

Appendix G

Air Quality

A. INTRODUCTION

Section 6-4-4, Air Quality, of this Draft Design Report/Draft Environmental Impact Statement (DDR/DEIS) summarizes the assessment of potential effects on ambient air quality from the operation of the Project in accordance with the procedures found in the New York State Department of Transportation (NYSDOT) Environmental Manual (TEM). Potential air quality effects associated with the construction phase are also described. This appendix describes the regulatory context, methodology, and results of the air quality assessment.

Mesoscale emissions for carbon monoxide (CO), volatile organic compounds (VOCs), oxides of nitrogen (NO_x), particulate matter (PM) less than or equal to 2.5 micrometers (PM_{2.5}) and PM less than or equal to 10 micrometers (PM₁₀) were assessed over the area studied in the traffic modeling for the No Build, Viaduct, and Community Grid Alternatives (see **Chapter 5, Transportation and Engineering Considerations**, for traffic information) for estimated time of completion (ETC) and estimated time of completion+30 (ETC+30). The analysis years of 2026 and 2056 were determined to be reasonably representative of roadway conditions at the time of completion.

The Project would not introduce any new, permanent stationary emission sources, such as boilers or generators.

B. REGULATORY CONTEXT

NATIONAL AMBIENT AIR QUALITY STANDARDS

As required by the Clean Air Act and its Amendments of 1990 (CAA), primary and secondary National Ambient Air Quality Standards (NAAQS) have been established for six major air pollutants: CO, nitrogen dioxide (NO₂), ozone, PM (PM_{2.5} and PM₁₀), sulfur dioxide (SO₂), and lead. The primary standards represent levels that are requisite to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. The primary standards are generally either the same as the secondary standards or more restrictive. The NAAQS are presented in **Table G-1**.

In addition to the criteria pollutants discussed above, toxic air pollutants, or mobile source air toxics (MSATs), are pollutants known to cause or are suspected of causing cancer or other serious health ailments. The CAA Amendments of 1990 listed 188 air toxics and addressed the need to control toxic emissions from transportation. EPA 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). These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

Table G-1
National Ambient Air Quality Standards (NAAQS)

Pollutant		Primary / Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 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	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb ⁽²⁾	Annual Mean
Ozone (O ₃)		primary and secondary	8 hours	0.070 ppm ⁽³⁾	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	PM _{2.5}	primary	1 year	12.0 µg/m ³	Annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m ³	Annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m ³	98th percentile, averaged over 3 years
	PM ₁₀	primary and secondary	24 hours	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	Sulfur Dioxide (SO ₂)
	secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year	

Notes:

ppm – parts per million (unit of measure for gases only)

µg/m³ – micrograms per cubic meter (unit of measure for gases and particles, including lead)

All annual periods refer to calendar year.

⁽¹⁾ In areas that are designated to be in nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m³ as a calendar quarter average) also remain in effect.

⁽²⁾ The level of the annual NO₂ standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

⁽³⁾ The final rule was signed on October 1, 2015, effective December 28, 2015. The previous (2008) O₃ standards additionally remain in effect in some areas. Revocation of the previous (2008) O₃ standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

⁽⁴⁾ The previous SO₂ standards (0.14 ppm 24-hour and 0.03 ppm annual) will also 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 an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO₂ standards or is not meeting the requirements of a SIP call under the previous SO₂ 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 required NAAQS.

Sources: 40 CFR Part 50. National Primary and Secondary Ambient Air Quality Standards. USEPA. <https://www.epa.gov/criteria-air-pollutants/naaqs-table>. Retrieved March, 2021.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

The CAA, as amended in 1990, defines non-attainment areas (NAA) as geographic regions that have been designated as not meeting one or more of the NAAQS. When an area is designated as non-attainment by USEPA, the state is required to develop and implement a State Implementation Plan (SIP), which delineates how a state plans to achieve air quality that meets the NAAQS under the deadlines established by the CAA, followed by a plan for maintaining attainment status once the area is in attainment.

Onondaga County is currently in attainment for all standards of criteria pollutants.

C. METHODOLOGY

Emissions from motor vehicles are referred to as on-road emissions, while emissions from construction equipment are referred to as non-road emissions. In both cases, emissions result from combustion of fuels. On-road emission sources are predominantly gasoline passenger vehicles and diesel trucks.

POLLUTANTS FOR ANALYSIS

Air quality is affected by air pollutants produced by both motor vehicles and stationary sources. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Ambient concentrations of CO are predominantly influenced by mobile source emissions. PM, VOCs, and NO_x are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere. Emissions of sulfur dioxide (SO₂) are associated mainly with stationary sources, and some sources utilizing non-road diesel such as large international marine engines. On-road diesel vehicles currently contribute very little to SO₂ emissions since the sulfur content of on-road diesel fuel, which is federally regulated, is extremely low. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs. Ambient concentrations of CO, PM, NO₂, SO₂, ozone, and lead are regulated by USEPA under the CAA and are referred to as ‘criteria pollutants’; emissions of VOCs, NO_x, and other precursors to criteria pollutants are also regulated by USEPA.

CARBON MONOXIDE

CO, a colorless and odorless gas, is produced primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. CO concentrations can diminish rapidly over relatively short distances; elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be analyzed on a local (microscale) basis.

NITROGEN OXIDES, VOCs, AND OZONE

NO_x are of principal concern because of their role, together with VOCs, as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. The effects of NO_x and VOC emissions from all sources are generally examined on a regional basis. The contribution of an action or project to regional emissions of these pollutants would include any added stationary or mobile source emissions.

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The Project would potentially result in changes to the regional vehicular travel patterns in the study areas. Therefore, the change in regional NO_x and VOC emissions was analyzed.

In addition to being a precursor to the formation of ozone, NO₂ (one component of NO_x) is also a regulated pollutant. Since NO₂ is mostly formed from the transformation of NO in the atmosphere, it has mostly been of concern further downwind from large stationary point sources, and not a local concern from mobile sources (NO_x emissions from fuel combustion consist of approximately 90 percent NO and 10 percent NO₂ at the source). However, with the promulgation of the 2010 1-hour average standard for NO₂, local sources such as vehicular emissions may be of greater concern. The changes in NO₂ concentrations associated with this Project have not been analyzed explicitly due to limitations in guidance and modeling tools. However, any changes in NO₂ concentrations associated with the Project would be relatively small, as demonstrated below for CO and PM.

The Project would not involve the addition of any new stationary emission sources. Therefore, an analysis of potential local impacts on NO₂ concentrations was not warranted.

LEAD

Airborne lead emissions are currently associated principally with industrial sources. Lead in gasoline has been banned under the CAA and would not be emitted from any other component of the Project. Therefore, an analysis of this pollutant was not warranted.

RESPIRABLE PARTICULATE MATTER—PM₁₀ AND PM_{2.5}

PM is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include the condensed and reacted forms of naturally occurring VOC; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from volcanic and geothermal eruptions and from forest fires. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating), chemical and manufacturing processes, all types of construction, agricultural activities, as well as wood-burning stoves and fireplaces. PM also acts as a substrate for the adsorption (accumulation of gases, liquids, or solutes on the surface of a solid or liquid) of other pollutants, often toxic, and some likely carcinogenic compounds.

As described below, PM is regulated in two size categories: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers (PM_{2.5}) and particles with an aerodynamic diameter of less than or equal to 10 micrometers (PM₁₀, which includes PM_{2.5}). PM_{2.5} has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that adsorb to the surfaces of the particles and is also extremely persistent in the atmosphere. PM_{2.5} is mainly derived from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from a source) or from precursor gases reacting in the atmosphere to form secondary PM.

All gasoline-powered and diesel-powered vehicles, especially heavy duty trucks and buses operating on diesel fuel, are a substantial source of respirable PM, most of which is PM_{2.5}. PM concentrations may, consequently, be locally elevated near roadways. Therefore, PM was included in the mobile source analysis.

SULFUR DIOXIDE

SO₂ emissions are primarily associated with the combustion of sulfur-containing fuels (oil and coal). SO₂ is also of concern as a precursor to PM_{2.5} and is regulated as a PM_{2.5} precursor under the New Source Review permitting program for large sources. Due to the federal restrictions on the sulfur content in diesel fuel for on-road and non-road vehicles, no substantial quantities are emitted from vehicular sources. Vehicular sources of SO₂ are not substantial and therefore, analysis of SO₂ from mobile and/or non-road sources was not warranted.

Additionally, during construction, all on-site non-road engines would use ultra-low sulfur diesel (ULSD) fuel and emit insignificant amounts of SO₂. Therefore, analysis of SO₂ was not warranted.

NON-CRITERIA POLLUTANTS

In addition to the criteria pollutants discussed above, mobile source air toxics, or MSATs, are pollutants known to cause or are suspected of causing cancer or other serious health ailments. The CAA Amendments of 1990 listed 188 air toxics and addressed the need to control toxic emissions from transportation sources. USEPA identified nine compounds with substantial 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).¹ These compounds are 1, 3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority MSATs, the list is subject to change and may be adjusted in consideration of future USEPA rules.

LOCAL (MICROSCALE) ASSESSMENT

CO MICROSCALE SCREENING ANALYSIS

An assessment of the potential air quality effects of CO concentrations that would result from the Project was performed following the procedures outlined in the NYSDOT TEM. The assessment included a mobile source screening analysis to determine whether the Project would result in increased traffic volumes or implement any other changes (e.g., changes in speed, roadway width, sidewalk locations, or traffic signals) that may result in substantial increases in CO concentrations, thereby requiring further detailed analysis.

According to the screening procedures, if the Level of Service (LOS) in the two Build Alternatives is A, B, or C, no air quality analysis is required. For each intersection or corridor operating at LOS D or worse, the following “Capture Criteria” are applied to determine if an air quality analysis may be warranted:

- A 10 percent or more reduction in the distance between source and receptor; or
- A 10 percent or more increase in traffic volume on affected roadways for the Build Year; or
- A 10 percent or more increase in vehicle emissions for the Build Year; or
- Any increase in the number of queued lanes for the Build Year (this applies to intersections); or
- A 20 percent reduction in speed when average speeds are below 30 miles per hour (mph).

¹ <https://www.epa.gov/national-air-toxics-assessment/2011-national-air-toxics-assessment>

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If a project does not meet any of the above criteria, a microscale analysis is not required. Should any one of the above Capture Criteria be met, a Volume Threshold Screening is performed using traffic volume and emission factor data to compare with specific volume thresholds established in TEM. The Volume Thresholds (provided in the TEM) establish traffic volumes under which a violation of the NAAQS for CO is extremely unlikely. This approach uses region-specific emissions data to determine corresponding vehicle thresholds.

Both the Capture Criteria and Volume Threshold Screening were developed by NYSDOT to be conservative air quality estimates based on worst-case assumptions. TEM states that if the project-related traffic volumes are below the Volume Threshold criteria, then a microscale air quality analysis is unnecessary even if the other Capture Criteria are met for a location with LOS D or worse, since a violation of the NAAQS would be extremely unlikely.

VEHICLE EMISSIONS

Engine Emissions

Vehicular CO and PM (including brake wear and tire wear) emission factors for Onondaga County were computed using the USEPA mobile source emissions model, MOVES2014a (the model in effect at the time of the analysis).² This emissions model is capable of calculating emission factors for various parameters relating to the on-road vehicles and the regional conditions. The model was run using a project level domain and took into consideration vehicle types, based on the fuel type (gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway types, roadway grade, number of starts per day, engine soak time, and various other factors that influence emissions, such as inspection and maintenance programs. The inputs and use of MOVES2014a incorporate the most current guidance available from NYSDEC.

Vehicle classification data were based on data obtained from the results described in the traffic study (see **Chapter 5, Transportation and Engineering Considerations**). Appropriate credits were used to accurately reflect the inspection and maintenance programs.³ County-specific hourly temperature and relative humidity data obtained from NYSDEC were used.

Road Dust

The contribution of re-entrained road dust to PM₁₀ concentrations, as presented in the PM₁₀ SIP, is considered to be substantial; therefore, the PM₁₀ estimates include exhaust, brake wear, tire wear, and road dust. Road dust emission factors were calculated according to the latest procedure delineated by USEPA.⁴ Road dust is not a substantial contributor to PM_{2.5} in New York State. Thus, based on USEPA guidance, road dust was not included in the PM_{2.5} microscale analysis.

TRAFFIC DATA

Vehicle classification data were based on field studies. Traffic data for the air quality analysis were derived from existing traffic counts, projected future growth in traffic, and other information

² USEPA. Motor Vehicle Emission Simulator (MOVES): User Guide for MOVES2014a. EPA420B15095. November 2015.

³ The inspection and maintenance programs require inspections of automobiles and light trucks to determine if pollutant emissions from each vehicle exhaust system are lower than emission standards. Vehicles failing the emissions test must undergo maintenance and pass a repeat test to be registered in New York State.

⁴ USEPA. *Compilations of Air Pollutant Emission Factors AP-42*. Fifth Edition, Volume I: Stationary Point and Area Sources, Ch. 13.2.1. NC. <http://www.epa.gov/ttn/chief/ap42>. January 2011.

developed as part of the traffic analysis for the proposed project (see **Chapter 5, Transportation and Engineering Considerations**). Traffic data for the future No Build and Build alternatives were used for the respective air quality modeling scenarios.

For the PM_{2.5} and PM₁₀ analyses, 24-hour data is required. The traffic volumes from the morning and evening peak periods were used as a baseline for determining volumes throughout the day. Off-peak traffic volumes were determined by adjusting the peak period volumes by the 24-hour distributions of actual vehicle counts collected at appropriate locations. Emissions modeling using MOVES2014a were conducted for four representative time periods (morning, midday, evening, and overnight) to cover a 24-hour period. While studies considered in the updates to the MOVES model suggest that there is little impact of temperature on running PM emissions for newer vehicles,⁵ emission rates for four representative months (one for each season) were run, and the maximum emission rates were used for the entire year for the analysis.

DISPERSION MODEL FOR PM MICROSCALE ANALYSIS

Maximum contributions from vehicular emissions to PM concentrations adjacent to each analysis site were calculated using CAL3QHCR, a refined version of the CAL3QHC model Version 2.0.⁶ This refined version of the model can utilize hourly traffic and meteorology data, and is more appropriate for calculating the 24-hour and annual average concentrations required to address the timescales of the PM NAAQS.

METEOROLOGY

In general, the transport and concentration of pollutants from vehicular sources are influenced by three principal meteorological factors: wind direction, wind speed, and atmospheric stability. Wind direction influences the direction in which pollutants are dispersed and atmospheric stability accounts for the effects of vertical mixing in the atmosphere. These factors, therefore, influence the concentration at a particular receptor location. The meteorological data set consisted of five consecutive years of the latest available meteorological data: surface data collected at the nearest representative National Weather Service Station (Syracuse Hancock International Airport) from 2011 to 2015 and concurrent upper air data collected at the nearest station in Albany, NY.

ANALYSIS YEAR

The PM microscale analysis for operational effects was performed for the critical analysis year, 2026. The critical year analysis was based on the estimated time of completion, year 2026, and future year 2056. Vehicular emission rates projected by the MOVES2014a model would be greatest in earlier years, and outweigh the projected growth in traffic volumes for the later analysis year (2056). The analysis was performed both without the Project (the No Build Alternative) and with the Project (either of the Build Alternatives).

ANALYSIS SITES

Intersections in the project area where traffic data were developed, as described in **Chapter 5, Transportation and Engineering Considerations**, were reviewed for the PM microscale analysis

⁵ USEPA. Emission Adjustments for Temperature, Humidity, Air Conditioning, and Inspection and Maintenance for On-road Vehicles in MOVES2014. EPA420R14012.

