2014-2015
Air Monitoring Network Plan

City of Philadelphia
Department of Public Health
Air Management Services

July 1, 2014

Executive Summary

Philadelphia has an air monitoring network of ten air monitoring stations that house instruments that measure ambient levels of gaseous, solid and liquid aerosol pollutants. It is operated by the City of Philadelphia's Department of Public Health, Air Management Services (AMS), the local air pollution control agency for the City of Philadelphia. This network is part of a broader network of air monitoring operated by our local states of Pennsylvania, New Jersey, Delaware and Maryland that make up the Philadelphia- Camden- Wilmington, PA-NJ-DE-MD Metropolitan Statistical Area (MSA).

The United States Environmental Protection Agency (US EPA) created regulations on how the air monitoring network is to be set up. These regulations can be found in Title 40 - Protection of Environment in the Code of Federal Regulations (CFR) Part 58 – Ambient Air Quality Surveillance, located online at: http://www.epa.gov/ttnamti1/40cfr53.html.

Beginning July 1, 2007, and each year thereafter, AMS has submitted to EPA Region III, an Air Monitoring Network Plan (Plan) which assures that the network stations continue to meet the criteria established by federal regulations.

Air monitoring provides critical information on the quality of air in Philadelphia. The objective for much of our network is to measure pollutants in areas that represent high levels of contaminants and high population exposure. Some monitoring is also done to determine the difference in pollutant levels in various parts of the City, provide long term trends, help bring facilities into compliance, provide real-time monitoring and provide the public with information on air quality.

The proper siting of a monitor requires the specification of the monitoring objective, the types of sites necessary to meet the objective, and the desired spatial scale of representativeness. These are discussed in the section entitled "Definitions".

This Plan is composed of twelve sections plus Appendices A - D:

1. **Announcement of Future Changes to the Network -** This section provides information on how the public is made aware of the Plan and where it is available for review.

2. **Definitions -** This section describes the terms used for air monitoring programs, measurement methods, monitoring objectives, spatial scales, air monitoring areas, pollutants, collection methods, and analysis methods.

3. **Current Network at a Glance -** This section shows the location of the monitoring sites and the pollutants measured at each site.

4. **Current Sites Summary -** This section provides information applicable to our overall network such as population. It also provides a brief overall purpose for each monitoring site.

5. **Direction of Future Air Monitoring -** This section gives a perspective of the major areas and initiatives AMS will be considering during the next few years.

6. **Potential Changes to the Network -** This section describes changes that may occur within the next 18 months that would modify the network from how it is currently described in the Plan.

7. **NO_2 Monitoring Network -** Per 40 CFR Part 58.10(a)(5), this section documents how AMS will establish NO_2 monitoring sites in response to the new 1-hour standard.

8. **CO Monitoring Network -** Per 40 CFR Part 58 Appendix D 4.2.1, this section documents the minimum requirements for CO monitors.

9. **$PM_{2.5}$ Monitoring Network** – Per 40 CFR Part 58.10(8)(i), this section documents the minimum $PM_{2.5}$ monitoring at near-road sites.

10. **Exclusion of Certain $PM_{2.5}$ Continuous FEM Data from Comparison to the NAAQS -** Per 40 CFR Part 58.10 (b) and Part 58.11 (e), this section documents the request to exclude $PM_{2.5}$ Continuous FEM Data from the LAB site for NAAQS and AQI purposes.

11. **NCore Monitoring Site – Relocation from BAX to NEW -**This section describes the current status of and the reasoning behind the involuntary relocation of the current NCore monitoring station (BAX).

12. **Detailed Information on Each Site -** This is the largest section of the Plan. Each monitoring site is separately described in a table, complete with pictures and maps. The material is presented as:
    - A table providing information on the pollutants measured, sampling type, operating schedule, collection method, analysis method, spatial scale, monitoring objective, probe height, and begin date of each monitor;
    - Pictures taken at ground level of the monitoring station;
    - A map of the monitoring site complete with major cross streets and major air emission sources within 3000 meters (almost 2 miles); and
    - An aerial picture providing a north view of the site.

13. **Appendices**

- **Wind Rose Plots -** Appendix A provides wind rose plots from 2005 – 2013.

- **Second Near-Road Monitoring Station** – Appendix B provides information regarding the second near-road NO_2 monitoring station

- **Approval letter to Exclude $PM_{2.5}$ Continuous FEM Data** – Appendix C provides the EPA approval regarding the request to exclude data from $PM_{2.5}$ Continuous FEM from the LAB site.

- **NCore Relocation from BAX to NEW –** Appendix D provides information regarding the NCore move from BAX to NEW and the approval from EPA.

AMS has provided a copy of the Plan for public inspection on the City's website at: http://www.phila.gov/health/AirManagement/PublicMeetings.html.

Comments or questions concerning the air monitoring network or this Plan can be directed to:

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Announcement of Future Changes to the Network

Beginning July 1, 2007, and each year thereafter, AMS has submitted to EPA Region III, a Plan assuring that the network stations continue to meet the criteria established by federal regulations. At least 30 days prior to July 1 of each year, AMS announces to the public the availability of the Plan through notices published in the *Philadelphia Daily News* and the *Pennsylvania Bulletin*. Copies of the Plan are available for public inspection on the City's website under the Department of Public Health, Air Management Services at:

http://www.phila.gov/health/AirManagement/PublicMeetings.html

and at the AMS office:

Air Management Services
321 University Avenue, 2nd Floor
Philadelphia, PA 19104
Phone – 215-685-7586

Provisions will be made to accommodate comments and questions concerning the air monitoring network or the Plan. If comments are received, they will be considered for incorporation into the Plan.

