Appendix E: Air Quality Technical Report

for the

I-95 Access Improvements from Caton Avenue to Fort McHenry Tunnel – Environmental Assessment (EA)
Baltimore City, Maryland

Prepared for:

Maryland Transportation Authority

DEPARTMENT OF TRANSPORTATION
BALTIMORE CITY

and

U.S. Department of Transportation
Federal Highway Administration

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Executive Summary

This technical report for the *I-95 Access Improvements from Caton Avenue to the Fort McHenry Tunnel Environmental Assessment (EA)* presents the detailed analysis of air quality for the Recommended Preferred Alternative (Alternative 5). The purpose of the *Air Quality Technical Report* is to identify pollutants of concern, review applicable standards, summarize existing air quality in the study area, and analyze the project's potential impacts on air quality in the study area. The Recommended Preferred Alternative's impacts were evaluated against the No-Build Alternative for the Design Year 2040. The analysis determined that the Recommended Preferred Alternative would not cause or contribute to a violation of the Clean Air Act requirements and standards.

1 Introduction

The Maryland Transportation Authority (MDTA) and the City of Baltimore Department of Transportation (BCDOT), in coordination with the Federal Highway Administration (FHWA), are proposing to modify the access ramps connecting Interstate 95 (I-95) with the Port Covington peninsula in south Baltimore. These improvements are collectively known as the I-95 Access Improvements from Caton Avenue to the Fort McHenry Tunnel (I-95 Access Improvements). In addition to supporting the economic development and land use changes at Port Covington, the purpose of the proposed action is to address the increased transportation demand to Port Covington and increased traffic on I-95, the existing capacity and roadway geometry not being adequate to meet projected traffic demands, and the limited multi-modal connections around and across I-95 in the vicinity of Port Covington.

The Port Covington redevelopment project will transform 266 acres on the peninsula from under-utilized industrial brownfields into a mixed-use urban development. As proposed, this mixed-use development is said to be the largest urban redevelopment project currently underway in the United States. The developer has committed to using technology and other incentives to reduce reliance on automobile trips as a means of accessing the site. As currently planned, the Port Covington redevelopment will increase population density and employment on the peninsula, which will generate a demand for infrastructure improvements. The program is as follows:

- 1.3 million square feet of retail
- 4.3 million square feet of office space (including 3.9 million square feet for the Under Armour World Headquarters)
- Over 5,300 residential units, including rental and for-sale properties at various price-points
- 303,000 square feet of industrial/light manufacturing space
- 200+ hotel rooms
- Almost 10,000 square feet of civic and cultural uses, including 40+ acres of public parks, a public waterfront, and other public facilities
- Total development: 11.33 million square feet (in addition to 3.4 million square feet of parking)

The Port Covington peninsula is surrounded on three sides by the Middle Branch of the Patapsco River, with I-95 running on structure along the northern boundary. Transportation access to the peninsula is currently provided by east-west connections via ramps to/from I-95 and north-south connections via a principal arterial, Hanover Street, and a minor arterial, Key Highway. McComas Street is a minor arterial, generally running parallel to I-95 that provides direct access from the peninsula to these connections.

I-95 is part of the Interstate Highway System in the City of Baltimore, and is owned, operated and maintained by MDTA. BCDOT is responsible for other arterial and collector roadways in the project area. The FHWA has approval authority over any changes to access points on the Interstate Highway System. Approval of any proposed modification to Interstate access constitutes a federal action subject to review under the National Environmental Policy Act (NEPA).

To simplify a complex project, the ramps and streets providing the existing connectivity were classified as seven distinct elements shown in **Table 1.**

Table 1: Designation of Elements

Designation	Element	Locations
A	I-95 Northbound Off-Ramps	• I-95 NB to Hanover Street SB • I-95 NB to McComas Street
B	I-95 Northbound On-Ramps	• Key Highway to I-95 NB
C	I-95 Southbound Off-Ramps	• I-95 SB to Key Highway
D	I-95 Southbound On-Ramps	• McComas Street WB to I-95 SB • Hanover Street NB to I-95 SB
E	Hanover Street	• Between Wells and McComas Streets
F	McComas Street and Key Highway	
G	Pedestrian and Bicycle Connections	• Hanover Street • Key Highway • McComas Street • Shared-Use Path

There are two alternatives discussed herein: the No-Build Alternative and the Recommended Preferred Alternative.

No-Build Alternative

For NEPA purposes, the No-Build Alternative provides the basis against which the Recommended Preferred Alternative is compared. The No-Build Alternative assumes the approximately 14 million square feet of development at the Port Covington peninsula will occur without any improvements to the connectivity between south Baltimore, I-95, and the Port Covington peninsula. The No-Build Alternative will not change any of the characteristics of Elements A-G and will maintain the current access to the study area from northbound Exit 54 (Hanover Street) and southbound Exit (55) Key Highway.

Exit 54 (Hanover Street) is not a full interchange, so there are currently two I-95 northbound exits and two I-95 southbound entrances, but only a single I-95 northbound entrance and a single I-95 southbound exit. Specifically, this interchange does not have an I-95 southbound exit to Hanover Street, or an I-95 northbound entrance from Hanover Street. The lack of ramps at this interchange limits the amount of traffic that is able to access the Port Covington area to/from north of the Fort McHenry Tunnel.

On northbound I-95, Exit 55 (Key Highway) is a one-lane exit from northbound I-95 to eastbound McComas Street, which runs at grade adjacent to and below I-95 along the northern border of the Port Covington peninsula. As eastbound McComas Street is a one way street, the exit touches down and becomes the third, left-most lane on McComas Street. The Key Highway exit from I-95 southbound is a one lane exit to westbound McComas Street that intersects Key Highway underneath the I-95 viaduct.

Recommended Preferred Alternative

The following describes the Recommended Preferred Alternative (Alternative 5), as approved by MDTA and Baltimore City DOT.

Element A: I-95 Northbound Off-Ramps

- New Ramps
    - **Spur from Russell Street Ramp** – The existing auxiliary lane between the Caton Avenue on-ramp and the Russell Street off-ramp will be widened to two lanes. The Russell Street off-ramp will also be widened to two lanes until it overpasses MD 295, at which point the two lanes will split. One lane will continue along the existing ramp alignment to Russell Street NB. The other lane will continue east, over the Middle Branch, as a new ramp spur parallel to the existing ramps adjacent to I-95 NB, and merge with the new spur ramp from I-395 SB, connecting to McComas Street at an at-grade intersection on the western side of Port Covington.
    - **Spur from I-395 SB Ramp** – A new ramp spur, splitting off from the existing I-395 SB Ramp to I-95 NB where it overpasses I-95, is proposed. It will run southeast, merge with the new spur ramp from Russell Street, and connect to McComas Street at an at-grade intersection on the western side of Port Covington.
- **I-95 NB to Hanover Street SB Ramp** – The existing ramp will be removed. Vehicles traveling from I-395 SB to MD 2 SB will be accommodated by the new ramp spur from I-395 SB.
- **I-95 NB to McComas Street Ramp** – The existing ramp will remain in a similar location, but will be realigned to accommodate the new I-95 NB On-Ramp (Element B), modifications to McComas Street (Element F), and the removal of the existing Hanover Street ramp from I-95 NB. The realigned ramp will extend the existing auxiliary lane that terminates at the Hanover Street exit to a two lane exit gore located approximately 1,600 feet from the existing I-395 SB on-ramp gore. The new two-lane exit ramp will run under I-95 NB, braid through the existing piers, and daylight perpendicular to an at-grade signalized intersection with McComas Street near the existing intersection of McComas and Cromwell Streets.

