Substantial ozone formations generally require a stable atmosphere with strong sunlight.

Because the proposed project is not anticipated to substantially affect regional emissions of ozone precursors, a regional ozone analysis is not warranted.

Nitrogen Dioxide

NO_2 is a brownish gas that irritates the lungs. It can cause breathing difficulties at high concentrations. Like ozone, NO_2 is not directly emitted but is formed through a reaction between nitric oxide (NO) and atmospheric oxygen. NO and NO_2 are collectively referred to as *nitrogen oxides* (NO_x) and are major contributors to ozone formation. NO_2 also contributes to the formation of PM_{10}. At atmospheric concentrations, NO_2 is only potentially irritating. In high concentrations, the result is a brownish-red cast to the atmosphere and reduced visibility. There is some indication of a relationship between NO_2 and chronic pulmonary fibrosis. Some increase in bronchitis in children (two and three years old) has also been observed at concentrations below 0.3 parts per million (ppm).

Because the proposed project is not anticipated to substantially affect regional emissions of NO_2, a regional NO_2 analysis is not warranted.

Lead

Lead (Pb) is a stable element that persists and accumulates in the environment and in animals. Its principal effects in humans are on the blood-forming, nervous, and renal systems. Lead levels in the urban environment from mobile sources (e.g., automobiles) have significantly decreased since the federally-mandated phase out of leaded gasoline in 1995.

Because the proposed project is not anticipated to substantially affect regional emissions of lead, a regional lead analysis is not warranted.

Mobile Source Air Toxic (MSAT) Emissions

The EPA has not established ambient standards for Mobile Source Air Toxic (MSAT) levels, so nonattainment areas have not been designated and conformity requirements for MSAT emissions have not been promulgated. The EPA regulates air toxics, which are pollutants known or suspected to cause cancer or other serious health effects. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

The CAA identified 188 air toxics, and 21 have been identified with mobile sources. The EPA identified six of these 21 mobile sources as priority MSATs, including

- Benzene
- Formaldehyde
- Diesel particulate matter/diesel exhaust organic gases
- Naphthalene
- Acrolein
- 1,3-Butadiene

Benzene

Benzene (C_6H_6) is a volatile, colorless, highly flammable liquid that dissolves easily in water. It is found in emissions from burning coal and oil, motor vehicle exhaust, evaporation from gasoline service stations, and in industrial solvents. These sources contribute to elevated levels of benzene in the ambient air, which the public may subsequently breathe in. People subjected to acute (short-term) inhalation exposure to benzene, may cause drowsiness, dizziness, and headaches; eye, skin, and respiratory tract irritation; and, unconsciousness at high levels of exposure. Chronic (long-term) inhalation exposure can lead to various disorders in the blood. Reproductive effects have also been reported for women exposed by inhalation to high levels of benzene.

Formaldehyde

Formaldehyde (CH_2O) is a colorless gas with a pungent, suffocating odor at room temperature. It has been detected in ambient air, and the average concentrations reported in U.S. urban areas range from 11 to 20 parts per billion (ppb). The major sources appear to be power plants, manufacturing facilities, incinerators, and automobile exhaust emissions. If humans are subjected to acute (short-term) and chronic (long-term) inhalation exposure, this can result in respiratory symptoms and eye, nose, and throat irritation. Limited studies involving human subjects have associated formaldehyde exposure with lung and nasopharyngeal cancer.

Diesel Particular Matter/Diesel Exhaust Organic Gases

Diesel Particular Matter/Diesel Exhaust Organic Gases (DPM/DEOG) are a complex mixture of thousands of gases and fine particles emitted by a diesel-fueled internal combustion engine. One of the main characteristics of diesel exhaust is the release of particles at a relative rate that is about 20 times greater than from gasoline-fueled vehicles (on an equivalent fuel energy basis). Almost 94% of these particles have a mass that is less than 2.5 microns in diameter. These particles are primarily composed of aggregates of spherical carbon particles coated with organic and inorganic substances that are mutagenic, cytotoxic, or carcinogenic.

Naphthalene

Naphthalene ($C_{10}H_8$) is a slightly water-soluble, two-ring aromatic hydrocarbon and is the most volatile member of the polycyclic aromatic hydrocarbons (PAHs). Naphthalene is used in moth repellents, lavatory scent discs, and soil fumigants. It is also found in light petroleum fractions and in residues from refineries. Acute (short-term) exposure to naphthalene can induce both the production of methhemoglobin in the blood which does not bind oxygen and the destruction of red blood cells in humans. Symptoms of chronic (long-term) exposure by naphthalene are less known.

Acrolein

Acrolein (C_3H_4O) is a water-white or yellow liquid that burns easily and is easily volatilized. Acrolein can be formed from the breakdown of certain pollutants found in outdoor air, from burning tobacco, or from burning gasoline. It is extremely toxic to humans from inhalation and dermal exposure. Acute (short-term) inhalation exposure may result in upper respiratory tract irritation and congestion.

1,3-Butadiene

1,3-butadiene (C_4H_6) is a colorless gas with a mild gasoline-like odor. Motor vehicle exhaust is the most common source of 1,3-butadiene. In humans, acute (short-term) exposure to 1,3-butadiene by inhalation results in irritation of the eyes, nasal passages, throat, and lungs. Epidemiological studies have reported a possible association between 1,3-butadiene exposure and cardiovascular diseases.

Health Impacts

Only limited tools and techniques are available for assessing project-specific health impacts from MSATs. FHWA's ability to evaluate how mobile source health risks should factor into project-level decision-making under the National Environmental Policy Act (NEPA) is impeded by these limitations. These limitations relate to emissions, dispersion, exposure levels, and health effects.

Emissions

The EPA tools available for estimating motor vehicle MSAT emissions are not sensitive to key variables that determine MSAT emissions for highway projects.

Dispersion

The tools available for predicting MSATs dispersion into the environment are limited. The current dispersion models were developed for the purpose of predicting episodic concentrations of CO, to determine compliance with the NAAQS. Dispersion models more accurately predict maximum concentrations, rather than exposure patterns.

Exposure Levels and Health Effects

Even if emissions levels and MSAT episodic concentrations could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis prevent reaching meaningful conclusions on project-specific health impacts. Exposure assessments are difficult to make, because it is difficult to accurately calculate annual MSAT concentrations near roadways and to determine durations that people are exposed to those concentrations at a specific location.

In addition, EPA has not established regulatory concentration targets for the six priority MSATs that are appropriate for use in the project development process. On September 30, 2009, the FHWA updated its interim guidance on MSAT analysis in NEPA documentation (FHWA 2009). The FHWA has suggested the following three-tiered approach for determining potential project-induced MSAT impacts:

- Tier 1 – No analysis for projects that have no potential for meaningful MSAT effects;
- Tier 2 – Qualitative analysis for projects with a low potential MSAT effects; and
- Tier 3 – Quantitative analysis to differentiate alternatives for projects that have higher potential MSAT effects.

This project falls within Tier 3 and requires quantitative analysis.

METHODOLOGY

This section discusses the methodology used to evaluate predicted CO concentrations and MSAT emissions during construction and operation of the proposed project.

Carbon Monoxide (CO)

The traffic analysis for Build Alternatives 1 and 2 (air quality analysis year 2040) assumes construction of a new I-405 half-interchange at NE 132nd Street with a northbound on-ramp and a southbound off-ramp. This half-interchange is not part of the Bellevue to Lynnwood Improvement Project, but it is a funded project that is planned to be built prior to 2040.

The traffic analysis for the Bellevue to Lynnwood Improvement Project assumes that under Build Alternative 1, high-occupancy vehicles (HOV) 3+ and single-occupancy vehicles (SOVs) that pay a toll will be allowed to use express toll (ET) lanes via the NE 128th Street direct-access ramps, as well as other locations (see Exhibit 6). This will result in higher traffic volumes on the NE 128th Street direct access ramps under this alternative than under Build Alternative 2 or the No Build Alternative. However, traffic volumes and Levels of Service (LOS) on the other study area intersections will be the same under both Build Alternatives and the No Build Alternative.

LOS is a measure that characterizes operating conditions on transportation facilities by assessing vehicle speed, travel time, and driver perceptions of comfort and freedom to maneuver in a traffic stream. The six LOS designations range from A to F, with LOS A representing ideal, uncongested operating conditions, and F representing extremely congested, breakdown conditions.

The only intersections in the study area affected by the I-405, Bellevue to Lynnwood Improvement Project are three intersections affected by projected increases in traffic volumes on the NE 128th Street direct access ramps. To calculate the average CO concentrations in parts per million (ppm), the evening peak-hour traffic volumes discussed in the *Bellevue to Lynnwood Improvement Project Transportation Discipline Report,* MOBILE 6.2 emission factors, and CAL3QHC Version 2 software were used (see Exhibit 5). The three intersections analyzed for CO effects are:

- NE 128th Street and 116th Avenue NE
- NE 128th Street and I-405 Off/On-Ramps
- NE 128th Street and Totem Lake Boulevard NE

Exhibit 7: Intersections modeled for carbon monoxide (CO)

MOBILE 6.2 Model

MOBILE 6.2 is an updated version of the Mobile Source Emission Factor Model computer program that the EPA developed to calculate emission factors from highway motor vehicles. MOBILE 6.2 accounts for the gradual replacement of older vehicles with newer, less-polluting vehicles and as a result, consistently predicts future-year emission rates that are lower than current emission rates.

For this project, air quality pollutant emission factors (expressed in grams of pollutant per vehicle mile traveled) for the analysis of existing conditions (year 2005), No Build (years 2014 and 2040), and Build (years 2014 and 2040) Alternatives were estimated using EPA's MOBILE 6.2 emission factor program. The data inputs provided by the Puget Sound Regional Council (PSRC) are based on the implementation of Washington State's enhanced inspection and maintenance and anti-tampering programs, which require bi-annual inspections of automobiles and light trucks to determine whether emissions from the vehicles' exhaust systems are below emission standards. Vehicles that fail the emissions test must undergo maintenance and pass a retest or receive a waiver to be registered in Washington State.

WASIST Model

For this project the Washington State Intersection Screening Tool (WASIST), a computerized screening model, used for estimating worst-case CO concentrations near signalized intersections and metered roadways, was used. The results from WASIST are based on the EPA-approved MOBILE6 model, Version 2.03 (EPA website 2003) and CAL3QHC (SSG, 1998). While these models provide the basis for WASIST, all the input variables required to run the two EPA models are not required to run WASIST. The purpose of the model is to allow the user to conservatively estimate the highest CO concentrations that would be found at an intersection without having to perform a more time-consuming detailed analysis.

The WASIST program allows a two-phase approach to evaluating the CO concentrations of an intersection, the Pre-Screening Analysis and WASIST Screening Analysis. The pre-screening feature allows users to determine if a complete WASIST screening analysis is required by entering only a minimal amount of information. Passing results from the pre-screening analysis indicate that project impacts do not violate the NAAQS for CO, and no further CO modeling is required. If a "fail" test result is indicated during the pre-screening analysis, a full WASIST screening analysis is required.

The full WASIST screening analysis requires additional project-specific details in order to calculate project CO levels. The results of the WASIST analysis provide a pass or fail test result for the 1-hour and 8-hour worst-case CO concentrations. To verify compliance with the 8-hour CO NAAQS, the WASIST model adjusts by the EPA-recommended persistence factor of 0.7 to conservatively estimate model-predicted 8-hour average CO impacts (EPA, 1992). The WASIST model also factors in background concentrations to estimate maximum ambient 1-hour average and 8-hour average CO concentrations, which are then compared against the CO NAAQS of 35 parts per million (ppm: 1-hour average) and 9 ppm (8-hour average). The 3.0 ppm background CO level used in this model is a WASIST model default value.