Definitions

Air Monitoring Programs

EPA has established various air monitoring programs for the measurement of pollutants. Some of these are briefly described below. Later in this Plan, air monitoring sites and monitoring equipment are specifically identified relative to these air monitoring programs:

- **NATTS** - National Air Toxics Trends Stations. This network provides ambient levels of hazardous air pollutants. These sites are established with the intent that they will operate over many years and provide both current and historical information.
- **NCore** - National Core multi-pollutant monitoring stations. Monitors at these sites are required to measure particles ($PM_{2.5}$, speciated $PM_{2.5}$, $PM_{10-2.5}$), O_3, SO_2, CO, nitrogen oxides ($NO/NO_2/NO_y$), Pb, and basic meteorology. They principally support research in air pollution control.
- **SLAMS** - State or Local Air Monitoring Stations. The SLAMS make up the ambient air quality monitoring sites that are primarily needed for NAAQS comparisons, but may serve other data purposes. SLAMS exclude special purpose monitor (SPM) stations and include NCore, PAMS, Near-road NO_2/CO and all other State or locally operated stations that have not been designated as SPM stations.
- **PAMS** - Photochemical Assessment Monitoring Stations.
- **STN** - A $PM_{2.5}$ speciation station designated to be part of the Speciation Trends Network. This network provides chemical species data of fine particulate. These sites are established with the intent that they will operate over many years and provide both current and historical information.
- **State speciation site** - A supplemental $PM_{2.5}$ speciation station that is not part of the speciation trends network.
- **SPM** - Special Purpose Monitor. As the name implies these monitors are placed for purposes of interest to the city of Philadelphia. Often this monitoring is performed over a limited amount of time. Data is reported to the federal Air Quality System (AQS) and is not counted when showing compliance with the minimum requirements of the air monitoring regulations for the number and siting of monitors of various types. The agency may designate a monitor as an SPM after January 1, 2007 only if it is a new monitor or for a monitor included in the monitoring plan prior to January 1, 2007, if the Regional Administrator has approved the discontinuation of the monitor as a SLAMS site.

Measurement Methods

- **Approved Regional Method (ARM)** - A continuous $PM_{2.5}$ method that has been approved specifically within a State or Local air monitoring network for purposes of comparison to the NAAQS and to meet other monitoring objectives.
- **Federal Equivalent Method (FEM)** - A method for measuring the concentration of an air pollutant in the ambient air that has been designated as an equivalent method in accordance with 40 CFR Part 53; it does not include a method for which an equivalent method designation has been canceled in accordance with 40 CFR Part 53.11 or 40 CFR Part 53.16.
- **Federal Reference Method (FRM)** - A method of sampling and analyzing the ambient air for an air pollutant that is specified as a reference method in an appendix to 40 CFR

Part 50, or a method that has been designated as a reference method in accordance with this part; it does not include a method for which a reference method designation has been canceled in accordance with 40 CFR Part 53.11 or 40 CFR Part 53.16.

Monitoring Objectives

The ambient air monitoring networks must be designed to meet three basic monitoring objectives:

- Provide air pollution data to the general public in a timely manner.
- Support compliance with ambient air quality standards and emissions strategy development.
- Assist in the evaluation of regional air quality models used in developing emission strategies, and to track trends in air pollution abatement control measures' impact on improving air quality.

In order to support the air quality management work indicated in the three basic air monitoring objectives, a network must be designed with a variety of different monitoring sites. Monitoring sites must be capable of informing managers about many things including the peak air pollution levels, typical levels in populated areas, air pollution transported into and outside of a city or region, and air pollution levels near specific sources.

Spatial Scales

The physical siting of the air monitoring station must be consistent with the objectives, site type and the physical location of a particular monitor.

The goal in locating monitors is to correctly match the spatial scale represented by the sample of monitored air with the spatial scale most appropriate for the monitoring site type, air pollutant to be measured, and the monitoring objective.

The spatial scale results from the physical location of the site with respect to the pollutant sources and categories. It estimates the size of the area surrounding the monitoring site that experiences uniform pollutant concentrations. The categories of spatial scale are:

- **Microscale -** Defines concentrations in air volumes associated with area dimensions ranging from several meters up to about 100 meters.
- **Middle scale** - Defines concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometer.
- **Neighborhood scale** - Defines concentrations within some extended area of the city that has relatively uniform land use with dimensions in the 0.5 to 4.0 kilometers range. The neighborhood and urban scales listed below have the potential to overlap in applications that concern secondarily formed or homogeneously distributed air pollutants.
- **Urban scale** - Defines concentrations within an area of city-like dimensions, on the order of 4 to 50 kilometers. Within a city, the geographic placement of sources may result in there being no single site that can be said to represent air quality on an urban scale.
- **Regional scale** – Defines usually a rural area of reasonably homogeneous geography without large sources, and extends from tens to hundreds of kilometers.
- **National and global scales** – These measurement scales represent concentrations characterizing the nation and the globe as a whole.

Air Monitoring Area

- **Core-Based Statistical Area (CBSA)** - Defined by the U.S. Office of Management and Budget, as a statistical geographic entity consisting of the county or counties associated with at least one urbanized area/urban cluster of at least a population of 10,000 people, plus adjacent counties having a high degree of social and economic integration.
- **Metropolitan Statistical Area (MSA)** - A Core-Based Statistical Area (CBSA) associated with at least one urbanized area of a population of 50,000 people or more. The central county plus adjacent counties with a high degree of integration comprise the area.

Pollutants

Air Management Services monitors for a wide range of air pollutants:

- **Criteria Pollutants** are measured to assess if and how well we are meeting the National Ambient Air Quality Standards (NAAQS) that have been set for each of these pollutants. These standards are set to protect the public's health and welfare.
  - **Ozone (O_3)**
  - **Sulfur Dioxide (SO_2)**
  - **Carbon Monoxide (CO)**
  - **Nitrogen Dioxide (NO_2)**
    - NO means nitrogen oxide.
    - NO_X means oxides of nitrogen and is defined as the sum of the concentrations of NO_2 and NO.
    - NO_y means the sum of all total *reactive* nitrogen oxides, including NO, NO_2, and other nitrogen oxides referred to as NO_Z.
  - **Particulate**
    - $PM_{2.5}$ means particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.
    - PM_{10} means particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
    - PM Coarse means particulate matter with an aerodynamic diameter greater than 2.5 micrometers and less than 10 micrometers.
  - **Lead (Pb)**
- **Volatile Organic Compounds** (VOC) - Approximately 57 of these compounds are monitored to assist in understanding the formation of ozone and how to control this pollutant.
- **Toxics** - Approximately 44 compounds, carbonyls – 7 compounds, and metals - 7 elements are toxic and are measured to assess the risk of cancer and non cancer caused by these pollutants.
- **Speciated $PM_{2.5}$** - $PM_{2.5}$ particles are analyzed to identify their makeup (60 components including elements, radicals, elemental carbon, and organic carbon) and help assess the level of health risk and identify sources that are contributing to the levels of $PM_{2.5}$ being measured.