Element B: I-95 Northbound On-Ramps

- **Key Highway to I-95 NB Ramp** – No modifications to the existing ramp are proposed.
- **McComas Street to I-95 NB Ramp** – A new ramp is proposed from McComas Street at a location approximately 700 feet east of its intersection with Hanover Street. The new ramp will braid with the realigned I-95 NB to McComas Street Ramp (Element A) and modifications to the realigned one-way section of McComas Street WB (Element F).

Element C: I-95 Southbound Off-Ramp

- **I-95 SB to Key Highway Ramp** – No modifications to the existing ramp are proposed.
- **I-95 SB to McComas Street WB Ramp** – A new ramp, with a gore located approximately 400 feet west of the Key Highway overpass is proposed. It will provide access to the one-way section of McComas Street WB located directly beneath I-95 SB. The new ramp will braid with the realigned McComas Street WB to I-95 SB Ramp (Element D). The improvements will require the relocation of two CSX storage tracks.

Element D: I-95 Southbound On-Ramps

- **McComas Street WB to I-95 SB** – The existing ramp will continue to provide access from the one-way section of McComas Street WB to I-95 SB, but will be realigned to minimize construction cost and duration. It will braid with the new ramp from I-95 SB to McComas Street WB (Element C).
- **Hanover Street NB to I-95 SB** – No modifications to the existing ramp are proposed.

Element E: Hanover Street

- **From Wells Street to McComas Street** – No modifications to this section of Hanover Street are proposed.

Element F: McComas Street & Key Highway

- **McComas Street west of Key Highway** – The existing two-way section of McComas Street and the one-way section of McComas Street EB will be converted to a two-way boulevard from the western side of the Port Covington peninsula to Key Highway. The boulevard will accommodate vehicular and multi-modal connections between South Baltimore, I-95, and the Port Covington development. The median will be designed to accommodate a future light rail spur from Westport anticipated to terminate prior to the existing intersection of McComas and Cromwell Streets. The existing one-way section of McComas Street WB beneath I-95 SB will remain in its current location, but will be modified to accommodate the addition of an exclusive right-turn lane at the approach to the Key Highway intersection, the addition of the I-95 SB to McComas Street WB ramp (Element C), and the tie-in to the proposed two-way McComas Street boulevard.

- **Key Highway** – The existing roadway will be widened from a 4-lane section (2 NB & 2 SB) to a 5-lane section (3 NB & 2 SB) between the McHenry Row and McComas Street intersections Additionally, a 450' long southbound right-turn lane will be added at the McComas Street intersection. The CSX bridge over Key Highway, just north of the McComas Street intersection, will be reconstructed to accommodate the new width of Key Highway.

Element G: Pedestrians and Bicycles

- **Hanover Street** – The existing sidewalks on Hanover Street will remain unchanged on the bridge over the CSX tracks. South of the bridge over the CSX tracks, a new sidewalk is proposed along the west side of Hanover Street, running south to the McComas Street intersection.

- **Key Highway** – An 11-foot wide shared-use path will be provided on the east side of Key Highway between the intersections of McHenry Row and McComas Street.

- **McComas Street** – Sidewalks will be installed along both sides of the McComas Street. Likewise, a shared-use path will be installed along the north side of McComas Street between the Cromwell Street and Key Highway intersections.

- **New Shared-Use Bridge/Path** – A new shared-use path, linking South Baltimore to Port Covington will be constructed. The path will run parallel to the south side of Winder Street, ramping up from the Light Street intersection. A stair case will connect to the path from the Charles Street intersection. At the Charles Street intersection, the ramp will turn south, bridge over the CSX tracks and under I-95, then turn east to connect to the shared-use path proposed along the north side of McComas Street.

2 Air Quality Regulatory Framework

2.1 Overview

Air pollution is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants can cause acute respiratory illnesses, contribute to the development of chronic ailments, reduce visibility, and inhibit the growth and resilience of crops. Air pollutants are regulated by the Clean Air Act (CAA) to protect the public and environmental well-being. The purpose of this analysis is to determine whether the Recommended Preferred Alternative would cause or contribute to a violation of the CAA requirements and standards.

2.2 Clean Air Act

The CAA is the overarching statute regulating air quality in the United States. The CAA requires the United States Environmental Protection Agency (USEPA) to set standards for air pollutants, and approve state plans and enforce deadlines for reducing air pollution, among many other responsibilities. The CAA Amendments of 1990 and the Final Transportation Conformity Rule [40 CFR Parts 51 and 93] direct USEPA to implement environmental policies and regulations that ensure acceptable levels of air quality.

2.3 National Ambient Air Quality Standards

As required by the CAA, USEPA sets NAAQS for airborne pollutants that have adverse impacts on human health and the environment. The NAAQS are a set of baseline standards over which state governments can choose to impose stricter standards.

USEPA has established NAAQS for six pollutants, which are commonly known as “criteria pollutants”: ozone, carbon monoxide (CO), particulate matter ($\mathrm{PM}_{2.5}$ and PM_{10}), nitrogen dioxide, sulfur dioxide, and lead. Within the NAAQS are primary and secondary standards. The primary standards serve to protect sensitive members of the human population, such as asthmatics, children, and the elderly. Secondary standards protect the general environment, including animals, crops, vegetation, and buildings. The NAAQS as of June 2017 are summarized in **Table 2**.

Table 2: National Ambient Air Quality Standards

National Ambient Air Quality Standards Criteria Pollutant	Primary / Secondary	Averaging Period	Concentration	Form
Carbon Monoxide (CO)	Primary	1-hour	35 ppm	*Not to be exceeded more than once per year*
		8-hour	9 ppm	
Lead (Pb)	Primary and Secondary	Rolling 3 Month Average	0.15 μg/m^3 (1)	*Not to be exceeded*
Nitrogen Dioxide (NO_2)	Primary	1-hour	188 μg/m^3	*98th percentile of 1-hour daily maximum concentrations, averaged over 3 years*
	Primary and Secondary	Annual	100 μg/m^3 (2)	*Annual Mean*
Ozone (O_3)	Primary and Secondary	8-hour	0.070 ppm (3)	*Annual fourth highest daily maximum 8-hour concentration, averaged over 3 years*
Particulates ($PM_{2.5}$)	Primary	Annual	12 μg/m^3	*Annual mean, averaged over 3 years*
	Secondary	Annual	15 μg/m^3	*Annual mean, averaged over 3 years*
	Primary and Secondary	24-hour	35 μg/m^3	*98th percentile, averaged over 3 years*
Particulates (PM_{10})	Primary and Secondary	24-hour	150 μg/m^3	*Not to be exceeded more than once per year on average over 3 years*
Sulfur Dioxide (SO_2)	Primary	1-hour	75 ppb (4)	*99th percentile of 1-hour daily maximum concentrations, averaged over 3 years*
	Secondary	3-hour	0.5 ppm	*Not to be exceeded more than once per year*

(1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 μg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
(2) The official level of the annual NO_2 standard is 100 μg/m^3.
(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.
(4) The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)), A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the require NAAQS.

