 |
| Off-Road Truck | 0.05 | 1.37 | <0.01 | 0.03 | 0.02 | 0.02 |
| Other General Equipment | 0.10 | 0.56 | <0.01 | 0.02 | 0.02 | 0.02 |
| Paving Machine | 0.09 | 0.60 | <0.01 | 0.02 | 0.02 | 0.01 |
| Pumps | 0.75 | 2.20 | <0.01 | 0.18 | 0.12 | 0.12 |
| Roller | 0.14 | 0.78 | <0.01 | 0.03 | 0.02 | 0.02 |
| Rubber Tired Loader | 0.12 | 0.61 | <0.01 | 0.02 | 0.02 | 0.02 |
| Scraper | 0.07 | 0.20 | <0.01 | 0.01 | 0.01 | 0.01 |
| Skid Steer Loader | 3.56 | 3.96 | <0.01 | 0.67 | 0.49 | 0.47 |
| Slip Form Paver | 0.09 | 0.60 | <0.01 | 0.02 | 0.02 | 0.01 |
| Small Dozer | 0.07 | 0.48 | <0.01 | 0.02 | 0.01 | 0.01 |

| Table 6. Off-Road Construction Equipment Emission Factors (g/hp-hr) | | | | | | |
|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **CO** | **$NO_x$** | **$SO_2$** | **VOC** | **$PM_{10}$** | **$PM_{2.5}$** |
| Surfacing Equip. (Grooving) | 0.52 | 1.69 | <0.01 | 0.09 | 0.07 | 0.07 |
| Sweepers | 0.36 | 0.95 | <0.01 | 0.05 | 0.05 | 0.05 |
| Tractor | 0.07 | 0.48 | <0.01 | 0.02 | 0.01 | 0.01 |
| Tractors/Loader/Backhoe | 1.20 | 1.85 | <0.01 | 0.26 | 0.19 | 0.19 |
| Trencher | 0.26 | 1.68 | <0.01 | 0.05 | 0.03 | 0.03 |
| Trowel Machine | 0.52 | 1.69 | <0.01 | 0.09 | 0.07 | 0.07 |
| Truck for Topsoil & Seed Del&Spread | 0.54 | 1.35 | <0.01 | 0.10 | 0.09 | 0.09 |
| 2030 | | | | | | |
| 40 Ton Rough Terrain Crane | 0.07 | 0.36 | <0.01 | 0.02 | 0.01 | 0.01 |
| Air Compressor | 0.17 | 1.30 | <0.01 | 0.04 | 0.03 | 0.03 |
| Asphalt Paver | 0.08 | 0.58 | <0.01 | 0.02 | 0.01 | 0.01 |
| Auger Drill | 0.58 | 2.29 | <0.01 | 0.15 | 0.10 | 0.10 |
| Backhoe | 1.04 | 1.69 | <0.01 | 0.23 | 0.17 | 0.16 |
| Bob Cat | 1.04 | 1.69 | <0.01 | 0.23 | 0.17 | 0.16 |
| Bulldozer | 0.05 | 0.45 | <0.01 | 0.01 | 0.01 | 0.01 |
| Caisson Drilling Rig | 0.58 | 2.29 | <0.01 | 0.15 | 0.10 | 0.10 |
| Chain Saw | 0.28 | 1.86 | <0.01 | 0.07 | 0.03 | 0.03 |
| Chipper/Stump Grinder | 0.51 | 1.74 | <0.01 | 0.11 | 0.09 | 0.09 |
| Cold Planer | 0.31 | 0.84 | <0.01 | 0.04 | 0.04 | 0.04 |
| Compacting Equipment | 2.14 | 4.04 | <0.01 | 0.68 | 0.22 | 0.21 |
| Concrete Boom Pump | 0.68 | 2.08 | <0.01 | 0.16 | 0.11 | 0.11 |
| Concrete Pump | 0.68 | 2.08 | <0.01 | 0.16 | 0.11 | 0.11 |
| Concrete Ready-Mix Trucks | 0.05 | 1.37 | <0.01 | 0.03 | 0.02 | 0.02 |
| Concrete Saws | 0.28 | 1.86 | <0.01 | 0.07 | 0.03 | 0.03 |
| Concrete Truck | 0.05 | 1.37 | <0.01 | 0.03 | 0.02 | 0.02 |
| Crack Cleaner | 0.31 | 0.84 | <0.01 | 0.04 | 0.04 | 0.04 |
| Crack Filler | 0.31 | 0.84 | <0.01 | 0.04 | 0.04 | 0.04 |
| Cranes | 0.07 | 0.36 | <0.01 | 0.02 | 0.01 | 0.01 |
| Curb/Gutter Paver | 0.08 | 0.58 | <0.01 | 0.02 | 0.01 | 0.01 |
| Dozer | 0.05 | 0.45 | <0.01 | 0.01 | 0.01 | 0.01 |
| Excavator | 0.05 | 0.31 | <0.01 | 0.01 | 0.01 | 0.01 |
| Fork Truck | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Forklift | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Front Loader | 1.04 | 1.69 | <0.01 | 0.23 | 0.17 | 0.16 |
| Generator | 0.66 | 2.15 | <0.01 | 0.16 | 0.10 | 0.10 |
| Grader | 0.03 | 0.15 | <0.01 | 0.01 | 0.01 | 0.01 |
| High Lift | 0.31 | 0.84 | <0.01 | 0.04 | 0.04 | 0.04 |
| Hydraulic Hammer | 0.31 | 0.84 | <0.01 | 0.04 | 0.04 | 0.04 |
| Hydroseeder | 0.48 | 1.23 | <0.01 | 0.09 | 0.08 | 0.08 |
| Loader | 1.04 | 1.69 | <0.01 | 0.23 | 0.17 | 0.16 |
| Log Chipper | 0.51 | 1.74 | <0.01 | 0.11 | 0.09 | 0.09 |