⁶ USEPA. User's Guide to CAL3QHC, A Modeling Methodology for Predicted Pollutant Concentrations Near Roadway Intersections. EPA454R92006.

for operational effects based on locations of high volumes, high traffic increments between No Build and each alternative, the greatest decrease in average travel speeds, and proximity to sensitive receptors. The traffic volumes for the AM and PM periods were reviewed and intersections with high volumes were identified. Of those intersections, four were selected for the microscale analysis (see **Table G-2**). The potential effects from vehicle emissions of PM₁₀ and PM_{2.5} were analyzed at each site.

Table G-2
PM Microscale Analysis Sites (Operational Effects)

Analysis Site	Location	Alternatives Analyzed
1	Crouse Avenue and Erie Boulevard	No Build, Viaduct, and Community Grid
2	West Street and Erie Boulevard	No Build, Viaduct, and Community Grid
3	Almond Street and Harrison Street	No Build, Viaduct, and Community Grid
4	State Street and Erie Boulevard	No Build and Community Grid

RECEPTOR PLACEMENT

Multiple receptors where the highest pollutant concentrations are expected were modeled at each of the selected sites. Receptors were placed along the approach and departure links and roadway segments at 7.6-meter intervals within approximately 23 meters of the intersections, and at 25-meter intervals along the remainder of the roadway links in the modeled extents (see **Figures G-1 through G-11**). Due to the presence of elevated roadways, receptors were also placed at elevated residential locations.

REGIONAL (MESOSCALE) ASSESSMENT

Mesoscale emissions were evaluated for the No Build, Viaduct, and Community Grid Alternatives.

The emissions were estimated using the projected vehicle miles traveled (VMT) reported in **Chapter 5, Transportation and Engineering Considerations**. Emission factors in grams per mile for criteria pollutants on both restricted roadways (i.e., expressways, freeways, and interstates) and unrestricted roadways (local roads) were obtained using the MOVES2014a model. Emission factors obtained from the MOVES2014a model for Onondaga County were calculated on a county level scale and summarized by vehicle type and speed for running exhaust (for engine and crankcase), brakewear, tirewear, evaporative permeation, evaporative fuel vapor venting, and evaporative fuel leaks where appropriate by pollutant. The average vehicle speeds and vehicle classifications for the AM and PM peak periods projected in the regional transportation analysis described in **Chapter 5, Transportation and Engineering Considerations**, were used to calculate emission factors along individual roadway segments. The modeled roadways consists of the area where a shift in local traffic using alternate routes could occur as a result of the reconstruction or removal of the I-81 viaduct. The roadway segments include the I-81, I-690, I-481, and I-90 interstate systems and surface streets that could be affected by the project. The modeled traffic network extents extend south to East Castle/Stratford Streets, north to Hiawatha Boulevard, west to South West Street, and east to Westcott Street (see **Figure 1 of Appendix C-2**).

Daily emissions were developed by multiplying the average projected daily traffic volumes of individual segments in the modeled area by the length of each modeled segment and the calculated emission factors. Regional emissions associated with the Project were then projected as the summation of all roadway emissions within the study area.

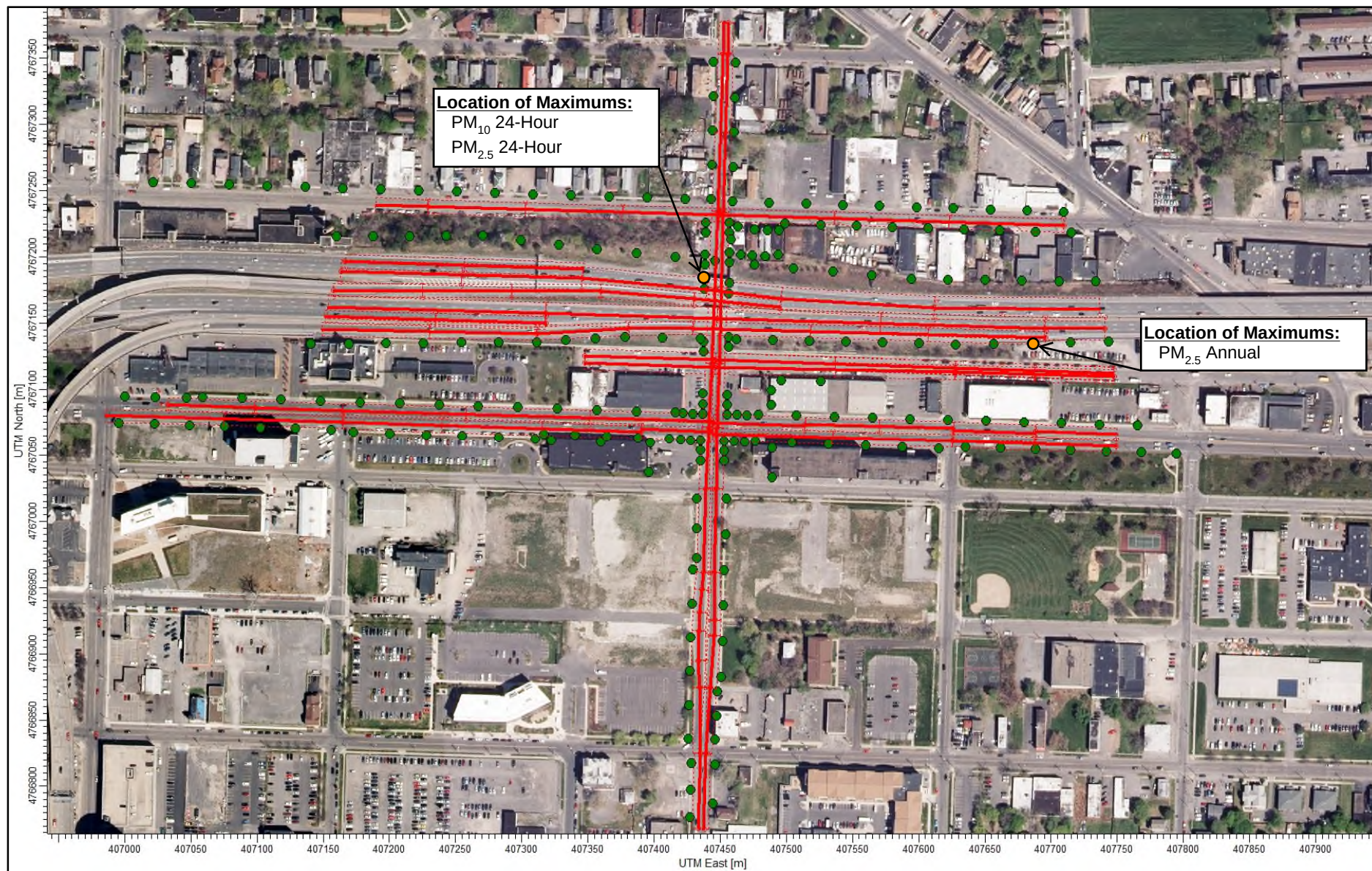


Figure G-1
Source & Receptor Diagram—No Build Alternative
Crouse Avenue & Erie Boulevard

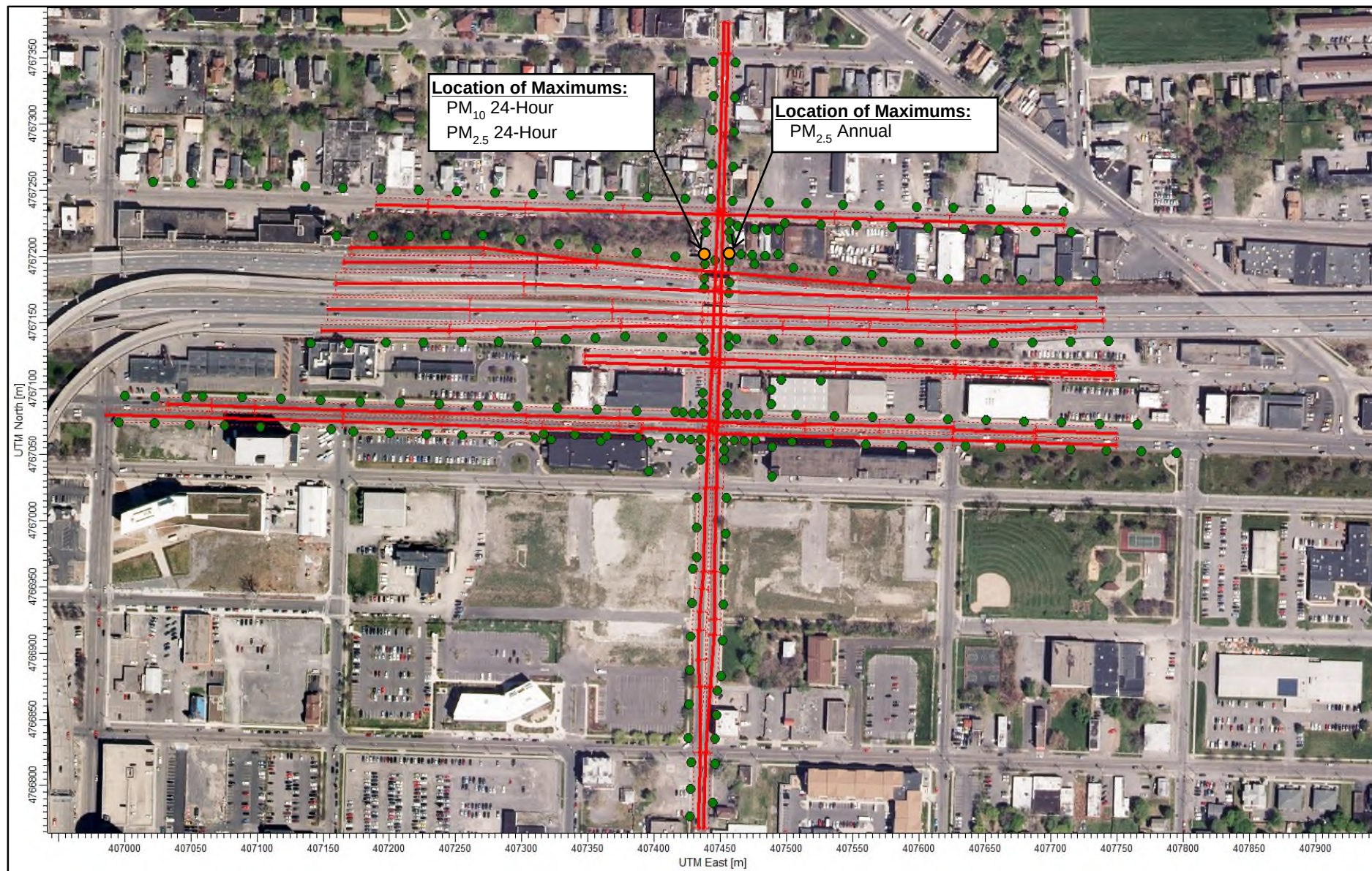


Figure G-2
Source & Receptor Diagram—Viaduct Alternative
Crouse Avenue & Erie Boulevard

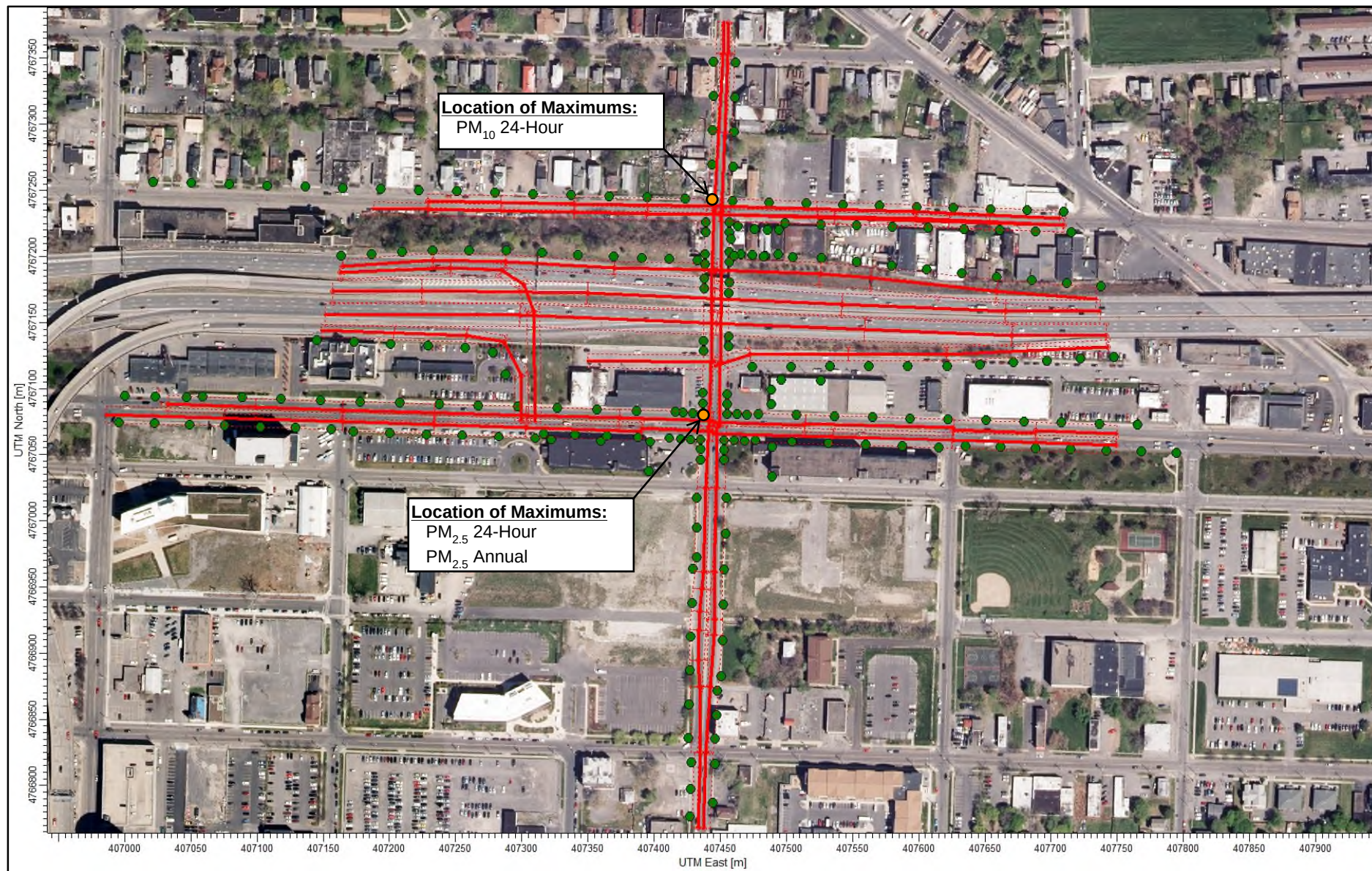


Figure G-3
Source & Receptor Diagram—Community Grid Alternative
Crouse Avenue & Erie Boulevard

