BRENT SPENCE BRIDGE CORRIDOR PROJECT

QUANTITATIVE MSAT ANALYSIS REPORT

ODOT PID 89068 | KYTC PROJECT ITEM NO. 6-17
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TEAM KENTUCKY
TRANSPORTATION CABINET

HNTB

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1. INTRODUCTION

This air quality technical report has been prepared in support of the Brent Spence Bridge (BSB) Corridor Project's supplemental Environmental Assessment (EA) effort. The purpose of this report is to quantitatively evaluate the impact of Mobile Source Air Toxic (MSAT) pollutants over the study area for the BSB Corridor Project.

1.1 Project Description

The BSB corridor consists of 7.8 miles of I-71 and I-75 connecting southwest Ohio and northern Kentucky. The corridor is located within the Greater Cincinnati/Northern Kentucky region and is a major route for regional and local mobility. Regionally, the BSB carries both I-71 and I-75 traffic over the Ohio River and connects to I-74, I-275, and US-50. The BSB corridor also facilitates local travel by providing access to downtown Cincinnati in Hamilton County, Ohio and Covington in Kenton County, Kentucky. The corridor forms a critical part of a major freight route connecting Canada to Florida, carrying more than $1 billion of freight every day and more than $400 billion of freight every year.

The primary features of the BSB Corridor Project are illustrated in Figure 1. The project will:

- Reconstruct I-71/I-75 and add one lane in each direction;
- Rebuild the overpass bridges and interchanges in the corridor and add a new exit at Ezzard Charles Drive in Ohio;
- Construct a collector-distributor (C-D) roadway system between West 12th Street in Kentucky and Ezzard Charles Drive in Ohio;
- Extend frontage roads connecting Pike Street to West 4th Street and West 5th Street in Kentucky;
- Add C-D lanes between Dixie Highway (US-25) and Kyles Lane (KY-1072) in Kentucky;
- Rehabilitate and reconfigure the existing double-decker BSB to carry three lanes of local traffic on each deck as part of the C-D roadway system; and
- Build a new double-decker companion bridge west of the existing BSB to carry five lanes of through (interstate) traffic on each deck.

The project will also add sidewalks and shared-use paths on local streets that are parallel to or cross the interstate and incorporate aesthetic treatments throughout the corridor.

The project will be delivered in three phases, as shown in Figure 2. Phases I and II are following a traditional design-bid-build procurement process. Phase III is following a progressive design-build procurement process.