| Table 6. Off-Road Construction Equipment Emission Factors (g/hp-hr) | | | | | | |
|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **CO** | **$NO_x$** | **$SO_2$** | **VOC** | **$PM_{10}$** | **$PM_{2.5}$** |
| Man Lift | 0.31 | 0.84 | <0.01 | 0.04 | 0.04 | 0.04 |
| Mulcher | 0.48 | 1.23 | <0.01 | 0.09 | 0.08 | 0.08 |
| Off-Road Truck | 0.05 | 1.37 | <0.01 | 0.03 | 0.02 | 0.02 |
| Other General Equipment | 0.09 | 0.53 | <0.01 | 0.02 | 0.02 | 0.02 |
| Paving Machine | 0.08 | 0.58 | <0.01 | 0.02 | 0.01 | 0.01 |
| Pumps | 0.68 | 2.08 | <0.01 | 0.16 | 0.11 | 0.11 |
| Roller | 0.14 | 0.77 | <0.01 | 0.03 | 0.02 | 0.02 |
| Rubber Tired Loader | 0.10 | 0.57 | <0.01 | 0.02 | 0.02 | 0.02 |
| Scraper | 0.05 | 0.16 | <0.01 | 0.01 | 0.01 | 0.01 |
| Skid Steer Loader | 2.95 | 3.59 | <0.01 | 0.56 | 0.41 | 0.40 |
| Slip Form Paver | 0.08 | 0.58 | <0.01 | 0.02 | 0.01 | 0.01 |
| Small Dozer | 0.05 | 0.45 | <0.01 | 0.01 | 0.01 | 0.01 |
| Surfacing Equip. (Grooving) | 0.46 | 1.58 | <0.01 | 0.08 | 0.06 | 0.06 |
| Sweepers | 0.31 | 0.84 | <0.01 | 0.04 | 0.04 | 0.04 |
| Tractor | 0.05 | 0.45 | <0.01 | 0.01 | 0.01 | 0.01 |
| Tractors/Loader/Backhoe | 1.04 | 1.69 | <0.01 | 0.23 | 0.17 | 0.16 |
| Trencher | 0.22 | 1.64 | <0.01 | 0.05 | 0.03 | 0.02 |
| Trowel Machine | 0.46 | 1.58 | <0.01 | 0.08 | 0.06 | 0.06 |
| Truck for Topsoil & Seed Del&Spread | 0.48 | 1.23 | <0.01 | 0.09 | 0.08 | 0.08 |
| 2032 | | | | | | |
| 40 Ton Rough Terrain Crane | 0.06 | 0.30 | <0.01 | 0.02 | 0.01 | 0.01 |
| Air Compressor | 0.14 | 1.24 | <0.01 | 0.03 | 0.02 | 0.02 |
| Asphalt Paver | 0.07 | 0.56 | <0.01 | 0.02 | 0.01 | 0.01 |
| Auger Drill | 0.43 | 1.83 | <0.01 | 0.11 | 0.08 | 0.08 |
| Backhoe | 0.80 | 1.46 | <0.01 | 0.17 | 0.13 | 0.12 |
| Bob Cat | 0.80 | 1.46 | <0.01 | 0.17 | 0.13 | 0.12 |
| Bulldozer | 0.04 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Caisson Drilling Rig | 0.43 | 1.83 | <0.01 | 0.11 | 0.08 | 0.08 |
| Chain Saw | 0.24 | 1.82 | <0.01 | 0.07 | 0.02 | 0.02 |
| Chipper/Stump Grinder | 0.41 | 1.48 | <0.01 | 0.09 | 0.07 | 0.07 |
| Cold Planer | 0.23 | 0.67 | <0.01 | 0.03 | 0.03 | 0.03 |
| Compacting Equipment | 2.12 | 4.04 | <0.01 | 0.67 | 0.21 | 0.20 |
| Concrete Boom Pump | 0.58 | 1.89 | <0.01 | 0.14 | 0.09 | 0.09 |
| Concrete Pump | 0.58 | 1.89 | <0.01 | 0.14 | 0.09 | 0.09 |
| Concrete Ready-Mix Trucks | 0.05 | 1.37 | <0.01 | 0.02 | 0.02 | 0.02 |
| Concrete Saws | 0.24 | 1.82 | <0.01 | 0.07 | 0.02 | 0.02 |
| Concrete Truck | 0.05 | 1.37 | <0.01 | 0.02 | 0.02 | 0.02 |
| Crack Cleaner | 0.23 | 0.67 | <0.01 | 0.03 | 0.03 | 0.03 |
| Crack Filler | 0.23 | 0.67 | <0.01 | 0.03 | 0.03 | 0.03 |
| Cranes | 0.06 | 0.30 | <0.01 | 0.02 | 0.01 | 0.01 |
| Curb/Gutter Paver | 0.07 | 0.56 | <0.01 | 0.02 | 0.01 | 0.01 |

| Table 6. Off-Road Construction Equipment Emission Factors (g/hp-hr) | | | | | | |
|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **CO** | **$NO_x$** | **$SO_2$** | **VOC** | **$PM_{10}$** | **$PM_{2.5}$** |
| Dozer | 0.04 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Excavator | 0.05 | 0.31 | <0.01 | 0.01 | 0.01 | 0.01 |
| Fork Truck | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Forklift | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Front Loader | 0.80 | 1.46 | <0.01 | 0.17 | 0.13 | 0.12 |
| Generator | 0.56 | 1.97 | <0.01 | 0.14 | 0.08 | 0.08 |
| Grader | 0.03 | 0.14 | <0.01 | 0.01 | 0.01 | 0.01 |
| High Lift | 0.23 | 0.67 | <0.01 | 0.03 | 0.03 | 0.03 |
| Hydraulic Hammer | 0.23 | 0.67 | <0.01 | 0.03 | 0.03 | 0.03 |
| Hydroseeder | 0.37 | 1.02 | <0.01 | 0.07 | 0.07 | 0.06 |
| Loader | 0.80 | 1.46 | <0.01 | 0.17 | 0.13 | 0.12 |
| Log Chipper | 0.41 | 1.48 | <0.01 | 0.09 | 0.07 | 0.07 |
| Man Lift | 0.23 | 0.67 | <0.01 | 0.03 | 0.03 | 0.03 |
| Mulcher | 0.37 | 1.02 | <0.01 | 0.07 | 0.07 | 0.06 |
| Off-Road Truck | 0.05 | 1.37 | <0.01 | 0.02 | 0.02 | 0.02 |
| Other General Equipment | 0.08 | 0.50 | <0.01 | 0.02 | 0.01 | 0.01 |
| Paving Machine | 0.07 | 0.56 | <0.01 | 0.02 | 0.01 | 0.01 |
| Pumps | 0.58 | 1.89 | <0.01 | 0.14 | 0.09 | 0.09 |
| Roller | 0.12 | 0.75 | <0.01 | 0.03 | 0.02 | 0.02 |
| Rubber Tired Loader | 0.07 | 0.50 | <0.01 | 0.02 | 0.02 | 0.01 |
| Scraper | 0.02 | 0.12 | <0.01 | 0.01 | 0.01 | 0.01 |
| Skid Steer Loader | 2.05 | 3.06 | <0.01 | 0.40 | 0.30 | 0.29 |
| Slip Form Paver | 0.07 | 0.56 | <0.01 | 0.02 | 0.01 | 0.01 |
| Small Dozer | 0.04 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Surfacing Equip. (Grooving) | 0.38 | 1.42 | <0.01 | 0.07 | 0.05 | 0.05 |
| Sweepers | 0.23 | 0.67 | <0.01 | 0.03 | 0.03 | 0.03 |
| Tractor | 0.04 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Tractors/Loader/Backhoe | 0.80 | 1.46 | <0.01 | 0.17 | 0.13 | 0.12 |
| Trencher | 0.17 | 1.57 | <0.01 | 0.04 | 0.02 | 0.02 |
| Trowel Machine | 0.38 | 1.42 | <0.01 | 0.07 | 0.05 | 0.05 |
| Truck for Topsoil & Seed Del&Spread | 0.37 | 1.02 | <0.01 | 0.07 | 0.07 | 0.06 |
| 2033 | | | | | | |
| 40 Ton Rough Terrain Crane | 0.05 | 0.27 | <0.01 | 0.01 | 0.01 | 0.01 |
| Air Compressor | 0.13 | 1.23 | <0.01 | 0.03 | 0.02 | 0.02 |
| Asphalt Paver | 0.07 | 0.56 | <0.01 | 0.02 | 0.01 | 0.01 |
| Auger Drill | 0.39 | 1.68 | <0.01 | 0.10 | 0.07 | 0.07 |
| Backhoe | 0.70 | 1.36 | <0.01 | 0.15 | 0.11 | 0.11 |
| Bob Cat | 0.70 | 1.36 | <0.01 | 0.15 | 0.11 | 0.11 |
| Bulldozer | 0.04 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Caisson Drilling Rig | 0.39 | 1.68 | <0.01 | 0.10 | 0.07 | 0.07 |
| Chain Saw | 0.23 | 1.81 | <0.01 | 0.06 | 0.02 | 0.02 |