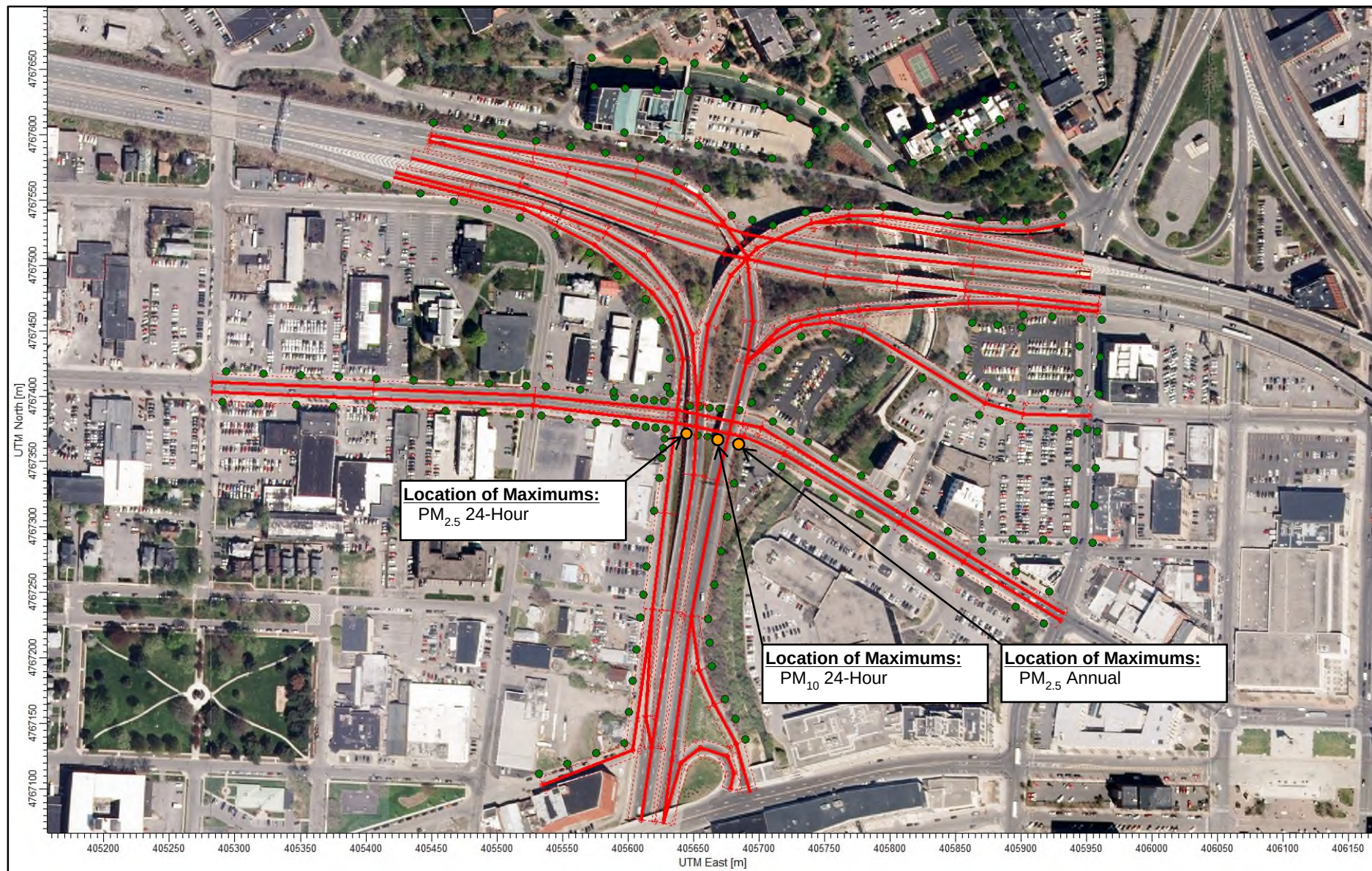


Figure G-4
Source & Receptor Diagram—No Build Alternative
West Street & Genesee Street

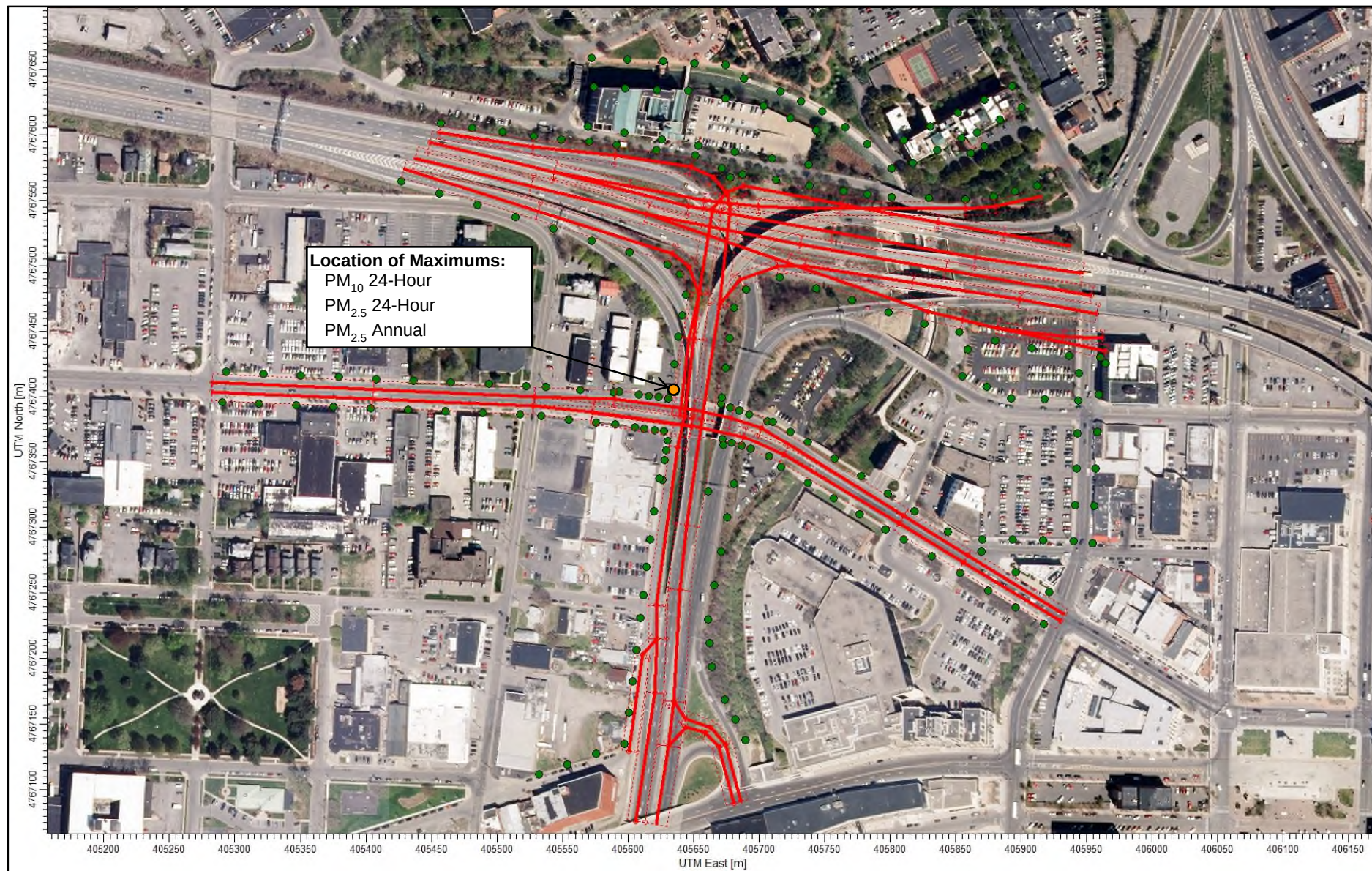


Figure G-5
Source & Receptor Diagram—Viaduct Alternative
West Street & Genesee Street

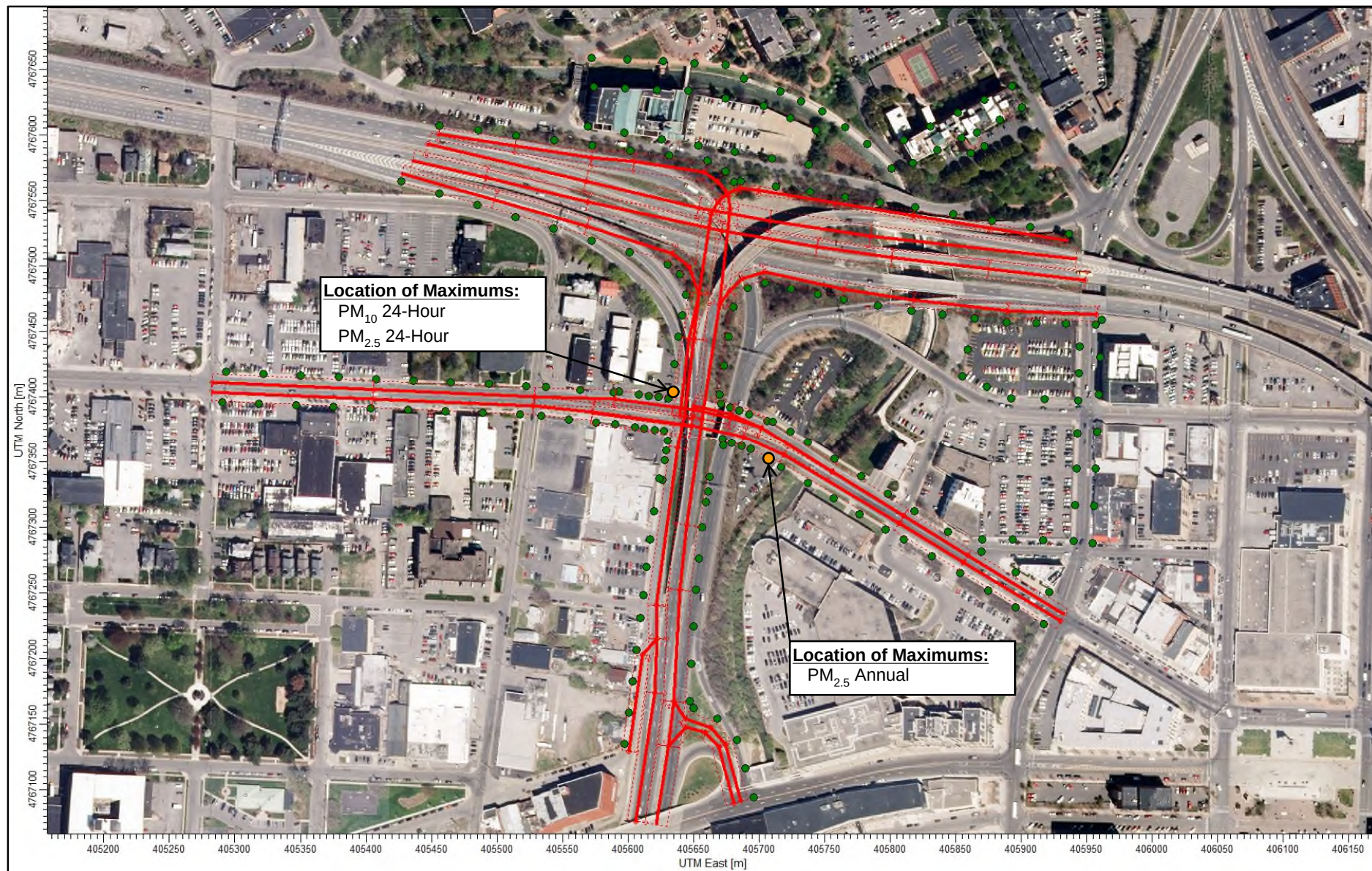


Figure G-6
Source & Receptor Diagram—Community Grid Alternative
West Street & Genesee Street

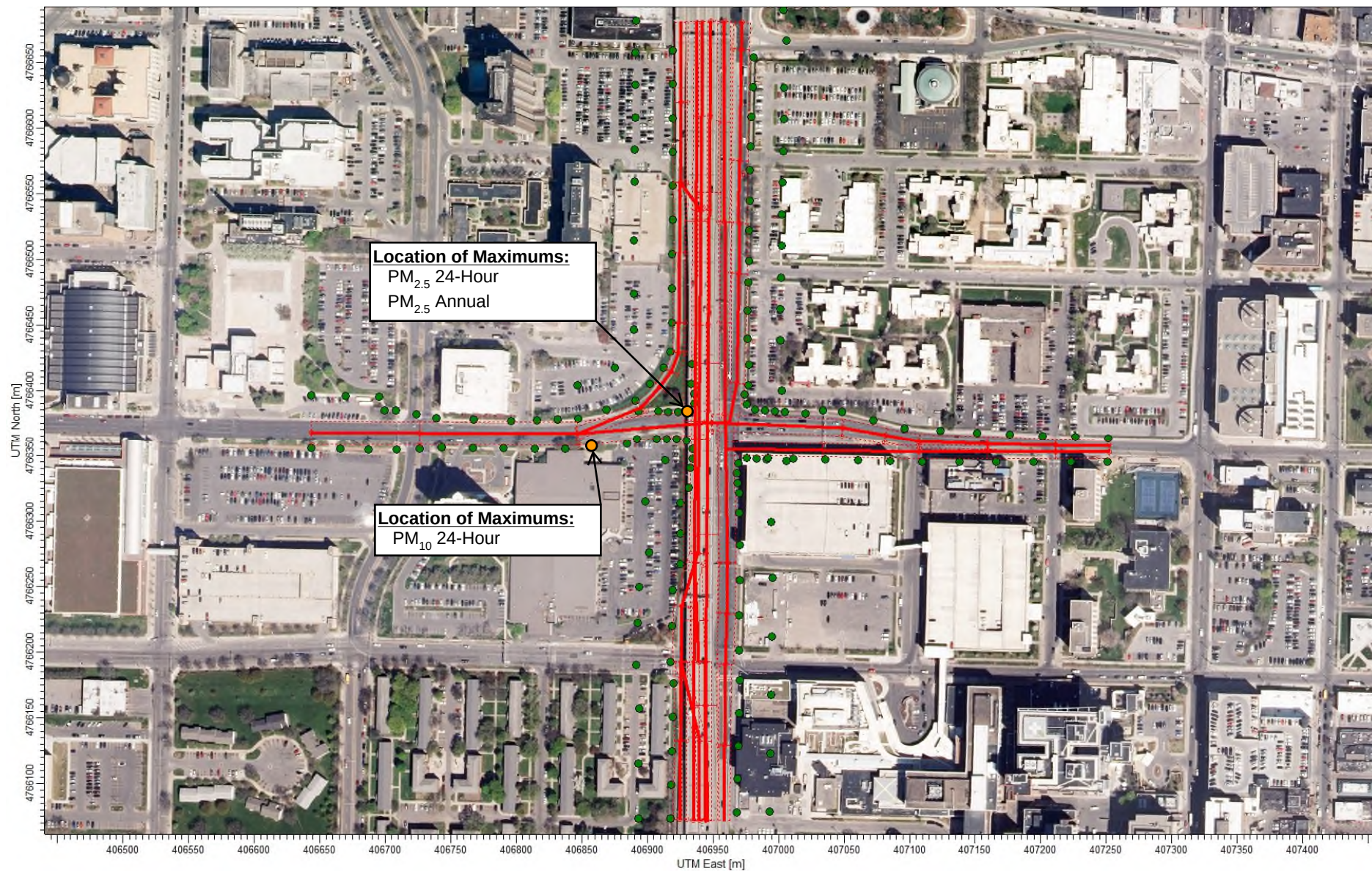


Figure G-7
Source & Receptor Diagram—No Build Alternative
Almond Street & Harrison Street