Collection Methods

Particulate samples

- **BAM-Beta Attenuation Monitor Met One BAM-1020** - This instrument provides concentration values of particulate each hour. The BAM -1020 uses the principle of beta ray attenuation to provide a simple determination of mass concentration. Beta ray attenuation: A small ^{14}C element emits a constant source of high-energy electrons, also

known as beta particles. These beta particles are efficiently detected by an ultra-sensitive scintillation counter placed nearby. An external pump pulls a measured amount of air through a filter tape. Filter tape, impregnated with ambient dust is placed between the source and the detector thereby causing the attenuation of the measured beta-particle signal. The degree of attenuation of the beta-particle signal may be used to determine the mass concentration of particulate matter on the filter tape and hence the volumetric concentration of particulate matter in ambient air.

The following instruments provide concentration values of particulate over a 24-hour period. Laboratory analysis is required before the concentration of particulate can be determined.

- **Hi-Vol -** High-Volume Air Samplers (HVAS) are used to determine the concentration of particulate matter in the air. Without a size-selective inlet (SSI), all collected material is defined as total suspended (in the air) particulates (TSP), including lead (Pb) and other metals. A size-selective inlet is added for PM_{10} measurement. A Hi-Volume sampler consists of two basic components: a motor similar to those used in vacuum cleaners and an air flow control system.
- **Hi-Vol-SA/GMW-321-B -** High Volume Sierra Anderson or General Metal Works (GMW) model 321-B PM_{10} is a high volume air sampler system which has a selective inlet 203 cm x 254 cm filter.
- **Met One SASS -** Filters used to collect PM measurement of total mass by gravimetry, elements by x-ray fluorescence.
- **R & P $PM_{2.5}$ -** Rupprecht & Potashnick $PM_{2.5}$ monitors an air sample drawn through a Teflon filter for 24 hours.

Gaseous / criteria pollutants

- **Instrumental - Data from these instruments is telemetered to a central computer system and values are available in near "real time".** An analyzer used to measure pollutants such as: carbon monoxide, sulfur dioxide, nitrogen oxides and ozone.

Toxic and organic (VOC) pollutants

- **SS Canister Pressurized -** Ambient air is collected in stainless-steel canisters, cryogenically concentrated using liquid nitrogen and analyzed for target VOCs and other organic components by GC-FID.
- **Canister Sub Ambient Pressure -** Collection of ambient air into an evacuated canister with a final canister pressure below atmospheric pressure.
- **DNPH-Coated Cartridges -** Cartridges are coated with 2,4-dinitrophenylhydrazine (DNPH). This is used for carbonyl determination in ambient air. High Performance Liquid Chromatography (HPLC) measures the carbonyl.

Analysis Methods

Particulate concentration

- **Gravimetric -** The determination of the quantities of the constituents of a compound, describes a set of methods for the quantitative determination of an analyte based on the weight of a solid. Laboratory analysis is needed.
- **BAM-Beta Attenuation -** The principle of beta ray attenuation to provide a simple determination of mass concentration. Instrumental – data is available in near real time.

Composition/make-up of particulates

- **Atomic Absorption -** This analysis measures the intensity of radiation of a specific wavelength that is absorbed by an atomic vapor.

- **Energy Dispersive XRF -** Energy dispersive x-Ray Fluorescence Spectrometer for the determination of metals including Lead concentration in ambient particulate matter. The method is collected on $PM_{2.5}$ filter samples.

Gaseous / criteria pollutants

- **Nitrogen Oxides – Chemiluminescence -** Emission of light as a result of a chemical reaction at environmental temperatures. This analysis is used for NO, NO_x, and NO_y. NO_2 is calculated as NO_x- NO.
- **Carbon Monoxide - Nondispersive infrared -** A nondispersive infrared (NDIR) gas analyzer is an instrument that measures air samples for CO content.
- **Sulfur Dioxide - Pulsed Fluorescent -** Pulsed fluorescence sulfur dioxide monitor where air is drawn from the outside and passes through the analysis cell, and a high intensity burst of UV light is emitted. The sulfur dioxide responds to the specific UV wavelength generated by absorbing the energy. When the flash lamp shuts off (in a fraction of a second) the SO_2 fluoresces giving off an amount of photons directly proportional to the concentration of sulfur dioxide in the air.
- **Ozone - Ultra Violet -** A light, which supplies energy to a molecule being analyzed. Ozone is analyzed with UV.

Toxic and volatile organic pollutants

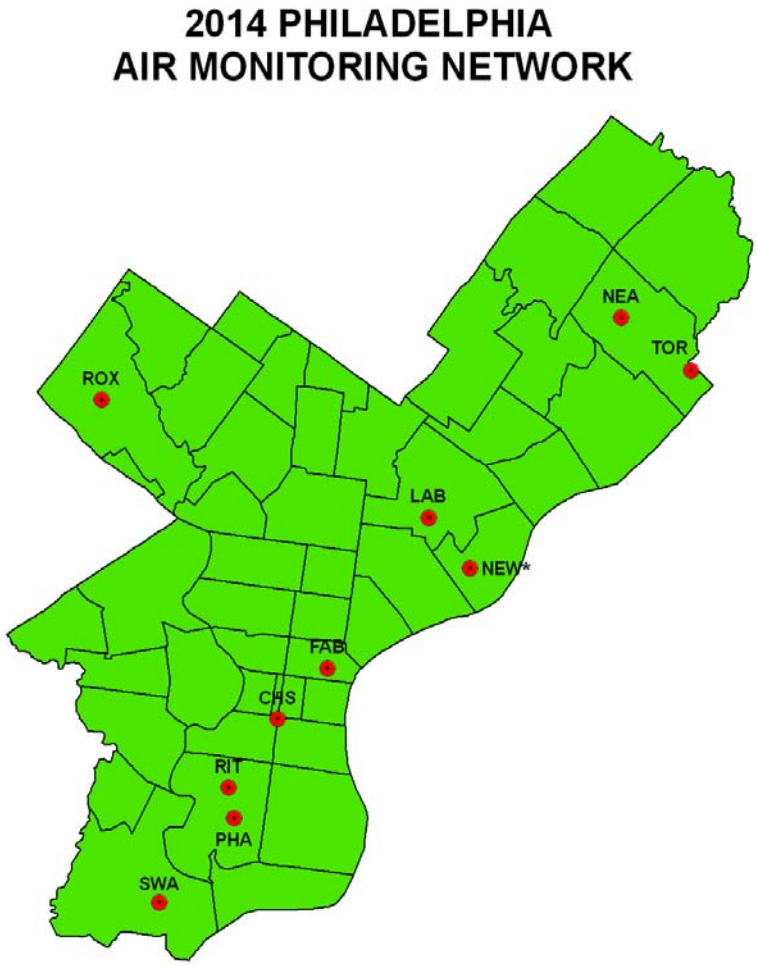
- **Cryogenic Preconcentration GC/FID -** Cryogenic Preconcentration Gas Chromatograph/Flame Ionization Detector - air injection volume for capillary GC combined with low concentrations of analyte require that samples be preconcentrated prior to GC analysis. Sample preconcentration is accomplished by passing a known volume of the air sample through a trap filled with fine glass beads that is cooled to -180^{o}C. With this technique, the volatile hydrocarbons of interest are quantitatively retained in the trap, whereas the bulk constituents of air (nitrogen, oxygen, etc.) are not. The air sample is collected in a vessel of known volume. A portion of this volume is analyzed and used to calculate concentration of each compound in the original air sample after Gas Chromatographic (Flame Ionization Detector, GC-FID) analysis. The sample trapped cryogenically on the glass beads is thermally desorbed into a stream of ultra-pure helium and re-trapped on the surface of a fine stainless steel capillary cooled to -180 ^{o}C. This second cryogenic trapping stage "focuses" the sample into a small linear section of tubing. The cold stainless steel capillary is ballistically heated (by electrical resistance) and the focused sample quickly desorbs into the helium stream and is transferred to the chromatographic column. Cryogen (liquid nitrogen, LN_2) is used to obtain sub ambient temperatures in the VOC concentration and GC. This analysis is used to determine the concentration of Benzene and other organic compounds and VOC in the atmosphere.
- **GC/MS -** Gas Chromatograph/Mass Spectrometer**.** Analysis of organic or VOC are conducted using a gas chromatograph (GC) with a mass spectrometer (MS) attached as the detector. Cryogenic preconcentration with liquid nitrogen (LN_2) is also used to trap and concentrate sample components.
- **Thin Layer Chromatography (TLC) -** TLC is a widely used chromatography technique used to separate chemical compounds. It involves a stationary phase consisting of a thin layer of adsorbent material, usually silica gel, aluminum oxide, or cellulose immobilized onto a flat, inert carrier sheet.
- **High Pressure Liquid Chromatography (HPLC)**. The analytical method used to analyze carbonyl compounds such as acetaldehyde and formaldehyde. Carbonyl compounds are collected on the sampling media as their 2,4-dinitrohydrazine derivatives. The derivatives are separated by liquid chromatography (LC) on a packed column by