| Table 6. Off-Road Construction Equipment Emission Factors (g/hp-hr) | | | | | | |
|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **CO** | **$NO_x$** | **$SO_2$** | **VOC** | **$PM_{10}$** | **$PM_{2.5}$** |
| Chipper/Stump Grinder | 0.37 | 1.39 | <0.01 | 0.08 | 0.07 | 0.07 |
| Cold Planer | 0.20 | 0.60 | <0.01 | 0.03 | 0.03 | 0.03 |
| Compacting Equipment | 2.11 | 4.04 | <0.01 | 0.67 | 0.21 | 0.20 |
| Concrete Boom Pump | 0.54 | 1.83 | <0.01 | 0.13 | 0.08 | 0.08 |
| Concrete Pump | 0.54 | 1.83 | <0.01 | 0.13 | 0.08 | 0.08 |
| Concrete Ready-Mix Trucks | 0.05 | 1.37 | <0.01 | 0.02 | 0.02 | 0.02 |
| Concrete Saws | 0.23 | 1.81 | <0.01 | 0.06 | 0.02 | 0.02 |
| Concrete Truck | 0.05 | 1.37 | <0.01 | 0.02 | 0.02 | 0.02 |
| Crack Cleaner | 0.20 | 0.60 | <0.01 | 0.03 | 0.03 | 0.03 |
| Crack Filler | 0.20 | 0.60 | <0.01 | 0.03 | 0.03 | 0.03 |
| Cranes | 0.05 | 0.27 | <0.01 | 0.01 | 0.01 | 0.01 |
| Curb/Gutter Paver | 0.07 | 0.56 | <0.01 | 0.02 | 0.01 | 0.01 |
| Dozer | 0.04 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Excavator | 0.05 | 0.31 | <0.01 | 0.01 | 0.01 | 0.01 |
| Fork Truck | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Forklift | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Front Loader | 0.70 | 1.36 | <0.01 | 0.15 | 0.11 | 0.11 |
| Generator | 0.53 | 1.91 | <0.01 | 0.13 | 0.08 | 0.07 |
| Grader | 0.03 | 0.14 | <0.01 | 0.01 | 0.01 | 0.01 |
| High Lift | 0.20 | 0.60 | <0.01 | 0.03 | 0.03 | 0.03 |
| Hydraulic Hammer | 0.20 | 0.60 | <0.01 | 0.03 | 0.03 | 0.03 |
| Hydroseeder | 0.33 | 0.93 | <0.01 | 0.06 | 0.06 | 0.06 |
| Loader | 0.70 | 1.36 | <0.01 | 0.15 | 0.11 | 0.11 |
| Log Chipper | 0.37 | 1.39 | <0.01 | 0.08 | 0.07 | 0.07 |
| Man Lift | 0.20 | 0.60 | <0.01 | 0.03 | 0.03 | 0.03 |
| Mulcher | 0.33 | 0.93 | <0.01 | 0.06 | 0.06 | 0.06 |
| Off-Road Truck | 0.05 | 1.37 | <0.01 | 0.02 | 0.02 | 0.02 |
| Other General Equipment | 0.07 | 0.48 | <0.01 | 0.02 | 0.01 | 0.01 |
| Paving Machine | 0.07 | 0.56 | <0.01 | 0.02 | 0.01 | 0.01 |
| Pumps | 0.54 | 1.83 | <0.01 | 0.13 | 0.08 | 0.08 |
| Roller | 0.12 | 0.74 | <0.01 | 0.03 | 0.02 | 0.02 |
| Rubber Tired Loader | 0.06 | 0.47 | <0.01 | 0.02 | 0.01 | 0.01 |
| Scraper | 0.02 | 0.12 | <0.01 | 0.01 | 0.01 | 0.01 |
| Skid Steer Loader | 1.83 | 2.92 | <0.01 | 0.36 | 0.26 | 0.26 |
| Slip Form Paver | 0.07 | 0.56 | <0.01 | 0.02 | 0.01 | 0.01 |
| Small Dozer | 0.04 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Surfacing Equip. (Grooving) | 0.34 | 1.35 | <0.01 | 0.06 | 0.05 | 0.04 |
| Sweepers | 0.20 | 0.60 | <0.01 | 0.03 | 0.03 | 0.03 |
| Tractor | 0.04 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Tractors/Loader/Backhoe | 0.70 | 1.36 | <0.01 | 0.15 | 0.11 | 0.11 |
| Trencher | 0.16 | 1.56 | <0.01 | 0.04 | 0.02 | 0.02 |
| Trowel Machine | 0.34 | 1.35 | <0.01 | 0.06 | 0.05 | 0.04 |

| Table 6. Off-Road Construction Equipment Emission Factors (g/hp-hr) | | | | | | |
|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **CO** | **$NO_x$** | **$SO_2$** | **VOC** | **$PM_{10}$** | **$PM_{2.5}$** |
| Truck for Topsoil & Seed Del&Spread | 0.33 | 0.93 | <0.01 | 0.06 | 0.06 | 0.06 |
| 2034 | | | | | | |
| 40 Ton Rough Terrain Crane | 0.05 | 0.25 | <0.01 | 0.01 | 0.01 | 0.01 |
| Air Compressor | 0.12 | 1.21 | <0.01 | 0.03 | 0.02 | 0.02 |
| Asphalt Paver | 0.06 | 0.55 | <0.01 | 0.02 | 0.01 | 0.01 |
| Auger Drill | 0.35 | 1.55 | <0.01 | 0.09 | 0.06 | 0.06 |
| Backhoe | 0.60 | 1.26 | <0.01 | 0.13 | 0.09 | 0.09 |
| Bob Cat | 0.60 | 1.26 | <0.01 | 0.13 | 0.09 | 0.09 |
| Bulldozer | 0.03 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Caisson Drilling Rig | 0.35 | 1.55 | <0.01 | 0.09 | 0.06 | 0.06 |
| Chain Saw | 0.22 | 1.81 | <0.01 | 0.06 | 0.02 | 0.02 |
| Chipper/Stump Grinder | 0.34 | 1.31 | <0.01 | 0.07 | 0.06 | 0.06 |
| Cold Planer | 0.17 | 0.53 | <0.01 | 0.03 | 0.03 | 0.03 |
| Compacting Equipment | 2.11 | 4.04 | <0.01 | 0.67 | 0.21 | 0.20 |
| Concrete Boom Pump | 0.51 | 1.77 | <0.01 | 0.12 | 0.08 | 0.07 |
| Concrete Pump | 0.51 | 1.77 | <0.01 | 0.12 | 0.08 | 0.07 |
| Concrete Ready-Mix Trucks | 0.05 | 1.37 | <0.01 | 0.02 | 0.02 | 0.02 |
| Concrete Saws | 0.22 | 1.81 | <0.01 | 0.06 | 0.02 | 0.02 |
| Concrete Truck | 0.05 | 1.37 | <0.01 | 0.02 | 0.02 | 0.02 |
| Crack Cleaner | 0.17 | 0.53 | <0.01 | 0.03 | 0.03 | 0.03 |
| Crack Filler | 0.17 | 0.53 | <0.01 | 0.03 | 0.03 | 0.03 |
| Cranes | 0.05 | 0.25 | <0.01 | 0.01 | 0.01 | 0.01 |
| Curb/Gutter Paver | 0.06 | 0.55 | <0.01 | 0.02 | 0.01 | 0.01 |
| Dozer | 0.03 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Excavator | 0.04 | 0.31 | <0.01 | 0.01 | 0.01 | 0.01 |
| Fork Truck | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Forklift | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Front Loader | 0.60 | 1.26 | <0.01 | 0.13 | 0.09 | 0.09 |
| Generator | 0.50 | 1.85 | <0.01 | 0.12 | 0.07 | 0.07 |
| Grader | 0.03 | 0.14 | <0.01 | 0.01 | 0.01 | 0.01 |
| High Lift | 0.17 | 0.53 | <0.01 | 0.03 | 0.03 | 0.03 |
| Hydraulic Hammer | 0.17 | 0.53 | <0.01 | 0.03 | 0.03 | 0.03 |
| Hydroseeder | 0.28 | 0.82 | <0.01 | 0.05 | 0.05 | 0.05 |
| Loader | 0.60 | 1.26 | <0.01 | 0.13 | 0.09 | 0.09 |
| Log Chipper | 0.34 | 1.31 | <0.01 | 0.07 | 0.06 | 0.06 |
| Man Lift | 0.17 | 0.53 | <0.01 | 0.03 | 0.03 | 0.03 |
| Mulcher | 0.28 | 0.82 | <0.01 | 0.05 | 0.05 | 0.05 |
| Off-Road Truck | 0.05 | 1.37 | <0.01 | 0.02 | 0.02 | 0.02 |
| Other General Equipment | 0.07 | 0.47 | <0.01 | 0.02 | 0.01 | 0.01 |
| Paving Machine | 0.06 | 0.55 | <0.01 | 0.02 | 0.01 | 0.01 |
| Pumps | 0.51 | 1.77 | <0.01 | 0.12 | 0.08 | 0.07 |
| Roller | 0.11 | 0.73 | <0.01 | 0.03 | 0.02 | 0.02 |