Source: U.S. Environmental Protection Agency 2017

USEPA is required to publish a list of all geographic areas in compliance with the NAAQS. Attainment status is determined on a pollutant by pollutant basis. Areas that routinely exceed a NAAQS for a particular pollutant are designated as "nonattainment areas." Areas which have succeeded in improving from "nonattainment" to "attainment" are called "maintenance areas." **Table 3** provides the definition for each attainment classification.

Table 3: Attainment Classifications and Definitions

Attainment	Nonattainment	Maintenance	Unclassified
Area is in compliance with the NAAQS.	Area is not in compliance with the NAAQS.	Area previously identified as nonattainment, but has since demonstrated compliance with the NAAQS.	Insufficient data is available for determination, so area is treated as in compliance.

When a region is designated a nonattainment, it must develop a plan for meeting the appropriate standard. The Plan, called the State Implementation Plan (SIP), is submitted to USEPA for approval. Similarly, after meeting the standard, the region must develop a Maintenance SIP to demonstrate that it will continue to meet the criteria. Transportation programs and plans must be evaluated for "conformity" to the applicable SIP provisions before projects can receive Federal funding. A Transportation Improvement Program (TIP) generally presents projects anticipated over the next several years while a Long Range Plan (LRP) covers a longer period. A Metropolitan Planning Organization (MPO) is designated to develop the TIP and LRP for a region, and to document their conformity with SIP provisions.

2.4 Criteria Pollutants

As shown in **Table 2**, pollutants that have established NAAQS are referred to as criteria pollutants. The criteria pollutants are ozone, carbon monoxide, particulate matter ($PM_{2.5}$ and PM_{10}), nitrogen dioxide, sulfur dioxide, and lead. Effects on human health and the general environment, as well as how they disperse and are deposited in the atmosphere, vary from pollutant to pollutant. A description of each criteria pollutant is provided below.

Nitrogen Dioxide and Ozone

Nitrogen dioxide (NO_2) is a brown colored gas that irritates the lungs. It is one of a class of highly reactive combinations of nitrogen and oxygen, known as nitrogen oxides, or NO_X. NO_2 is formed from the burning of fossil fuels, such as natural gas. Primary sources include on and off road vehicles as well as power generating plants. NO_2 and O_3 are linked in that the production of NO_2 is a precursor to the formation of O_3. It is considered a highly reactive gas that is also linked to the production of acid rain. Since the chemical reactions that form O_3 occur slowly, the effects of the pollutants involved are usually analyzed on a regional level.

NO_X is a precursor molecule to the secondary formation of both ozone and $PM_{2.5}$ pollution. NO_X in the air damages the leaves of plants, inhibiting photosynthesis and decreasing growth. NO_X can acidify and over-fertilize sensitive ecosystems when deposited on land and in estuaries, lakes, and streams. This results in a range of harmful deposition-related effects on the environment, including damage to water quality, soils, fish, and wildlife.

Ozone is a colorless toxic gas. Its effects on human health vary depending on its location in the atmosphere. Ozone can be found in two locations: the protective ozone layer in the stratosphere and at ground level. Both types of ozone have the same chemical composition (O_3). USEPA uses the slogan "Good up High, Bad Nearby" to differentiate the effects ozone has on human health.

Carbon Monoxide

Carbon Monoxide (CO) is a colorless gas that harms the human body by reducing the oxygen-carrying capacity of the blood to vital organs such as the brain, heart, and other tissues. People with several types of existing heart conditions and heart disease are most at risk for developing adverse symptoms in response to CO exposure, including chest pain and decreased oxygen to the heart. Short-term CO exposure amplifies their bodies' compromised ability to respond to the increased oxygen demands of exercise or exertion. At high levels, CO can cause asphyxiation and death.

CO is emitted directly from engines due to the incomplete combustion of fuel. Motor vehicles emit the highest amounts of CO when they are at low speeds or idling, which is exhibited at congested intersections.

Particulate Matter

Particulate matter is composed of solid or liquid droplets of various substances that are small enough to remain suspended in the air. Particulates often consist of smoke, soot, dust, salts, acids, and metals, some of which can be highly toxic to humans. They are emitted through both on-road and off-road sources.

There are two main classifications of particulate matter that are of concern to human health: fine and coarse. Fine particulate matter ($PM_{2.5}$) consists of particles with a diameter of less than 2.5 microns, while coarse particulate matter (PM_{10}) consists of particles with a diameter between 2.5 and 10 microns.

PM_{10} is often associated with fugitive dust, wind erosion, and agricultural sources. Particles of this size can be inhaled and affect the upper respiratory system. The main contributors of $PM_{2.5}$ are motor vehicles and power generation processes. The fuel combustion process in an internal combustion engine releases hydrocarbons in the form of VOC which react to form particulate matter in the atmosphere. SO_2 and NO_X also contribute to the secondary formation of $PM_{2.5}$. $PM_{2.5}$ is generally regarded as a greater health concern because it is small enough to bypass the upper respiratory system and travel deep into the lungs where it may damage tissue. Once in the lungs, particulate matter can cause a variety of ailments. Exposure can cause increased respiratory distress, decreased lung function, development of chronic bronchitis, nonfatal heart attacks, and premature death in people with heart or lung disease. $PM_{2.5}$ is partially responsible for decreased visibility in congested urban areas. Suspended particulates carried by wind may cause environmental damage far from the source.

Sulfur dioxide

Sulfur dioxide (SO_2) is in a class of highly reactive combinations of sulfur and oxygen called sulfur oxides, or SO_X. They are regulated closely with NO_X, as they are both highly reactive and harm human health and the environment. SO_X are emitted mainly at stationary power generation sources, such as coal-fueled power plants. Deposition related effects of SO_X include the acidification of rivers, lakes, and streams.

Lead

Lead is a metal found naturally in the environment as well as in manufactured products. Exposure to lead at early stages in life has been linked to effects on learning, memory, and behavior. USEPA promulgated a Final Rule in the 1990s to ban leaded gasoline. This has resulted in a 95% decrease in lead emissions from the transportation sector between 1980 and 1999. While mobile source lead has been drastically reduced, there are still areas which are of primary concern for lead pollution. Major sources of lead today can be found in areas near lead smelters, ore and metals processing plants, utility plants, and lead-acid battery manufacturers, and in piston-engine aircraft operating on leaded aviation gasoline.

2.5 Transportation Conformity

Transportation conformity is a process mandated by USEPA and US Department of Transportation (DOT) and required by the CAA section 176(c) (42 U.S.C. 7506 (c)) to ensure that federally-supported highway and transit projects are consistent with the state's air quality goals. The CAA and Final Transportation Conformity Rule affect proposed transportation projects in the following way, according to Title I, Section 176 (c) 2:

"No federal agency may approve, accept, or fund any transportation plan, program, or project unless such plan, program, or project has been found to conform to any applicable State Implementation Plan in effect under this act."

According to Section 176 (c) 2 (A) of the CAA, conformity to an implementation plan means eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards, and ensuring that such activities will not:

- Cause or contribute to any new violation of any NAAQS in any area:
- Increase the frequency or severity of any existing violation of any NAAQS in any area: or
- Delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in any area.