Figure 1: BSB Corridor Project Overview

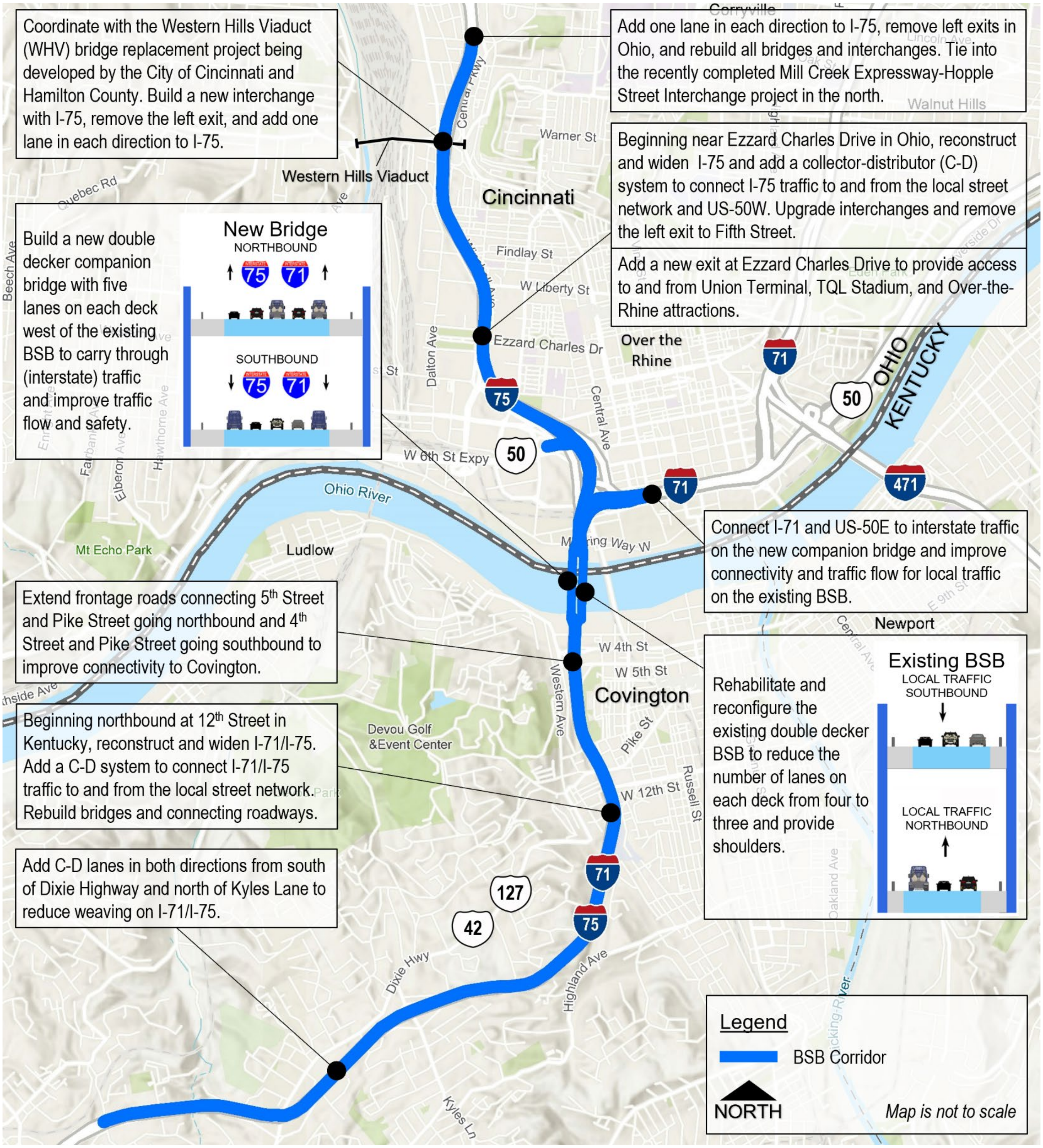
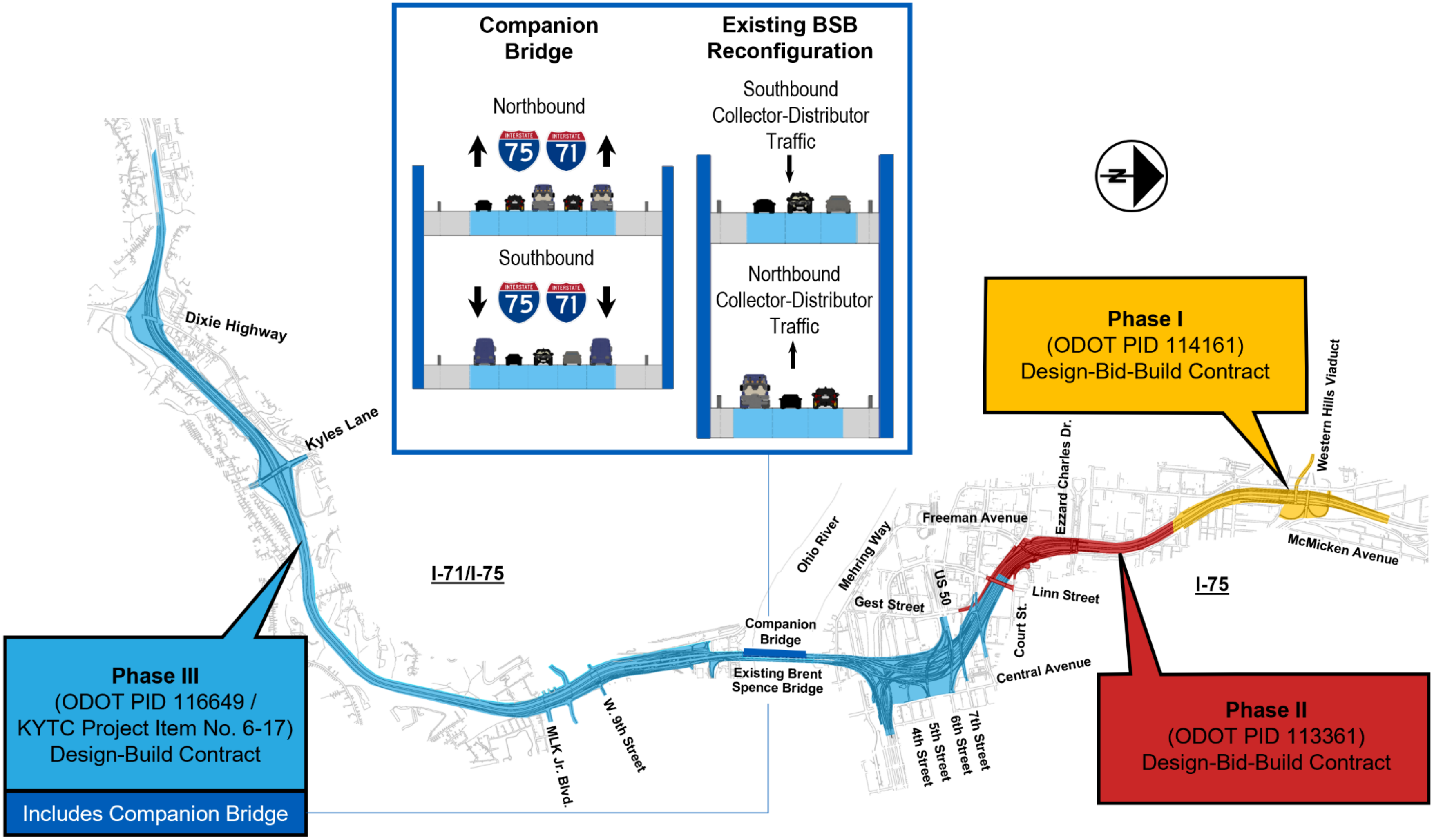