| Table 6. Off-Road Construction Equipment Emission Factors (g/hp-hr) | | | | | | |
|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **CO** | **$NO_x$** | **$SO_2$** | **VOC** | **$PM_{10}$** | **$PM_{2.5}$** |
| Rubber Tired Loader | 0.05 | 0.45 | <0.01 | 0.02 | 0.01 | 0.01 |
| Scraper | 0.02 | 0.12 | <0.01 | 0.01 | 0.01 | 0.01 |
| Skid Steer Loader | 1.64 | 2.81 | <0.01 | 0.32 | 0.23 | 0.23 |
| Slip Form Paver | 0.06 | 0.55 | <0.01 | 0.02 | 0.01 | 0.01 |
| Small Dozer | 0.03 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Surfacing Equip. (Grooving) | 0.31 | 1.29 | <0.01 | 0.06 | 0.04 | 0.04 |
| Sweepers | 0.17 | 0.53 | <0.01 | 0.03 | 0.03 | 0.03 |
| Tractor | 0.03 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Tractors/Loader/Backhoe | 0.60 | 1.26 | <0.01 | 0.13 | 0.09 | 0.09 |
| Trencher | 0.15 | 1.55 | <0.01 | 0.04 | 0.02 | 0.02 |
| Trowel Machine | 0.31 | 1.29 | <0.01 | 0.06 | 0.04 | 0.04 |
| Truck for Topsoil & Seed Del&Spread | 0.28 | 0.82 | <0.01 | 0.05 | 0.05 | 0.05 |
| 2035 | | | | | | |
| 40 Ton Rough Terrain Crane | 0.04 | 0.23 | <0.01 | 0.01 | 0.01 | 0.01 |
| Air Compressor | 0.11 | 1.20 | <0.01 | 0.03 | 0.02 | 0.02 |
| Asphalt Paver | 0.06 | 0.55 | <0.01 | 0.02 | 0.01 | 0.01 |
| Auger Drill | 0.31 | 1.43 | <0.01 | 0.08 | 0.06 | 0.05 |
| Backhoe | 0.51 | 1.18 | <0.01 | 0.11 | 0.08 | 0.08 |
| Bob Cat | 0.51 | 1.18 | <0.01 | 0.11 | 0.08 | 0.08 |
| Bulldozer | 0.03 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Caisson Drilling Rig | 0.31 | 1.43 | <0.01 | 0.08 | 0.06 | 0.05 |
| Chain Saw | 0.22 | 1.81 | <0.01 | 0.06 | 0.02 | 0.02 |
| Chipper/Stump Grinder | 0.31 | 1.23 | <0.01 | 0.07 | 0.06 | 0.05 |
| Cold Planer | 0.15 | 0.47 | <0.01 | 0.02 | 0.02 | 0.02 |
| Compacting Equipment | 2.11 | 4.04 | <0.01 | 0.67 | 0.21 | 0.20 |
| Concrete Boom Pump | 0.47 | 1.70 | <0.01 | 0.12 | 0.07 | 0.07 |
| Concrete Pump | 0.47 | 1.70 | <0.01 | 0.12 | 0.07 | 0.07 |
| Concrete Ready-Mix Trucks | 0.05 | 1.37 | <0.01 | 0.02 | 0.02 | 0.02 |
| Concrete Saws | 0.22 | 1.81 | <0.01 | 0.06 | 0.02 | 0.02 |
| Concrete Truck | 0.05 | 1.37 | <0.01 | 0.02 | 0.02 | 0.02 |
| Crack Cleaner | 0.15 | 0.47 | <0.01 | 0.02 | 0.02 | 0.02 |
| Crack Filler | 0.15 | 0.47 | <0.01 | 0.02 | 0.02 | 0.02 |
| Cranes | 0.04 | 0.23 | <0.01 | 0.01 | 0.01 | 0.01 |
| Curb/Gutter Paver | 0.06 | 0.55 | <0.01 | 0.02 | 0.01 | 0.01 |
| Dozer | 0.03 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Excavator | 0.04 | 0.31 | <0.01 | 0.01 | 0.01 | 0.01 |
| Fork Truck | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Forklift | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Front Loader | 0.51 | 1.18 | <0.01 | 0.11 | 0.08 | 0.08 |
| Generator | 0.46 | 1.79 | <0.01 | 0.12 | 0.06 | 0.06 |
| Grader | 0.03 | 0.14 | <0.01 | 0.01 | 0.01 | 0.01 |
| High Lift | 0.15 | 0.47 | <0.01 | 0.02 | 0.02 | 0.02 |