2.5.1 Regional Transportation Conformity

The Baltimore region has been designated by USEPA as not attaining both the 1997 and the 2008 8-hour ozone NAAQS. On April 15, 2004, USEPA designated the Baltimore region as nonattainment for the 1997 8-hour ozone standard which became effective on June 15, 2004. On June 12, 2007, the Maryland Department of the Environment (MDE) submitted the Baltimore Nonattainment Area 8-hour Ozone SIP to USEPA. On January 15, 2009, USEPA sent a letter to MDE stating that USEPA finds the budgets in the 2008 Reasonable Further Progress Plan (for the 1997 standard) submittal for the Baltimore 8-hour nonattainment area adequate for transportation conformity purposes. The Federal Register notice was published on March 27, 2009. On February 1, 2012, USEPA determined that the Baltimore region did not attain the 1997 8-hour ozone standard by the June 15, 2011 attainment date. As a result, the region was reclassified as "serious" nonattainment for the 1997 8-hour ozone NAAQS. On July 20, 2012, a final USEPA rule designating nonattainment areas for the 2008 8-hour ozone NAAQS became effective. Under this rule, the Baltimore region was designated the only "moderate" ozone nonattainment area for the 2008

8-hour ozone standard in the East. Currently, the Baltimore region is a "moderate" ozone nonattainment area for the 2008 8-hour ozone standard and is a former serious nonattainment area for the 1997 ozone standard. Due to the timing of this current conformity determination, it demonstrates conformity to the 2008 ozone NAAQS, demonstrated through the 8-hour ozone Reasonable Further Progress (RFP) SIP motor vehicle emissions budgets (for the 1997 standard), which were determined by USEPA as adequate for use in conformity determinations, as published in the Federal Register on March 27, 2009. The 8-hour ozone RFP SIP was prepared by MDE and contains motor vehicle emissions budgets for volatile organic compounds (VOC) and nitrogen oxides (NOx).

Mobile source emissions are among the most significant local contributors to the Baltimore area's ozone problem. The Baltimore region's attainment date for the 2008 Ozone NAAQS is July 20, 2018.

The CAAA and the Conformity Rule at 40 CFR 93.102(d) provide a one-year grace period from the effective date of designations before transportation conformity applies in newly designated nonattainment areas for a specific NAAQS. Transportation conformity for the 2008 ozone NAAQS applied one year after the effective date of nonattainment designations for this NAAQS (i.e., July 20, 2013). Conformity to the 2008 ozone NAAQS was demonstrated for the first time in the May 2013 Conformity Determination of Plan It 2035 and the 2012-2015 Transportation Improvement Program: Addendum to Address the 2008 Ozone Standard, approved by FHWA and FTA on July 10, 2013.

2.5.2 Project-Level Conformity

Project level conformity determinations require that the FHWA/FTA project must come from a conforming transportation plan/TIP or associated regional emissions analysis. In addition, in carbon monoxide and particulate matter nonattainment and maintenance areas, an analysis of localized emissions may be required for federally funded or approved projects. This analysis is called a "hot-spot" analysis.

2.6 Mobile Source Air Toxics

In addition to the criteria pollutants for which there are NAAQS, USEPA also regulates Mobile Source Air Toxics (MSATs). Regulation of hazardous air toxics was first mandated by Congress with the passage of the CAA Amendments in 1990. USEPA developed the National-Scale Air Toxics Assessment (NATA) as an ongoing comprehensive research tool for air toxics.

In 2011, USEPA, as part of its Integrated Risk Information System (IRIS), identified 93 MSATs and highlighted nine as priority MSATs which are considered national and regional-scale cancer risk drivers. The nine priority MSATs are benzene, 1,3-butadiene, formaldehyde, acrolein, acetaldehyde, diesel particulate matter, ethylbenzene, naphthalene, and polycyclic organic matter.

According to USEPA, national emissions from all air toxics are projected to decrease from 5,030,000 tons in 1999 to 4,010,000 tons in 2020, as a result of existing and planned emission controls on major, area, and mobile sources. Emissions are projected to increase slightly between 2020 and 2030, but are not anticipated to return to the levels seen today.

The FHWA has developed a tiered approach for analyzing MSATs, as indicated in the *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents* (October 2016). Three levels of analysis have been indicated in this guidance*:*

- Tier I: No analysis for projects with no potential for meaningful MSAT effects;
- Tier II: Qualitative analysis for projects with low potential MSAT effects; or
- Tier III: Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

Tier I includes projects which have no meaningful effects on MSAT levels. Tier II covers a broad range of projects, including those that serve to improve operations of highway, transit, or freight without adding substantial new capacity or without creating a facility that is likely to meaningfully increase MSAT emissions. Tier III standards cover projects that increase diesel vehicles at intermodal freight facilities or add significant capacity to urban highways.

2.7 Greenhouse Gases

Greenhouse gases (GHGs) are another pollutant monitored by USEPA. GHGs are critical to life on Earth, as they trap heat from the sun in the atmosphere and warm the planet to acceptable temperatures to support liquid water and life. According to the National Oceanic and Atmospheric Administration (NOAA), without GHGs, the average temperature of the earth would be around 0° F (-18° C), instead of its present 57° F (14° C).

The combustion of coal, oil, and gas by humans has been increasing the amount of GHGs in the atmosphere, mostly in the form of CO_2. According to the NOAA, pre-industrial levels of CO_2 in the atmosphere were approximately 280 parts per million by volume (ppmv). Current levels are over 380 ppmv and have been steadily increasing at a rate of 1.9 ppmv per year since the year 2000. This exceeds the natural range of the past 650,000 years of 180 to 300 ppmv.

In 2009, the state of Maryland passed the Greenhouse Gas Reduction Act (GGRA). The GGRA, which led to the creation of Maryland's wide-ranging Greenhouse Gas Reduction Plan, directed the state to reduce GHG levels by 25 percent by 2020. In 2015, the Maryland Department of the Environment issued a report stating that Maryland was on track to the meet the 25% reduction goal by 2020. In 2016, the governor of Maryland reauthorized the GGRA and extended its GHG reduction goals to 40 percent by 2030. A description of the primary greenhouse gases in the Earth's atmosphere is provided below.

Carbon Dioxide (CO_2). Carbon dioxide is the most prevalent of the four GHGs. CO_2 is emitted primarily from the burning of fossil fuels (oil, natural gas, coal) by power plants and motor vehicles, the burning of solid waste, trees, and wood products, and as a result of chemical reactions such as the manufacture of cement. CO_2 is removed from the atmosphere (sequestered) when it is absorbed by plants as part of the biological carbon cycle.

Methane (CH_4). Methane is emitted during the production and transport of various energy sources, including coal, natural gas, and oil. Methane also comes from agricultural practices and from landfills as waste decays.

Nitrous Oxide (N_2O). Nitrous Oxide is emitted during various agricultural and manufacturing activities as well as during combustion of fossil fuels and solid waste.

Fluorinated Gases. Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic gases that are emitted from a variety of industrial processes. Fluorinated gases may be used in place of ozone-depleting gases such as chlorofluorocarbons (CFCs). While these gases may be emitted in smaller quantities than the others, they are very potent and have a High Global Warming Potential.

For mobile source analyses based on fossil fuel consumption, CO_2 is the predominant greenhouse gas emitted; therefore, this analysis focuses on CO_2 to represent greenhouse gas emissions.