Figure 2: Brent Spence Bridge Corridor Project Phases



1.2 Project History

On October 14, 2004, The Kentucky Transportation Cabinet (KYTC) and the Ohio Department of Transportation (ODOT) recognized the need to improve the BSB corridor and formally entered into an agreement to jointly develop and deliver a project to replace the existing BSB. That agreement has been updated and modified five times from 2004 to present, including a supplement dated December 12, 2012 that established a Bi-State Management Team to focus on procurement, financing, and project communications.

KYTC and ODOT developed a range of alternatives for improving the BSB corridor. Through a series of preliminary engineering and planning studies coupled with extensive public outreach and stakeholder involvement, KYTC and ODOT narrowed the range of alternatives to two feasible alternatives, which were evaluated in an EA. In August 2012, the Federal Highway Administration (FHWA) issued a Finding of No Significant Impact (FONSI) identifying Alternative I as the selected alternative for the BSB Corridor Project. Reevaluations of the EA/FONSI subsequently completed in 2015 and 2018 concluded that the 2012 FONSI remained valid.

Since 2012, KYTC and ODOT have conducted a Value Engineering Workshop (October 2012), a Performance-Based Design Workshop (December 2019), and other studies and activities to identify and evaluate measures to improve the design and constructability and to reduce the cost of the project. Further improvements and cost saving measures were identified as Phases I and II of the project progressed through detailed design development (see Figure 2). These combined efforts culminated in a set of refinements to Selected Alternative I, which have been designated Refined Alternative I (Concept I-W), referred to hereinafter as Concept I-W.

KYTC and ODOT are preparing a supplemental EA for Concept I-W. As part of that effort, KYTC and ODOT are updating resource-specific studies to reflect any changes in regulatory or site conditions that have occurred since approval of the FONSI in 2012. This report is one component of those efforts.

1.3 Previous MSAT Evaluation

An *Air Quality Technical Report: Mobile Source Air Toxics* (November 2010) was prepared to support the development of the 2012 EA/FONSI. The 2010 report utilized the U.S. Environmental Protection Agency's (USEPA's) MOBILE6.2 model to analyze the no-build and build conditions for the design year (2035). Seven priority MSAT compounds were analyzed, including acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter. The 2010 analysis concluded that all MSAT levels for the build (2035) condition were predicted to decrease when compared to the no-build (2035) condition, with the exception of formaldehyde, which was predicted to increase by 0.8 percent. As this increase was less than one percent, it was not considered to be significant.

KYTC and ODOT compared the traffic volumes in the 2010 MSAT report to year 2050 certified traffic projections for Concept I-W and concluded a quantitative MSAT emissions analysis was appropriate because projected traffic exceeded the threshold for a quantitative MSAT analysis, and new FHWA guidance and modeling tools had been issued since the completion of the 2010 MSAT report. As a result, this quantitative MSAT emissions analysis was prepared using the travel demand models for the project's approved certified traffic and in accordance with the most current FHWA guidance.

1.4 Purpose and Need

The purpose and need for the BSB Corridor Project is to:

- Improve traffic flow and level of service;
- Improve safety;
- Correct geometric deficiencies; and
- Maintain connections to key regional and national transportation corridors.

2. MSAT QUANTITATIVE ANALYSIS

This MSAT quantitative analysis for the BSB Corridor Project has been conducted in accordance with FHWA's *Updated Interim Guidance on Mobile Source Air Toxic (MSAT) Analysis in National Environmental Policy Act (NEPA) Documents (January 2023).*[1] The FHWA developed a tiered approach with three categories for analyzing MSAT in NEPA documents, depending on specific project circumstances:

- Projects with no meaningful potential MSAT effects, or exempt projects;
- Projects with low potential MSAT effects; or
- Projects with higher potential MSAT effects.

To be categorized as a project with higher potential MSAT effects, a project should:

- Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location, involving a significant number of diesel vehicles for new projects or accommodating with a significant increase in the number of diesel vehicles for expansion projects; or
- Create new capacity or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the average annual daily traffic (AADT) is projected to be in the range of 140,000 to 150,000 or greater by the design year; and also
- Be proposed to be located in proximity to populated areas.

[1] https://www.fhwa.dot.gov/environMent/air_quality/air_toxics/policy_and_guidance/msat/

The BSB Corridor Project will add new capacity to I-71/I-75, and the highest design year (2050) AADT along the project corridor is estimated to be more than 200,000 vehicles per day. In addition, the entire project corridor passes through populated areas. Based on the criteria defined in the FHWA guidance, the BSB Corridor Project is categorized as a project with higher potential MSAT effects.