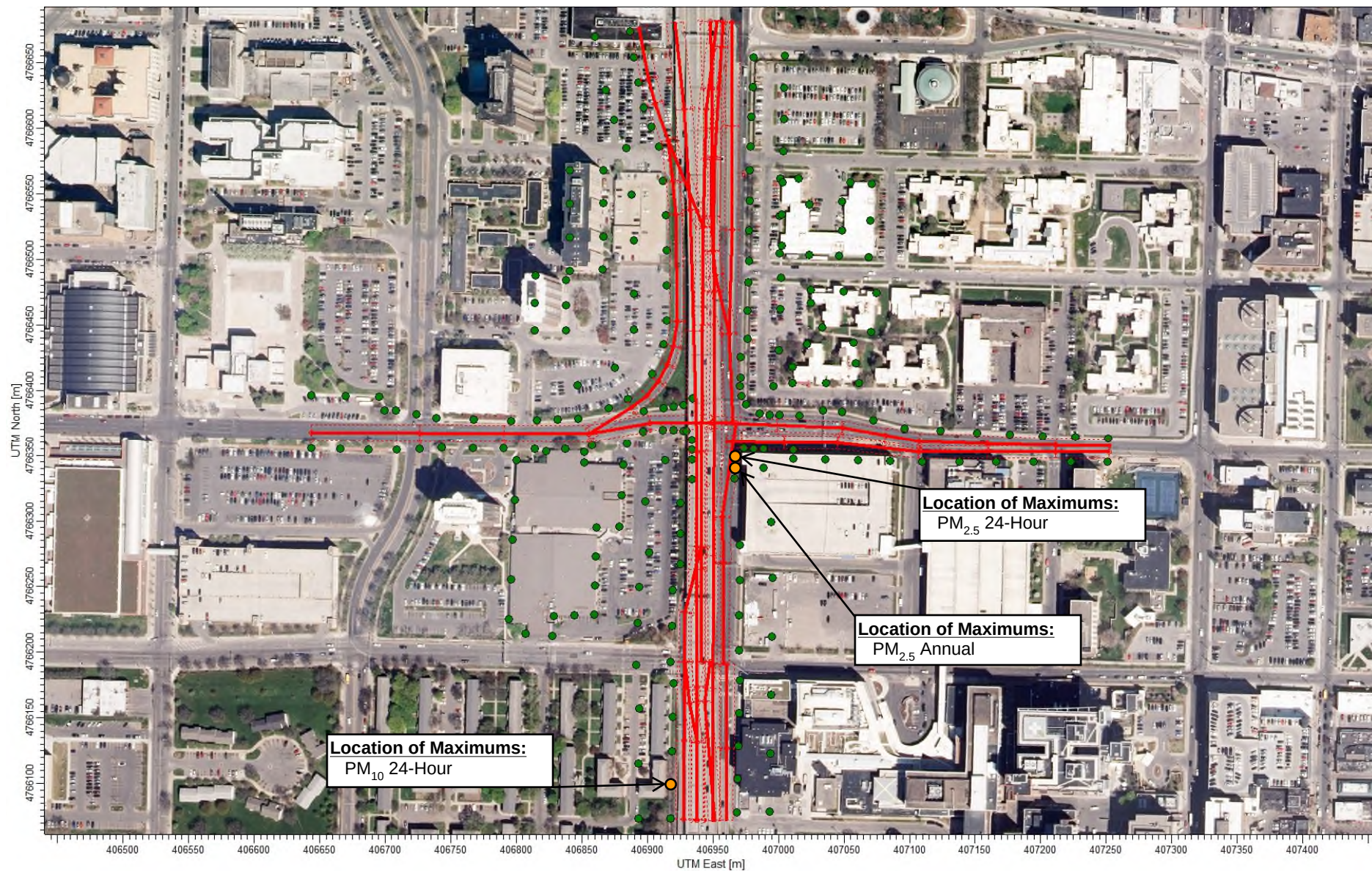


Figure G-8
Source & Receptor Diagram—Viaduct Alternative
Almond Street & Harrison Street

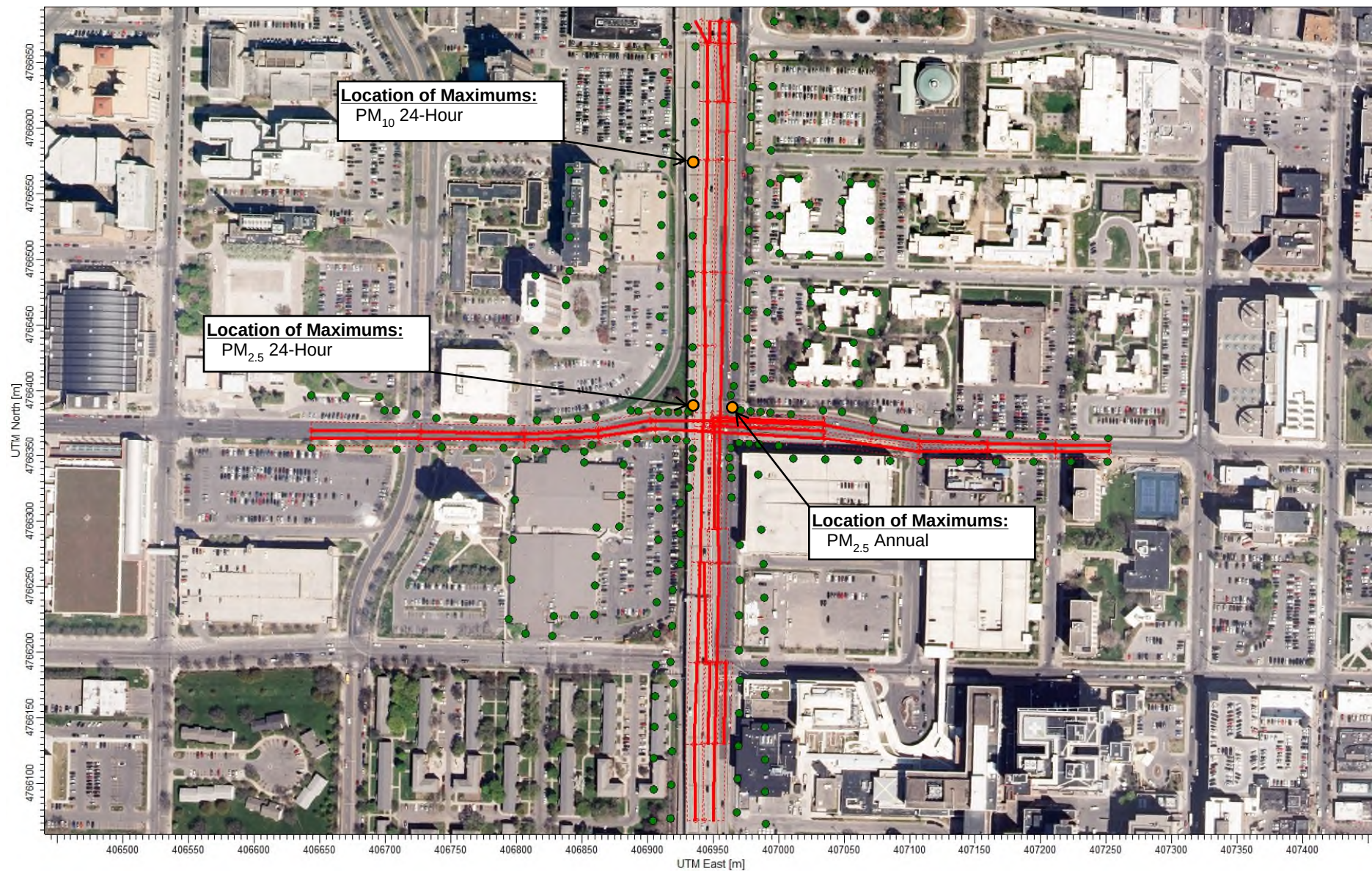


Figure G-9
Source & Receptor Diagram—Community Grid Alternative
Almond Street & Harrison Street

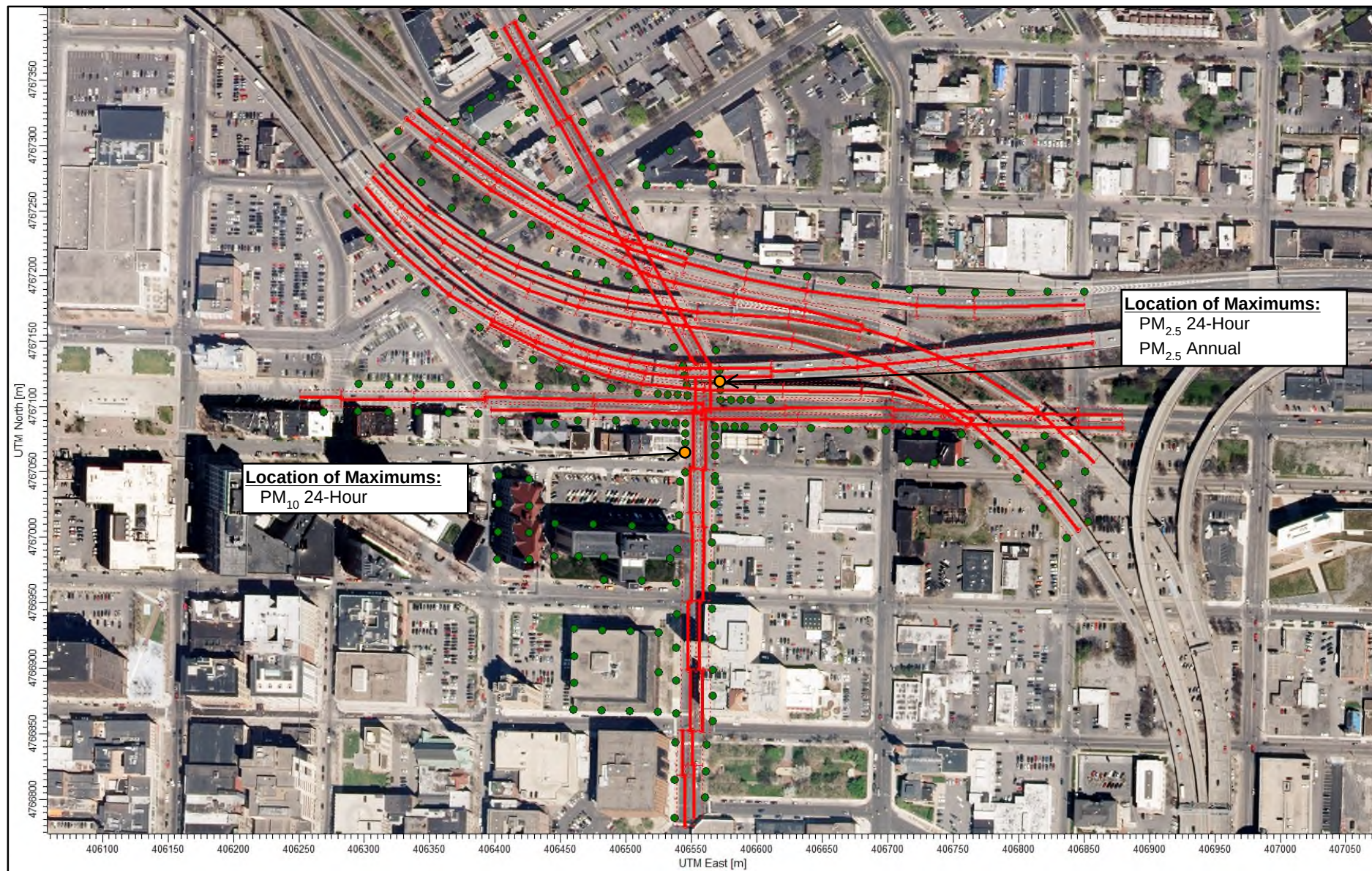


Figure G-10
Source & Receptor Diagram—No Build Alternative
State Street & Erie Boulevard

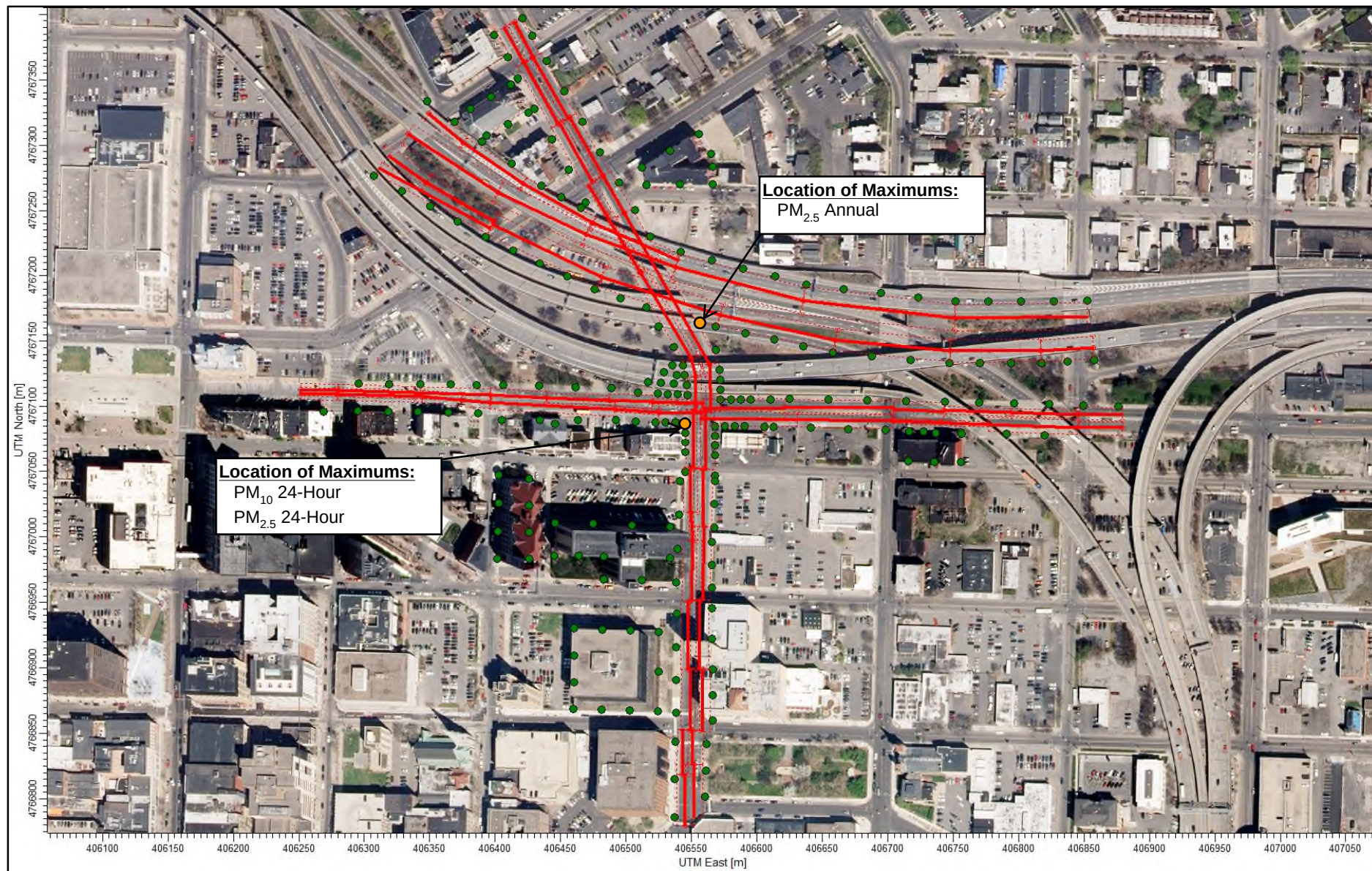


Figure G-11
Source & Receptor Diagram—Community Grid Alternative
State Street & Erie Boulevard

CONSTRUCTION EFFECTS ASSESSMENT

Emissions from on-site construction equipment, on-road construction-related vehicles, diverted traffic during construction, and dust-generating construction activities have the potential to affect air quality. In general, much of the heavy equipment used in construction is powered by diesel engines that have the potential to produce relatively high PM emissions. Fugitive dust generated by construction activities is also a source of PM. Gasoline engines produce relatively high levels of CO. Since USEPA mandates the use of ultra-low sulfur diesel (ULSD) fuel for all highway and non-road diesel engines, SO_x emitted from the Project's construction activities would be negligible. Therefore, the pollutants to be analyzed for the construction period are PM₁₀, PM_{2.5}, and CO. The analysis of potential construction air quality effects includes both on-site and on-road sources of air emissions, where applicable.