Regulation of greenhouse gas emissions is a focal point of the Maryland Clean Car Program, which was introduced to reduce GHG emissions from vehicular sources and improve air quality in its densely populated counties. In 2007, Maryland became the 12^{th} state to adopt the California Low Emission Vehicle Tier II (Cal LEV II) standards, a set of tailpipe emission standards more stringent than the federal Tier II standards at that time. In 2009, the federal government announced that the federal standards will be fully merged with the stricter California standards by Model Year 2016.

3 Existing Conditions

3.1 Monitored Ambient Air Quality

The Air and Radiation Management Administration within the MDE is responsible for implementing and enforcing regulations to ensure that the air Maryland citizens breathe is clean and healthful. One of their functions is to operate a statewide network of air quality monitors that continuously measure air quality. This data is made available through USEPA's AirData website. The closest monitor to the project study area is located approximately 8 miles northeast at 600 Dorsey Avenue in Essex, MD in Baltimore County. The local monitored air quality data is shown below in **Table 4**.

Table 4: Local Monitored Air Quality Data

Pollutant	Location	Units	Period	Concentrations			Number of Exceedances of Federal Standard	
				Mean	Highest	Second Highest	Primary	Secondary
CO	600 Dorsey Avenue, Essex, MD	ppm	8-hour	-	1.5	1.0	0	0
			1-hour	-	2.1	1.5	0	0
SO_2	600 Dorsey Avenue, Essex, MD	ppm	3-hour	-	11.1	8.9	0	-
			1-hour	-	21.4	20.1	-	0
Respirable Particulates (PM10)	1100 Hillen Street, Baltimore, MD	µg/m^3	24-hour	-	33	23	0	0
Respirable Particulates (PM2.5)	600 Dorsey Avenue, Essex, MD	µg/m^3	Annual	8.7	-	-	0	0
			24-hour	20.7	32.6	20.6	0	0
NO2	600 Dorsey Avenue, Essex, MD	ppb	Annual	10.4	-	-	0	0
			1-hour	22.9	51.9	51.3	0	0
Lead (Pb)	N/A	µg/m^3	3-month	-	-	-	0	0
O_3	600 Dorsey Avenue, Essex, MD	ppm	8-hour	0.078			1	1

**There is no active Lead monitoring site within 100 miles of the project site.*

3.2 Climate and Meteorology

The project area is located in Baltimore City, MD. It is immediately adjacent to the Patapsco River and approximately 11 miles west of the Chesapeake Bay, and 100 miles west of the Atlantic Ocean. Its proximity to the ocean makes it susceptible to tropical storms and severe summer thunderstorms with brief periods of heavy precipitation.

Precipitation helps alleviate air quality issues in a few ways. Air pollution particles serve as the nucleus on which condensation forms, so precipitation events bring these particles out of the air. Precipitation can prevent fugitive dust formation by moistening the ground. This may be an immediate relief for air quality concerns; however, the air pollutants NO_X and SO_X can combine with water molecules to form acid rain.

Annual precipitation ranges from 25 inches to more than 55 inches. Rainfalls exceeding 10 inches in a 24-hour period have been recorded when tropical storms pass. Seasonal snowfall is almost 24 inches and varies yearly, but it is uncommon for snowfalls of 4 inches or more to occur. These occur only twice a year on average.

The coldest period is in late January, with low temperatures averaging around 21 degrees Fahrenheit. The warmest period occurs in late July, with an average of 88 degrees Fahrenheit.

Wind speed, direction, and variability have a large influence on the dispersion of atmospheric pollutants. Prevailing winds are from the south. During the winter, they are from the northwest. The windiest seasons are late winter and early spring. Winds generally calm overnight and peak during afternoon hours. During severe summer thunderstorms, hurricanes, and winter storms, winds may reach 50 to 60 miles per hour.

3.3 Attainment Status

The project study area is located in Baltimore which is classified as a moderate nonattainment area for the 8-hour ozone standard, a “maintenance” (formerly nonattainment) area for CO, and an attainment area for all other criteria pollutants[1]

4 Environmental Consequences

4.1 Regional Conformity

The Maryland Transportation Authority (MDTA) is currently in the process of having the proposed projected included in the most recent Maryland Transportation Improvement Plan (TIP). Once included, the proposed project will have been deemed to be in conformity with the region’s long term air quality plans for ozone and no further analysis of this pollutant will be required.

Based on the traffic studies associated with the proposed project, the amount of diesel vehicles and VMT in the study area is not expected to significantly increase from the No-Build Alternative to the Recommended Preferred Alternative. Therefore, the proposed project is not expected to adversely impact the regional air quality forecast and no further regional analysis is required.

As noted earlier, in order to demonstrate project level conformity in CO and particulate matter nonattainment and maintenance areas, analysis of localized emissions may be required for CO and PM. Since the study area is in attainment for PM, CO is the pollutant of concern for further analysis.

[1] USEPA Green Book - https://www3.epa.gov/airquality/greenbook/anayo_md.html

The CO dispersion analysis was conducted following procedures outlined in USEPA's 1992 *Guideline for Modeling Carbon Monoxide from Roadway Intersection* and shown in Figure 1 of Appendix E Air Quality Technical Report.

4.2 Carbon Monoxide Analysis

Microscale air quality modeling was performed using MOVES emission factors, Synchro7 traffic data, and the CAL3QHC Version 2.0 carbon monoxide dispersion model. Carbon monoxide concentrations were estimated for the No-Build Alternative and the Recommended Preferred Alternative at selected intersections throughout the project study area.

4.2.1 Traffic Information

Peak hour traffic volume, lane configurations, intersection geometry, saturation flow rates, signal type, arrival rate, and signal phasing information were referenced from the Synchro7 traffic simulation model for the AM and PM peak travel periods for the 2040 Design Year.

Intersection geometry was referenced from Synchro and project alignment drawings. Signal type was referenced from the fully-actuated, semi-actuated, and pre-timed settings in Synchro. The dispersion model is sensitive to time spent idling on an approach during the red phase of a cycle; when analyzing actuated signals, the actuated effective green and actuated cycle length were input to provide a more realistic model of green and red time in response to forecasted traffic demand. Arrival type was assumed to be "above average" for coordinated movements, and a default "average" random arrival type was applied for all other movements. Idle emission rates and running emission rates according to approach and departure vehicle speed were input in CAL3QHC. A summary of the most relevant traffic factors related to the air quality analysis is shown in **Table 5.**

Table 5: Traffic Parameters

Freeway Operations Parameters	Scenarios		
	Existing	No Build 2040	Alt 5 2040
Annual Study Area VMT	1.4M	1.64M	1.71M
Percent passenger cars	91%	91%	91%
Percent light trucks	2.5%	2.5%	2.5%
Percent Heavy Vehicles	6.5%	6.5%	6.5%
Base Free-flow Speed (mph)	55-65	55-65	55-65

4.2.2 Methodology

4.2.2.1 Site Selection

The flowchart in **Figure 1** is an excerpt from USEPA's 1992 *Guideline for Modeling Carbon Monoxide from Roadway Intersections* and presents the methodology for screening intersections for an in-depth microscale analysis.