2.1 Background

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments of 1990, whereby Congress mandated that the USEPA regulate 188 air toxics, also known as hazardous air pollutants. USEPA assessed this expansive list in its rule on the Control of Hazardous Air Pollutants from Mobile Sources[1] and identified a group of 93 compounds emitted from mobile sources that are part of USEPA's Integrated Risk Information System (IRIS).[2] In addition, USEPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the 2011 National Air Toxics Assessment (NATA).[3] These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter (POM). While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future USEPA rules.

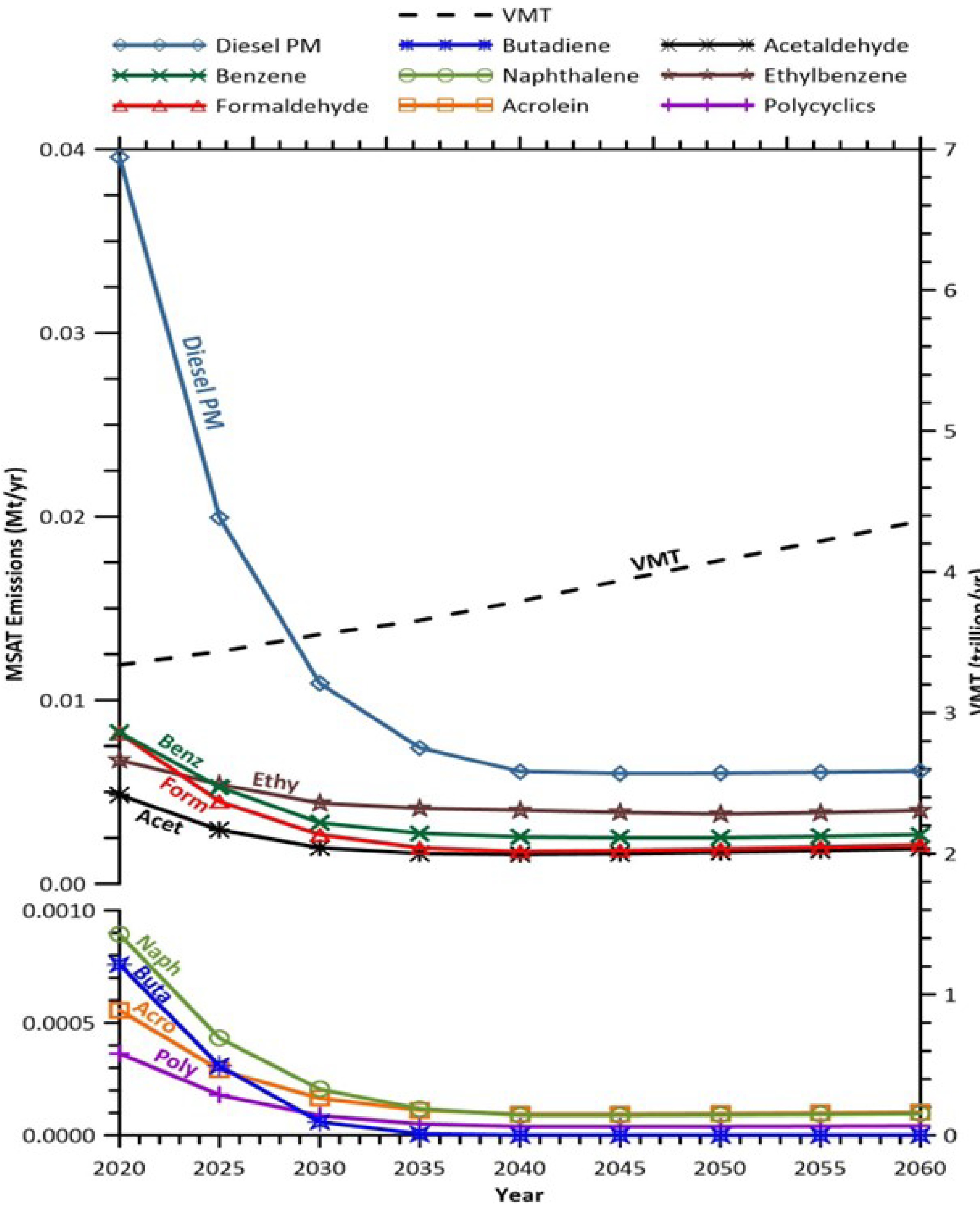
2.2 Motor Vehicle Emissions Simulator (MOVES)

MOtor Vehicle Emission Simulator (MOVES) is a state-of-the-science emission modeling system from EPA that estimates emissions for mobile sources for criteria air pollutants, greenhouse gases, and air toxics. MOVES3 is the latest available version of MOVES and includes new data for emissions, fleet, and activity; new emissions standards, and new functional improvements and features than the earlier version. These new emissions data are for light- and heavy-duty vehicles, exhaust and evaporative emissions, and fuel effects. MOVES3 also adds updated vehicle sales, population, age distribution, and vehicle miles travelled (VMT) data. In November 2020, the USEPA issued MOVES3 Mobile Source Emissions Model Questions and Answers.[4] USEPA states that for on-road emissions, MOVES3 updated heavy-duty diesel and compressed natural gas emissions running rates and updated heavy-duty gasoline emission rates. MOVES3 also updated light-duty emission rates for hydrocarbon, carbon monoxide and nitrogen oxide and updated light-duty particulate matter rates, incorporating new data on gasoline direct injection vehicles.