The pre-screening and full WASIST screening analysis use a combination of worst-case conditions that, when occurring simultaneously, produce the highest levels of CO. If the results from either WASIST test do not violate NAAQS for CO, the impact from any other combination of conditions will also be below the standards and no further modeling is required. If the results from a complete WASIST screening analysis indicate that the project may cause a NAAQS violation, a more detailed analysis using other dispersion models recommended by the EPA should be performed to better evaluate project CO levels.

WASIST modeling file printouts of input and output data are provided in Attachment 1 and modeling results are presented in Table 2 below. Traffic data used in the WASIST model were based on PM peak hour volumes provided by the I-405 project team. An annual growth of 2 percent in the Bellevue area was assumed as worst case which is the approximate percent increase in population and employment for the area (City of Bellevue, 2007).

Mobile Source Air Toxic (MSAT) Emissions

The Bellevue to Lynnwood Improvement Project was identified as a project that has a high potential for MSAT effects. Based on the FHWA's recommended approach for determining MSAT effects, this project falls within the Tier 3 approach. Following FHWA's recommendation, a quantitative analysis was performed using the Easy Mobile Inventory Tool (EMIT) and MOBILE 6.2 to calculate annual MSAT pollutant burdens (in tons per year) for existing conditions and the Build and No Build Alternatives. Because the EPA has not established ambient standards for MSAT levels, no MSAT concentrations were estimated.

EMIT estimates emission quantities for five of the six priority MSATS: 1,3-butadiene, acrolein, benzene, diesel particulate matter, and formaldehyde. MOBILE 6.2 was used to estimate naphthalene emissions. EMIT incorporates EPA's MOBILE 6.2 emission factor model and components for forecasting congested vehicle speeds and VMT as function of area type and roadway functional class. Summer and winter parameters were input into the MOBILE 6.2 portion of EMIT to obtain an accurate annual pollutant burden estimate. The MOBILE 6.2 input parameters recommended by the PSRC, Ecology, and the FHWA were used in the EMIT model, along with the traffic volumes, speeds, and travel characteristics forecasted for the project. Model inputs are provided in Appendix C.

For each alternative, from EMIT, the MOBILE 6.2 input file was saved. This file was rerun within MOBILE 6.2 with the addition of the HAPS_Base file to calculate total naphthalene emissions (Exhibit C-7 in Appendix C).

Construction

The PSCAA regulates particulate emissions in the form of fugitive dust generated during construction activities. For this project, fugitive dust emissions will be controlled using the best control technology available (PSCAA Rule 1, Section 9.15). According to PSCAA Rule 1, Section 9.15, fugitive dust from construction activities shall not injure human health, plants and animals, or property, and shall not unreasonably interfere with the enjoyment of life and property. Also, a person may not operate a vehicle that deposits particulate matter on a paved public highway (PSCAA Rule 1, Section 9.15).

EXISTING AND BASELINE CONDITIONS

This section presents CO concentrations and MSAT emissions for the proposed project. Baseline conditions under all alternatives incorporate the Kirkland Nickel Project.

Carbon Monoxide

Existing Conditions

Under existing conditions, the maximum estimated one-hour CO concentrations from vehicle emissions is 5.6 ppm (see Exhibit 8). The maximum estimated eight-hour CO concentration is 3.9 ppm (see Exhibit 9). Worst-case CO concentrations for existing conditions would not exceed the one-hour average NAAQS of 35 ppm for CO or the eight-hour NAAQS of 9 ppm at modeled locations.

Baseline Conditions

Under baseline conditions, the maximum estimated one-hour CO concentrations from vehicle emissions is 5.3 ppm (see Exhibit 8). The maximum estimated eight-hour CO concentration is 4.6 ppm (see Exhibit 9). Worst-case CO concentrations for baseline conditions would not exceed the one-hour average NAAQS of 35 ppm for CO or the eight-hour NAAQS of 9 ppm at modeled locations.

Exhibit 8: Maximum One-Hour Average Carbon Monoxide Concentrations

Intersection	2005 Existing Conditions	2014 Baseline Conditions
NE 128th St & 116th Ave NE	5.6	5.3
NE 128th St & I-405 Off/On Ramps	Does not exist	4.6
NE 128th St & Totem Lake Blvd NE	N/A	5.0

Notes: N/A = not applicable, this intersection was not signalized in 2005.
Concentration values are in parts per million (ppm).
The one-hour NAAQS for CO is 35 ppm.

Exhibit 9: Maximum Eight-Hour Average Carbon Monoxide Concentrations

Intersection	2005 Existing Conditions	2014 Baseline Conditions
NE 128th St & 116th Ave NE	3.9	4.6
NE 128th St & I-405 Off/On-Ramps	Does not exist	4.1
NE 128th St & Totem Lake Blvd NE	N/A	4.4

Notes: N/A = not applicable; this intersection was not signalized in 2005.
Concentration values are in parts per million (ppm).
The eight-hour NAAQS for CO is 9 ppm.

Mobile Source Air Toxic (MSAT) Emissions

Existing and future baseline conditions Mobile Source Air Toxic (MSAT) emissions are discussed in the following *Project Effects* section.

PROJECT EFFECTS

This section presents and discusses the results of the CO and MSAT analyses.

Operation

Carbon Monoxide (CO)

Once this project is constructed and operating, future CO concentrations in the study area are predicted to decrease. This trend corresponds with the regional trend illustrated in Exhibit 6. Maximum one-hour and eight-hour average CO concentrations for the No Build and Build Alternatives are shown in Exhibits 10 and 11.

Exhibit 10: Maximum One-Hour Average Carbon Monoxide Concentrations

Intersection	2014 Build Alt. 1 (express toll)	2014 No Build & Build Alt. 2 (HOV)	2040 Build Alt. 1 (express toll)	2040 No Build & Build Alt. 2 (HOV)
NE 128th St & 116th Avenue NE	5.7	5.3	6.6	6.4
NE 128th St & I-405 Off/On Ramps	5.5	4.6	6.3	5.6
NE 128th St & Totem Lake Boulevard NE	5.2	5.0	6.3	6.2

Notes: Concentration values are in parts per million (ppm).
The one-hour NAAQS for CO is 35 ppm

Exhibit 11: Maximum Eight-Hour Average Carbon Monoxide Concentrations

Intersection	2014 Build Alt. 1	2014 No Build & Build Alt. 2	2040 Build Alt. 1	2040 No Build & Build Alt. 2
NE 128th St & 116th Avenue NE	4.9	4.6	5.5	5.4
NE 128th St & I-405 Off/On Ramps	4.8	4.1	5.3	4.8
NE 128th St & Totem Lake Boulevard NE	4.5	4.4	5.3	5.2

Notes: Concentration values are in parts per million (ppm).
The eight-hour NAAQS for CO is 9 ppm.

Build Alternative 1

The maximum estimated one-hour CO concentrations from vehicle emissions are 5.7 ppm in 2014 and 6.6 ppm in 2040. The maximum estimated eight-hour CO concentrations are 4.9 ppm in 2014 and 5.5 ppm in 2040. The worst-case CO concentrations for existing conditions, year of opening, and design year would not exceed the one-hour average NAAQS of 35 ppm for CO or the eight-hour NAAQS of 9 ppm at modeled locations. No mitigation would be required because no exceedances of NAAQS are predicted.

Build Alternative 2

The maximum estimated one-hour CO concentrations from vehicle emissions are 5.3 ppm in 2014 and 6.4 ppm in 2040. The maximum estimated eight-hour CO concentration is 4.6 ppm in 2014 and 5.4 ppm in 2040. The worst-case CO concentrations for existing conditions, year of opening, and design year would not exceed the one-hour average NAAQS of 35 ppm for CO or the eight-hour NAAQS of 9 ppm at modeled locations. No mitigation would be required because no exceedances of NAAQS are predicted.

No Build Alternative

The No Build Alternative has the same CO concentrations as Build Alternative 2.

MSAT Emissions

As shown in Exhibit 12, MSAT emissions in the study area are predicted to noticeably decrease in the future, even though VMT is predicted to increase by over 40 percent under both the No Build and Build Alternatives in 2040 (Exhibit 12). Therefore, no mitigation would be required. Exhibit 13 compares the No Build and Build Alternative emissions. Generally, the Build Alternative provides reduced emissions over the No Build Alternative.

Exhibit 12: Estimated Mobile Source Air Toxic (MSAT) Emissions

				Percent Change from Existing	
	2005 Existing	2040 No Build Alternative	2040 Build Alternative (express toll)	2005 to 2040 No Build Alternative	2005 to 2040 Build Alternative (express toll)
Vehicle Miles Traveled (VMT)	2,500,300	3,604,974	3,640,220	44%	46%
1,3-Butadiene	4.28	3.22	3.00	-25%	-30%
Acrolein	0.78	0.60	0.56	-24%	-29%
Benzene	51.03	49.58	46.57	-3%	-9%
Diesel Particulate Matter	31.45	1.68	1.70	-95%	-95%
Formaldehyde	13.77	11.36	10.65	-17%	-23%
Naphthalene	2.48	2.37	2.26	-4%	-9%

**Emission rates in tons/year*

Exhibit 13: Estimated Mobile Source Air Toxic (MSAT) Emissions – 2040 No Build vs. 2040 Build Alternatives

	2040 No Build Alternative	2040 Build Alternative (express toll)	2040 No Build to 2040 Build Alternative (express toll)
Vehicle Miles Traveled (VMT)	3,604,974	3,640,220	1%
1,3-Butadiene	3.22	3.00	-7%
Acrolein	0.60	0.56	-6%
Benzene	49.58	46.57	-6%
Diesel Particulate Matter	1.68	1.70	1%
Formaldehyde	11.36	10.65	-6%
Naphthalene	2.37	2.26	-5%

**Emission rates in tons/year*

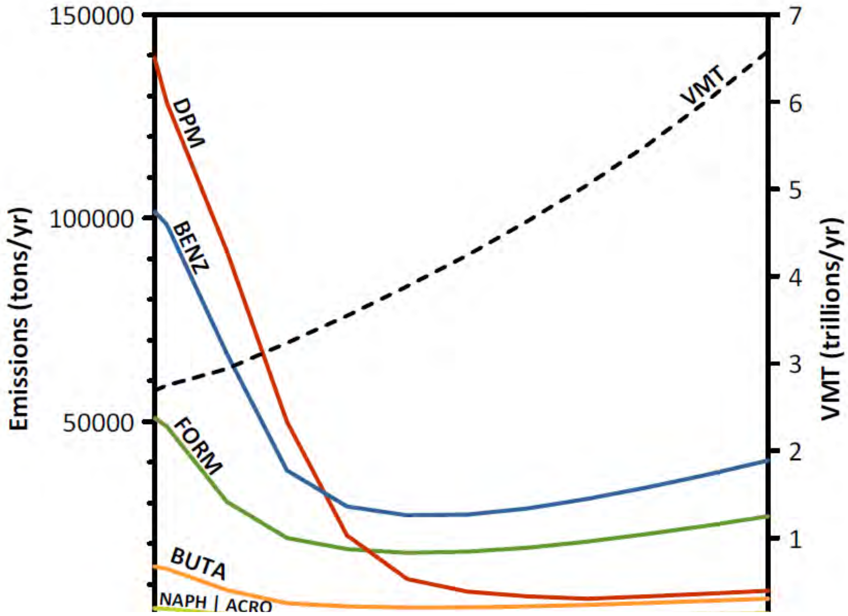
The MSAT trends in this study correspond with the national trend illustrated in Exhibit 14, and result from EPA's national control programs that are projected to reduce MSAT emissions by 67% to 90% by 2020 from 2000 levels. Local trends differ slightly from national trends due to fleet mix and turnover, VMT growth rates, and local control measures.