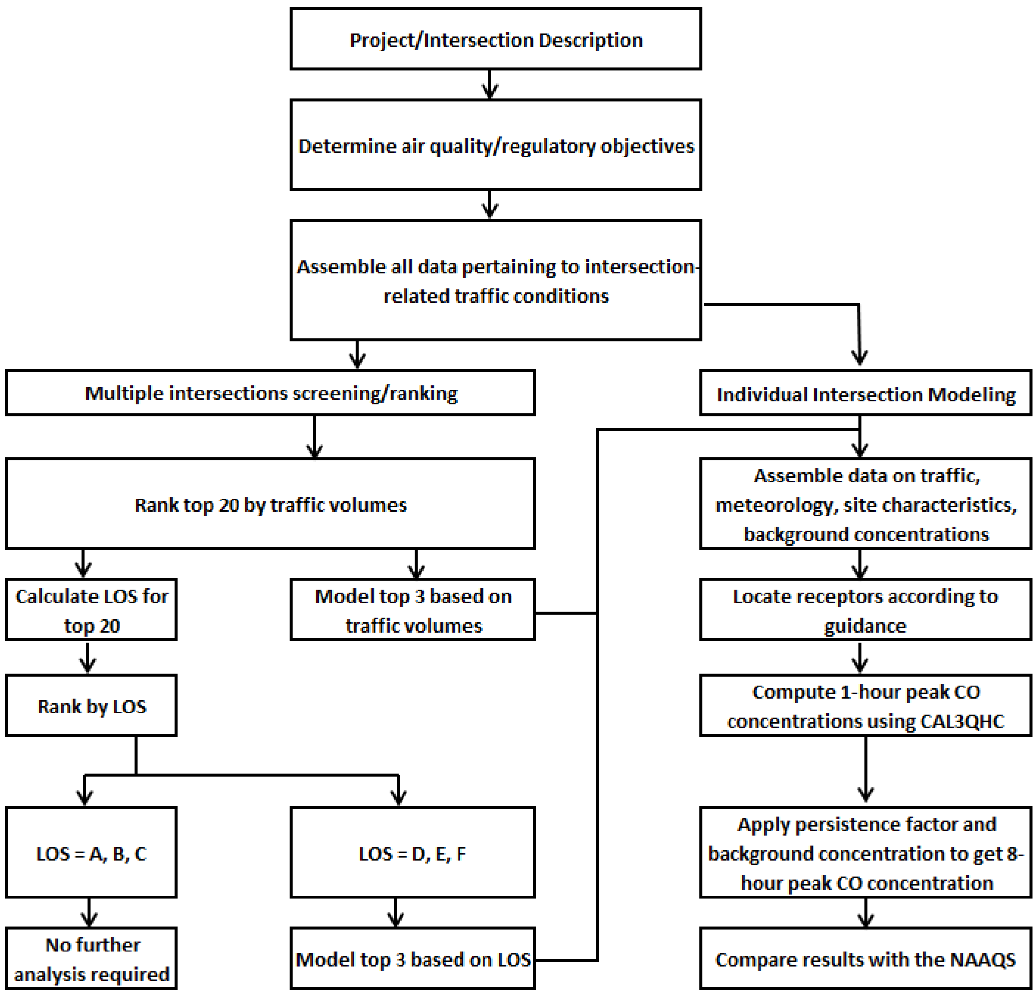


Figure 1 – CO Intersection Screening Flowchart

Seventeen intersections in the study area were screened for evaluation. These were screened for each scenario: Existing Conditions, No-Build Alternative, and the Recommended Preferred Alternative. The ranking spreadsheet can be found in **Appendix A**.

The intersections were ranked by the maximum peak hour traffic volume entering the intersection from all approaches. The busiest signalized intersections by volume were then ranked by Level of Service (LOS). LOS is a letter-based ranking system (A through F) based upon total delay time at intersections, so the worst LOS is represented by the highest delay. The top 3 intersections with the highest traffic volumes and the top 3 intersections with the worst LOS were selected for CO microscale analysis.

This method is recommended by USEPA, as the intersections with the highest volume and worst LOS represent a cross section of the "worst case" intersections. It is assumed that if these "worst case" intersections meet the NAAQS, then all other intersections in the study area with lower volumes and a better LOS should also meet the NAAQS.

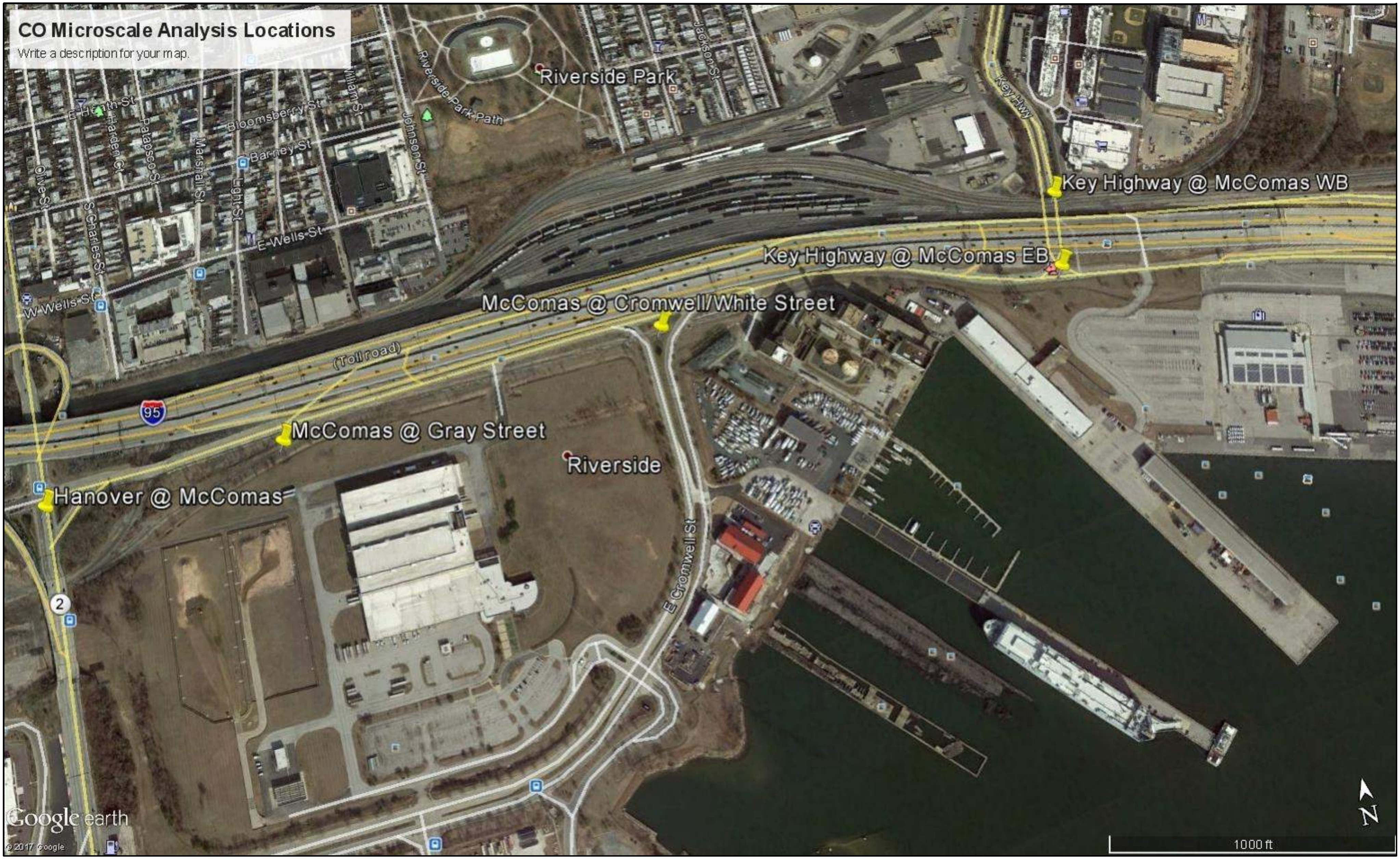
Each scenario produced a minimum of 5 and a maximum of 8 intersections for analysis. Ultimately, five (5) intersections triggered analysis based on the ranking information. As a result, five intersections were analyzed for the No-Build Alternative and the Recommended Preferred Alternative. The traffic intersections screened for air quality are presented in **Table 6**. Refer to **Table 7** and **Figure 2** for an overview of study intersection locations. CAL3QHC input and output files can be found in supplemental **Appendix A**.