means of a solvent mixture under high pressure (HPLC) followed by UV detection of each carbonyl derivative.

Current Network at a Glance

The City of Philadelphia is served by a network of ten air monitoring sites located throughout the City that measure the criteria pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM_{10} and $PM_{2.5}$), and lead (Pb). Five of the sites also measure toxics, such as benzene, acetaldehyde, and formaldehyde. The map below shows the location of air monitors and the pollutants measured at each monitor location.

Figure 1 - 2014 Philadelphia Air Monitoring Network as of July 1, 2014



			Parameter																		
AQS Site Code	**AMS Site**	**Address**	**CO**	**SO_2**	**Ozone**	**NO_2**	**NOy/ NO**	**PM_{10}**	**$PM_{2.5}$**	**Speciated $PM_{2.5}$**	**PM Coarse**	**Carbonyls**	**PAMS VOC**	**TSP (11101)**	**TSP Metals** (Be, Cr, Mn, Ni, As, Cd, Pb)	**TSP Lead (14129)**	**Toxics TO15**	**MET**	**Comm. Air Toxics** OPEN PATH	**AMS Site**
421010004	**LAB**	1501 E. Lycoming	X		X	X	X		X			X	X		X		X			**LAB**
421010014	**ROX**	Eva & Dearnley										X			X		X			**ROX**
421010024	**NEA**	Grant & Ashton			X													X		**NEA**
421010047	**CHS**	500 S. Broad				X			X			X			X		X			**CHS**
421010048	**NEW**	2861 Lewis	X	X	X		X	X	X	X	X			X		X		X		**NEW**
421010055	**RIT**	24th & Ritner		X					X	X		X			X		X	X		**RIT**
421010057	**FAB**	3rd & Spring Garden							X											**FAB**
421010063	**SWA**	8200 Enterprise										X			X		X			**SWA**
421010075	**TOR**	4900 Grant Ave	X			X			X									X		**TOR**
	PHA	3100 Penrose Ferry Rd																	X	**PHA**

Summary of Current Sites

All of our ten monitoring sites are located in Philadelphia, PA:

State: Pennsylvania
City: Philadelphia
County: Philadelphia
Metropolitan Statistical Area (MSA): Philadelphia – Camden - Wilmington, PA-NJ-DE-MD
MSA number: 37980
Population: 6,034,678 as of 2013 annual estimate
EPA Region: III, Philadelphia
Class I area: Brigantine Natural Wildlife Preserve near Atlantic City, NJ
City population: 1,553,165 as of 2013 annual estimate
Time zone: EST
UTM zone: 18

Table 1 - Site Summary Table

AQS Site Code	AMS Site	Address	Statement of Purpose
421010004	**LAB**	1501 E. Lycoming	Built in 1964, a good site for the assessment of the City's impact on precursors to the formation of ozone and is a designated PAMS site. It is a good site to test new or complex monitoring methods as laboratory staff are readily available.
421010014	**ROX**	Fowler & Dearnley	Periphery site
421010024	**NEA**	Grant & Ashton	Periphery site High Ozone
421010047	**CHS**	500 S. Broad	Traffic related, a site that indicates the impact of street traffic and pollutants that are transported into Center City
421010048	**NEW**	2861 Lewis	Originally sited to measure the impact of Franklin Smelting and Refining (now closed), MDC (now closed), and the waste water treatment plant. In 2013, the NCore site was re-located here.
421010055	**RIT**	24th & Ritner	This site was selected to help assess the impact of the petroleum refinery on the local community. The area was identified by air quality modeling.
421010057	**FAB**	3rd & Spring Garden	This site was established to represent the highest levels of $PM_{2.5}$ in the City based on EPA Region III's air quality modeling of air toxics in Philadelphia. It shows high levels of $PM_{2.5}$ created by vehicle traffic.
421010063	**SWA**	8200 Enterprise	This site was established to measure toxics, carbonyls, and metals. EPA Region III modeling analysis showed areas near the airport to have high levels of aldehydes.
421010075	**TOR**	4901 Grant Ave & James St.	This site was established as the 1st near-road NO_2 monitor in the Philadelphia-Camden-Wilmington, PA-NJ-DE-MD Metropolitan Statistical Area .
	PHA	3100 Penrose Ferry Road	This site was selected as a Community Scale Air Toxics Monitoring to continuously monitor air toxics pollutants such as benzene and hydrogen fluoride (HF) in the South Philadelphia community.