ON-SITE CONSTRUCTION ACTIVITY ASSESSMENT

The Martin Luther King, Jr. East (MLK, Jr. East) area was selected for the on-site air quality analysis because of the proximity of construction activities to a number of sensitive receptor locations there, including the Dr. King Elementary School, the State University of New York College of Environmental Science and Forestry, the Tucker Missionary Baptist Church, and several residential buildings (see **Figure G-12**). This location represents a reasonable-worst case scenario for the analysis. The dispersion analysis included modeling of the worst-case annual and short-term (i.e., 24-hour, 8-hour, and 1-hour) averaging periods. Other areas in the project corridor were not modeled but are discussed qualitatively, based on the reasonable worst-case analysis results.

Engine Emissions

The sizes, types, and number of units of construction equipment were estimated based on the construction activity schedule developed for the Project (see **Chapter 4, Construction Means and Methods**). Emission factors for CO, PM₁₀, and PM_{2.5} from on-site construction engines were developed using USEPA's NONROAD2008 emission model (NONROAD).⁷ Emission rates from truck engines were developed using the MOVES2014a emission model. Emission rates for the daily and annual periods were estimated by multiplying peak emissions factors by daily and annual usage factors.

On-Site Fugitive Dust

In addition to engine emissions, fugitive dust emissions from operations (e.g., excavation and transferring of excavated materials into dump trucks) were calculated based on USEPA procedures in AP-42 Table 13.2.3-1.⁸ In accordance with the NYSDOT Engineering Instruction 17-006, §107-11 Air Quality Protection, a dust control plan would be implemented during the construction of the project. Measures that could be included in a dust control plan include requiring trucks that are hauling loose material to be equipped with tight-fitting tailgates and have their loads securely covered prior to leaving the project site; and the use of water sprays for demolition, excavation, and transfer of soils

⁷ <https://www.epa.gov/moves/nonroad-model-nonroad-engines-equipment-and-vehicles> – “NONROAD2008 has been incorporated into MOVES2014 and MOVES2014a. USEPA recommends using MOVES2014a if you are having problems installing or using NONROAD2008 on newer operating systems.”

⁸ EPA Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: *Stationary Point and Area Sources*, Section 1.3, Table 1.3-1.

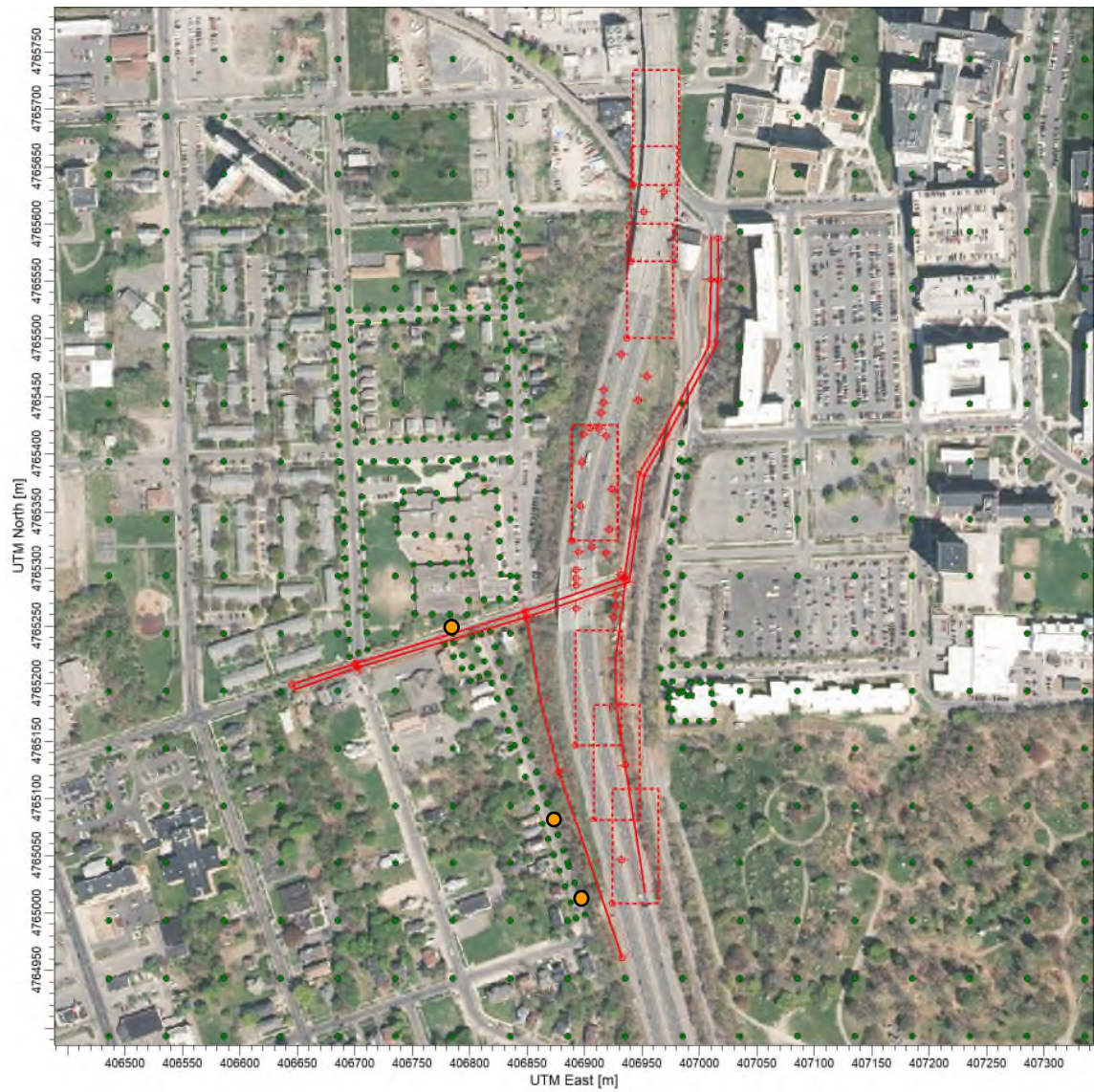


Figure G-12
Source & Receptor Diagram—Construction

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to ensure that materials would be dampened as necessary to avoid the suspension of dust into the air. These measures would effectively reduce PM emissions from dust-generating construction activities.

Dispersion Modeling

Potential effects from construction sources were evaluated using the USEPA/AMS AERMOD dispersion model. AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain and includes updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and handling of terrain interactions.

Source Simulation

As discussed above, the MLK, Jr. East area was selected for the on-site air quality analysis because of the proximity of construction activities to several sensitive receptor locations. For short-term model scenarios (predicting concentration averages for periods of 24 hours or less), all stationary sources, such as cranes or concrete trucks, which idle in a single location while unloading, were simulated as point sources. Other engines, such as excavators that move around the site on any given day, were simulated as area sources. For periods of eight hours or less (less than the length of a shift), it was assumed that all engines would be active simultaneously. All sources would move around the site throughout the year and were therefore simulated as area sources in the annual analysis. Sources were assumed to be operating during a typical 8-hour construction workday (i.e., from 7 AM to 3 PM) and 5 days per week in the dispersion model, consistent with the assumption presented in **Chapter 4, Construction Means and Methods**.

Background Concentrations

To estimate the maximum expected total pollutant concentrations, the calculated concentrations from the emission sources were added to a background value that accounts for existing pollutant concentrations from other sources. The background levels are based on concentrations monitored at the nearest ambient air monitoring stations (see **Table G-3**).

Table G-3
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Averaging Period	Concentration
PM _{2.5}	East Syracuse, Onondaga	24-hour	13.5 µg/m ³
		Annual	5.6 µg/m ³
PM ₁₀	Rochester 2, Monroe	24-hour	33.0 µg/m ³
CO	Rochester Near Road, Monroe	1-hour	1.6 ppm
		8-hour	0.7 ppm
Source: NYSDEC, New York State Ambient Air Quality Report (2014–2018).			

Meteorological Data

The meteorological data set consisted of five consecutive years of latest available meteorological data: surface data collected at the nearest representative National Weather Service Station (Syracuse Hancock International Airport) from 2011 to 2015 and concurrent upper air data collected at Albany, NY, the nearest upper air monitoring station. The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period.

These data were processed using the USEPA AERMET program to develop data in a format that could be readily processed by the AERMOD model.

Receptor Locations

Receptors were placed at locations that would be publicly accessible, at residential and other sensitive uses, such as schools, at both a ground-level pedestrian height of 1.8 meters, and elevated locations at a height of 6.1 meters (e.g., windows of residences) with a minimum distance of 2.1 meters from emission sources (i.e., roadways and areas of construction) at each analysis location. In addition, a ground-level receptor grid extending one kilometer from the construction sources was established.

Analysis Year

The highest emissions were predicted for 2018 when demolition, superstructure, and earthworks activities would overlap and that there would be an increasing percentage of in-use newer and cleaner vehicles and engines for construction in future years.

CONSTRUCTION-RELATED TRAFFIC DIVERSIONS

During construction of the Project, various connectors and ramps are expected to be closed at times. A shift in the traveling pattern due to temporary ramp and highway closures would increase traffic volumes at some local intersections, potentially increasing pollutant concentrations at those locations. Therefore, microscale analyses were performed to assess the effect of the traffic diversion on air quality.

Potential air quality effects associated with the traffic diversions that are expected to occur during construction activities were analyzed for PM₁₀ and PM_{2.5} at MLK, Jr. East at the southbound I-81 on-ramp and MLK, Jr. East at the northbound I-81 off-ramp due the highest projected volume increase expected at this ramp location (see **Figure G-12**). The proximity to sensitive receptors at this location was also considered. Traffic diversions were analyzed for Phase 3 (see **Chapter 4, Construction Means and Methods**), during the closure of I-81 between MLK, Jr. East and Butternut Street. Additionally, construction activities would generate both worker automobile trips and construction truck trips.

COMBINED IMPACT

Since emissions from both on-site construction equipment and construction-related traffic diversion may contribute to concentrations concurrently at the same location, the combined effect was assessed where applicable. Roadway links were added to the construction AERMOD dispersion model alongside the on-site construction sources. Traffic conditions, volumes, and roadway locations from the mobile source analysis of construction-related traffic diversions were used for the combined modeling and were assumed to occur throughout the construction period.

D. EXISTING CONDITIONS

Pollutant levels measured at area monitoring stations are used to characterize existing conditions. Concentrations of relevant regulated pollutants at monitoring stations closest to the project area are shown in **Table G-4**. These values are the most recent data available at the time the analyses for this Project were undertaken, and are consistent with the background conditions used in the future conditions analyses (see below). As shown in the table, the monitored levels do not exceed the NAAQS.

Table G-4
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	Rochester Near Road, Monroe	ppm	1-hour	1.6	35
			8-hour	0.7	9
SO ₂	East Syracuse, Onondaga	ppb	1-hour ⁽¹⁾	2.33	75
			3-hour ⁽²⁾	10.2	500
PM ₁₀	Rochester 2, Monroe	µg/m ³	24-hour	33.0	150
PM _{2.5}	East Syracuse, Onondaga	µg/m ³	24-hour ⁽³⁾	13.5	35
			Annual	5.6	12
NO ₂	Buffalo, Erie	ppb	1-hour ⁽⁴⁾	49.20	100
			Annual	9.81	53
Lead	Rochester 2, Monroe	µg/m ³	3-month	0.004	0.15
Ozone	East Syracuse, Onondaga	ppm	8-hour	0.065	0.070

Notes:
⁽¹⁾ The 1-hour value is based on a three-year average (2016–2018) of the 99th percentile of daily maximum 1-hour average concentrations. USEPA replaced the 24-hr and the annual standards with the 1-hour standard.
⁽²⁾ The 3-hour value is based on the maximum three-hour average concentration in 2011–2012, the latest years of reported 3-hour concentrations.
⁽³⁾ The 24-hour value is based on a three-year average (2016–2018) of the 98th percentile of 24-hour average concentrations.
⁽⁴⁾ The 1-hour value is based on a three-year average (2014–2018) of the 98th percentile of daily maximum 1-hour average concentrations.
Source: NYSDEC, New York State Ambient Air Quality Report (2014–2018).

E. NO BUILD ALTERNATIVE

Under the No Build Alternative, the existing roadways would remain with only routine maintenance and minor repairs. No new roadways or associated supporting infrastructure would be constructed. Emissions would continue to be emitted from existing sources including on-road emissions in the project area. Construction emissions associated with the project would not occur, but emissions associated with maintenance of aging roadway facilities would increase. An assessment of the No Build Alternative was performed for comparison to the Viaduct and Community Grid Alternatives.

F. VIADUCT ALTERNATIVE

MICROSCALE ANALYSIS

CO MICROSCALE SCREENING ANALYSIS

LOS Screening Analysis

Based on the review of the intersections analyzed for the Transportation analysis (see **Chapter 5, Transportation and Engineering Considerations**), 24 and 19 intersections were projected to operate at a LOS D or worse during one or both of the peak traffic periods analyzed in the 2026 and 2056 analysis years, respectively.

Capture Criteria Screening Analysis

The capture criteria screening analysis indicated that there would be a 10 percent or more increase in traffic volume or 20 percent or more decrease in speed on affected roadways for the Viaduct Alternative at 24 and 19 of the intersections for the two analysis years, respectively, requiring a Volume Threshold Screening analysis at these locations.

Volume Threshold Screening

The results of the LOS screening, capture criteria, and volume threshold screening analyses are included as an attachment to this appendix. The highest Build peak hour traffic volume at these locations was projected to be 1,807 at the northbound approach of Almond Street and Harrison Street, which is below the Volume Threshold criteria of 3,800 vehicles in the peak hour. This was determined by comparing the associated emission factor of 8.65 grams per mile (cruise emission factor) and 9.77 grams per hour (idle emission factor), developed from MOVES2014a based on speed and vehicle mix, to Table 3C of the TEM. Therefore, a CO microscale dispersion modeling was not warranted for all of the intersections for the Viaduct Alternative. The Viaduct Alternative would not increase traffic volumes, reduce source-receptor distances, or change other existing conditions to such a degree as to jeopardize attainment of the CO NAAQS.

PARTICULATE MATTER (PM) MICROSCALE ANALYSIS

PM concentrations for the critical analysis year 2026 would be below the NAAQS at all analysis sites. Due to improved speeds at Site 1, the maximum concentration at this site is projected to decrease when compared with the No Build Alternative. The receptor locations where maximum predicted concentrations are anticipated to occur are identified in **Figures G-1 through G-11**. While specific locations vary by time period and pollutant, the maximum predicted concentrations generally occur at an intersection of roadways where the effects of both roadways would be observed.

Table G-5
PM_{2.5} and PM₁₀ Maximum Predicted Concentrations at Analysis Sites (µg/m³)

Analysis Site	Pollutant	Averaging Period	No Build Total Concentration	Viaduct Alternative Total Concentration	NAAQS
Site 1: Crouse Avenue and Burnet Avenue to Crouse Avenue and Erie Boulevard	PM ₁₀	24-Hour	43.0	40.5	150
		Annual	5.9	5.9	12
	PM _{2.5}	24-Hour	14.5	14.4	35
Site 2: N. West Street and W. Genesee Street	PM ₁₀	24-Hour	42.7	42.0	150
		Annual	6.3	6.0	12
	PM _{2.5}	24-Hour	14.8	14.9	35
Site 3: Almond Street and Harrison Street	PM ₁₀	24-Hour	82.7	92.4	150
		Annual	16.7	17.6	35
	PM _{2.5}	24-Hour	16.7	17.6	35
Notes:					
PM ₁₀ background concentration, 36.5 µg/m ³ , was based on 2014–2016 data at the Rochester 2 monitoring station.					
PM _{2.5} background concentrations for 24-hour and annual PM _{2.5} (14.3 and 6.1 µg/m ³ , respectively) were based on 2014–2016 data at the East Syracuse monitoring station.					