| Table 6. Off-Road Construction Equipment Emission Factors (g/hp-hr) | | | | | | |
|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **CO** | **$NO_x$** | **$SO_2$** | **VOC** | **$PM_{10}$** | **$PM_{2.5}$** |
| Hydraulic Hammer | 0.15 | 0.47 | <0.01 | 0.02 | 0.02 | 0.02 |
| Hydroseeder | 0.24 | 0.73 | <0.01 | 0.04 | 0.04 | 0.04 |
| Loader | 0.51 | 1.18 | <0.01 | 0.11 | 0.08 | 0.08 |
| Log Chipper | 0.31 | 1.23 | <0.01 | 0.07 | 0.06 | 0.05 |
| Man Lift | 0.15 | 0.47 | <0.01 | 0.02 | 0.02 | 0.02 |
| Mulcher | 0.24 | 0.73 | <0.01 | 0.04 | 0.04 | 0.04 |
| Off-Road Truck | 0.05 | 1.37 | <0.01 | 0.02 | 0.02 | 0.02 |
| Other General Equipment | 0.06 | 0.47 | <0.01 | 0.02 | 0.01 | 0.01 |
| Paving Machine | 0.06 | 0.55 | <0.01 | 0.02 | 0.01 | 0.01 |
| Pumps | 0.47 | 1.70 | <0.01 | 0.12 | 0.07 | 0.07 |
| Roller | 0.11 | 0.73 | <0.01 | 0.03 | 0.02 | 0.02 |
| Rubber Tired Loader | 0.04 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Scraper | 0.02 | 0.12 | <0.01 | 0.01 | 0.01 | 0.01 |
| Skid Steer Loader | 1.48 | 2.71 | <0.01 | 0.29 | 0.21 | 0.20 |
| Slip Form Paver | 0.06 | 0.55 | <0.01 | 0.02 | 0.01 | 0.01 |
| Small Dozer | 0.03 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Surfacing Equip. (Grooving) | 0.29 | 1.24 | <0.01 | 0.06 | 0.04 | 0.04 |
| Sweepers | 0.15 | 0.47 | <0.01 | 0.02 | 0.02 | 0.02 |
| Tractor | 0.03 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Tractors/Loader/Backhoe | 0.51 | 1.18 | <0.01 | 0.11 | 0.08 | 0.08 |
| Trencher | 0.15 | 1.54 | <0.01 | 0.04 | 0.02 | 0.02 |
| Trowel Machine | 0.29 | 1.24 | <0.01 | 0.06 | 0.04 | 0.04 |
| Truck for Topsoil & Seed Del&Spread | 0.24 | 0.73 | <0.01 | 0.04 | 0.04 | 0.04 |
| 2036 | | | | | | |
| 40 Ton Rough Terrain Crane | 0.04 | 0.21 | <0.01 | 0.01 | 0.01 | 0.01 |
| Air Compressor | 0.11 | 1.19 | <0.01 | 0.03 | 0.01 | 0.01 |
| Asphalt Paver | 0.06 | 0.55 | <0.01 | 0.02 | 0.01 | 0.01 |
| Auger Drill | 0.28 | 1.33 | <0.01 | 0.07 | 0.05 | 0.05 |
| Backhoe | 0.44 | 1.10 | <0.01 | 0.09 | 0.07 | 0.07 |
| Bob Cat | 0.44 | 1.10 | <0.01 | 0.09 | 0.07 | 0.07 |
| Bulldozer | 0.03 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Caisson Drilling Rig | 0.28 | 1.33 | <0.01 | 0.07 | 0.05 | 0.05 |
| Chain Saw | 0.22 | 1.81 | <0.01 | 0.06 | 0.02 | 0.02 |
| Chipper/Stump Grinder | 0.27 | 1.15 | <0.01 | 0.06 | 0.05 | 0.05 |
| Cold Planer | 0.13 | 0.43 | <0.01 | 0.02 | 0.02 | 0.02 |
| Compacting Equipment | 2.12 | 4.04 | <0.01 | 0.67 | 0.21 | 0.20 |
| Concrete Boom Pump | 0.43 | 1.64 | <0.01 | 0.11 | 0.06 | 0.06 |
| Concrete Pump | 0.43 | 1.64 | <0.01 | 0.11 | 0.06 | 0.06 |
| Concrete Ready-Mix Trucks | 0.05 | 1.37 | <0.01 | 0.02 | 0.02 | 0.02 |
| Concrete Saws | 0.22 | 1.81 | <0.01 | 0.06 | 0.02 | 0.02 |
| Concrete Truck | 0.05 | 1.37 | <0.01 | 0.02 | 0.02 | 0.02 |
| Crack Cleaner | 0.13 | 0.43 | <0.01 | 0.02 | 0.02 | 0.02 |

| Table 6. Off-Road Construction Equipment Emission Factors (g/hp-hr) | | | | | | |
|---|---|---|---|---|---|---|
| **Off-Road Equipment Type** | **CO** | **$NO_x$** | **$SO_2$** | **VOC** | **$PM_{10}$** | **$PM_{2.5}$** |
| Crack Filler | 0.13 | 0.43 | <0.01 | 0.02 | 0.02 | 0.02 |
| Cranes | 0.04 | 0.21 | <0.01 | 0.01 | 0.01 | 0.01 |
| Curb/Gutter Paver | 0.06 | 0.55 | <0.01 | 0.02 | 0.01 | 0.01 |
| Dozer | 0.03 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Excavator | 0.04 | 0.31 | <0.01 | 0.01 | 0.01 | 0.01 |
| Fork Truck | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Forklift | 0.08 | 1.04 | <0.01 | 0.02 | 0.01 | 0.01 |
| Front Loader | 0.44 | 1.10 | <0.01 | 0.09 | 0.07 | 0.07 |
| Generator | 0.43 | 1.74 | <0.01 | 0.11 | 0.06 | 0.06 |
| Grader | 0.03 | 0.14 | <0.01 | 0.01 | 0.01 | 0.01 |
| High Lift | 0.13 | 0.43 | <0.01 | 0.02 | 0.02 | 0.02 |
| Hydraulic Hammer | 0.13 | 0.43 | <0.01 | 0.02 | 0.02 | 0.02 |
| Hydroseeder | 0.21 | 0.66 | <0.01 | 0.04 | 0.04 | 0.03 |
| Loader | 0.44 | 1.10 | <0.01 | 0.09 | 0.07 | 0.07 |
| Log Chipper | 0.27 | 1.15 | <0.01 | 0.06 | 0.05 | 0.05 |
| Man Lift | 0.13 | 0.43 | <0.01 | 0.02 | 0.02 | 0.02 |
| Mulcher | 0.21 | 0.66 | <0.01 | 0.04 | 0.04 | 0.03 |
| Off-Road Truck | 0.05 | 1.37 | <0.01 | 0.02 | 0.02 | 0.02 |
| Other General Equipment | 0.06 | 0.46 | <0.01 | 0.01 | 0.01 | 0.01 |
| Paving Machine | 0.06 | 0.55 | <0.01 | 0.02 | 0.01 | 0.01 |
| Pumps | 0.43 | 1.64 | <0.01 | 0.11 | 0.06 | 0.06 |
| Roller | 0.11 | 0.72 | <0.01 | 0.03 | 0.02 | 0.01 |
| Rubber Tired Loader | 0.04 | 0.42 | <0.01 | 0.01 | 0.01 | 0.01 |
| Scraper | 0.02 | 0.12 | <0.01 | 0.01 | 0.01 | 0.01 |
| Skid Steer Loader | 1.34 | 2.62 | <0.01 | 0.27 | 0.19 | 0.18 |
| Slip Form Paver | 0.06 | 0.55 | <0.01 | 0.02 | 0.01 | 0.01 |
| Small Dozer | 0.03 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Surfacing Equip. (Grooving) | 0.26 | 1.19 | <0.01 | 0.05 | 0.04 | 0.03 |
| Sweepers | 0.13 | 0.43 | <0.01 | 0.02 | 0.02 | 0.02 |
| Tractor | 0.03 | 0.43 | <0.01 | 0.01 | 0.01 | 0.01 |
| Tractors/Loader/Backhoe | 0.44 | 1.10 | <0.01 | 0.09 | 0.07 | 0.07 |
| Trencher | 0.15 | 1.53 | <0.01 | 0.04 | 0.02 | 0.02 |
| Trowel Machine | 0.26 | 1.19 | <0.01 | 0.05 | 0.04 | 0.03 |
| Truck for Topsoil & Seed Del&Spread | 0.21 | 0.66 | <0.01 | 0.04 | 0.04 | 0.03 |