Construction

Particulate emissions will vary from day to day depending on the level of construction activity, specific operations, and weather conditions. Particulate emissions will depend on the soil's moisture and silt content, wind speed, and the amount and type of equipment operating. Larger dust particles will settle near the source, and fine particles will disperse over greater distances from the construction site.

The quantity of fugitive dust or particulate emissions will be proportional to the area of construction operations and level of activity. Based on field measurements of unmitigated dust emissions from roadway projects, an approximate emission factor for construction operations is 1.2 tons per acre of construction per month of activity (EPA, 1995). Possible mitigation measures to control fugitive dust or particulate emissions are discussed in the Measures to Avoid or Minimize Construction Effects.

Exhibit 14: National Mobile Source Air Toxic Emissions Trend



Notes: For on road mobile sources. Emissions factors were generated using Mobile6.2. MTBE proportion of market for oxygenates is held constant at 50%. Gasoline RVP and oxygenate content are held constant. VMT: Highway Statistics 2000. Table VM-2 for 2000, analysis assumes annual growth rate of 2.5 %. "DPM + DEOG" is based on Mobile6.2-generated factors for elemental carbon, organic carbon and SO4 from diesel powered vehicles with the particle size cutoff set at 10.0 microns.
**DPM+DEOG = Diesel particulate matter plus diesel exhaust organic gases*
***Values in parentheses are percent decrease from 2000 emission rates*
Source: U. S. EPA, 2009.

MEASURES TO AVOID OR MINIMIZE CONSTRUCTION EFFECTS

If uncontrolled, fugitive dust from construction activities will be noticeable near construction sites. During construction, mitigation measures that comply with PSCAA regulations will be implemented. These regulations require the control of dust and mud deposits on paved streets during construction.[1] Measures that reduce deposits of mud and particulate emissions are identified in the *Construction Mitigation* section of the *Programmatic EIS Air Quality Review* (WSDOT, 2001) prepared for the I-405 Corridor Program master plan (see Section 3.1.6.1).

In addition to particulate emissions, heavy trucks and construction equipment powered by gasoline and diesel engines generate CO and NO_x in exhaust emissions. If construction traffic reduces the speed of other vehicles in the area, emissions from traffic will increase slightly while those vehicles are delayed. These emissions will be temporary and limited to the immediate area surrounding the construction site. Construction emissions will contribute a small amount to total emissions in the study area, because construction traffic will be a very small fraction of the area's total traffic.

Some construction phases will result in short-term odors, particularly if asphalt is used for paving operations. Odors might be detectable to some people near the construction site. These odors will decrease as distance from the site increases.

Construction impacts will be reduced by incorporating the mitigation measures outlined in the Associated General Contractor of Washington (AGCW) Guidelines into the project's construction specifications (AGCW, 1997). Possible mitigation measures to control emissions of particulate matter, CO, and NOx during construction include the following:

- Spraying exposed soil with water to reduce particulate emissions;
- Covering and/or wetting materials transported by trucks, or providing adequate freeboard (space from the top of the material to the top of the truck) to reduce particulate emissions during transportation;
- Providing wheel washers to remove particulate matter that vehicles would otherwise carry offsite to decrease particulate matter on area roadways;
- Removing particulate matter deposited on paved roadways to reduce mud and windblown dust on area roadways;

[1] *PSCAA Regulation 1, Article 9.*

- Using appropriate emission-control devices on all construction equipment powered by gasoline or diesel fuel, to reduce particulate, CO, and NOx emissions in vehicular exhaust;
- Covering dirt, gravel, and debris piles as needed;
- Routing and scheduling construction trucks in a manner that will reduce delays and the indirect air quality effects associated with traffic slowing to accommodate construction vehicles;
- Using well-maintained equipment to reduce CO and NOx emissions as it normally would if the equipment were operating within its first 5 years of operation; and
- Planting vegetative cover as soon as possible after grading, to reduce windblown particulates in the area.

CONFORMITY DETERMINATION

The study area for the Bellevue to Lynnwood Improvement Project includes a carbon monoxide (CO) maintenance area. Projects located in maintenance areas must comply with the project-level and regional conformity criteria described in the EPA Conformity Rule (40 CFR 93) and with WAC Chapter 173-420. Because this proposed project will not cause or increase any exceedance of the NAAQS, it meets project-level conformity requirements per 40 CFR 93.123. No significant adverse unavoidable impacts related to air quality are predicted as a result of this proposed project.

The PSRC included the I-405 Corridor Program's Selected Alternative (which includes the Bellevue to Lynnwood Improvement Project, among other projects) in the Metropolitan Transportation Plan (MTP) and the Transportation Improvement Plan (TIP), as a project that conforms to the Puget Sound region's Air Quality Maintenance Plans. This demonstrates that the proposed project will not cause or contribute to exceedances of the NAAQS at the regional level.

The Bellevue to Lynnwood Improvement Project is included in the PSRC MTP and in the TIP. This project meets regional conformity technical requirements because it has been included in the MTP modeling. The project meets all requirements of 40 CFR Part 93 and WAC 173-420 and demonstrates regional conformity.

REFERENCES

GIS Data Sources

Exhibit 2

WSDOT (Washington State Department of Transportation). 2006 - 2007. I-405 Staff; project limits.

Exhibit 7

Parsons Brinckerhoff, 2007. Intersections Analyzed for CO and Proposed NE 128th Street Connector.

Base Data

All GIS exhibits contain one or more of the following as base layers:

GDT (Geographic Data Technology, Inc.), April 2005. GDT - Dynamap Transportation.

King County Standard GIS Data Disk, extract June 2006:

2004. Cities with annexations.

2005. Open Water.

2006. Parks in King County. Data updated by I-405 staff to match data from cities of Renton and Tukwila.

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2002 *Latest Findings on National Air Quality 2001 Status and Trends*. Report Number EPA-454/K-02-001. Washington, D.C., 2002.

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2009 MOBILE6.2 Model run 20 August 2009

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2003 *2000-2002 Air Quality Trends*. Olympia, Washington, 2003.

2000 1999 Air Quality Trends in Washington. Olympia, Washington, 2000.

Washington State Department of Transportation (WSDOT)

2001 I-*405 Corridor Program NEPA/SEPA Draft EIS: Draft Air Quality Review*, prepared by Parsons Brinckerhoff to support the I-405 Corridor Program EIS. Seattle, Washington, 2001.

2011 I-405, Bothell to Lynnwood Improvement Project Transportation Discipline Report, February 2011.

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APPENDIX A MOBILE 6.2 AND CAL3QHC INFORMATION

MOBILE 6.2

Many factors affect pollutant emissions from motor vehicles, including travel speed, temperature, operating mode, and a vehicle's age, type, and condition. New technologies are being implemented to reduce emissions in newer vehicles, compared to prior models. Emissions models calculate emission factors for "average vehicles" (a composite of automobiles, light trucks, heavy trucks, sport-utility vehicles, etc.) operating under specific parameters (e.g., speed, vehicle age, and local emission control requirements).

The I-405 Project Team estimated air quality pollutant emission factors using the EPA MOBILE 6.2 emission factor program. The data inputs provided by the Puget Sound Regional Council (PSRC) are based on implementation of the Washington State Enhanced Inspection and Maintenance (I&M) and Anti-Tampering programs. These programs require annual inspection of automobiles and light trucks, to determine whether carbon monoxide (CO) and hydrocarbon (HC) emissions from the vehicles' exhaust systems are below strict emission standards. Vehicles that fail the emissions test must undergo maintenance and pass a retest, or receive a waiver to be registered in the state of Washington. Decreases in emissions occur over time, as newer, less-polluting vehicles gradually replace older vehicles. Overall transportation-pollutant-related air quality has been improving in the Puget Sound Region because of this reduction in emissions.

WASIST Modeling

Washington State Intersection Screening Tool (WASIST) is a Windows-based screening model used for determining worst-case carbon monoxide (CO) concentrations at signalized intersections throughout the State of Washington. WASIST uses readily available data in a user-friendly application to make a conservative estimate of project CO levels. This is done by using a combination of worst-case conditions that when occurring simultaneously produce the highest levels of CO. If the results from WASIST do not violate National Ambient Air Quality Standards (NAAQS) for CO, the impact from any other combination of conditions will also be below the standards and no further modeling is required. If the results from WASIST indicate that the project may cause a NAAQS violation, a detailed analysis should be performed to better evaluate project CO levels.

WASIST is based on the Illinois Carbon Monoxide Screen for Intersection Modeling (COSIM). COSIM was originally developed by researchers at the University of Illinois, Urbana-Champaign (UIUC) under research sponsored by the Illinois Transportation Research Center (ITRC) and UIUC (Larson, 1999, 2003). Project guidance was provided by a committee consisting of members from UIUC, ITRC, Illinois Department of

Transportation (IDOT), Illinois Environmental Protection Agency (IEPA), and Federal Highway Administration (FHWA).

To create WASIST, COSIM was modified by Scott Peters, one of the principal researchers on the COSIM project, for use by the Washington State Department of Transportation. Although WASIST was designed to be easy to use, the user should be familiar with the basic concepts of atmospheric dispersion modeling and vehicle emissions modeling before using this program.

APPENDIX B WASIST OUTPUTS

Electronic versions of WASIST outputs are available from the I-405 Team.