Using USEPA's MOVES3 model, as shown in Figure 3, FHWA estimates that even if VMT increases by 31 percent from 2020 to 2060 as forecast, a combined reduction of 76 percent in the total annual emissions for the priority MSAT is projected for the same time period.

1 Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007
2 https://www.epa.gov/iris
3 https://www.epa.gov/national-air-toxics-assessment
4 https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1010M06.pdf

Figure 3: **FHWA Projected National MSAT Emission Trends 2020-2060 for Vehicles Operating on Roadways**



Note: Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors.

Source: EPA MOVES3 model runs conducted by FHWA, March 2021.

Diesel PM is the dominant component of MSAT emissions, making up 36 to 56 percent of all priority MSAT pollutants by mass, depending on calendar year. MOVES3 is based on updated data on some emissions and pollutant processes compared to MOVES2014 and also reflects the latest federal emissions standards in place at the time of its release. In addition, MOVES3 emissions forecasts are based on slightly higher VMT projections than MOVES2014, consistent with nationwide VMT trends.

2.3 MSAT Research

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA.

Nonetheless, air toxics concerns continue to arise on highway projects during the NEPA process. Even as the science emerges, the public and other agencies expect FHWA to address MSAT impacts in its environmental documents. The FHWA, USEPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential health risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field.

2.4 BSB Corridor Project Quantitative MSAT Analysis

A quantitative MSAT analysis for the BSB Corridor Project was conducted consistent with the latest guidance developed by the FHWA. These include FHWA's *Updated Interim Guidance on Mobile Source Air Toxic (MSAT) Analysis in National Environmental Policy Act (NEPA) Documents (January 2023)* and the supporting document titled *Frequently Asked Questions (FAQs): FHWA Recommendations for Conducting Quantitative Mobile Source Air Toxics (MSAT) Analysis for FHWA NEPA Documents (January 2023).*[1]

2.4.1 Analysis Scenarios

For this project, three study scenarios were selected for the modeling analysis using USEPA's latest MOVES3.1: 2020 Existing, 2050 No-Build, and 2050 Build.

The 2020 Existing, 2050 No-Build, and 2050 Build traffic forecasts were developed using the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) travel demand model of record. In addition to this quantitative MSAT analysis, the OKI travel demand model of record was used to develop the certified traffic projections that will be utilized in the preparation of noise analyses, an Interchange Modification Study, and other studies for the project.

1 https://www.fhwa.dot.gov/environMent/air_quality/air_toxics/policy_and_guidance/msat/fhwa_nepa_msat_faq_moves3_.pdf

2.4.2 Affected Network

The first step in the quantitative MSAT analysis was to identify the affected transportation network to capture the anticipated changes in MSAT emissions as a direct result of a proposed project. FHWA recommends analyzing all segments associated with the project, plus those segments expecting meaningful changes in emissions due to the project (e.g., ± 10 percent or more).

The affected network for the quantitative MSAT analysis includes all the links associated with the project. Segment links from the travel demand model that meet one or more of the following metrics were also considered[1]:

- ± 5 percent or more change in annual average daily traffic (AADT) on congested highway links of level of service (LOS) D or worse;
- ± 10 percent or more change in AADT on uncongested highway links of LOS C or better; and/or
- ± 10 percent or more change in travel time.