Notes: g/hp-hr = grams per horsepower-hour. CO = carbon monoxide, $NO_x$ = nitrogen oxide, $SO_2$ = sulfur dioxide, VOC = volatile organic compounds, $PM_{10}$ = particulate matter with a diameter of 10 microns or smaller, and $PM_{2.5}$ = particulate matter with a diameter of 2.5 microns or smaller.
All off-road construction equipment is assumed to be operating on diesel fuel.
No construction anticipated in 2031 (see *Table 2 - Construction Projects, Footprint, and Schedule*), therefore no emission factors presented in table for this year.
Source: U.S. EPA MOVES4, 2024.

Emissions Calculations

On-road construction vehicle emissions were computed by applying the emission factors of each on-road vehicle type to the anticipated VMT of expected vehicle use, using the following formula:

***On-road Construction Vehicle Emissions (tons/year)*** *= emission factor (grams/mile) x vehicle-miles-travelled (VMT/year) x (1 pound/453.6 grams) x (1 ton/2,000 pounds)*

Off-road construction equipment emissions were estimated by applying the emission factors of each off-road equipment type to the equipment's size (in horsepower), load factor, and to the anticipated activity levels (in hours) of expected equipment use. The emission estimates were computed using the following formula:

***Off-road Construction Equipment Emissions (tons/year)*** *= emission factor (grams/hp-hour) x size (horsepower) x load factor x hours per year x (1 pound/453.6 grams) x (1 ton/2,000 pounds)*

Fugitives

Fugitive dust ($PM_{10}$/$PM_{2.5}$) and evaporative (VOCs) emissions result from non-combustive activities including, but not limited to, earthmoving, demolition, asphalt paving and concrete batching. Emissions of $PM_{10}$/$PM_{2.5}$ associated with the construction and demolition activities of Alternatives #1 and #2 were calculated using emission factors from the EPA's AP-42 documentation, VOC emissions from asphalt paving activities were estimated using EPA guidance specific to asphalt paving. All fugitive emissions were included in the total construction emissions inventory.

## 3.2. Operational Emissions Inventory

Aircraft Operations

Operational emissions inventories were developed only for Alternative #2 for aircraft, APUs, and GSE. The aircraft operations associated with Alternative #2 reflects the anticipated introduction of commercial airline activity at HEF beginning in 2026. The current general aviation aircraft operations are not expected to increase as a result of this alternative.

Emissions inventories for aircraft, APUs and GSE were developed for the years 2026 through 2036 and for the future build-out year 2041. These inventories include criteria air pollutants and their precursors. The analysis utilized the latest available version of the FAA's Aviation Environmental Design Tool (AEDT, Version 3f)[9] at the start of study. Default AEDT data for APUs and GSE were applied in the modeling analysis.

It is assumed that the aircraft fleet mix will remain consistent throughout the analysis years. The aircraft fleet mix, number of operations, engine assignments, runway use, stage length, and other modeling parameters used to develop the emissions inventories were aligned with the noise analysis presented in *Appendix L - Noise Technical Report* of the EA. As detailed in the *Noise Technical Report*, the aircraft fleet mix and operational data were derived from the RS&H forecast developed as part of the HEF Master Plan and the AvPorts commercial airline forecast. The projected additions of commercial aircraft operations (arrivals and departures) for all analysis years are summarized in **Table 7**.

[9] U.S. Department of Transportation (DOT), Federal Aviation Administration, "Aviation Environmental Design Tool (AEDT)," https://aedt.faa.gov/ . At the time of the preparation of this analysis, AEDT Version 3f was the latest version of AEDT.

| Table 7. Aircraft Operations | |
|---|---|
| Year | Operations |
| 2026 | 7,955 |
| 2027 | 11,153 |
| 2028 | 12,266 |
| 2029 | 14,284 |
| 2030 | 16,337 |
| 2031 | 17,888 |
| 2032 | 18,353 |
| 2033 | 18,722 |
| 2034 | 19,145 |
| 2035 | 19,337 |
| 2036 | 19,032 |
| 2041 | 21,304 |
| Note: Operations include arrivals and departures. Source: HEF, 2025. | |

Motor Vehicle Operations

This analysis evaluated operational emissions from motor vehicles traveling on airport roadways. Emissions of criteria air pollutants and their precursors were computed using emissions factors from the MOVES model and project-related annual VMT data obtained from *Appendix M – Traffic Impact Analysis Report* of the EA. The vehicle fleet mix was assumed to consist of 50% gasoline-fueled passenger cars and 50% gasoline-fueled passenger trucks. MOVES emission factors for passenger cars/trucks for criteria air/precursor pollutants are presented in **Table 8**.

| Table 8. Motor Vehicle Emission Factors (g/mile) | | | | | | |
|---|---|---|---|---|---|---|
| Year | CO | $NO_x$ | $SO_2$ | VOC | $PM_{10}$ | $PM_{2.5}$ |
| 2026 | 4.13 | 0.13 | <0.01 | 0.04 | 0.01 | 0.06 |
| 2027 | 3.90 | 0.10 | <0.01 | 0.03 | 0.01 | 0.06 |
| 2028 | 3.74 | 0.09 | <0.01 | 0.02 | 0.01 | 0.06 |
| 2029 | 3.57 | 0.08 | <0.01 | 0.02 | 0.01 | 0.06 |
| 2030 | 3.37 | 0.06 | <0.01 | 0.02 | 0.01 | 0.06 |
| 2031 | 3.22 | 0.05 | <0.01 | 0.02 | 0.01 | 0.06 |
| 2032 | 3.06 | 0.03 | <0.01 | 0.02 | 0.01 | 0.06 |
| 2033 | 2.91 | 0.03 | <0.01 | 0.02 | 0.01 | 0.06 |
| 2034 | 2.75 | 0.02 | <0.01 | 0.01 | 0.01 | 0.06 |
| 2035 | 2.59 | 0.02 | <0.01 | 0.01 | 0.01 | 0.06 |
| 2036 | 1.90 | 0.02 | <0.01 | 0.05 | 0.01 | 0.06 |
| 2041 | 1.37 | 0.01 | <0.01 | 0.05 | 0.01 | 0.06 |
| Notes: CO = carbon monoxide, $NO_x$ = nitrogen oxide, $SO_2$ = sulfur dioxide, VOC = volatile organic compounds, $PM_{10}$ = particulate matter with a diameter of 10 microns or smaller, $PM_{2.5}$ = particulate matter with a diameter of 2.5 microns or smaller. Source: U.S. EPA MOVES4, 2024. | | | | | | |

The traffic impact analysis analyzed VMT for 2027, 2036 and 2041. The 2036 VMT were conservatively applied to each analysis year, because they represent the year with the highest VMT during the analysis period of 2026 through 2036. The VMT for 2036 is 6,772,648 miles and the VMT for the build-out year 2041 is 7,579,955 miles. Motor vehicle emissions are calculated using the same methodology applied to on-road construction vehicles.