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APPENDIX C EMIT INPUT PARAMETERS AND OUTPUT TABLES

EMIT Input Parameters

Exhibit C-1: Emit inputs, Existing 2005 – sheet 1 of 4

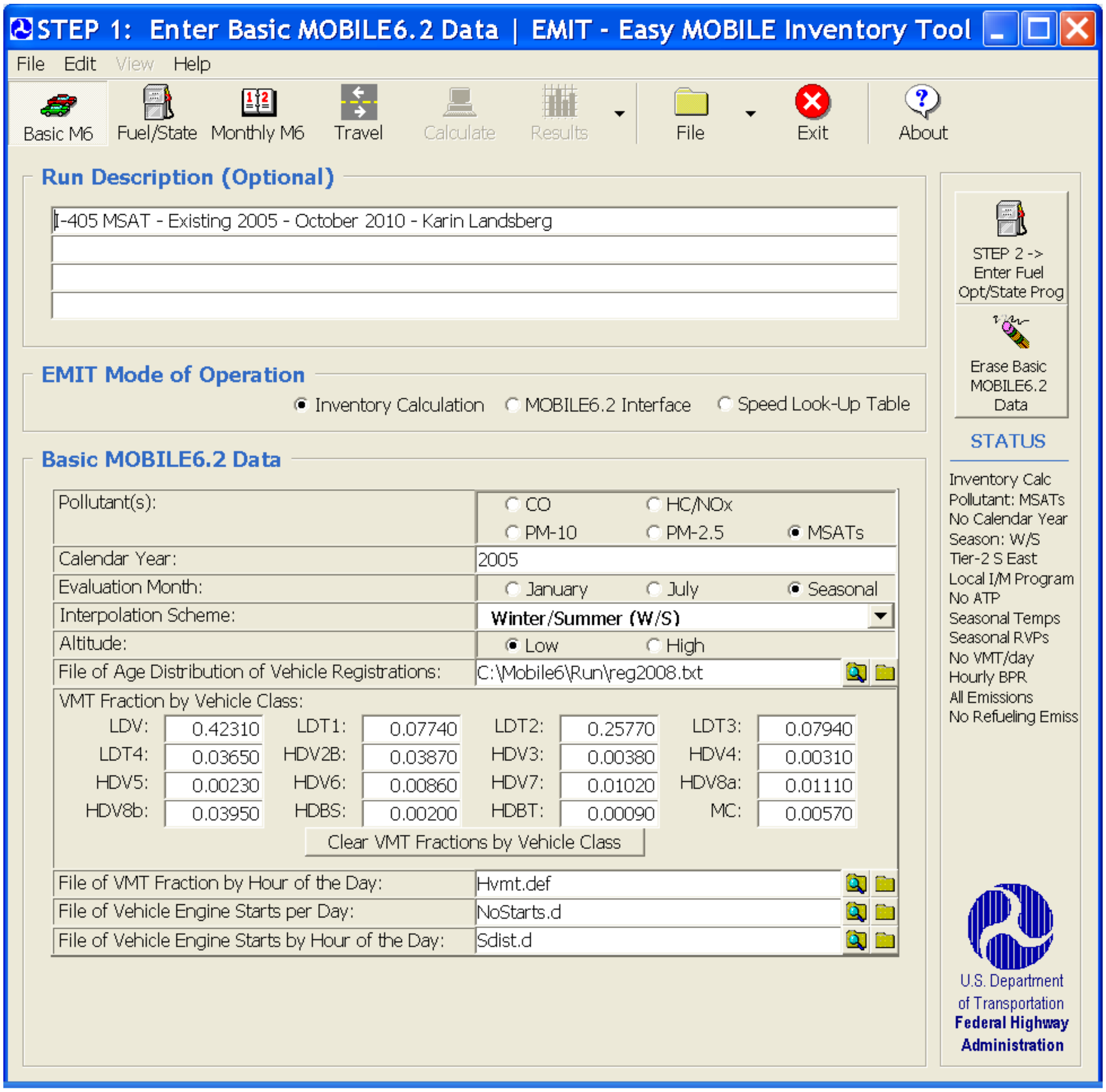


Exhibit C-1: Emit inputs, Existing 2005 – sheet 2 of 4

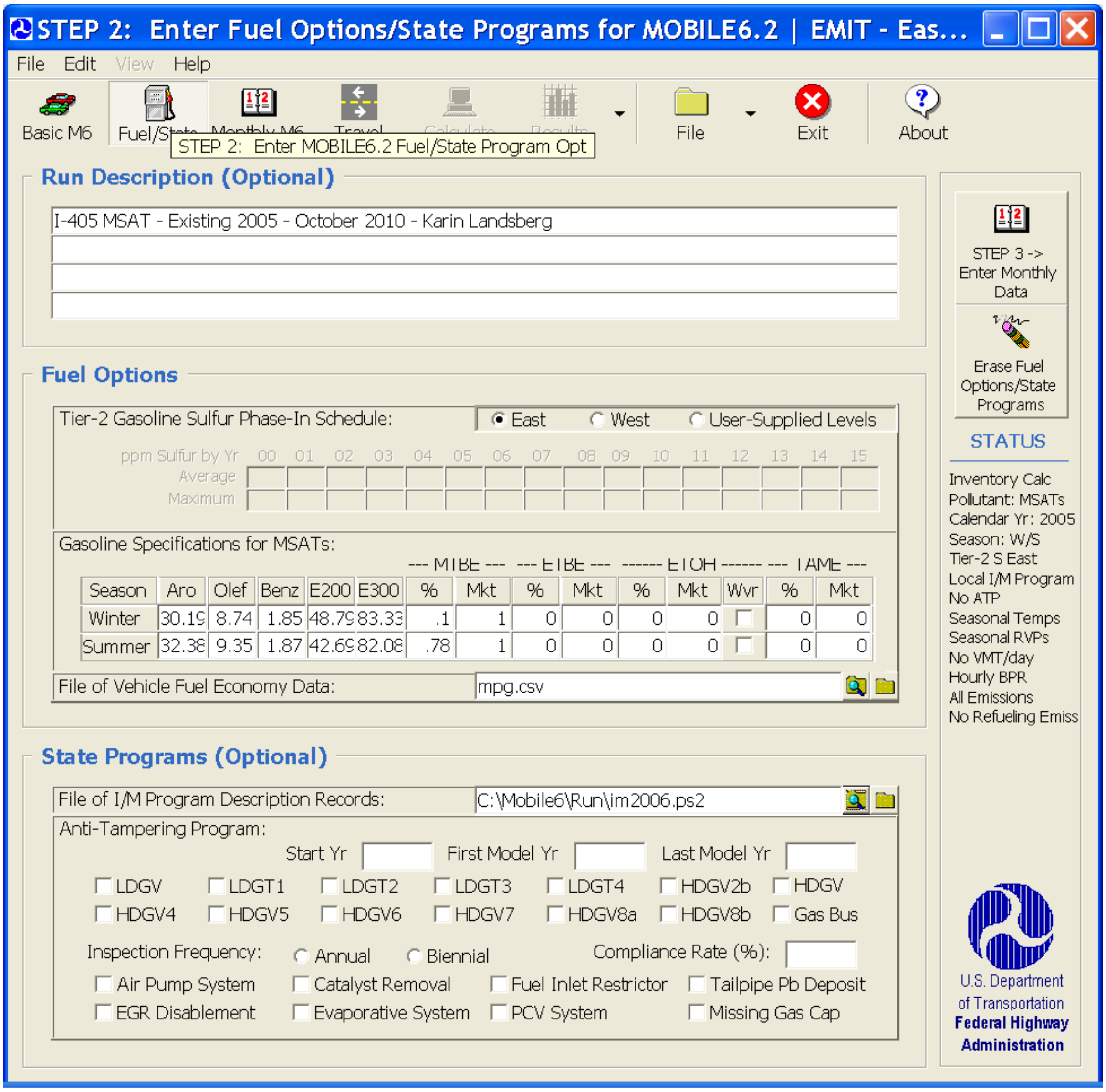