MESOSCALE ANALYSIS

A mesoscale emissions analysis for CO, VOC, NO_x, and PM was conducted in accordance with TEM using the USEPA mobile source emissions model, MOVES2014a, and the results of the regional traffic modeling conducted for the Viaduct Alternative. The study area used for the regional traffic modeling, which includes a network of interstate segments, ramp connections, and intersections that span the county and incorporate planned transportation projects in the No Build Alternative and the Viaduct Alternative, was used as the study area for the mesoscale analysis (see **Chapter 5, Transportation and Engineering Considerations for traffic information**). The modeled roadways consist of the area where a shift in local traffic using alternate routes could occur as a result of the reconstruction or removal of the I-81 viaduct. The modeled traffic network extents are shown in **Figure 1 of Appendix C-2**. The mesoscale analysis was conducted for the analysis years 2026 and

2056. The mesoscale analysis used estimated annual vehicle miles traveled (VMT) by vehicle type and speed-based emission rates by link that were specific to each alternative.

The projected vehicle miles traveled (VMT) and the mesoscale emissions associated with traffic conditions under the Viaduct Alternative are shown in **Table G-6**. As described in **Chapter 5, Transportation and Engineering Considerations**, traffic volumes in the Viaduct Alternative would be higher on I-81 compared with the No Build condition because additional traffic would be attracted to I-81 in response to improvements introduced under the Viaduct Alternative. Shifts in traffic volumes would occur between local streets and parallel highway segments, due to the operational improvements, new interconnect ramps between routes, and changes to existing ramps.

Table G-6
Criteria Pollutant Emissions in the No Build and Viaduct Alternatives

Analysis Year	Alternative	Annual VMT	Tons per Year				
			CO	NO _x	VOC	PM ₁₀	PM _{2.5}
2026	No Build	3,796,753,177	12,033.6	1,746.5	340.2	95.6	255.3
	Viaduct	3,789,038,105	10,892.9	1,576.0	280.6	79.8	190.4
	Difference	1,284,928 (0.03%)	-1,140.6 (-9%)	-170.6 (-10%)	-59.6 (-18%)	-15.8 (-17%)	-64.9 (-25%)
2056	No Build	3,988,571,639	3,873.2	352.9	113.7	33.0	193.0
	Viaduct	3,997,227,337	3,576.7	306.4	90.5	24.3	133.3
	Difference	8,655,698 (0.22%)	-296.5 (-8%)	-46.5 (-13%)	-23.2 (-20%)	-8.7 (-26%)	-59.7 (-31%)

Compared to the No Build Alternative, in all analysis years, the Viaduct Alternative would result in lower emissions of all other modeled criteria pollutants. The improvements in travel speed and the predicted shift in traffic between roadway and the associated traffic conditions would result in a percent decrease in annual emissions between the No Build and Viaduct Alternative much larger than the percent increase in VMT. Total emissions in 2056 would also be substantially lower than emissions in earlier years due to continued turnover of the fleet to lower emissions vehicles.

The regional emissions would decrease overall for all of the pollutants analyzed from transportation sources. The changes in emissions between the No Build and the Viaduct Alternatives are driven by three inputs—slight increases in annual VMT, changes to traffic conditions between the alternatives (i.e., travel speed, and vehicle classification) on individual road segments, and the analysis year which (would determine fleet-wide average per vehicle-mile emission rates for both Alternatives). In all analysis years, the improvements in travel speed and the predicted shift in traffic between roadway and the associated traffic conditions would result in a percent decrease in annual emissions between the No Build and Viaduct Alternative much larger than the percent increase in VMT.

MOBILE SOURCE AIR TOXICS (MSATS) ANALYSIS

FHWA's updated interim guidance⁹ includes a tiered approach for addressing MSATs for the purpose of NEPA. According to this guidance, design-year AADT projections less than 140,000 to 150,000 are considered to have low potential for MSAT effects and qualitative assessments are recommended. Since the purpose of the I-81 Viaduct Project is, in part, to address structural and operational deficiencies and improve access and connections within and through the I-81 corridor of the Project

⁹ FHWA. *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*,
https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat

Area (see **Chapter 1, Introduction**, for full project purpose), the overall increase in traffic volumes is not expected to be substantial, with additional traffic on I-81 but a decrease in traffic on some local streets and parallel routes. However, the highest forecasted AADT in study area for the Viaduct Alternative is 99,533 (see **Appendix C-4, Attachment C**; I-81: Segment 11) is well below the FHWA criteria for a quantitative analysis. Therefore, a qualitative assessment was conducted for this Project, in accordance with FHWA's guidance.

MSAT emissions would be proportional to the VMT of the No Build and Viaduct Alternatives for a given year when variables such as fleet mix remain similar for each alternative. Since the estimated VMT under the No Build and Viaduct Alternatives varies by less than 1 percent for both the ETC year 2026 and 2056 (ETC+30), as shown in Table 6-4-4-5, it is expected there would be no appreciable difference in overall MSAT emissions among the alternatives in either analysis year. In locations where traffic volumes are predicted to increase or where new, expanded, or elevated roadway sections would be located closer to nearby residences, schools, and businesses, there may be localized areas of increased ambient concentrations of MSATs. The Viaduct Alternative would locate roadway segments closer to sensitive receptors adjacent to the segment of southbound I-81 between the entrance ramp from I-690 and Harrison Street when compared to the No Build Alternative. Under both alternatives, overall future MSAT emissions are expected to be substantially lower than under existing conditions due to implementation of USEPA's vehicle and fuel regulations.

In general, 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 set of highway alternatives. 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 MSATs. 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)¹⁰, which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects." 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 MSATs, 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 concentrations¹¹ or in the future as vehicle emissions substantially decrease.

¹⁰ USEPA. Integrated Risk Information System "<https://www.epa.gov/iris>"

¹¹ Health Effects Institute. Special Report 16, "<https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects>"

Appendix G: Air Quality

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 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.

Furthermore, 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.¹² 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. 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.”¹³

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.¹⁴

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

¹² Health Effects Institute. Special Report 16, “<https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects>”

¹³ EPA IRIS database, Diesel Engine Exhaust, Section II.C, “https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0642.htm#quainhal”

¹⁴ [https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/\\$file/07-1053-1120274.pdf](https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/$file/07-1053-1120274.pdf)

benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

CONSTRUCTION EFFECTS

Emissions from on-site construction equipment, on-road construction-related vehicles, diverted traffic during construction, and dust-generating construction activities have the potential to affect air quality. The potential effects of these activities on air quality are discussed in this section.

Construction of the Viaduct Alternative is anticipated to take six years to complete. An analysis was conducted to assess the effects of on-site construction activities on the surrounding community. Based on the CO screening methodologies used for the operational traffic analysis, it was determined that a microscale air quality analysis for CO is not warranted. However, to address concerns expressed from the public regarding PM air quality in the vicinity of I-81 during construction, a microscale detour traffic analysis was conducted. Traffic would be disrupted during the construction period, but detours/diversions are not expected to last more than three weeks in any one location (see **Chapter 4, Construction Means and Methods**). Therefore, in accordance with the NYSDOT's TEM, a mesoscale emissions analysis for construction traffic detours/diversions is not warranted.

ON-SITE CONSTRUCTION ACTIVITY

In general, much of the heavy equipment used in construction is powered by diesel engines that have the potential to produce relatively high PM emissions. Fugitive dust generated by construction activities is also a source of PM. In addition, gasoline engines produce relatively high levels of CO. Since USEPA mandates the use of ultra-low sulfur diesel (ULSD) fuel for all highway and non-road diesel engines,¹⁵ SO₂ emitted from the Project's construction activities would be negligible. Therefore, the three primary air pollutants of concern for construction activities are PM₁₀, PM_{2.5}, and CO.

The Martin Luther King, Jr. East (MLK, Jr. East, formerly East Castle Street) area was selected for the on-site air quality analysis because of the proximity of construction activities to a number of sensitive receptor locations there, including the Dr. King Elementary School, the State University of New York College of Environmental Science and Forestry, the Tucker Missionary Baptist Church, and a number of residential buildings. This location therefore represents a reasonable worst-case scenario for the analysis. The dispersion analysis included modeling of the worst-case annual and short-term (i.e., 24-hour, 8-hour, and 1-hour) averaging periods. Other areas in the Project corridor were not modeled, but are discussed qualitatively, based on the reasonable worst-case analysis results.

The following are the key factors and assumptions used for this analysis:

- **Engine Emissions:** The sizes, types, and number of units of construction equipment were estimated based on the construction activity schedule anticipated for the Project (see **Chapter 4, Construction Means and Methods**). Emission factors for CO, PM₁₀, and PM_{2.5} from on-site construction engines were developed using the USEPA NONROAD2008 emission model (NONROAD).¹⁶ Emission rates from truck engines were developed using the MOVES2014a emission model.

¹⁵ USEPA required a major reduction in the sulfur content of diesel fuel intended for use in locomotive, marine, and non-road engines and equipment, including construction equipment. As of 2015, the diesel fuel produced by all large refiners, small refiners, and importers must be ULSD fuel. Levels in non-road diesel fuel are limited to a maximum of 15 parts per million.

¹⁶ <https://www.epa.gov/moves/nonroad-model-nonroad-engines-equipment-and-vehicles>
"NONROAD2008 has been incorporated into MOVES2014 and MOVES2014a. USEPA recommends

- **On-site Fugitive Dust:** In addition to engine emissions, fugitive dust emissions from operations (e.g., excavation and transferring of excavated materials into dump trucks) were calculated based on USEPA procedures in AP-42 Table 13.2.3-1.¹⁷ In accordance with NYSDOT specifications in order to minimize and mitigate the adverse effects of construction activities on the community, it will be required (see **Table 4-7 of Chapter 4, Construction Means and Methods**) that a dust control plan would be developed by the contractor and implemented during the construction of the Project. Measures that could be included in a dust control plan include requiring trucks that are hauling loose material to be equipped with tight-fitting tailgates and have their loads securely covered prior to leaving the Project site and the use of water sprays for demolition, excavation, and transfer of soils to ensure that materials would be dampened as necessary to avoid the suspension of dust into the air. These measures would effectively reduce PM emissions from dust-generating construction activities.
- **Dispersion Modeling:** Potential effects from construction sources were evaluated using the USEPA/AMS AERMOD, a refined dispersion model. AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrains, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain and includes updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and handling of terrain interactions.
- **Source Simulation:** As discussed above, the MLK, Jr. East area was selected for the on-site air quality analysis because of the proximity of construction activities to a number of sensitive receptor locations. For short-term model scenarios (predicting concentration averages for periods of 24 hours or less), all stationary sources, such as cranes and pile hammers, which idle in a single location while unloading, were simulated as point sources. Point sources were conservatively modeled at a single location throughout the year to capture the maximum potential short-term concentrations. Other engines, such as excavators and loaders that would move around the site on any given day, were simulated as area sources. For periods of eight hours or less, it was assumed that all engines would be active simultaneously. All sources are anticipated to move around the site throughout the year and were therefore simulated as area sources in the annual analysis. Sources were assumed to be operating during a typical 8-hour construction workday (i.e., from 7 AM to 3 PM) in the dispersion model, consistent with the assumption presented in **Chapter 4, Construction Means and Methods**.
- **Meteorological Data:** The meteorological data set consisted of five consecutive years of latest available meteorological data: surface data collected at the nearest representative National Weather Service Station (Syracuse Hancock International Airport) from 2011 to 2015 and concurrent upper air data collected at Albany, NY, the nearest upper air monitoring station. The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period. These data were processed using the USEPA AERMET program to develop data in a format that could be readily processed by the AERMOD model.
- **Background Concentrations:** To estimate the maximum expected total pollutant concentrations, the calculated concentrations from the construction emission sources were added

using MOVES2014a if you are having problems installing or using NONROAD2008 on newer operating systems.”

¹⁷ USEPA Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Section 1.3, Table 1.3-1.

to a background value that accounts for existing pollutant concentrations from other sources. The background levels are based on concentrations monitored at the nearest ambient air monitoring stations (see **Table G-2**).

- **Receptor Locations:** Receptors were placed at locations that would be publicly accessible, at residential and other sensitive uses, such as schools, at both ground-level and elevated locations (e.g., windows of residences). In addition, a ground-level receptor grid extending one kilometer from the construction sources was established.
- **Analysis Year:** The highest emissions were predicted for 2018 when demolition, superstructure, and earthworks activities would overlap. There would be an increasing percentage of in-use newer and cleaner vehicles and engines for construction in future years.

Maximum predicted concentrations (including background) from peak construction activities under the Viaduct Alternative are presented in **Table G-7**. As shown, total maximum concentrations from the on-site sources are predicted to be lower than the corresponding NAAQS for PM_{2.5}, PM₁₀, and CO. The modeled results for the 2018 analysis year are based on construction activities at the reasonable worst-case location in the MLK, Jr. East area where sensitive receptor locations are near on-site construction activities. Lower concentration increments from construction would be expected at other locations in the study area since activities would generally be located farther away from sensitive receptor locations.

Table G-7
Maximum Predicted Pollutant Concentrations from
On-Site Construction Activity for the Viaduct Alternative

Pollutant	Averaging Period	Background	Concentration Increment from On-Site Construction Activity	Total	NAAQS
PM _{2.5}	24-hour	13.5 µg/m ³	4.9 µg/m ³	18.4 µg/m ³	35 µg/m ³
	Annual	5.6 µg/m ³	0.3 µg/m ³	5.9 µg/m ³	12 µg/m ³
PM ₁₀	24-hour	33.0 µg/m ³	5.2 µg/m ³	38.2 µg/m ³	150 µg/m ³
CO	1-hour	1.6 ppm	10.5 ppm	12 ppm	35 ppm
	8-hour	0.7 ppm	2.6 ppm	3.3 ppm	9 ppm
Notes: PM ₁₀ and CO background concentrations were based on 2014–2016 data at the Rochester 2 monitoring station. PM _{2.5} background concentrations for 24-hour and annual PM _{2.5} were based on 2014–2016 data at the East Syracuse monitoring station.					

COMBINED EFFECT

Since emissions from both on-site construction equipment and construction-related traffic diversions may contribute to concentrations concurrently at the same location, the combined effect was assessed where applicable. Roadway links were added to the construction AERMOD dispersion model alongside the on-site construction sources. Traffic conditions, volumes, and roadway locations from the mobile source analysis of construction-related traffic diversions were used for the combined modeling and were assumed to occur throughout the construction period.

The receptor locations where maximum predicted concentrations are anticipated to occur are identified in **Figure G-12**. While specific locations vary by time period and pollutant, the maximum predicted concentrations generally occur to the west of the modeled construction site and along the nearby roadways. As presented in **Table G-8**, total maximum concentrations from the on-site sources and traffic diversions including background concentrations are projected to be lower than the

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corresponding NAAQS for PM_{2.5} and PM₁₀. Therefore, construction under the Viaduct Alternative would not be anticipated to result in substantial air quality effects.