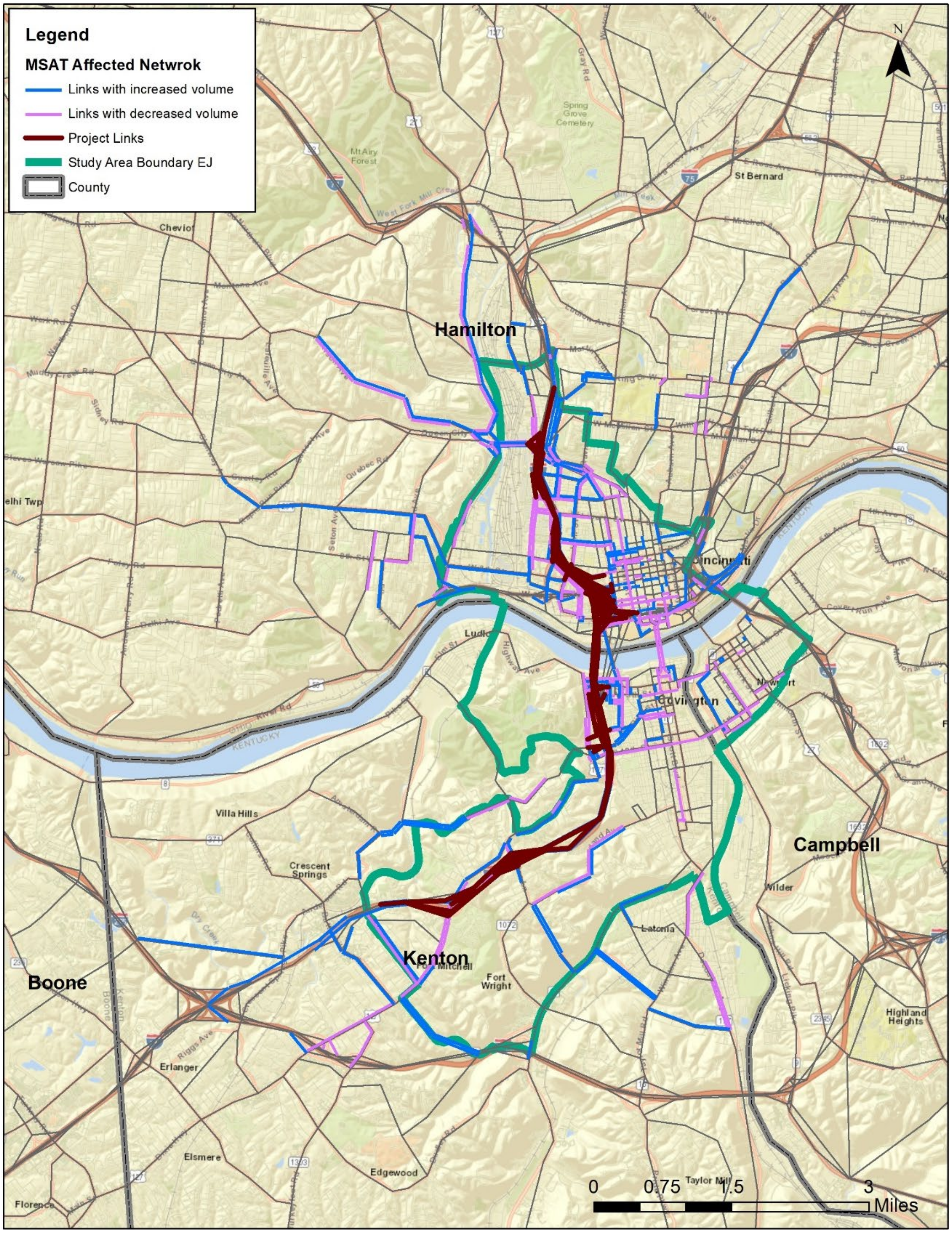
Additional project-specific considerations included retaining only those segments with an AADT of at least 200 vehicles and excluding segments far removed from the project. For the latter, an influence area for the quantitative MSAT analysis considered the following:

- The project construction limits;
- The traffic operational study area for the Interchange Modification Study;
- The study area utilized for the project's environmental justice and socioeconomic analyses; and
- Corridors with logical connection to the project and contiguousness of the network.

The final affected network for this quantitative MSAT analysis is shown in Figure 4.

[1] FHWA's guidance also includes consideration of ±10 percent or more in intersection delay. Intersection delay is not readily extractable from the travel demand model that was used to identify the affected network. Therefore, the segment-based metrics from FHWA's illustrative criteria were used.

Figure 4: Affected Network for MSAT Analysis



2.4.3 Analysis Inputs

Table 1 and Table 2 illustrate the MOVES inputs for the Runspec and for the county data manager, respectively.

Table 1: MOVES Inputs for Runspec

MOVES Input Section	Modeled Parameters	Description
Description	--	Varies by scenario
Scale	Model	Onroad
	Domain/Scale	County
	Calculation Type	Inventory
Time Spans	Time Aggregation Level	Hour
	Years	2020, 2050
	Days	Weekday and Weekend
	Months	All 12 months
	Start Hour	0:00 - 0:59
	End Hour	23:00 - 23:59
Geographic Bounds	Region	County - Campbell, Hamilton, and Kenton
	Domain Input Database Server and Database	Varies by Scenario
Vehicles/Equipment-On Road Vehicle Equipment	Selections	All permissible source use types with Compressed Natural Gas, Diesel Fuel, Ethanol and Gasoline
Road Type	Selected Road Types	• Urban Restricted Access • Urban Unrestricted Access
Pollutants and Processes	Pollutants	• Total Gaseous Hydrocarbons (chained to other pollutants) • Non-Methane Hydrocarbons (chained to other pollutants) • Volatile Organic Compounds (chained to other pollutants) • Primary Exhaust PM_{10} Total • Primary $PM_{2.5}$ Organic Carbon (chained to other pollutants) • Primary $PM_{2.5}$ Elemental Carbon (chained to other pollutants) • Primary $PM_{2.5}$ Sulfate Particulate (chained to other pollutants) • Primary $PM_{2.5}$ Organic Carbon (chained to other pollutants) • Total Energy Consumption (chained to other pollutants)

MOVES Input Section	Modeled Parameters		Description
Table 1 (cont.)			