Exhibit C-1: Emit inputs, Existing 2005 – sheet 3 of 4

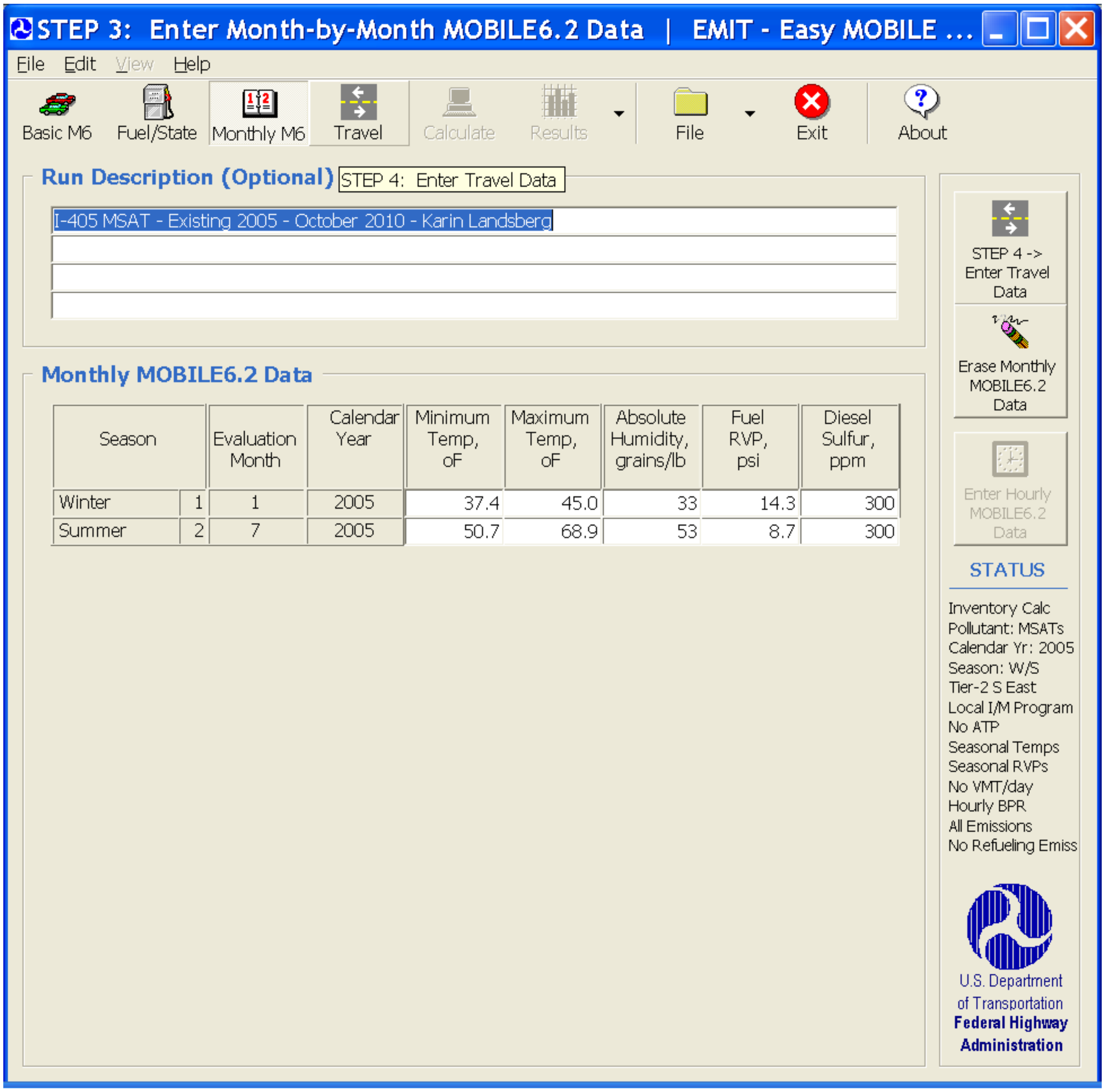


Exhibit C-1: Emit inputs, Existing 2005 – sheet 4 of 4

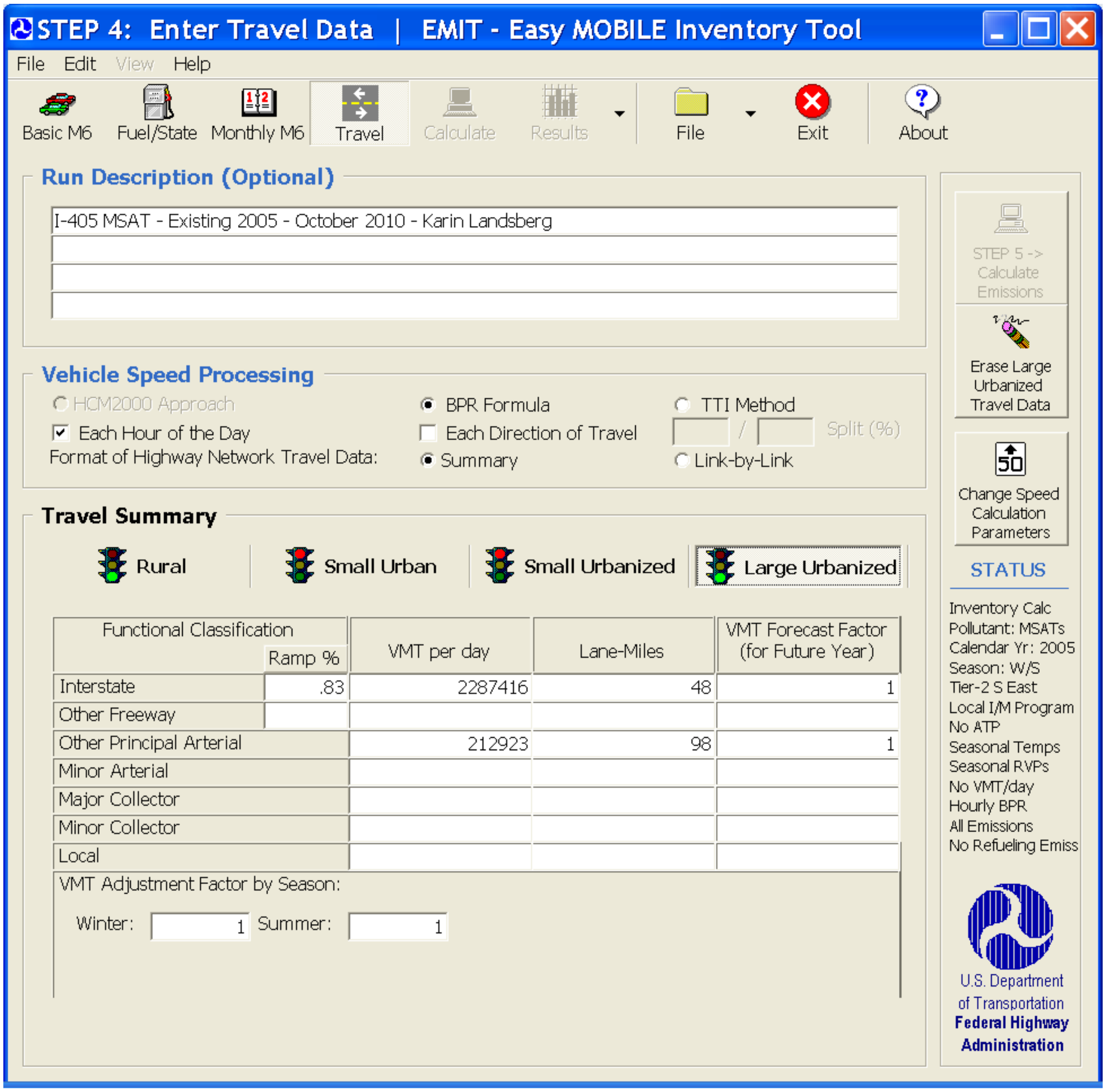


Exhibit C-2: EMIT inputs, No Build 2040 – sheet 1 of 4

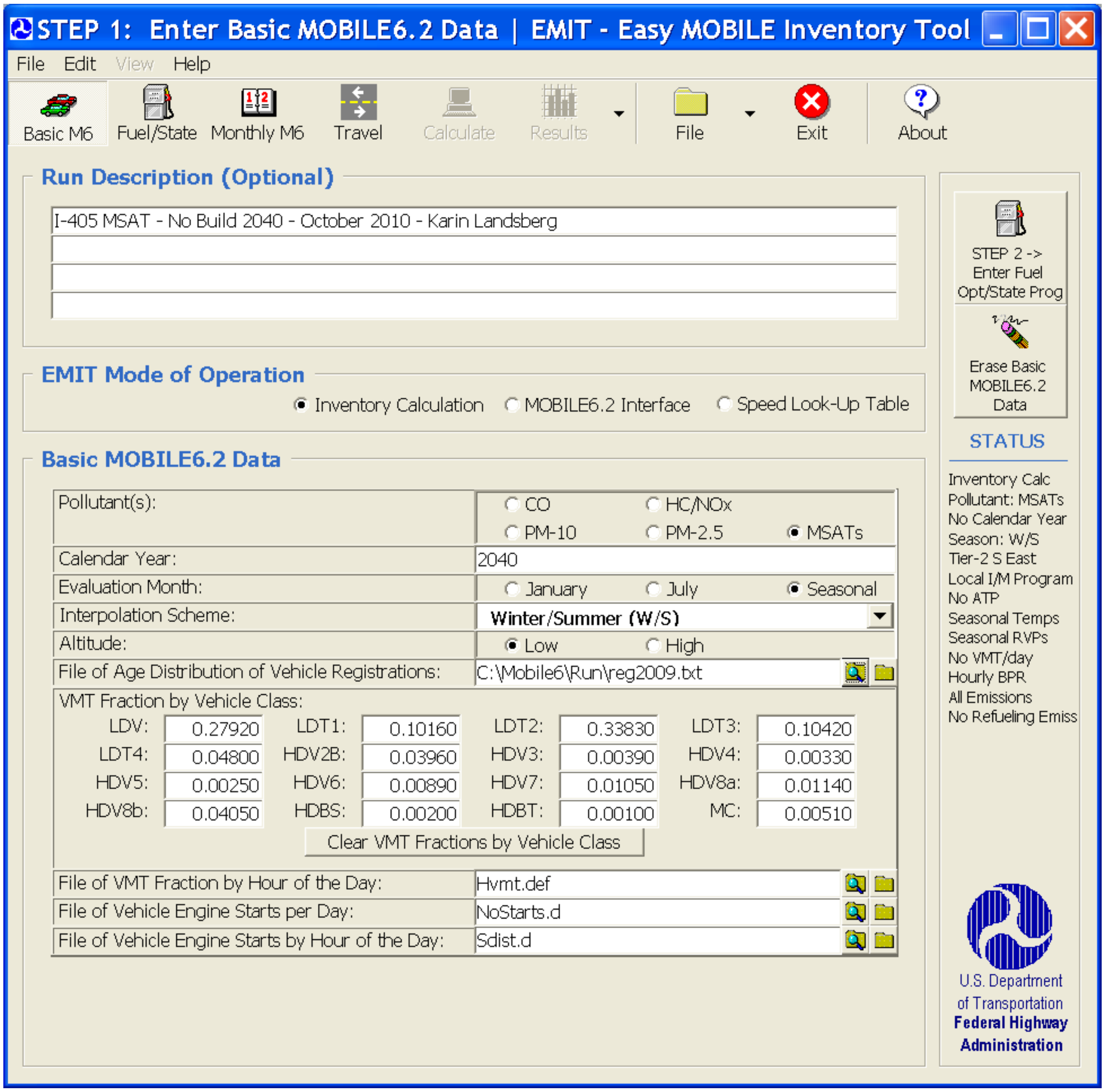
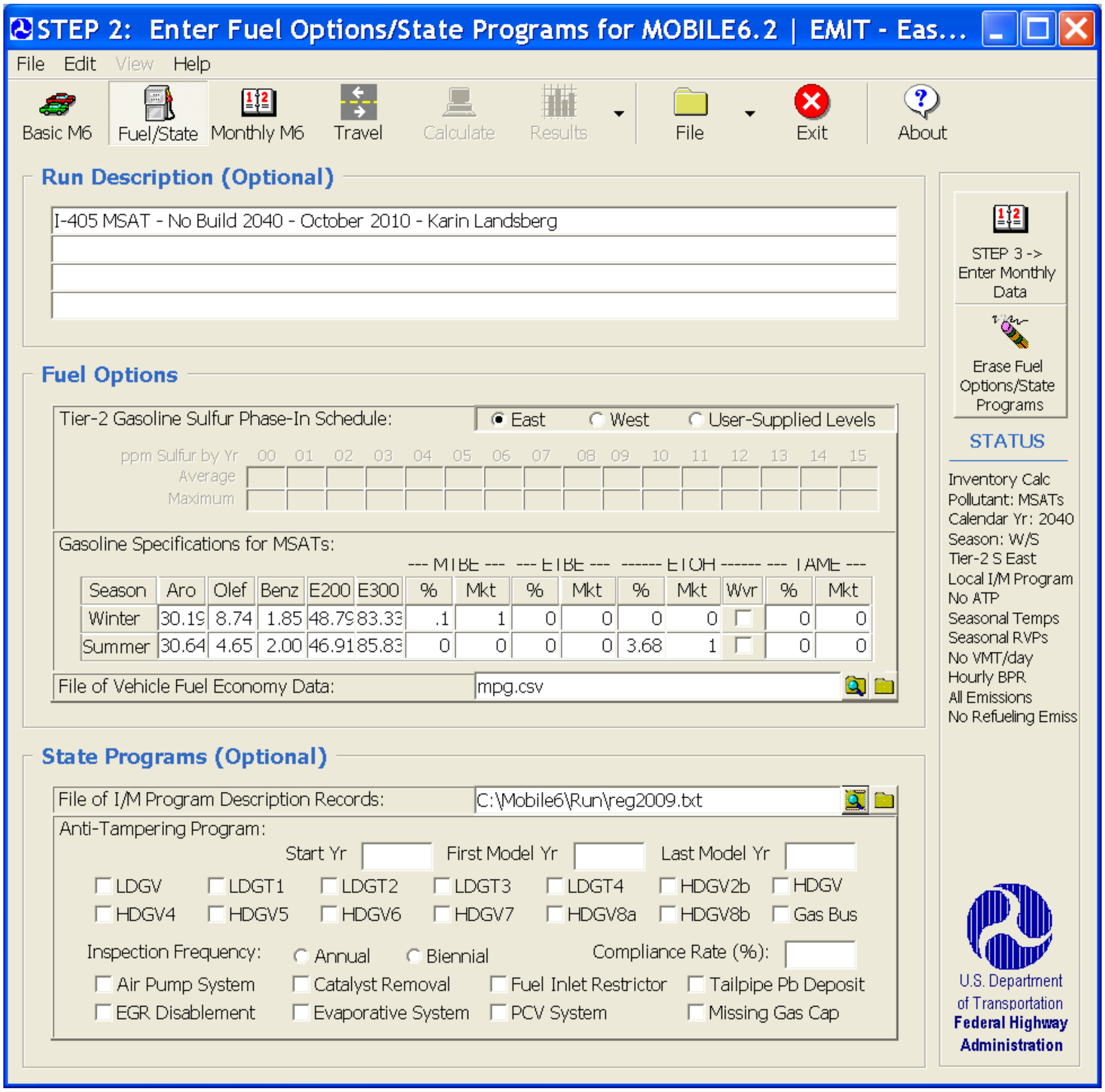