Table G-8

Maximum Combined Concentrations from On-Site Construction Activity and Traffic Diversions during Construction for the Viaduct Alternative (µg/m³)

Pollutant	Averaging Period	Background	On-Site Construction Activity Contribution ¹	Mobile Sources Contribution ¹	Total	NAAQS
PM _{2.5}	24-hour	13.5	4.9	1.5	19.9	35
	Annual	5.6	0.3	0.4	6.3	12
PM ₁₀	24-hour	33	5.2	8.8	47.0	150

Notes:
¹ The values shown are the contributions that are predicted to occur at the receptor of maximum total concentration. PM₁₀ background concentration, 36.5 µg/m³, was based on 2016–2018 data at the Rochester 2 monitoring station. PM_{2.5} background concentrations for 24-hour and annual PM_{2.5} (14.3 and 6.1 µg/m³, respectively) were based on 2016–2018 data at the East Syracuse monitoring station.

G. COMMUNITY GRID ALTERNATIVE

MICROSCALE ANALYSIS

CO MICROSCALE SCREENING ANALYSIS

LOS Screening Analysis

Based on the review of the intersections analyzed for the Transportation analysis, 27 and 22 intersections were projected to operate at a LOS D or worse during one or both of the peak traffic periods analyzed in the 2026 and 2056 analysis years, respectively.

Capture Criteria Screening Analysis

The LOS screening analysis indicated that there would be a 10 percent or more increase in traffic volume or a 20 percent or more decrease in speed on affected roadways for the Community Grid Alternative at 27 and 22 of the intersections for the three analysis years, respectively, requiring a Volume Threshold Screening analysis at these locations.

Volume Threshold Screening

The results of the LOS Screening, Capture Criteria, and Volume Threshold screening analyses are included as an attachment to this appendix. The highest peak hour traffic volume at these locations was projected to be 1,491 at the northbound approach of Genesee Street and Highbridge Rd, which is below the Volume Threshold criteria of 4,000 vehicles in the peak hour. This was determined by comparing the associated emission factor of 5.63 grams per mile (cruise emission factor) and 9.77 grams per hour (idle emission factor), developed from MOVES2014a based on speed and vehicle mix, to Table 3C of the TEM. Therefore, a CO microscale dispersion modeling was not warranted for all of the intersections for the Community Grid Alternative. The Community Grid Alternative would not increase traffic volumes, reduce source-receptor distances, or change other existing conditions to such a degree as to jeopardize attainment of the CO NAAQS.

PARTICULATE MATTER (PM) MICROSCALE ANALYSIS

With the Community Grid Alternative, PM concentrations in the critical analysis year of 2026 would be below the NAAQS at all analysis sites. Furthermore, due to the shift in roadway geometry as well as the removal of the I-81 viaduct, concentrations at Site 3 are projected to decrease when compared with the No Build Alternative. The receptor locations where maximum predicted concentrations are anticipated to occur are identified in **Figures G-1** through **G-11**. While specific locations vary by time period and pollutant, the maximum predicted concentrations generally occur at an intersection of roadways where the effects of both roadways would be observed.

Table G-9

PM_{2.5} and PM₁₀ Maximum Predicted Concentrations at Analysis Sites (µg/m³)

Analysis Site	Pollutant	Averaging Period	No Build Total Concentration	Community Grid Alternative Total Concentration	NAAQS
Site 1: Crouse Avenue and Burnet Avenue to Crouse Avenue and Erie Boulevard	PM ₁₀	24-Hour	43.0	44.7	150
	PM _{2.5}	24-Hour	14.5	15.3	35
		Annual	5.9	6.2	12
Site 2: N. West Street and W. Genesee Street	PM ₁₀	24-Hour	42.7	45.5	150
	PM _{2.5}	24-Hour	14.8	15.4	35
		Annual	6.3	6.1	12
Site 3: Almond Street and Harrison Street	PM ₁₀	24-Hour	82.7	58.6	150
	PM _{2.5}	24-Hour	16.7	14.6	35
		Annual	6.6	6.0	12
Site 4: State Street and Erie Boulevard	PM ₁₀	24-Hour	46.0	46.4	150
	PM _{2.5}	24-Hour	15.5	15.2	35
		Annual	6.2	6.1	12
Notes: PM ₁₀ background concentration, 33 µg/m ³ , was based on 2016–2018 data at the Rochester 2 monitoring station. PM _{2.5} background concentrations for 24-hour and annual PM _{2.5} (13.5 and 5.6 µg/m ³ , respectively) were based on 2016–2018 data at the East Syracuse monitoring station.					

MESOSCALE ANALYSIS

A mesoscale emissions analysis for CO, VOC, NO_x, and PM was conducted in accordance with the TEM using the USEPA mobile source emissions model, MOVES2014a, and the results of the regional traffic modeling conducted for the Community Grid Alternative. The study area used for the traffic modeling was used as the study area for the mesoscale analysis. This area includes a county-wide network of interstate segments, ramp connections, and intersections that incorporate planned transportation projects in the No Build Alternative and the Community Grid Alternative (see **Chapter 5, Transportation and Engineering Considerations for traffic information**). The modeled roadways consist of the area where a shift in local traffic using alternate routes could occur as a result of the reconstruction or removal of the I-81 viaduct. The modeled traffic network extents are shown in **Figure 1 of Appendix C-2**. The mesoscale analysis was conducted for the analysis years 2026 estimated time of completion (ETC) and 2056 (ETC+30). The mesoscale analysis used estimated annual VMT by vehicle type and speed-based emission rates by link that were specific to each alternative.

The mesoscale emissions associated with traffic conditions under the Community Grid Alternative are shown in **Table G-10**. Compared to the No Build Alternative, in all analysis years, the Community Grid Alternative would result in lower emissions of all modeled criteria pollutants. Furthermore, total emissions in 2056 would also be substantially lower than emissions in earlier years due to continued turnover of fleet to lower emissions vehicles.

Table G-10

Criteria Pollutant Emissions in the No Build and Community Grid Alternatives

Analysis Year	Alternative	Annual VMT	Tons per Year				
			CO	NO _x	VOC	PM ₁₀	PM _{2.5}
2026	No Build	3,796,753,177	12,033.6	1,746.5	340.2	95.6	255.3
	Community Grid	3,792,590,133	10,788.4	1,568.4	291.2	79.5	191.8
	Difference	-4,163,044 (-0.11%)	-1,245.1 (-10%)	-178.1 (-10%)	-49.0 (-14%)	-16.1 (-17%)	-63.5 (-25%)
2056	No Build	3,988,571,639	3,873.2	352.9	113.7	33.0	193.0
	Community Grid	3,982,887,754	3,595.7	305.4	92.8	24.8	137.3
	Difference	-5,683,886 (-0.14%)	-277.5 (-7%)	-47.5 (-13%)	-20.9 (-18%)	-8.2 (-25%)	-55.8 (-29%)

Regional emissions would result in an overall decrease from transportation sources for all of the pollutants analyzed. The changes in emissions between the No Build and the Community Grid Alternatives are driven by three inputs—slight decreases in annual VMT, changes to traffic conditions between the alternatives (i.e., travel speed, and vehicle classification) on individual road segments, and the analysis year which (would determine fleet-wide average per vehicle-mile emission rates for both Alternatives). For all analysis years, the Community Grid Alternative would result in decreases in VMT, and the improvements in travel speed as well as the predicted shift in traffic between roadway and the associated traffic conditions would result in decreases in annual emissions for all pollutants analyzed.

MOBILE SOURCE AIR TOXICS (MSATS) ANALYSIS

FHWA's updated interim guidance¹⁸ includes a tiered approach for addressing MSATs for the purpose of NEPA. According to this guidance, design-year AADT projections less than 140,000 to 150,000 are considered to have low potential for MSAT effects and qualitative assessments are recommended. Since the purpose of the Project is, in part, to address structural and operational deficiencies, bring design features up to date, and improve access and connections within and through the I-81 corridor of the Project Area (see **Chapter 1, Introduction**, for full project purpose), the overall increase in traffic volumes is not expected to be substantial, with additional traffic on I-81 but a decrease in traffic on some local streets and parallel routes. The highest forecasted AADT in study area for the Community Grid Alternative is 104,717 (see **Appendix C-4, Attachment C**; I-690: Segment 5) is well below the FHWA criteria for a quantitative analysis. Therefore, a qualitative assessment was conducted, in accordance with FHWA guidance.

MSAT emissions would be proportional to the VMT of the No Build and Community Grid Alternatives for a given year when variables such as fleet mix remain similar for each alternative. Since the estimated VMT under the No Build and Community Grid Alternatives varies by approximately 0.1 percent for 2056 (ETC+30), as shown in Table 6-4-4-10, there would be no appreciable difference in overall MSAT emissions between the No Build and Community Grid Alternatives in 2056. In locations where traffic volumes are predicted to increase or re-designed roadway sections would be located closer to nearby residences, schools, and businesses, there may be localized areas of increased ambient concentrations of MSATs. The localized increases in MSAT concentrations would likely be most pronounced along the re-designated portions of I-81 and parallel routes that traffic would be

¹⁸ FHWA. *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*,
["https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat"](https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat)

Appendix G: Air Quality

diverted onto, including the additional access to University Hill and points south of the city. Under both alternatives, future MSATs are expected to be substantially lower than existing conditions due to implementation of USEPA's vehicle and fuel regulations.

In general, 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 set of highway alternatives. 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 MSATs. USEPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the IRIS¹⁹, which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects." 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 MSATs, including the 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 concentrations²⁰ 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 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.

Furthermore, 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.²¹ As a result, there is no national

¹⁹ USEPA. Integrated Risk Information System, "<https://www.epa.gov/iris>"

²⁰ Health Effects Institute. Special Report 16, "<https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects>"

²¹ Health Effects Institute. Special Report 16, "<https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects>"

consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. 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.”²²

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.²³

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.

CONSTRUCTION EFFECTS

Emissions from on-site construction equipment, on-road construction-related vehicles, diverted traffic during construction, and dust-generating construction activities have the potential to affect air quality. The potential effects of these activities on air quality are discussed in this section.

Construction of the Community Grid Alternative is anticipated to take six years to complete. An analysis was conducted to assess the effects of on-site construction activities on the surrounding community. Based on the CO screening methodologies used for the operational traffic analysis, it was determined that a microscale air quality analysis for CO is not warranted. However, to address concerns expressed from the public regarding PM air quality in the vicinity of I-81 during construction, a microscale detour traffic analysis was conducted. Traffic would be disrupted during the construction period, but detours/diversions are not expected to last more than three weeks in any one location (see **Chapter 4, Construction Means and Methods**). Therefore, in accordance with the NYSDOT’s TEM, a mesoscale emissions analysis for construction traffic detours/diversions is not warranted.

²² EPA IRIS database, Diesel Engine Exhaust, Section II.C,
“https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0642.htm#quainhal”

²³ [https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/\\$file/07-1053-1120274.pdf](https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/$file/07-1053-1120274.pdf)

Appendix G: Air Quality

ON-SITE CONSTRUCTION ACTIVITY

In general, much of the heavy equipment used in construction is powered by diesel engines that have the potential to produce relatively high PM emissions. Fugitive dust generated by construction activities is also a source of PM. In addition, gasoline engines produce relatively high levels of CO. Since USEPA mandates the use of ultra-low sulfur diesel (ULSD) fuel for all highway and non-road diesel engines,²⁴ SO₂ emitted from the Project's construction activities would be negligible. Therefore, the three primary air pollutants of concern for construction activities are PM₁₀, PM_{2.5}, and CO.

The Martin Luther King, Jr. East (MLK, Jr. East, formerly East Castle Street) area was selected for the on-site air quality analysis because of the proximity of construction activities to several sensitive receptor locations there, including the Dr. King Elementary School, the State University of New York College of Environmental Science and Forestry, the Tucker Missionary Baptist Church, and a number of residential buildings. This location therefore represents a reasonable worst-case scenario for the analysis. The dispersion analysis included modeling of the worst-case annual and short-term (i.e., 24-hour, 8-hour, and 1-hour) averaging periods. Other areas in the Project corridor were not modeled, but are discussed qualitatively, based on the reasonable worst-case analysis results.

Maximum predicted concentrations (including background) from peak construction activities under the Community Grid Alternative are presented in **Table G-12**. As shown, total maximum concentrations from the on-site sources are predicted to be lower than the corresponding NAAQS for PM_{2.5}, PM₁₀, and CO. The modeled results for the 2018 analysis year are based on construction activities at the reasonable worst-case location in the MLK, Jr. East area where sensitive receptor locations are near on-site construction activities. Lower concentration increments from construction would be expected at other locations in the study area since activities would generally be located farther away from sensitive receptor locations.

Table G-11

**Maximum Predicted Pollutant Concentrations from
On-Site Construction Activity for the Community Grid Alternative**

Pollutant	Averaging Period	Background	Concentration Increment from On-Site Construction Activity	Total	NAAQS
PM _{2.5}	24-hour	13.5 µg/m ³	4.1 µg/m ³	17.6 µg/m ³	35 µg/m ³
	Annual	5.6 µg/m ³	0.2 µg/m ³	5.8 µg/m ³	12 µg/m ³
PM ₁₀	24-hour	33.0 µg/m ³	4.3 µg/m ³	37.3 µg/m ³	150 µg/m ³
CO	1-hour	1.6 ppm	10.5 ppm	12.1 ppm	35 ppm
	8-hour	0.7 ppm	2.6 ppm	3.3 ppm	9 ppm
Notes: PM ₁₀ and CO background concentrations were based on 2016–2018 data at the Rochester 2 monitoring station. PM _{2.5} background concentrations for 24-hour and annual PM _{2.5} were based on 2016–2018 data at the East Syracuse monitoring station.					

COMBINED EFFECT

Since emissions from both on-site construction equipment and construction-related traffic diversions may contribute to concentrations concurrently at the same location, the combined effect was assessed

²⁴ USEPA required a major reduction in the sulfur content of diesel fuel intended for use in locomotive, marine, and non-road engines and equipment, including construction equipment. As of 2015, the diesel fuel produced by all large refiners, small refiners, and importers must be ULSD fuel. Levels in non-road diesel fuel are limited to a maximum of 15 parts per million.

where applicable. Roadway links were added to the construction AERMOD dispersion model alongside the on-site construction sources. Traffic conditions, volumes, and roadway locations from the mobile source analysis of construction-related traffic diversions were used for the combined modeling and were assumed to occur throughout the construction period.

The receptor locations where maximum predicted concentrations are anticipated to occur are identified in **Figure G-12**. While specific locations vary by time period and pollutant, the maximum predicted concentrations generally occur to the west of the modeled construction site and along the nearby roadways. As presented in **Table G-12**, total maximum concentrations from the on-site sources and traffic diversions including background concentrations are projected to be lower than the corresponding NAAQS for PM_{2.5} and PM₁₀. Therefore, construction under the Viaduct Alternative would not be anticipated to result in substantial air quality effects.

Table G-12

Maximum Combined Concentrations from On-Site Construction Activity and Traffic Diversions during Construction for the Community Grid Alternative ($\mu\text{g}/\text{m}^3$)

Pollutant	Averaging Period	Background	On-Site Construction Activity Contribution ¹	Mobile Sources Contribution ¹	Total	NAAQS
PM _{2.5}	24-hour	13.5	4.1	1.2	18.8	35
	Annual	5.6	0.2	0.5	6.3	12
PM ₁₀	24-hour	33.0	4.3	9.6	46.9	150

Notes:
¹ The values shown are the contributions that are predicted to occur at the receptor of maximum total concentration. PM₁₀ background concentration, 33 $\mu\text{g}/\text{m}^3$, was based on 2016–2018 data at the Rochester 2 monitoring station. PM_{2.5} background concentrations for 24-hour and annual PM_{2.5} (13.5 and 5.6 $\mu\text{g}/\text{m}^3$, respectively) were based on 2016–2018 data at the East Syracuse monitoring station.