# 4. Emissions Inventory Results

## 4.1. Criteria Air/Precursor Pollutants Emissions Inventory Results

The results of the construction and operational emissions inventories are provided in **Table 9** and **Table 10** for Alternatives #1 and #2, respectively. Notably, operational emissions inventories were developed only for Alternative #2.

For disclosure purposes, under NEPA, emission results are presented for the criteria air pollutants and pollutant precursors CO, $NO_x$, $SO_2$, VOC, $PM_{10}$ and $PM_{2.5}$. The results of $NO_x$ and VOCs are further compared to their applicable CAA General Conformity *de minimis* thresholds of 100 and 50 tons per year, respectively.

**Table 9. Alternative #1 Criteria Air/Precursor Pollutants Emissions Inventory (Short Tons)**

| Year | Category | CO | $NO_x$ | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ | VOC |
|---|---|---|---|---|---|---|---|
| 2027 | Construction | 3.4 | 0.51 | <0.01 | 0.39 | 0.05 | 0.15 |
| | *CAA de minimis thresholds* | -- | *100* | -- | -- | -- | *50* |
| | ***Exceeds CAA de minimis thresholds?*** | **--** | ***No*** | **--** | **--** | **--** | ***No*** |
| 2028 | Construction | 3.2 | 0.47 | <0.01 | 0.39 | 0.05 | 0.15 |
| | *CAA de minimis thresholds* | -- | *100* | -- | -- | -- | *50* |
| | ***Exceeds CAA de minimis thresholds?*** | **--** | ***No*** | **--** | **--** | **--** | ***No*** |
| 2032 | Construction | 1.9 | 0.05 | <0.01 | 0.07 | 0.01 | 0.02 |
| | *CAA de minimis thresholds* | -- | *100* | -- | -- | -- | *50* |
| | ***Exceeds CAA de minimis thresholds?*** | **--** | ***No*** | **--** | **--** | **--** | ***No*** |
| 2033 | Construction | 1.7 | 0.04 | <0.01 | 0.07 | 0.01 | 0.02 |
| | *CAA de minimis thresholds* | -- | *100* | -- | -- | -- | *50* |
| | ***Exceeds CAA de minimis thresholds?*** | **--** | ***No*** | **--** | **--** | **--** | ***No*** |
| 2034 | Construction | 1.6 | 0.04 | <0.01 | 0.07 | 0.01 | 0.02 |
| | *CAA de minimis thresholds* | -- | *100* | -- | -- | -- | *50* |
| | ***Exceeds CAA de minimis thresholds?*** | **--** | ***No*** | **--** | **--** | **--** | ***No*** |

Notes:
Criteria air pollutants and their precursors include carbon monoxide (CO), nitrogen oxides ($NO_x$), sulfur dioxide ($SO_2$), volatile organic compounds (VOCs), and particulate matter with diameters of 10 and 2.5 microns ($PM_{10}$ and $PM_{2.5}$).
The City of Manassas is attainment for the pollutants CO, $SO_2$, $PM_{2.5}$ and $PM_{10}$, thus the CAA *de minimis* levels do not apply to these pollutants.
Results may reflect rounding.
Construction emissions include emissions associated with on-road construction vehicles, off-road construction equipment and fugitives (dust and evaporative).
Source: CMT, 2025.

**Table 10. Alternative #2 Criteria Air/Precursor Pollutants Emissions Inventory (Short Tons)**

| Year | Category | Source | CO | $NO_x$ | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ | VOC |
|---|---|---|---|---|---|---|---|---|
| 2026 | Construction | | 12.7 | 8.9 | 0.02 | 8.9 | 1.2 | 1.9 |
| | Operational[1] | Motor Vehicles | 30.8 | 1.0 | 0.02 | 0.4 | 0.1 | 0.3 |
| | | Aircraft | 28.1 | 34.0 | 3.22 | 0.3 | 0.3 | 3.5 |
| | **Total** | | **71.6** | **43.9** | **3.26** | **9.6** | **1.5** | **5.7** |
| | *CAA de minimis thresholds* | | -- | *100* | -- | -- | -- | *50* |
| | ***Exceeds CAA de minimis thresholds?*** | | **--** | ***No*** | **--** | **--** | **--** | ***No*** |
| 2027 | Construction | | 14.4 | 3.5 | 0.01 | 4.6 | 0.6 | 1.4 |
| | Operational[1] | Motor Vehicles | 29.1 | 0.8 | 0.02 | 0.4 | 0.1 | 0.2 |
| | | Aircraft | 39.4 | 47.7 | 4.52 | 0.4 | 0.4 | 4.9 |
| | **Total** | | **83.0** | **52.0** | **4.55** | **5.4** | **1.1** | **6.5** |