Exhibit C-2: EMIT inputs, No Build 2040 – sheet 2 of 4



Exihbit C-2: EMIT inputs, No Build 2040 – sheet 3 of 4

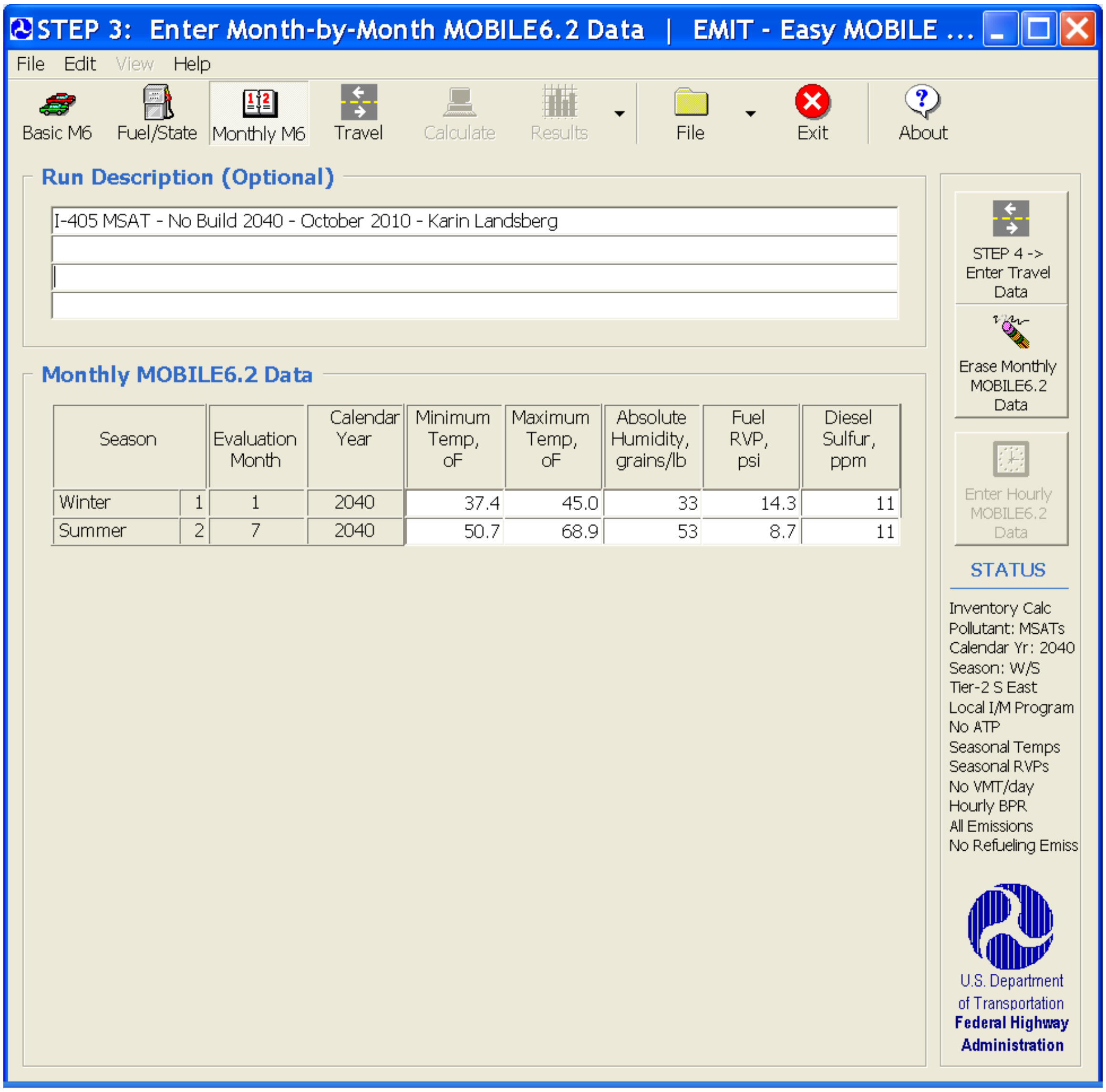
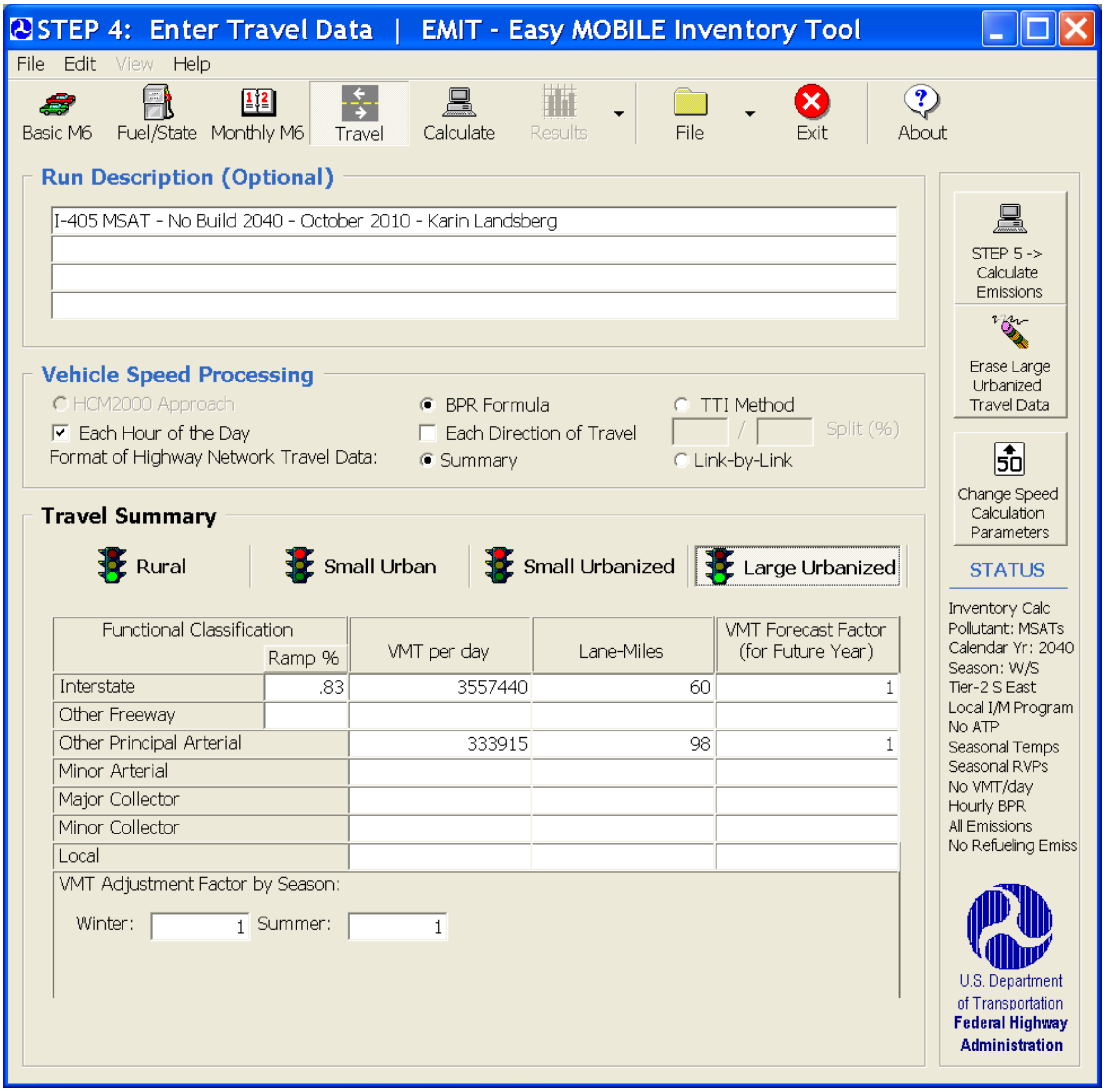
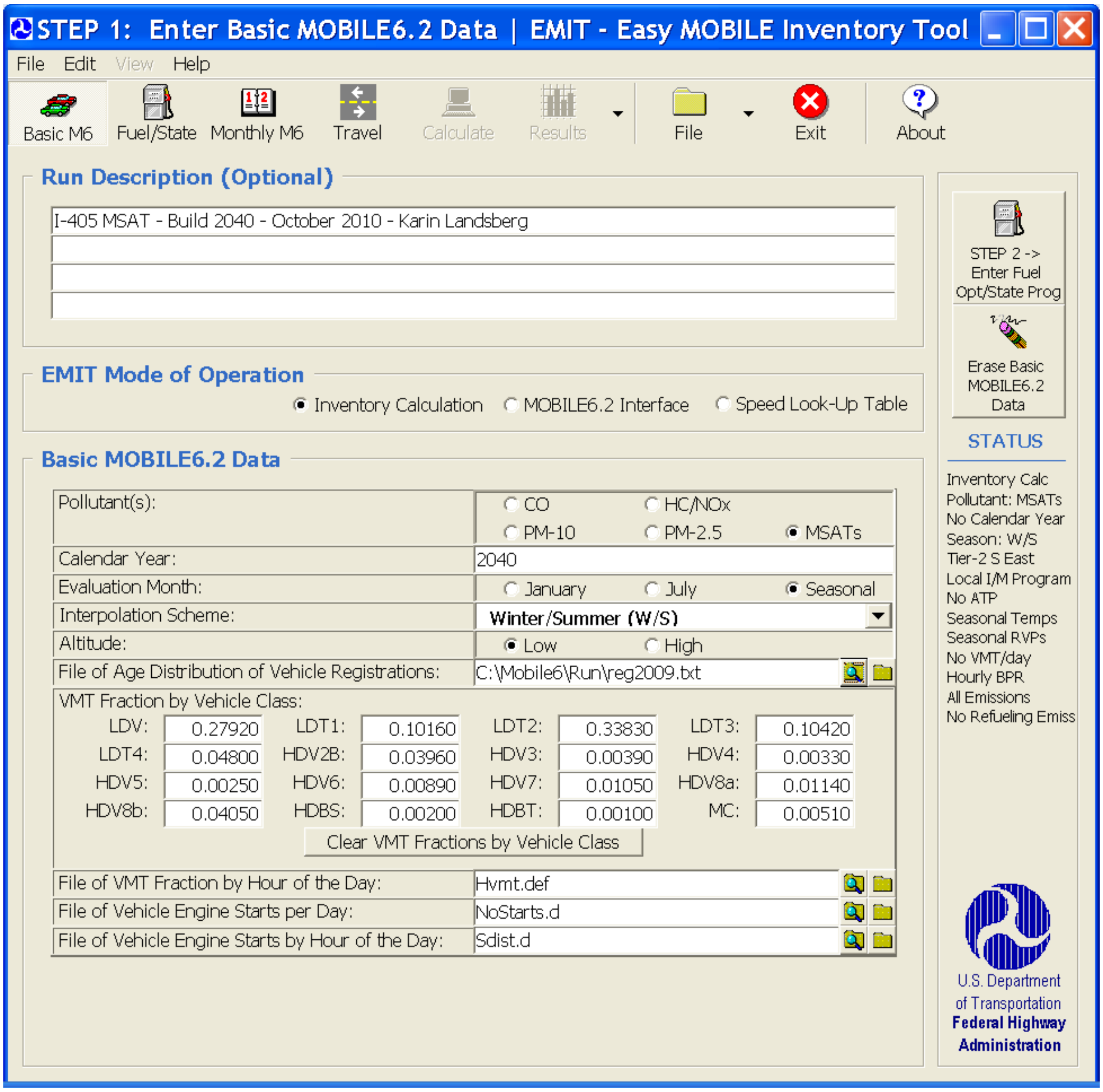