Attachment

Table 3 - CO Screening Community Grid 2026

INTERSECTIONS WITH LOS D OR WORSE IN ANY PEAK PERIOD

Analysis Year: 2026 Intersections with LOS D or Worse	Volumes				% Change in Volume		No Build Speed		Build Speed		% Change		Volume Threshold Screening				Pass/Fail
	No Build		Community Grid										Speed	Cruise EF	Idle EF	Threshold (TEM Tables 3b/3c)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM							
Almond St & E. Washington St	298	367	455	915	53%	149%	5.27	12.49	14.11	14.24	168%	14%	14.11	3.62	9.77	4000	Pass
	27	129	461	129	1607%	0%	22.80	9.39	2.74	5.20	-88%	-45%	2.74	5.63	9.77	4000	Pass
	357	330	749	622	110%	88%	6.10	16.34	10.84	8.89	78%	-46%	8.89	4.12	9.77	4000	Pass
	108	70	85	76	-21%	9%	15.76	5.44	5.14	6.67	-67%	23%	5.14	5.63	9.77	4000	Pass
Almond St/Catherine St & NY 5/Erie Blvd E.	229	381	599	888	162%	133%	10.01	13.09	6.13	4.48	-39%	-66%	4.48	5.63	9.77	4000	Pass
	273	395	781	592	186%	50%	10.63	6.97	3.92	5.04	-63%	-28%	3.92	5.63	9.77	4000	Pass
	228	279	332	322	46%	15%	8.28	18.96	6.93	4.67	-16%	-75%	4.67	5.63	9.77	4000	Pass
	401	353	312	642	-22%	82%	18.67	13.36	3.17	3.36	-83%	-75%	3.17	5.63	9.77	4000	Pass
Comstock Av & Stratford St	565	389	639	472	13%	21%	3.70	14.50	4.14	9.67	12%	-33%	4.14	5.63	9.77	4000	Pass
	45	78	45	78	0%	0%	12.74	18.58	19.46	21.45	53%	15%	-	-	-		
	283	511	301	544	6%	6%	17.14	8.32	17.06	25.29	0%	204%	-	-	-		
	33	130	33	131	0%	1%	13.88	13.03	13.86	17.62	0%	35%	-	-	-		
Forman Av & Erie Blvd E.	19	41	7	52	-63%	27%	7.28	7.62	3.25	4.14	-55%	-46%	3.25	5.63	9.77	4000	Pass
	313	431	823	627	163%	45%	28.79	27.51	21.30	27.82	-26%	1%	21.30	3.24	9.77	4000	Pass
	363	357	556	983	53%	175%	26.85	27.82	28.05	25.46	4%	-9%	25.46	2.71	9.77	4000	Pass
N. Salina St & E./W. Willow St	206	368	297	570	44%	55%	24.43	26.53	28.42	26.06	16%	-2%	26.06	2.71	9.77	4000	Pass
	23	68	133	33	478%	-51%	5.89	13.61	12.18	24.77	107%	82%	12.18	4.12	9.77	4000	Pass
	927	555	630	567	-32%	2%	2.55	8.81	2.54	7.32	0%	-17%	-	-	-		
N. Salina St & Herald Pl	89	351	241	572	171%	63%	12.97	3.18	18.94	3.61	46%	14%	3.61	5.63	9.77	4000	Pass
	902	509	396	404	-56%	-21%	2.83	8.81	7.51	9.15	166%	4%	-	-	-		
	290	573	370	816	28%	42%	6.15	5.88	5.65	5.69	-8%	-3%	5.65	5.63	9.77	4000	Pass
N. State St & Butternut St	233	480	186	250	-20%	-48%	2.79	5.36	2.10	1.47	-25%	-73%	1.47	8.65	9.77	3800	Pass
	422	703	139	190	-67%	-73%	3.29	6.35	14.90	4.34	353%	-32%	4.34	5.63	9.77	4000	Pass
	255	163	327	219	28%	34%	3.29	4.02	2.23	2.27	-32%	-44%	2.23	8.65	9.77	3800	Pass
	251	480	178	339	-29%	-29%	2.64	4.10	3.65	2.19	38%	-47%	2.19	8.65	9.77	3800	Pass
N./S. Geddes St & Erie Blvd W.	990	868	1073	910	8%	5%	5.04	4.18	4.84	3.61	-4%	-14%	-	-	-		
	332	369	218	427	-34%	16%	7.40	7.91	5.94	5.44	-20%	-31%	5.44	5.63	9.77	4000	Pass
	425	604	653	818	54%	35%	9.15	3.16	11.67	3.68	28%	17%	3.68	5.63	9.77	4000	Pass
	455	330	470	337	3%	2%	3.18	3.86	3.23	3.55	1%	-8%	-	-	-		
NY 5/E. Genesee St/Highbridge Rd & Bridlepath Rd/Lyndon Rd	9	67	48	60	433%	-10%	5.01	4.57	4.39	4.44	-12%	-3%	4.39	5.63	9.77	4000	Pass
	1543	977	1491	903	-3%	-8%	9.50	9.12	8.90	7.09	-6%	-22%	7.09	5.63	9.77	4000	Pass
	1384	1092	1194	994	-14%	-9%	5.17	10.11	13.08	10.57	153%	5%	-	-	-		
	92	263	92	265	0%	1%	4.86	2.33	4.55	4.23	-6%	81%	-	-	-		
	1360	2963	1233	2923	-9%	-1%	29.82	9.50	35.86	20.22	20%	113%	-	-	-		
S. Geddes St & Grand Av/Shonnard St	837	551	899	627	7%	14%	15.55	24.71	10.94	21.73	-30%	-12%	10.94	4.12	9.77	4000	Pass
	1	34	2	3	100%	-91%			14.60	13.18			13.18	3.62	9.77	4000	Pass
	778	1467	827	1498	6%	2%	5.24	9.05	4.94	9.34	-6%	3%	-	-	-		
	582	454	619	452	6%	0%	13.61	5.67	10.15	5.00	-25%	-12%	5.00	5.63	9.77	4000	Pass
S. Geddes St & Marcellus St	1095	853	1153	896	5%	5%	25.85	28.25	5.12	11.07	-80%	-61%	5.12	5.63	9.77	4000	Pass
	16	72	16	71	0%	-1%	25.17	24.90	25.32	24.06	1%	-3%	-	-	-		
	810	1262	845	1338	4%	6%	24.76	26.31	24.83	25.19	0%	-4%	-	-	-		
S. Geddes St & W. Fayette St	1095	912	1148	962	5%	5%	4.86	5.82	2.59	2.45	-47%	-58%	2.45	8.65	9.77	3800	Pass
	371	1067	210	884	-43%	-17%	10.34	4.86	11.74	9.98	14%	105%	-	-	-		
	486	619	659	871	36%	41%	13.35	21.87	11.74	9.86	-12%	-55%	9.86	4.12	9.77	4000	Pass
	498	377	504	342	1%	-9%	4.48	5.49	7.59	9.01	69%	64%	-	-	-		

Table 3 - CO Screening Community Grid 2026

INTERSECTIONS WITH LOS D OR WORSE IN ANY PEAK PERIOD

Analysis Year: 2026 Intersections with LOS D or Worse	Volumes				% Change in Volume		No Build Speed		Build Speed		% Change		Volume Threshold Screening				Pass/Fail
	No Build		Community Grid										Speed	Cruise EF	Idle EF	Threshold (TEM Tables 3b/3c)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM							
S. Salina St & E./W. Adams St	451	486	603	619	34%	27%	2.33	2.54	3.37	2.54	45%	0%	2.54	5.63	9.77	4000	Pass
	35	289	106	381	203%	32%	1.35	3.32	1.46	3.45	9%	4%	1.46	8.65	9.77	3800	Pass
	353	358	361	345	2%	-4%	4.98	3.48	3.54	3.23	-29%	-7%	3.23	5.63	9.77	4000	Pass
	926	426	1024	485	11%	14%	2.84	7.46	2.75	5.48	-3%	-27%	2.75	5.63	9.77	4000	Pass
S. Salina St & Harrison St and Onondaga St	302	278	424	396	40%	42%	2.91	3.14	3.76	3.11	29%	-1%	3.11	5.63	9.77	4000	Pass
	512	643	180	654	-65%	2%	8.56	5.18	1.29	2.40	-85%	-54%	1.29	8.65	9.77	3800	Pass
	362	283	560	406	55%	43%	12.69	19.57	11.83	17.61	-7%	-10%	11.83	4.12	9.77	4000	Pass
	245	257	356	351	45%	37%	4.00	3.01	5.08	5.83	27%	94%	5.08	5.63	9.77	4000	Pass
S. Warren St & E. Water St	187	369	292	509	56%	38%	10.64	11.44	10.82	10.57	2%	-8%	10.57	4.12	9.77	4000	Pass
	602	318	581	371	-3%	17%	21.81	13.14	12.31	14.51	-44%	10%	12.31	4.12	9.77	4000	Pass
	59		91	128	54%		7.84		5.85	3.48	-25%		3.48	5.63	9.77	4000	Pass
S. Warren St & Harrison St	285	378	269	422	-6%	12%	10.21	7.05	3.93	4.53	-62%	-36%	3.93	5.63	9.77	4000	Pass
	900	720	237	685	-74%	-5%	13.43	15.51	4.14	5.30	-69%	-66%	4.14	5.63	9.77	4000	Pass
	16	7	5	7	-69%	0%	23.16	24.26	5.86	8.14	-75%	-66%	5.86	5.63	9.77	4000	Pass
			418	241					5.88	4.70			4.70	5.63	9.77	4000	Pass
Solar St & Bear St	59	384	123	427	108%	11%	1.82	3.67	1.66	3.54	-9%	-4%	1.66	8.65	9.77	3800	Pass
	716	743	898	1044	25%	41%	3.63	4.54	3.44	4.47	-5%	-2%	3.44	5.63	9.77	4000	Pass
	191	260	235	268	23%	3%	6.05	10.55	5.32	9.80	-12%	-7%	5.32	5.63	9.77	4000	Pass
	449	472	557	609	24%	29%	4.02	6.34	4.05	6.35	1%	0%	4.05	5.63	9.77	4000	Pass
Teall Av & Canal St	532	1321	505	1252	-5%	-5%	24.67	5.26	25.82	6.43	5%	22%	-	-	-		
	5	96	11	99	120%	3%	10.10	9.20		6.85	-100%	-26%	6.85	5.63	9.77	4000	Pass
	1016	845	972	840	-4%	-1%	21.70	24.25	22.64	25.61	4%	6%	-	-	-		
	52	123	19	56	-63%	-54%	24.87	19.26	25.13	25.03	1%	30%	-	-	-		
Teall Av & Erie Blvd E.	179	395	191	455	7%	15%	1.06	1.50	1.32	1.94	25%	29%	1.32	8.65	9.77	3800	Pass
	474	771	463	702	-2%	-9%	14.59	8.65	15.19	11.09	4%	28%	-	-	-		
	558	486	615	601	10%	24%	4.38	1.78	2.24	2.26	-49%	27%	2.24	8.65	9.77	3800	Pass
	286	639	193	459	-33%	-28%	25.26	14.95	27.87	20.01	10%	34%	-	-	-		
Teall Av & Lynch St	436	998	437	914	0%	-8%	27.40	5.95	28.15	8.89	3%	49%	-	-	-		
	12	36	13	36	8%	0%	12.79	2.94	12.98	4.29	1%	46%	-	-	-		
	662	496	701	631	6%	27%	27.98	27.55	27.85	27.31	0%	-1%	27.31	2.71	9.77	4000	Pass
	7	71	7	65	0%	-8%	13.23	12.41	13.24	12.45	0%	0%	-	-	-		
US 11/N. Salina St & Hiawatha Blvd E.	22	104	271	392	1132%	277%	1.23	0.96	1.46	1.40	19%	46%	1.40	8.65	9.77	3800	Pass
	106	297	127	346	20%	16%	12.86	10.98	9.70	8.59	-25%	-22%	8.59	4.12	9.77	4000	Pass
	396	734	429	753	8%	3%	5.90	2.02	3.35	2.06	-43%	2%	2.06	8.65	9.77	3800	Pass
	578	648	675	708	17%	9%	10.07	6.09	6.68	10.14	-34%	67%	6.68	5.63	9.77	4000	Pass
	1118	1239	1053	1197	-6%	-3%	11.90	4.60	6.15	3.56	-48%	-23%	3.56	5.63	9.77	4000	Pass
US 11/N. Salina St & NY 298/Court St & Alford St	353	600	366	606	4%	1%	7.78	2.90	5.17	2.99	-34%	3%	2.99	5.63	9.77	4000	Pass
	25	51	26	62	4%	22%	7.66	7.77	7.92	13.04	3%	68%	7.92	4.12	9.77	4000	Pass
	252	311	242	351	-4%	13%	5.90	5.62	5.94	5.41	1%	-4%	5.41	5.63	9.77	4000	Pass
	338	270	420	358	24%	33%	13.04	13.40	12.62	13.43	-3%	0%	12.62	3.62	9.77	4000	Pass
	224	267	114	90	-49%	-66%	8.89	8.79	6.04	6.40	-32%	-27%	6.04	5.63	9.77	4000	Pass

Table 3 - CO Screening Community Grid 2026

INTERSECTIONS WITH LOS D OR WORSE IN ANY PEAK PERIOD

Analysis Year: 2026 Intersections with LOS D or Worse	Volumes				% Change in Volume		No Build Speed		Build Speed		% Change		Volume Threshold Screening				Pass/Fail
	No Build		Community Grid										Speed	Cruise EF	Idle EF	Threshold (TEM Tables 3b/3c)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM							
US 11/S. State St & E. Water St	184	494	333	798	81%	62%	5.40	4.08	4.27	3.58	-21%	-12%	3.58	5.63	9.77	4000	Pass
	85	99	84	78	-1%	-21%	16.48	15.27	14.43	11.66	-12%	-24%	11.66	4.12	9.77	4000	Pass
	603	280	762	427	26%	53%	2.31	1.35	8.35	1.61	262%	20%	1.61	8.65	9.77	3800	Pass
	180	73	194	104	8%	42%	5.66	13.19	7.90	5.58	40%	-58%	5.58	5.63	9.77	4000	Pass
Walnut Av & E. Water St	201	245	267	339	33%	38%	17.01	13.41	15.73	6.51	-8%	-51%	6.51	5.63	9.77	4000	Pass
	20	24	17	42	-15%	75%	21.34	20.26	22.00	23.51	3%	16%	22.00	3.24	9.77	4000	Pass
	95	102	129	157	36%	54%	6.10	6.25	5.63	6.00	-8%	-4%	5.63	5.63	9.77	4000	Pass
Walnut Pl & Waverly Av	23	68	32	78	39%	15%	6.63	4.09	8.64	3.42	30%	-16%	3.42	5.63	9.77	4000	Pass
	249	244	270	249	8%	2%	3.88	6.47	3.28	5.62	-16%	-13%	-	-	-		
	224	474	219	488	-2%	3%	6.35	7.36	4.70	6.99	-26%	-5%	4.70	5.63	9.77	4000	Pass
Westmoreland Av & Erie Blvd E.	67	152	84	185	25%	22%	1.58	1.47	1.52	1.55	-3%	5%	1.52	8.65	9.77	3800	Pass
	433	748	394	700	-9%	-6%	28.23	28.10	28.31	28.15	0%	0%	-	-	-		
	159	240	165	260	4%	8%	8.00	8.79	7.70	8.38	-4%	-5%	-	-	-		
	280	532	274	564	-2%	6%	34.87	31.24	35.13	31.64	1%	1%	-	-	-		