Direction of Future Air Monitoring

The agency will study and assess the overall monitoring program within the City to determine the course of future changes to the air monitoring network.

The agency will focus on the following:

- Improve the understanding of particulate and air toxic pollutants in Philadelphia. Model results from the EPA Region III Philadelphia Air Toxics Project were provided to AMS. The Philadelphia river ports and International Airport were identified as potential major contributors to health risk associated with air toxic emissions. The agency plans to pursue negotiations with the port entities in order to implement monitoring and emission inventory efforts in this location.
- Utilize funds from EPA grants to expand the monitoring network.
    - The agency will utilize the funds received from the EPA for its Community Scale Air Toxics Monitoring grant to finalize the installation of the monitors. This will enable the agency to continuously monitor air toxic pollutants such as benzene and hydrogen fluoride (HF) in the South Philadelphia community. This 3-year project will help the agency to take appropriate actions in protecting the community and to evaluate the open path monitoring method.
    - The agency was awarded a grant to install a near-road monitor at Torresdale train station and has begun the data collection/analysis phase since January 1, 2014. Currently, the agency is assessing potential sites for the second near-road monitor. The second near-road monitor is expected to be operating by January 1, 2015.
- Maximize the monitoring network to be more efficient (i.e., utilizing continuous equipment to replace filter based equipment, downsize monitoring to reduce overlapping, etc)
    - The agency has relocated the NCore station due to property issues, from BAX to NEW.
    - The agency will continue to utilize $PM_{2.5}$ FEMs as replacements for FRMs. All $PM_{2.5}$ monitoring sites, except LAB, has utilized $PM_{2.5}$ FEMs as their primary $PM_{2.5}$ monitors.

Proposed Changes to the Network

Below are changes that are anticipated to occur over the next 18 months to the existing air monitoring network:

- Shutdown the ITO site as of July 1, 2014
  - BaP, TSP, and PM_{10} will be discontinued.
- $PM_{2.5}$
  - LAB
    - Primary monitor is FRM.
      - As of July 1, 2014, will operate on a 1 in 3 day schedule.
    - Co-located monitor is FRM
      - From July 1, 2014, will operate on a 1 in 3 day schedule.
  - CHS
    - As of July 1, 2014, the co-located FRM will be shut down.
- PM_{10} at the LAB will be shutdown as of July 1, 2014.
- SO_2 at the LAB to shut down as of July 1, 2014.
- AMS plans to establish and operate a 2nd Near-road NO_2 monitor by January 1, 2015 (See Appendix B).
- AMS plans to establish a monitoring site (PAC) near the Port of Philadelphia
  - A monitor to measure $PM_{2.5}$, PM_{10}, toxics, carbonyls, and metals will be placed to assess the river port.
  - When the PAC site is established:
    - Toxics, carbonyls, and metals will no longer be monitored at ROX and will be moved to PAC.
- Data collection to begin for 2 open path monitors in the parking lot of the Philadelphia Housing Authority to continuously monitor selected air toxics in South Philadelphia. See Appendix E of the 2012 – 2013 Air Monitoring Network Plan for additional information.
- CHS may shut down. Based on EPA Region III modeling results, FAB was established as an alternative site to CHS.
  - If CHS is shut down, NO_2 and NO will be moved to RIT.

NO_2 Monitoring Network

Per 40 CFR Part 58.10(a)(5)(iv), the Plan must document how AMS will establish a second near-road NO2 monitoring site in accordance with the requirements of 40 CFR Part 58 Appendix D, section 4.3.2 by July 1, 2014.

On January 22, 2010, EPA strengthened the health-based National Ambient Air Quality Standard (NAAQS) for nitrogen dioxide (NO_2) by setting a new 1-hour NO_2 standard at the level of 100 parts per billion (ppb). EPA is also retaining, with no change, the current annual average NO_2 standard of 53 ppb.

EPA also set new requirements for the placement of new NO_2 monitors in urban areas. The requirements are codified in 40 CFR Part 58 Appendix D 4.3.2. The final rule requires:

- 1 microscale near-road NO_2 monitoring station in CBSAs with population of 500,000 persons or more.
- 2 microscale near-road NO_2 monitoring stations in CBSAs with population of 2,500,000 persons or more, or in any CBSA with a population of 500,000 or more persons and one or more road segments with 250,000 or greater AADT counts.
- 1 NO_2 monitoring station in each CBSA with a population of 1,000,000 or more persons to assess community-wide concentrations.
- Monitors must be operational between January 1, 2014 and January 1, 2017.

Based on the final rule, the Philadelphia-Camden-Wilmington, PA-NJ-DE-MD CBSA is required to have 2 near-road NO_2 monitoring stations.

On March 7, 2013, the EPA issued a final rule amending the implementation approach, allowing for additional time to install and operate the near-road NO_2 monitors. One required near-road monitor must be installed and operational by January 1, 2014, for CBSAs with 1,000,000 or more persons. The second required monitor must be installed and operational by January 1, 2015, for a CBSA with 2,500,000 or more persons, or with 500,000 or more persons that has one or more road segments of 250,000 or greater annual average daily traffic counts. This revision replaces the 2010 rule requirement that all NO_2 monitors be operational by January 1, 2013. AMS currently operates an NO_2 monitor that meets the area-wide monitoring requirements. The first near-road NO_2 was established at TOR and started operation as of January 1, 2014. AMS is in the process of finding a suitable location for the second near-road monitor (see Appendix B) and expects to be operational by January 1, 2015.

CO Monitoring Network

Per 40 CFR Part 58.10(a)(7), the Plan must document how AMS will establish CO monitoring sites in accordance with the requirements of 40 CFR Part 58 Appendix D, section 4.2.1.

On August 12, 2011, EPA issued a decision to retain the existing National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO). The existing primary standards are 9 parts per million (ppm) measured over 8 hours, and 35 ppm measured over 1 hour.

EPA is revising minimum requirements for CO monitoring by requiring CO monitors to be sited near roads in certain urban areas. The requirements are codified in 40 CFR Part 58 Appendix D 4.2.1. In summary, EPA is requiring one CO monitor to be collocated with a near-road NO_2 monitor in CBSAs having populations of 1 million or more. EPA is specifying that monitors required in CBSAs of 2.5 million or more persons are to be operational by January 1, 2015. Other CO monitors required in CBSAs having 1 million or more persons are required to be operational by January 1, 2017. The Philadelphia-Camden-Wilmington, PA-NJ-DE-MD CBSA has a CO monitor collocated with the near-road NO_2 monitor at TOR and has been operational since January 1, 2014.