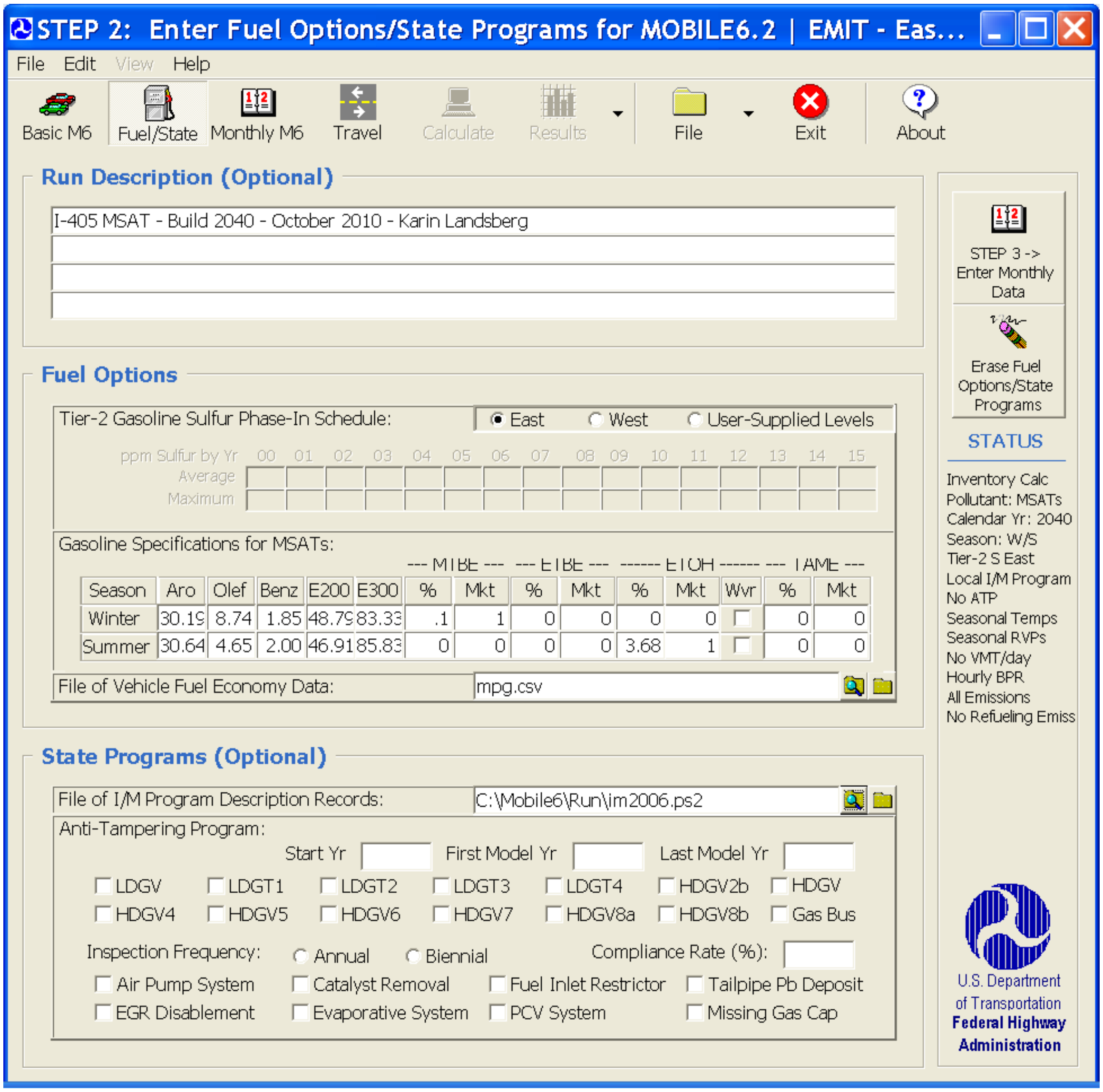
Exhibit C-2: EMIT inputs, No Build – sheet 4 of 4



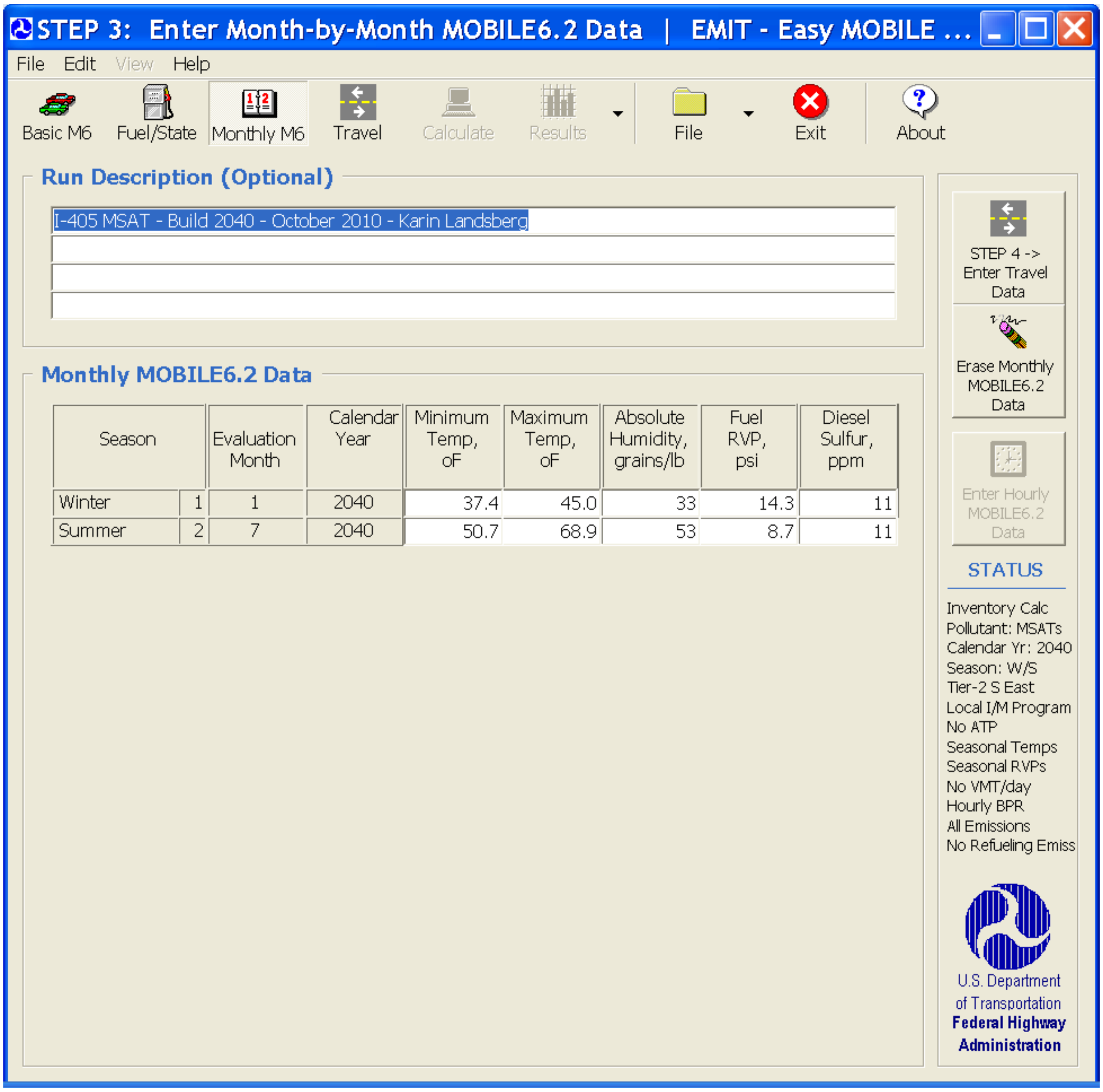
Exibit C-3: EMIT inputs, Build 2040 – sheet 1 of 4



Exibit C-3: EMIT inputs, Build 2040 – sheet 2 of 4

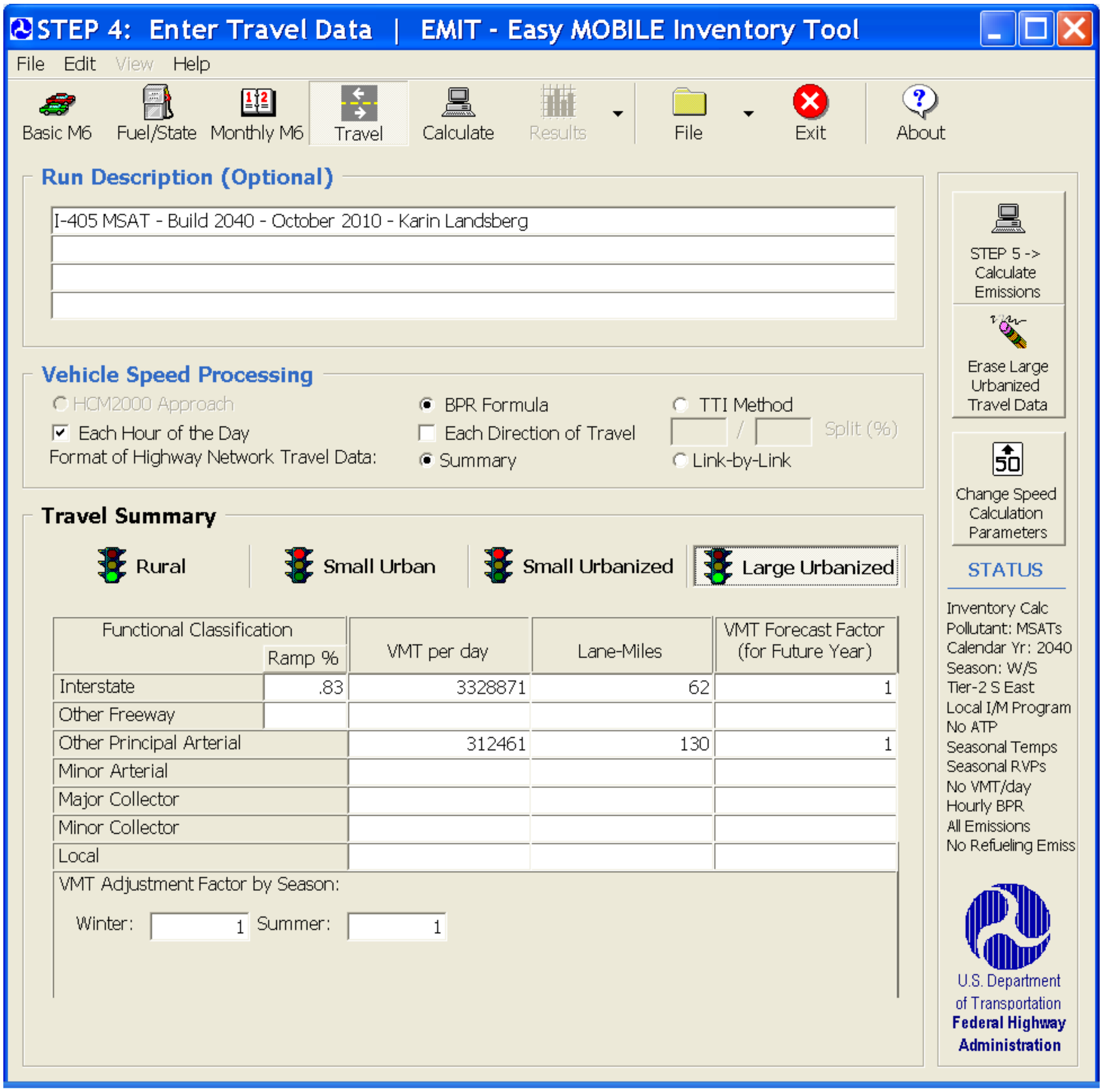


Exibit C-3: EMIT inputs, Build 2040 – sheet 3 of 4



Season		Evaluation Month	Calendar Year	Minimum Temp, oF	Maximum Temp, oF	Absolute Humidity, grains/lb	Fuel RVP, psi	Diesel Sulfur, ppm
Winter	1	1	2040	37.4	45.0	33	14.3	11
Summer	2	7	2040	50.7	68.9	53	8.7	11

Exhibit C-3: EMIT inputs, Build 2040 – sheet 4 of 4



EMIT Output Tables

Exhibit C-4: EMIT results - ExistingThe EMIT output tables for the Bellevue to Lynnwood Improvement Project are found in Exhibit C-4 through Exhibit C-6.