Table 6: Study Area Intersections

Int ID#	Description
1	Washington Boulevard @ I-95 NB off-ramp
2	Washington Boulevard @ I-95 SB on-ramp
3	Hanover Street at Wells Street
4	Hanover Street at McComas Street
5	McComas Street at Cromwell Street/White Street
6E	McComas Street at EB to WB U-turn
6W	McComas Street WB at U-turn
7E	Key Hwy at McComas Street (EB)
7W	Key Hwy at McComas Street (WB)
8	Key Hwy at McHenry Row
9	McComas Street at Tan Street
10	McComas Street at Gray Street
11	McComas Street at Violet Street
12	McComas Street at Teal Street (unsignalized)
13	McComas Street at Pink Street
14	McComas Street at Brown Street (new intersection)
15	McComas Street at Yellow Street (new intersection)

Table 7: Carbon Monoxide Microscale Analysis Locations

Int ID#	Description
4	Hanover Street at McComas Street
5	McComas Street at Cromwell Street/White Street
7E	Key Hwy at McComas Street (EB)
7W	Key Hwy at McComas Street (WB)
10	McComas Street at Gray Street



Maryland Transportation Authority

I-95 ACCESS IMPROVEMENTS
FIGURE 2

CARBON MONOXIDE MICROSCALE ANALYSIS LOCATION

MARYLAND TRANSPORTATION AUTHORITY

CITY OF BALTIMORE

May 2017

4.2.2.2 Emissions Estimating Software

Motor Vehicle Emissions Simulator (MOVES) is an emission factor model for predicting gram per mile emissions of hydrocarbons (VOC), CO, NO_X, CO_2, particulate matter, and air toxics from cars, trucks, and motorcycles under various conditions. It was used for local emission factor development of CO in this air quality analysis in an effort to demonstrate consistency with national air quality standards. Vehicular emission factors for this analysis were developed using the most recent version of MOVES (MOVES2014a) utilizing all available federal and local approved control measures and national default data. A summary of the inputs used for the MOVES2014a model can be found in Appendix B of this report.

4.2.2.3 Dispersion Model

The dispersion modeling program used in this analysis was CAL3QHC Version 2.0, recommended in USEPA's *Guidelines for Modeling Carbon Monoxide from Roadway Intersections* (1992). Mobile source models are the basic analytical tools used to estimate CO concentrations expected under given traffic, roadway geometry, and meteorological conditions. The mathematical expressions involved in the various models attempt to describe complex physical phenomenon as closely as possible. CAL3QHC is a Gaussian model; Gaussian models assume that the dispersion of pollutants downwind of a pollution source follows a normal distribution from the center of the source. CAL3QHC simplifies different types of emission rates into two categories:

- **Idle Emissions** – emissions produced when vehicles are stopped and idling during the red phase of a signalized intersection
- **Running Emissions** – emissions produced when vehicles are in motion during the green phase of a signalized intersection

A complete description of this model is provided in USEPA's *User's Guide to CAL3QHC (Version 2.0): A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections (1992)*.

BREEZE Roads (a graphical user interface software which incorporates CAL3QHC) was used to complete the analysis.

Receptor Locations

Receptors are points within the CAL3QHC dispersion model that represent an assumed breathing height of a standing human (5') to experience concentrations of CO emitted from vehicles idling at an intersection. Following USEPA's guidance, receptors were located at the intersection corner, 3 meters away from the edge of the road, 1.8 meters above ground, at 25 meters and at 50 meters away from the corner.

Meteorological Conditions

Wind direction and speed are important factors in CO dispersion. Maximum CO concentrations are found when the wind blows parallel to the roadway adjacent to a receptor location. The approximate angle that results in maximum pollutant concentrations is difficult to assess at complex intersections (not at a right angle). Each receptor location was tested with all wind angles from 0 to 360 degrees in 10 degree increments to find the wind angle that produced the maximum concentration.

Maximum CO concentrations are found at very low wind speeds. A wind speed of 1 meter per second (2.2 mph) was chosen to predict CO concentrations under worst-case conditions. A temperature inversion layer prohibits CO from dispersing upward into the atmosphere, so cold temperatures with a Class D (neutral) atmospheric stability class were chosen to represent the worst case meteorological scenario.

Ambient condition parameters and traffic parameters such as wind speed, wind direction, atmospheric stability class, mixing heights, surface roughness, signal type, intersection arrival rate, saturation flow rate, and clearance lost time for the dispersion modeling are shown in **Table 8**.

Table 8: Input Parameters for Microscale CO Modeling

Parameter	Value
Wind speed	1 meter per second
Wind direction	10-degree interval for 360-degree wind angles
Atmospheric stability class	Class D
Mixing heights	1000 meters
Surface roughness	100cm
Signal type	Actuated
Intersection arrival rate	Average progression
Persistence factor	0.7
Background Concentration	1-hour, 1.5 ppm, 8-hour 1.0 ppm
Saturation flow rate	Varies by intersection
Clearance lost time	3 seconds

Persistence Factor

The CO 8-hr concentration is predicted by applying a persistence factor to the maximum predicted 1-hr concentration to account for meteorological variability and fluctuations in traffic volumes and speeds during various hours of the day. USEPA defined default persistence factor of 0.7 was used to calculate the 8-hour concentrations.

Background Concentrations

A background concentration is developed from air quality monitoring data and added to the maximum modeled CO concentration to account for ambient CO concentrations. In accordance with the form of the CO standard, which is “not to be exceeded more than once per year,” the average 2nd maximum CO concentrations were used from the last complete year of monitoring data (2016). To be conservative, the representative monitor was chosen as the one exhibiting the highest concentrations of CO. This monitor is located in Essex, MD at 600 Dorsey Avenue. The 2nd maximum 1-hour CO concentration was 1.5 ppm. The 2nd maximum 8-hour concentration was 1.0 ppm.

4.2.3 CO Analysis Results

Predicted worst case 1-hour and 8-hour CO concentrations for the Design Year 2040 for the Recommended Preferred Alternative and No-Build Alternative scenarios for all modeled intersections are listed in **Table 9**. The highest concentration for the AM peak hour under all modeled scenarios occurred at the Key Highway @ EB McComas Street intersection. The highest concentration for the PM peak hour under all modeled scenarios occurred at the Hanover Street @ McComas Street intersection.