$PM_{2.5}$ Monitoring Network

Per 40 CFR Part 58.10(8)(i), the Plan must document how AMS will establish near-road $PM_{2.5}$ monitoring sites in CBSAs having 2.5 million or more persons in accordance with the requirements of 40 CFR Part 58 Appendix D, section 4.7.

40 CFR Part 58 Appendix D, section 4.7.1(b)(2) requires at least one $PM_{2.5}$ monitor to be collocated at a near-road NO_2 station for CBSAs with a population of 1,000,000 or more persons. This requirement is met at the TOR monitoring site.

Exclusion of Certain $PM_{2.5}$ Continuous FEM Data from Comparison to the NAAQS

40 CFR Part 58.11(e) documents the process for excluding $PM_{2.5}$ FEM data from comparison to the NAAQS and/or AQI if the performance criteria described in Table C-4 of Subpart C are not met when assessed with a collocated FRM monitor.

In the 2013-2014 Plan, AMS submitted a request to exclude $PM_{2.5}$ FEM data from 2011 through the second quarter of 2013 at the LAB monitoring site (AQS ID 421010004) from being used for comparison to the NAAQS and AQI. This request was approved (see Appendix C).

NCore Monitoring Site – Relocation from BAX to NEW

In the 2013-2014 Plan, AMS provided information regarding the relocation of the NCore monitoring site from BAX to NEW. The relocation of the NCore site was approved by EPA (see Appendix D).

Detailed Information on Each Site

LAB

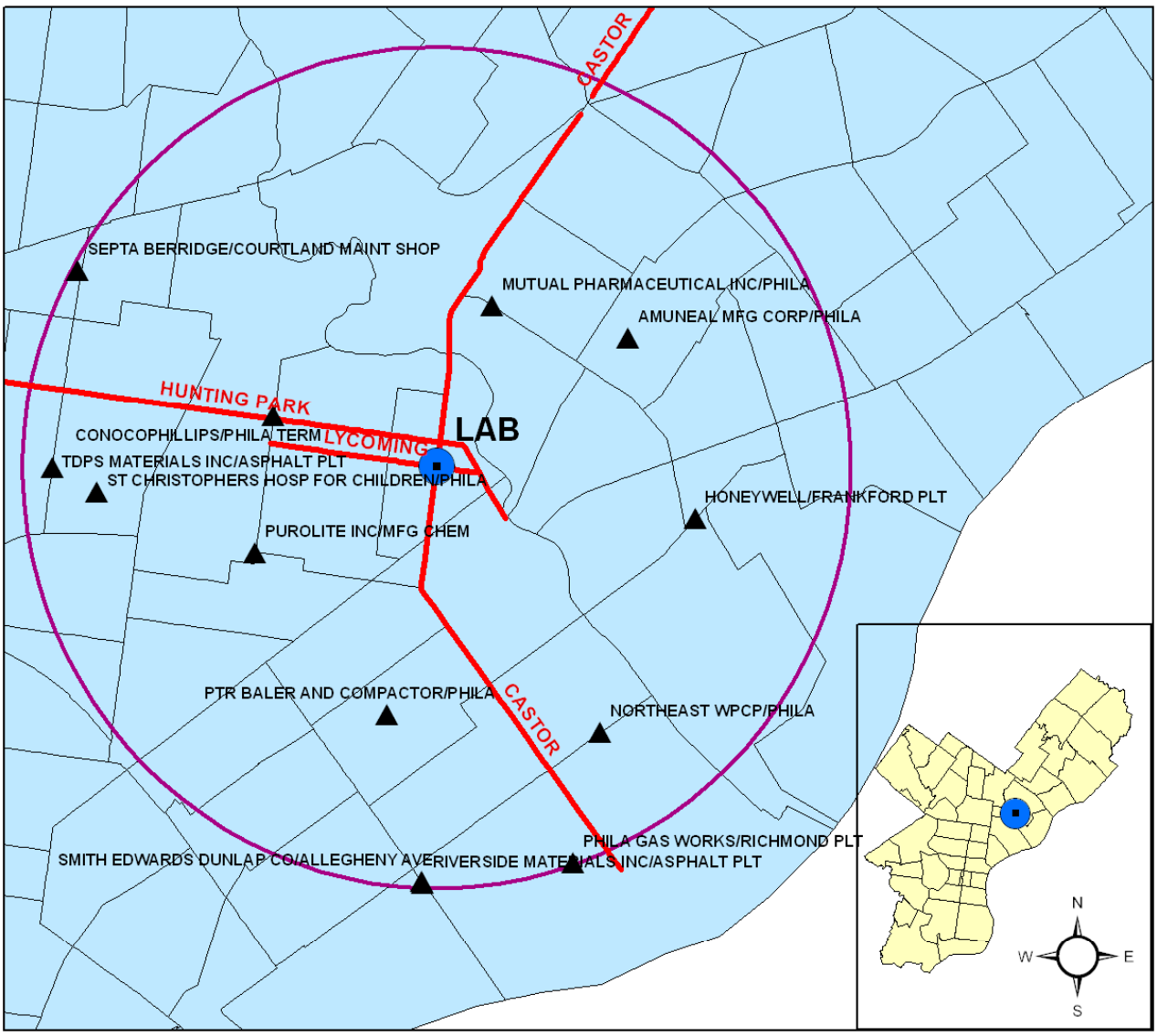
Table 2 - Detailed LAB Information with Monitoring Station Picture

AMS SITE ID: LAB
AQS Site ID: 421010004
Street Address: 1501 E. Lycoming Street, 19124
Geographical Coordinates
Latitude: 40.008889
Longitude: -75.09778

Parameter	Sampling Type	Operating Schedule	Collection Method	Analysis Method	Comments	Parameter Code	POC	AQS Method	Spatial Scale	Monitoring Objective	Probe Height (m)	Begin Date
CO	SLAMS	Continuous	Instrumental	Nondispersive infrared		42101	1	93	Neighborhood	Population Exposure	7	2/1/1966
Ozone	PAMS	Continuous	Instrumental	Ultra Violet		44201	1	87	Neighborhood	Population Exposure	7	1/1/1974
NO2	SLAMS, PAMS	Continuous	Instrumental	Chemiluminescence		42602	3	99	Urban	Population Exposure	7	1/1/1977
NOy	SLAMS	Continuous	Low Level Nox Instrumental	TECO 42S Chemiluminescence		42600	1	599				
PM2.5 FRM Primary	SLAMS	1/3 days	R&P PM2.5	Gravimetric		88101	2	145				
PM2.5 FRM Collocated	SLAMS	1/3 days	R&P PM2.5	Gravimetric		88101		145				