	Calendar			MOBILE6.2 Facility Type				Total Emissions	
Pollutant	Year	Season	Parameter	Freeway	Arterial	Local	Ramp	Start/Diurnal	(tons)
ACRO	2005	Winter	EF (mg/VMT)	0.856	0.473	0.964	0.581	0.000	
ACRO	2005	Winter	VMT Fraction	2,268,430	212,923	0	18,986	2,500,339	0.412
ACRO	2005	Summer	EF (mg/VMT)	0.766	0.426	0.871	0.517	0.000	
ACRO	2005	Summer	VMT Fraction	2,268,430	212,923	0	18,986	2,500,339	0.371
ACRO	2005	Total Emissions	(tons)	0.740	0.038	0.000	0.004	0.000	0.783
	Calendar			MOBILE6.2 Facility Type				Total Emissions	
Pollutant	Year	Season	Parameter	Freeway	Arterial	Local	Ramp	Start/Diurnal	(tons)
BENZ	2005	Winter	EF (mg/VMT)	49.446	25.581	46.916	35.945	2.186	
BENZ	2005	Winter	VMT Fraction	2,268,430	212,923	0	18,986	2,500,339	24.828
BENZ	2005	Summer	EF (mg/VMT)	51.537	26.491	49.145	36.988	2.652	
BENZ	2005	Summer	VMT Fraction	2,268,430	212,923	0	18,986	2,500,339	26.200
BENZ	2005	Total Emissions	(tons)	46.085	2.231	0.000	0.279	2.434	51.028
	Calendar			MOBILE6.2 Facility Type				Total Emissions	
Pollutant	Year	Season	Parameter	Freeway	Arterial	Local	Ramp	Start/Diurnal	(tons)
BUTA	2005	Winter	EF (mg/VMT)	4.314	2.406	4.340	3.312	0.000	
BUTA	2005	Winter	VMT Fraction	2,268,430	212,923	0	18,986	2,500,339	2.079
BUTA	2005	Summer	EF (mg/VMT)	4.539	2.543	4.546	3.478	0.000	
BUTA	2005	Summer	VMT Fraction	2,268,430	212,923	0	18,986	2,500,339	2.199
BUTA	2005	Total Emissions	(tons)	4.040	0.212	0.000	0.026	0.000	4.278
	Calendar			MOBILE6.2 Facility Type				Total Emissions	
Pollutant	Year	Season	Parameter	Freeway	Arterial	Local	Ramp	Start/Diurnal	(tons)
DPM	2005	Winter	EF (mg/VMT)	31.872	31.872	31.872	31.872	0.000	
DPM	2005	Winter	VMT Fraction	2,268,430	212,923	0	18,986	2,500,339	15.988
DPM	2005	Summer	EF (mg/VMT)	30.660	30.660	30.660	30.660	0.000	
DPM	2005	Summer	VMT Fraction	2,268,430	212,923	0	18,986	2,500,339	15.464
DPM	2005	Total Emissions	(tons)	28.535	2.678	0.000	0.239	0.000	31.452
	Calendar			MOBILE6.2 Facility Type				Total Emissions	
Pollutant	Year	Season	Parameter	Freeway	Arterial	Local	Ramp	Start/Diurnal	(tons)
FORM	2005	Winter	EF (mg/VMT)	14.068	7.987	16.045	9.620	0.000	
FORM	2005	Winter	VMT Fraction	2,268,430	212,923	0	18,986	2,500,339	6.780
FORM	2005	Summer	EF (mg/VMT)	14.410	8.230	16.230	10.119	0.000	
FORM	2005	Summer	VMT Fraction	2,268,430	212,923	0	18,986	2,500,339	6.986
FORM	2005	Total Emissions	(tons)	12.996	0.695	0.000	0.075	0.000	13.766

Exhibit C-5: EMIT results – No Build 2040

	Calendar							Total Emissions	
Pollutant	Year	Season	Parameter	Freeway	Arterial	Local	Ramp	Start/Diurnal	(tons)
ACRO	2040	Winter	EF (mg/VMT)	0.458	0.164	0.318	0.186	0.000	
ACRO	2040	Winter	VMT Fraction	3,270,609	306,991	0	27,373	3,604,973	0.312
ACRO	2040	Summer	EF (mg/VMT)	0.414	0.150	0.293	0.169	0.000	
ACRO	2040	Summer	VMT Fraction	3,270,609	306,991	0	27,373	3,604,973	0.283
ACRO	2040	Total Emissions	(tons)	0.574	0.019	0.000	0.002	0.000	0.595
	Calendar							Total Emissions	
Pollutant	Year	Season	Parameter	Freeway	Arterial	Local	Ramp	Start/Diurnal	(tons)
BENZ	2040	Winter	EF (mg/VMT)	35.130	9.314	17.556	11.319	0.308	
BENZ	2040	Winter	VMT Fraction	3,270,609	306,991	0	27,373	3,604,973	23.909
BENZ	2040	Summer	EF (mg/VMT)	37.494	9.665	18.556	11.717	0.378	
BENZ	2040	Summer	VMT Fraction	3,270,609	306,991	0	27,373	3,604,973	25.675
BENZ	2040	Total Emissions	(tons)	47.787	1.172	0.000	0.127	0.497	49.583
	Calendar							Total Emissions	
Pollutant	Year	Season	Parameter	Freeway	Arterial	Local	Ramp	Start/Diurnal	(tons)
BUTA	2040	Winter	EF (mg/VMT)	2.461	0.817	1.515	0.977	0.000	
BUTA	2040	Winter	VMT Fraction	3,270,609	306,991	0	27,373	3,604,973	1.670
BUTA	2040	Summer	EF (mg/VMT)	2.263	0.753	1.400	0.894	0.000	
BUTA	2040	Summer	VMT Fraction	3,270,609	306,991	0	27,373	3,604,973	1.545
BUTA	2040	Total Emissions	(tons)	3.108	0.097	0.000	0.010	0.000	3.215
	Calendar							Total Emissions	
Pollutant	Year	Season	Parameter	Freeway	Arterial	Local	Ramp	Start/Diurnal	(tons)
DPM	2040	Winter	EF (mg/VMT)	1.159	1.159	1.159	1.159	0.000	
DPM	2040	Winter	VMT Fraction	3,270,609	306,991	0	27,373	3,604,973	0.838
DPM	2040	Summer	EF (mg/VMT)	1.159	1.159	1.159	1.159	0.000	
DPM	2040	Summer	VMT Fraction	3,270,609	306,991	0	27,373	3,604,973	0.843
DPM	2040	Total Emissions	(tons)	1.525	0.143	0.000	0.013	0.000	1.681
	Calendar							Total Emissions	
Pollutant	Year	Season	Parameter	Freeway	Arterial	Local	Ramp	Start/Diurnal	(tons)
FORM	2040	Winter	EF (mg/VMT)	7.912	2.883	5.742	3.190	0.000	
FORM	2040	Winter	VMT Fraction	3,270,609	306,991	0	27,373	3,604,973	5.387
FORM	2040	Summer	EF (mg/VMT)	8.733	3.159	6.220	3.536	0.000	
FORM	2040	Summer	VMT Fraction	3,270,609	306,991	0	27,373	3,604,973	5.977
FORM	2040	Total Emissions	(tons)	10.953	0.373	0.000	0.037	0.000	11.363

Exhibit C-6: EMIT results – Build 2040

Pollutant	Calendar Year	Season	Parameter	Freeway	Arterial	Local	Ramp	Start/Diurnal	Total Emissions (tons)
ACRO	2040	Winter	EF (mg/VMT)	0.422	0.164	0.318	0.186	0.000	
ACRO	2040	Winter	VMT Fraction	3,328,880	283,479	0	27,861	3,640,220	0.292
ACRO	2040	Summer	EF (mg/VMT)	0.381	0.150	0.293	0.169	0.000	
ACRO	2040	Summer	VMT Fraction	3,328,880	283,479	0	27,861	3,640,220	0.265
ACRO	2040	Total Emissions	(tons)	0.538	0.018	0.000	0.002	0.000	0.558
Pollutant	Calendar Year	Season	Parameter	Freeway	Arterial	Local	Ramp	Start/Diurnal	Total Emissions (tons)
BENZ	2040	Winter	EF (mg/VMT)	32.397	9.314	17.556	11.319	0.308	
BENZ	2040	Winter	VMT Fraction	3,328,880	283,479	0	27,861	3,640,220	22.454
BENZ	2040	Summer	EF (mg/VMT)	34.578	9.665	18.556	11.717	0.378	
BENZ	2040	Summer	VMT Fraction	3,328,880	283,479	0	27,861	3,640,220	24.115
BENZ	2040	Total Emissions	(tons)	44.855	1.082	0.000	0.129	0.502	46.569
Pollutant	Calendar Year	Season	Parameter	Freeway	Arterial	Local	Ramp	Start/Diurnal	Total Emissions (tons)
BUTA	2040	Winter	EF (mg/VMT)	2.257	0.817	1.515	0.977	0.000	
BUTA	2040	Winter	VMT Fraction	3,328,880	283,479	0	27,861	3,640,220	1.559
BUTA	2040	Summer	EF (mg/VMT)	2.077	0.753	1.400	0.894	0.000	
BUTA	2040	Summer	VMT Fraction	3,328,880	283,479	0	27,861	3,640,220	1.443
BUTA	2040	Total Emissions	(tons)	2.902	0.090	0.000	0.010	0.000	3.002
Pollutant	Calendar Year	Season	Parameter	Freeway	Arterial	Local	Ramp	Start/Diurnal	Total Emissions (tons)
DPM	2040	Winter	EF (mg/VMT)	1.159	1.159	1.159	1.159	0.000	
DPM	2040	Winter	VMT Fraction	3,328,880	283,479	0	27,861	3,640,220	0.847
DPM	2040	Summer	EF (mg/VMT)	1.159	1.159	1.159	1.159	0.000	
DPM	2040	Summer	VMT Fraction	3,328,880	283,479	0	27,861	3,640,220	0.851
DPM	2040	Total Emissions	(tons)	1.552	0.132	0.000	0.013	0.000	1.697
Pollutant	Calendar Year	Season	Parameter	Freeway	Arterial	Local	Ramp	Start/Diurnal	Total Emissions (tons)
FORM	2040	Winter	EF (mg/VMT)	7.285	2.883	5.742	3.190	0.000	
FORM	2040	Winter	VMT Fraction	3,328,880	283,479	0	27,861	3,640,220	5.047
FORM	2040	Summer	EF (mg/VMT)	8.038	3.159	6.220	3.536	0.000	
FORM	2040	Summer	VMT Fraction	3,328,880	283,479	0	27,861	3,640,220	5.598
FORM	2040	Total Emissions	(tons)	10.263	0.345	0.000	0.038	0.000	10.645

Exhibit C-7: MOBILE 6.2 Naphthalene results

Alternative	Season	Process	Emission Rate (mg/mile)
Existing	Winter	Exhaust	0.7546
	Winter	Running Evaporative	0.2028
	Winter	Total	0.9574
Existing	Summer	Exhaust	0.7477
	Summer	Running Evaporative	0.2456
	Summer	Total	0.9933

Alternative	Season	Process	Emission Rate (mg/mile)
No Build	Winter	Exhaust	0.3642
	Winter	Running Evaporative	0.2437
	Winter	Total	0.6079
No Build	Summer	Exhaust	0.3642
	Summer	Running Evaporative	0.2945
	Summer	Total	0.6587

Alternative	Season	Process	Emission Rate (mg/mile)
Build	Winter	Exhaust	0.3638
	Winter	Running Evaporative	0.2147
	Winter	Total	0.5785
Build	Summer	Exhaust	0.3638
	Summer	Running Evaporative	0.2575
	Summer	Total	0.6213