Pollutants and Processes (cont.)	Pollutants (cont.)		• Benzene
			• 1,3-Butadiene
			• Formaldehyde
			• Acetaldehyde
			• Acrolein
			• Polycyclic Aromatic Hydrocarbons (PAH)
			  ○ Acenaphthene particle, gas
			  ○ Acenaphthylene particle, gas
			  ○ Anthracene particle, gas
			  ○ Benz(a)anthracene particle, gas
			  ○ Benzo(a)pyrene particle, gas
			  ○ Benzo(b)fluoranthene particle, gas
			  ○ Benzo(g,h,i)perylene particle, gas
			  ○ Benzo(k)fluoranthene particle, gas
			  ○ Chrysene particle, gas
			  ○ Dibenzo(a,h)anthracene particle, gas
			  ○ Fluoranthene particle, gas
			  ○ Fluorene particle, gas
			  ○ Indeno(1,2,3,c,d)pyrene particle, gas
			  ○ Napthalene particle, gas
			  ○ Phenanthrene particle, gas
			  ○ Pyrene particle, gas

	Processes		Running Exhaust, Crankcase Running Exhaust, Evaporation Permeation, and Evaporation Fuel Leaks
Output-General Outputs	Units	Mass Units	Grams
		Energy Units	Joules
		Distance Units	Miles
	Activity		• Distance Travelled • Population
Output - Output Emissions Detail	Time		Hour
	Geographic		County
	For All Vehicle/Equipment Categories		• Fuel Type • Emission Process
	On Road		• Road Type • Source Use Type

Table 2: MOVES County Data Manager Inputs

Data Tab	Data Source Input Table	Scope of Data	Source
Source Type Population	SourceTypeYear	Number of vehicles by 13 different source types for each modeled year.	OKI MPO, TDM
Vehicle Type VMT	HPMSTypeYear	Annual VMT in the affected network by the 6 HPMS (Highway Performance Monitoring System) vehicle types	TDM
	monthVMTFraction	Proportion of VMT per month for each of the 13 MOVES source types	OKI MPO
	dayVMTFraction	Proportion of VMT occurring over the course of days of the week for each of the 13 MOVES source types and for each month modeled and each road type	OKI MPO
	hourVMTFraction	Proportion of VMT occurring in each hour modeled for each of the 13 MOVES source types, road types and day	TDM
I/M Programs	IMCoverage (for Hamilton County, no IM program in other counties)	Inspection and maintenance program data for different fuel type vehicles and for each year	OKI MPO
Fuel	Avft	Fraction of engine types by different source types	OKI MPO
	FuelSupply	Market share and available fuel formulations	OKI MPO
	FuelFormulation	Properties of the available fuels	OKI MPO
	FuelUsageFraction	Fuel Type usage by vehicle source type and model year	OKI MPO
Meteorology	ZoneMonthHour	Meteorology data for each month and hour of the day modeled	OKI MPO
Road Type Distribution	RoadTypeDistribution	Fraction of VMT by the 13 MOVES source types and 2 Road types	TDM
Age Distribution	sourceTypeAgeDistribution	Fraction of vehicles by age for each vehicle type	OKI MPO
Average Speed Distribution	avgSpeedDistribution	Fraction of traffic within several speed bins by vehicle and road type for each hour of the modeled period	TDM

2.5 MSAT Assessment Results

Annual MSAT emissions for the 2020 Existing, 2050 No-Build, and 2050 Build scenarios were calculated based on the inputs summarized in Table 1 and Table 2. The results were compared to determine the overall trend in emissions over time and to understand how the project will impact the overall emission levels within the affected transportation network. As shown in Table 3, all MSAT emissions are projected to decrease when the 2050 No-Build and Build scenarios are compared to the 2020 Existing scenario. All MSAT emissions except POM are projected to decrease when the Build 2050 scenario is compared to the No-Build scenario. POM is anticipated to increase by 0.5 percent; however, POM is anticipated to decrease from the 2020 Existing scenario to both 2050 No-Build and Build scenarios by 85.3 percent. Since the future scenarios are anticipated to have significant decrease in emission from the existing scenario, the minor emission increase from the 2050 No-Build to 2050 Build scenario is not considered to be significant.1,3-Butadiene are projected to decrease to zero emission in the future 2050 Build and No-Build scenario. Running emissions of this air toxic are projected to be zero after ~2030 due to EPA vehicle regulations. However, there are still 1,3 Butadiene emissions produced from other mobile source processes (mainly evaporative) that are not included in a project MSAT analysis. The remaining seven pollutants are projected to decrease between 0.4 and 6.2 percent from the 2050 No-Build to the 2050 Build scenario.