| Table 10. Alternative #2 Criteria Air/Precursor Pollutants Emissions Inventory (Short Tons) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **Category** | **Source** | **CO** | **$NO_x$** | **$SO_2$** | **$PM_{10}$** | **$PM_{2.5}$** | **VOC** |
| | *CAA de minimis thresholds* | | -- | *100* | -- | -- | -- | *50* |
| | ***Exceeds CAA de minimis thresholds?*** | | **--** | ***No*** | **--** | **--** | **--** | ***No*** |
| 2028 | Construction | | 11.3 | 2.1 | 0.01 | 3.2 | 0.4 | 1.0 |
| | Operational[1] | Motor Vehicles | 27.9 | 0.7 | 0.02 | 0.4 | 0.1 | 0.2 |
| | | Aircraft | 43.3 | 52.3 | 4.96 | 0.5 | 0.5 | 5.4 |
| | **Total** | | **82.5** | **55.1** | **4.98** | **4.1** | **0.9** | **6.6** |
| | *CAA de minimis thresholds* | | -- | *100* | -- | -- | -- | *50* |
| | ***Exceeds CAA de minimis thresholds?*** | | **--** | ***No*** | **--** | **--** | **--** | ***No*** |
| 2029 | Construction | | 7.2 | 2.3 | <0.01 | 3.0 | 0.4 | 1.1 |
| | Operational[1] | Motor Vehicles | 26.6 | 0.6 | 0.01 | 0.4 | 0.1 | 0.2 |
| | | Aircraft | 50.5 | 61.1 | 5.79 | 0.5 | 0.5 | 6.3 |
| | **Total** | | **84.3** | **63.9** | **5.81** | **3.9** | **1.0** | **7.6** |
| | *CAA de minimis thresholds* | | -- | *100* | -- | -- | -- | *50* |
| | ***Exceeds CAA de minimis thresholds?*** | | **--** | ***No*** | **--** | **--** | **--** | ***No*** |
| 2030 | Construction | | 2.6 | 1.3 | <0.01 | 1.8 | 0.2 | 0.7 |
| | Operational[1] | Motor Vehicles | 25.2 | 0.5 | 0.01 | 0.4 | 0.1 | 0.1 |
| | | Aircraft | 57.8 | 69.8 | 6.62 | 0.6 | 0.6 | 7.2 |
| | **Total** | | **85.6** | **71.6** | **6.64** | **2.8** | **0.9** | **8.0** |
| | *CAA de minimis thresholds* | | -- | *100* | -- | -- | -- | *50* |
| | ***Exceeds CAA de minimis thresholds?*** | | **--** | ***No*** | **--** | **--** | **--** | ***No*** |
| 2031 | Operational[1] | Motor Vehicles | 24.0 | 0.4 | 0.01 | 0.4 | 0.1 | 0.1 |
| | | Aircraft[1] | 63.3 | 76.5 | 7.25 | 0.7 | 0.7 | 7.9 |
| | **Total** | | **87.3** | **76.9** | **7.27** | **1.1** | **0.7** | **8.1** |
| | *CAA de minimis thresholds* | | -- | *100* | -- | -- | -- | *50* |
| | ***Exceeds CAA de minimis thresholds?*** | | **--** | ***No*** | **--** | **--** | **--** | ***No*** |
| 2032 | Construction | | 1.9 | <0.01 | <0.01 | 0.1 | <0.01 | <0.01 |
| | Operational[1] | Motor Vehicles | 22.8 | 0.2 | 0.01 | 0.4 | 0.1 | 0.1 |
| | | Aircraft | 64.7 | 78.3 | 7.42 | 0.7 | 0.7 | 8.1 |
| | **Total** | | **89.4** | **78.5** | **7.43** | **1.2** | **0.8** | **8.2** |
| | *CAA de minimis thresholds* | | -- | *100* | -- | -- | -- | *50* |
| | **Exceeds CAA *de minimis thresholds?*** | | **--** | ***No*** | **--** | **--** | **--** | ***No*** |
| 2033 | Construction | | 8.5 | 1.0 | <0.01 | 1.7 | 0.2 | 0.6 |
| | Operational[1] | Motor Vehicles | 21.8 | 0.2 | 0.01 | 0.4 | 0.1 | 0.1 |
| | | Aircraft | 66.2 | 80.0 | 7.59 | 0.7 | 0.7 | 8.3 |
| | **Total** | | **96.5** | **81.2** | **7.61** | **2.8** | **1.0** | **9.0** |
| | *CAA de minimis thresholds* | | -- | *100* | -- | -- | -- | *50* |
| | **Exceeds CAA *de minimis thresholds?*** | | **--** | ***No*** | **--** | **--** | **--** | ***No*** |
| 2034 | Construction | | 6.3 | 0.1 | <0.01 | 0.5 | 0.1 | 0.2 |
| | Operational[1] | Motor Vehicles | 20.5 | 0.2 | 0.01 | 0.4 | 0.1 | 0.1 |
| | | Aircraft | 67.7 | 81.9 | 7.76 | 0.7 | 0.7 | 8.5 |
| | **Total** | | **94.5** | **82.1** | **7.78** | **1.7** | **0.8** | **8.8** |
| | *CAA de minimis thresholds* | | -- | *100* | -- | -- | -- | *50* |
| | **Exceeds CAA *de minimis thresholds?*** | | **--** | ***No*** | **--** | **--** | **--** | ***No*** |
| 2035 | Construction | | 2.0 | 0.4 | <0.01 | 0.2 | 0.1 | 0.1 |
| | Operational[1] | Motor Vehicles | 19.3 | 0.1 | 0.01 | 0.4 | 0.1 | 0.1 |
| | | Aircraft | 68.4 | 82.7 | 7.84 | 0.7 | 0.7 | 8.6 |
| | **Total** | | **89.7** | **83.2** | **7.85** | **1.3** | **0.8** | **8.7** |
| | *CAA de minimis thresholds* | | -- | *100* | -- | -- | -- | *50* |
| | **Exceeds CAA *de minimis thresholds?*** | | **--** | ***No*** | **--** | **--** | **--** | ***No*** |

| Table 10. Alternative #2 Criteria Air/Precursor Pollutants Emissions Inventory (Short Tons) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **Category** | **Source** | **CO** | **$NO_x$** | **$SO_2$** | **$PM_{10}$** | **$PM_{2.5}$** | **VOC** |
| 2036 | Construction | | 1.8 | 0.03 | <0.01 | 0.2 | 0.1 | 0.05 |
| | Operational[1] | Motor Vehicles | 14.2 | 0.1 | 0.01 | 0.4 | 0.1 | 0.4 |
| | | Aircraft | 67.1 | 81.2 | 7.69 | 0.7 | 0.7 | 8.4 |
| | **Total** | | **83.1** | **81.3** | **7.70** | **1.3** | **0.8** | **8.9** |
| | *CAA de minimis thresholds* | | -- | *100* | -- | -- | -- | *50* |
| | ***Exceeds CAA de minimis thresholds?*** | | **--** | ***No*** | **--** | **--** | **--** | ***No*** |
| 2041 | Operational[1] | Motor Vehicles | 11.4 | 0.1 | 0.01 | 0.5 | 0.1 | 0.4 |
| | | Aircraft | 77.0 | 92.3 | 8.72 | 0.9 | 0.8 | 8.8 |
| | **Total** | | **88.4** | **92.4** | **8.73** | **1.3** | **0.9** | **9.2** |
| | *CAA de minimis thresholds* | | -- | *100* | -- | -- | -- | *50* |
| | ***Exceeds CAA de minimis thresholds?*** | | **--** | ***No*** | **--** | **--** | **--** | ***No*** |

Notes:
[1] Operational emissions represent the difference between Alternative #2 and the No Action.
Criteria air pollutants and their precursors include carbon monoxide (CO), nitrogen oxides ($NO_x$), sulfur dioxide ($SO_2$), volatile organic compounds (VOCs), and particulate matter with diameters of 10 and 2.5 microns ($PM_{10}$ and $PM_{2.5}$).
The City of Manassas is attainment for the pollutants CO, $SO_2$, $PM_{2.5}$ and $PM_{10}$, thus the CAA *de minimis* levels do not apply to these pollutants.
Results may reflect rounding.
Construction emissions include emissions associated with on-road construction vehicles, off-road construction equipment and fugitives (dust and evaporative).
Motor vehicles emissions represent passenger cars/trucks traveling on airport roadways.
Aircraft emissions include emissions associated with aircraft engines, APUs, and GSE.
Source: CMT, 2025.

As previously stated, under the CAA General Conformity Rule, federal agencies are prohibited from supporting, permitting, or approving any action that does not conform to an approved SIP. The most direct approach to meeting the General Conformity requirement is demonstrating that the Alternatives' emissions are below applicable *de minimis* levels. As presented in **Table 9** and **Table 10**, project-related emissions of criteria air/precursor pollutant for both Alternatives #1 and #2 are below *de minimis* levels for $NO_x$ and VOCs. Therefore, both Alternatives #1 and #2 comply with the requirements of the CAA General Conformity Rule, and a formal Conformity Determination is not required. No further analysis is necessary.

## 5. Summary

Compliance with NEPA was achieved by disclosing the impacts associated with the construction and operational activities for Alternatives #1 and #2 . Furthermore, emissions results for both alternatives are below the CAA *de minimis* thresholds of 100 tons per year for $NO_x$ and 50 tons per year for VOCs. Consequently, the Alternatives #1 and #2 are considered to conform to the applicable EPA-approved SIP, and no additional analysis under the CAA General Conformity Rule is required.