Table 9: Microscale CO Emissions

No-Build Alternative – 1 Hour Maximum CO Concentrations (ppm)

Intersection	AM	PM	NAAQS
Key Highway @ McComas Street (Eastbound)	4.9	4.5	35
Key Highway @ McComas Street (Westbound)	3.7	4	35
Hanover Street @ McComas Street	4.8	5.2	35
McComas Street @ Tan Street	4.0	4.5	35
McComas Street @ Gray Street	4.0	4.6	35

****Includes background concentration of 1.5 ppm***

No-Build Alternative – 8 Hour Maximum CO Concentrations (ppm)

Intersection	AM	PM	NAAQS
Key Highway @ McComas Street (Eastbound)	3.4	3.1	9
Key Highway @ McComas Street (Westbound)	2.5	2.8	9
Hanover Street @ McComas Street	3.3	3.6	9
McComas Street @ Tan Street	2.8	3.1	9
McComas Street @ Gray Street	2.8	3.2	9

****Includes background concentration of 1.0 ppm***

Recommended Preferred Alternative – 1 Hour Maximum CO Concentrations (ppm)

Intersection	AM	PM	NAAQS
Key Highway @ McComas Street (Eastbound)	5.0	5.0	35
Key Highway @ McComas Street (Westbound)	4.7	4.2	35
Hanover Street @ McComas Street	5.0	5.5	35
McComas Street @ Cromwell/White Street	4.1	4.3	35
McComas Street @ Gray Street	3.4	4.5	35

****Includes background concentration of 1.5 ppm***

Recommended Preferred Alternative – 8 Hour Maximum CO Concentrations (ppm)

Intersection	AM	PM	NAAQS
Key Highway @ McComas Street (Eastbound)	3.5	3.5	9
Key Highway @ McComas Street (Westbound)	3.2	2.9	9
Hanover Street @ McComas Street	3.5	3.8	9
McComas Street @ Cromwell/White Street	2.8	3.0	9
McComas Street @ Gray Street	2.3	3.1	9

****Includes background concentration of 1.0 ppm***

As shown in **Table 9**, the CO microscale analysis at the selected intersections revealed maximum 1-hour CO concentrations below the NAAQS of 35 ppm and maximum 8-hour CO concentrations below the NAAQS of 9 ppm. Therefore, the proposed action is not likely to cause any adverse air quality impacts and no further mobile source analysis is required.

4.3 $PM_{2.5}$ Analysis

Baltimore City was previously designated as a maintenance area for $PM_{2.5}$ for the 1997 primary annual standard, but the USEPA revoked that NAAQS[2]. Therefore, transportation conformity requirements no longer apply for the $PM_{2.5}$ standard and no analysis is necessary.

4.4 Mobile Source Air Toxics Emissions

Based on the traffic studies associated with this proposed project (as shown in **Table 5**), this project would be classified as Tier 1 (project with no potential for meaningful MSAT effects) under FHWA criteria based on no significant increase in VMT or percentage of diesel traffic throughout the project study area.

The purpose of this project is to improve access to I-95 by constructing on and off ramps to improve traffic flow. This project has been determined to generate minimal air quality impacts for Clean Air Act criteria pollutants and has not been linked with any special mobile source air toxic (MSAT) concerns. As such, this project will not result in changes in traffic volumes, vehicle mix, basic project location, or any other factor that would cause a meaningful increase in MSAT impacts of the project from that of the no-build alternative.

Moreover, USEPA regulations for vehicle engines and fuels will cause overall MSAT emissions to decline significantly over the next several decades. Based on regulations now in effect, an analysis of national trends with EPA's MOVES2014 model forecasts a combined reduction of over 90 percent in the total annual emissions rate for the priority MSAT from 2010 to 2050 while vehicle-miles of travel are projected to increase by over 45 percent (*Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents, Federal Highway Administration*, October 12, 2016). This will both reduce the background level of MSAT as well as the possibility of even minor MSAT emissions from this project.

4.5 Greenhouse Gas Assessment

Estimates of CO_2 emissions, a primary factor in greenhouse gases, are based on the amount of direct energy required for vehicle propulsion. This energy is a function of traffic characteristics such as volume, speed, distance traveled, vehicle mix, and thermal value of the fuel being used. A review of traffic data for the project reveals that, because there will not be a significant change in traffic volumes from the No-build to Build (Recommended Preferred Alternative) conditions, CO_2 emission burdens will most likely result in almost no change as compared to the existing conditions.

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[2] For background, the EPA issued a final rule (81 FR 58010), effective October 24, 2016, on "*Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements*" that stated, in part: "*Additionally, in this document the EPA is revoking the 1997 primary annual standard for areas designated as attainment for that standard because the EPA revised the primary annual standard in 2012*." (See: https://www.gpo.gov/fdsys/pkg/FR-2016-08-24/pdf/2016-18768.pdf). Accordingly, Baltimore City is no longer designated as maintenance for $PM_{2.5}$, and the associated EPA regulatory requirements for conformity for $PM_{2.5}$ are eliminated for Baltimore, MD.

Greenhouse gas (GHG) emissions analyses are typically conducted on a regional basis for emissions from transportation projects. Since the limits of the project are contained in one county and it is not expected to significantly increase VMT in the study area, a detailed analysis of greenhouse gases is not required.

4.6 Construction Impacts

The construction duration of the project is not anticipated to exceed five years in any single location; thus, any impact incurred during construction would be considered a temporary impact. The primary air quality concerns during construction would be a potential localized increase in the concentration of fugitive dust (including airborne particulate matter, $PM_{2.5}$ and PM_{10}), as well as mobile source emissions.

Mobile source emissions include pollutants such as CO. Since CO emissions from motor vehicles generally increase with decreasing vehicle speed, disruption of traffic during construction (such as temporary reduction of roadway capacity and increased queue lengths) could result in short-term elevated concentrations of CO. To minimize the amount of emissions generated, efforts would be made during construction to limit traffic disruptions, especially during peak travel hours.

All required construction-related permits would be obtained from MDE prior to construction. The construction contractor may use the following dust control measures, to minimize, to the greatest extent practicable, impacts to air quality.

Mitigation measures to be used during construction could include:

- Minimize land disturbance
- Cover trucks when hauling soil, stone, and debris (MD Law)
- Use water trucks to minimize dust
- Use dust suppressants if environmentally acceptable
- Stabilize or cover stockpiles
- Construct stabilized construction entrances per construction standard specifications
- Regularly sweep all paved areas including public roads
- Stabilize onsite haul roads using stone
- Temporarily stabilize disturbed areas per MDE erosion and sediment standards

Mitigation measures to be used post-construction could include:

- Remove/grade stockpile areas
- Remove haul roads and grade to drain
- Permanently stabilize/landscape any remaining disturbed areas

5 Mitigation

Since the Recommended Preferred Alternative is not predicted to increase emission burdens compared to the No-Build Alternative, nor is the Recommended Preferred Alternative predicted to cause or contribute to a violation of the NAAQS, no long-term impacts to local or regional air quality are anticipated, and no mitigation measures are warranted.

As the project's construction is not anticipated to last more than five years in any location, construction impacts are considered to be temporary. Short-term mitigation measures to control dust during construction are described above.

6 Conclusions

The Recommended Preferred Alternative is not predicted to increase emissions compared to the No-Build Alternative, nor cause or exacerbate a violation of the NAAQS; this takes into account the pollutants for which the area is in nonattainment or maintenance, including ozone and its precursor molecules and carbon monoxide. The project is not expected to measurably increase MSAT or greenhouse gas emissions compared to the No-Build Alternative. No long-term mitigation measures are proposed.