The total MSAT emissions are projected to decrease by 81.6 and 82.1 percent with a corresponding VMT increase of 18.3 and 20.3 percent, respectively, when the 2050 No-Build and 2050 Build scenarios are compared to the 2020 Existing scenario. The total MSAT emissions are projected to decrease by 3.0 percent with a corresponding VMT increase of 1.7 percent when the 2050 Build scenario is compared to the 2050 No-Build scenario. The reductions that are projected to occur when the 2050 No-Build and 2050 Build scenarios are compared to the 2020 Existing scenario are primarily due to USEPA's motor vehicle and fuel control program. The reduced emission in 2050 Build scenario from the 2050 No-Build scenario may result from the reduced congestion and higher average speeds with the project in future Build scenario. Given the above, the project is not anticipated to have an appreciable impact on MSAT emissions.

Table 3: Annual MSAT Emissions and VMT

MSAT/ VMT	Scenario			Difference (%)		
	2020 Existing	2050 No-Build	2050 Build	2020 Existing to 2050 No-Build	2020 Existing to 2050 Build	2050 Build to 2050 No-Build
Benzene (Mt/year)[1]	1.34277	0.58260	0.58007	-56.6%	-56.8%	-0.4%
1,3-Butadiene (Mt/year)	0.10753	0	0	-100.0%	-100.0%	N/A
Formaldehyde (Mt/year)	1.54706	0.33634	0.32175	-78.3%	-79.2%	-4.3%
Acrolein (Mt/year)	0.10491	0.01466	0.01413	-86.0%	-86.5%	-3.6%
Naphthalene (Mt/year)	0.17288	0.02568	0.02553	-85.1%	-85.2%	-0.6%
POM (Mt/year)	0.07440	0.01092	0.01097	-85.3%	-85.3%	0.5%
Ethyl Benzene (Mt/year)	0.73284	0.32004	0.31383	-56.3%	-57.2%	-1.9%
Acetaldehyde (Mt/year)	0.81662	0.23937	0.22456	-70.7%	-72.5%	-6.2%
Diesel PM (Mt/year)	6.41730	0.55472	0.53174	-91.4%	-91.7%	-4.1%
Total MSATs (Mt/year)	11.31631	2.08432	2.02258	-81.6%	-82.1%	-3.0%
VMT (million miles)	611.11	723.12	735.41	18.3%	20.3%	1.7%

1. Mt-metric tons

Note that results presented in Table 3 represent the expected MSAT emissions for the entire corridor and do not represent emissions for any one point along the corridor. While MSAT emissions for the 2050 Build scenario are expected to decrease when compared to the 2020 Existing and 2050 No-Build scenarios, it is possible that some localized areas may experience an increase in emissions and ambient levels of these pollutants due to locally increased traffic levels associated with the project. This air quality assessment has provided a quantitative analysis of MSAT emissions relative to the proposed project. However, available technical tools do not enable prediction of the project-specific health impacts of the emission changes. Because of these limitations, the following discussion is included in accordance with the President's Council on Environmental Quality regulations regarding incomplete or unavailable information.[1]

Incomplete Or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed highway project. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

USEPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. USEPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects,"[2] Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix D of FHWA's *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*. Among the adverse health effects linked to MSAT compounds at high exposures are: cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI Special Report 16) or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science

[1] 40 CFR, Section 1502.21
[2] USEPA, https://www.epa.gov/iris

that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (Special Report 16). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The USEPA states that with respect to diesel engine exhaust, "[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk."[1]).

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by USEPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires USEPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld USEPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable[2]).

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

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1 USEPA IRIS database, Diesel Engine Exhaust, Section II.C. https://iris.epa.gov/static/pdfs/0642_summary.pdf
2 https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/$file/07-1053-1120274.pdf

3. CONCLUSION

The purpose of this report is to quantitatively evaluate the impact of MSAT pollutants throughout the affected transportation network associated with the BSB Corridor Project. The understanding of mobile source air toxics is an area of continued study. Nine pollutants were analyzed for the following scenarios: 2020 Existing, 2050 No-Build, and 2050 Build. When compared to the 2020 Existing scenario, emissions of all MSAT pollutants are projected to be substantially lower for the 2050 No-Build and the 2050 Build scenarios. When compared to the 2050 No-Build scenario, emissions of all MSAT pollutants were projected to decrease across the affected network for the 2050 Build scenario with the exception of POM. POM shows a significant reduction of over 80 percent when compared to the 2020 Existing scenario and is only anticipated to increase by 0.5 percent when the 2050 Build scenario is compared to the 2050 No-Build scenario. Therefore, the minimal increase in POM for the 2050 Build scenario is not considered to be significant. USEPA's vehicle and fuel regulations are expected to result in substantially lower MSAT levels in the future than exist today due to cleaner engine standards coupled with fleet turnover. The magnitude of the USEPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the BSB Corridor Project area will be substantially lower in the future than they are today. The decrease in emission in 2050 Build scenario from the 2050 No-Build scenario can be a result from the improved traffic flow and higher average speeds with the project in Build scenario. Given the above, the project is not anticipated to have an appreciable impact on MSAT emissions.