Parameter	Sampling Type	Operating Schedule	Collection Method	Analysis Method	Comments	Parameter Code	POC	AQS Method	Spatial Scale	Monitoring Objective	Probe Height (m)	Begin Date
PAMS VOC	PAMS, 24 hr Real Time	1/6 days (April, May, Sept, and Oct)	SS Canister Pressurized	Cryogenic Preconcentration GC/FID			2	101				
	PAMS, 24-hr Colocated	1/6 days (April-Oct)	SS Canister Pressurized	Cryogenic Preconcentration GC/FID			5	101				
	PAMS, 3-hr RealTime	Daily from June-Aug, with sample every 3 hrs	SS Canister Pressurized	Cryogenic Preconcentration GC/FID	continuous PAMS 3 hr, samples during summer		1	101				
	PAMS, 3-hr Colocated	1/6 days (Jun -Aug)	SS Canister Pressurized	Cryogenic Preconcentration GC/FID			4	101				
Carbonyls	Urban Air Toxics	1/6 days	DNPH-Coated Cartridges	HPLC	sampled for four 3-hour periods every 3rd day during PAMS season			102				
Toxics	Urban Air Toxics	1/6 days	Canister Subambient Pressure	Multi-Detector GC				150				

Figure 2 - LAB Monitoring Site Map with Major Streets and Major Emission Sources



PLID	CLASS CODE	NAME	STREET	2012 EMISSIONS (in TONS/YR)						
				CO	NOX	PB	PM10	PM2.5	SO2	VOC
01416	SM	TDPS MATERIALS INC/ASPHALT PLT	3870 N 2ND ST	6.58	1.30	0.00	1.49	0.23	0.17	1.60
01421	SM	RIVERSIDE MATERIALS INC/ASPHALT PLT	2870 E ALLEGHENY AVE	13.81	2.79	0.00	1.39	0.43	0.36	5.07
01551	A	HONEYWELL/FRANKFORD PLT	4700 BERMUDA STREET	81.23	215.08	0.00	71.85	57.90	28.88	119.17
01617	SM	PUROLITE INC/MFG CHEM	3620 G ST	2.30	2.74	0.00	0.21	0.21	0.02	3.48
02052	A	SUN CHEM CORP/HUNTING PARK PLT	3301 HUNTING PARK AVE	0.19	0.23	0.00	0.11	0.00	0.00	13.83
02255	SM	SMITH EDWARDS DUNLAP CO/ALLEGHENY AVE	2867 E ALLEGHENY AVE	0.04	0.20	0.00	0.01	0.01	1.20	4.03
02258	SM	MUTUAL PHARMACEUTICAL INC/PHILA	1100 ORTHODOX ST	1.14	1.67	0.00	0.13	0.13	0.01	0.59
03506	SM	PTR BALER AND COMPACTOR/PHILA	2207 E ONTARIO ST	0.02	0.10	0.00	0.01	0.01	0.04	23.83
04172	SM	SEPTA BERRIDGE/COURTLAND MAINT SHOP	200 W WYOMING AVE	1.11	3.14	0.00	4.15	4.15	0.02	5.14
04904	A	EXELON GENERATION CO/SCHUYLKILL STA	2800 CHRISTIAN ST	0.35	2.66	0.00	0.20	0.09	2.11	0.03
04922	A	PHILA GAS WORKS/RICHMOND PLT	3100 E VENANGO ST	1.93	4.53	0.00	0.17	0.14	0.01	0.16
05004	A	CONOCOPHILLIPS/PHILA TERM	4210 G ST	0.00	0.00	0.00	0.00	0.00	0.00	34.46
08576	SM	ST CHRISTOPHERS HOSP FOR CHILDREN/PHILA	W ERIE AVE & FRONT ST	1.76	2.70	0.00	0.20	0.20	0.06	0.17
09513	A	NORTHEAST WPCP/PHILA	3899 RICHMOND ST	32.21	9.50	0.00	1.65	1.65	6.17	14.62
T0034	SM	AMUNEAL MFG CORP/PHILA	4737 DARRAH STREET	0.00	0.00	0.00	0.00	0.00	0.00	0.17
			TOTAL	**142.68**	**246.64**	**0.00**	**81.57**	**65.15**	**39.06**	**226.34**

Figure 3 - LAB North Aerial View

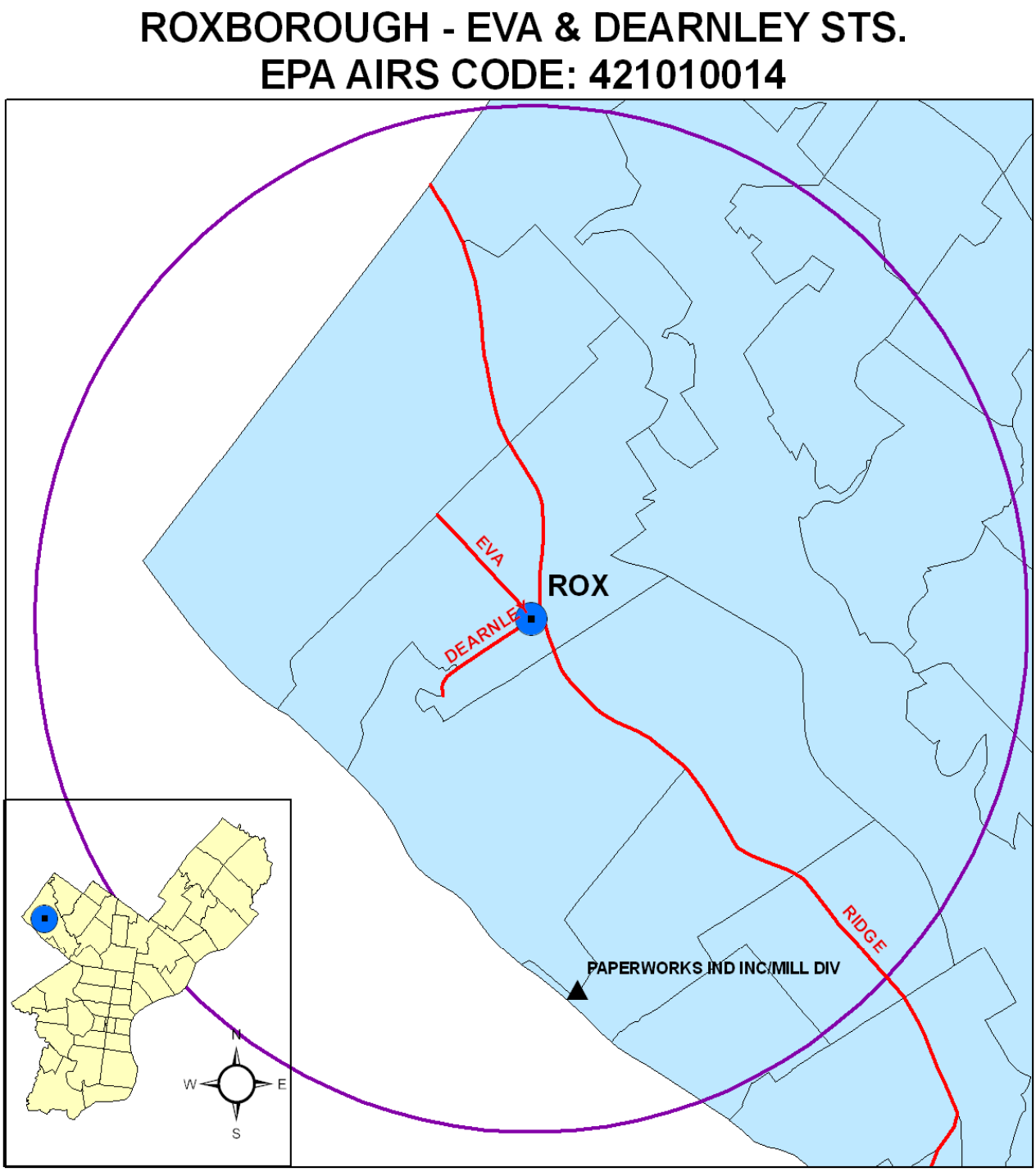
ROX

Table 3 – Detailed ROX Information with Monitoring Station Picture

AMS SITE ID: ROX
AQS Site ID: 421010014
Street Address: Fowler & Dearnley Streets
Geographical Coordinates
Latitude: 40.050000
Longitude: -75.240556

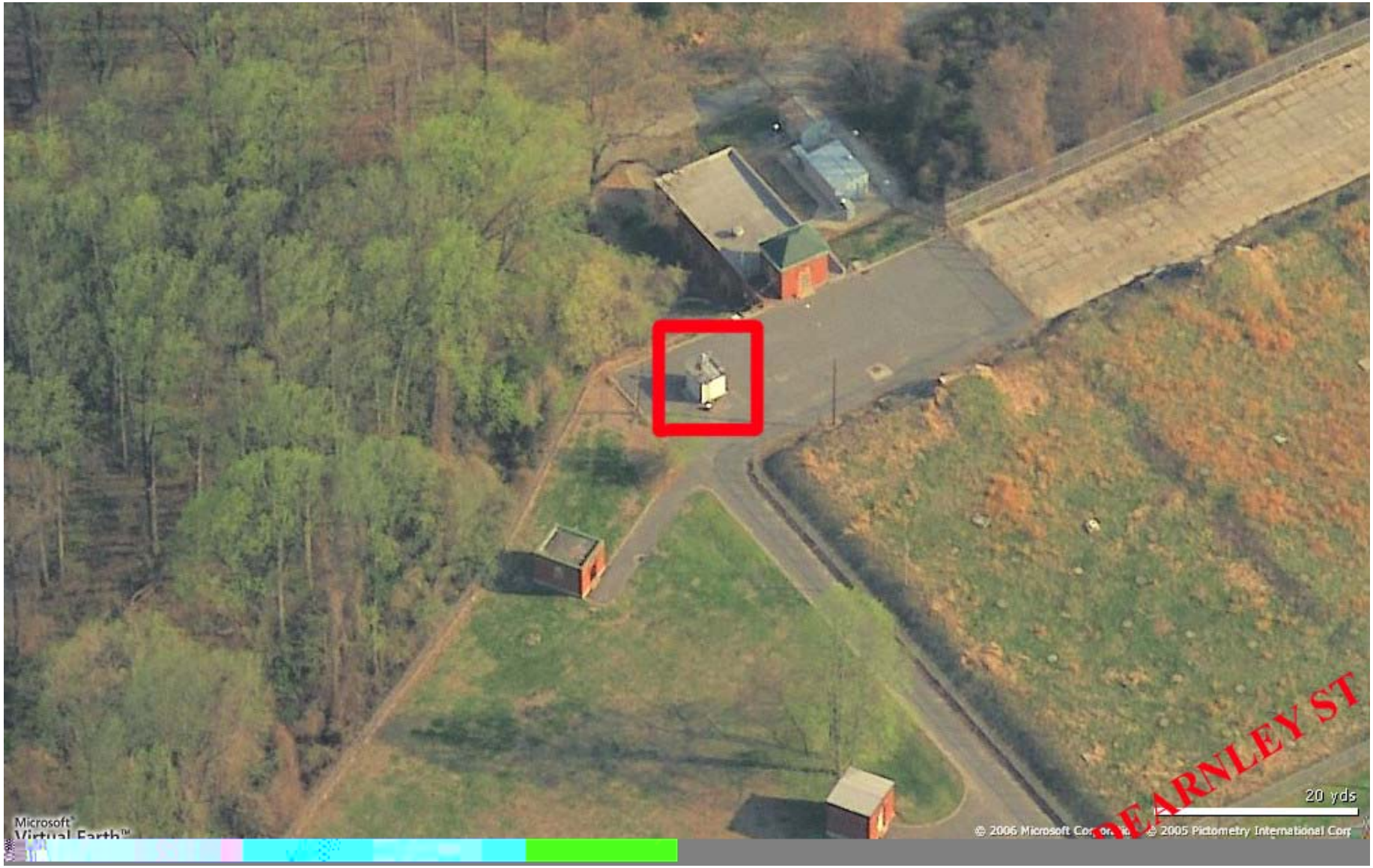
Parameter	Sampling Type	Operating Schedule	Collection Method	Analysis Method	Comments	Parameter Code	POC	AQS Method	Spatial Scale	Monitoring Objective	Probe Height (m)	Begin Date
Metals	SLAMS	1/6 days	Hi-Vol	ICP-MS	Analysis by WV (TSP sampler with quartz)			92 /89				
Carbonyls	Urban Air Toxics	1/6 days	DNPH-Coated Cartridges					102				
Toxics	Urban Air Toxics	1/6 days	Canister Subambient Pressure	Multi-Detector GC				150				

Figure 4 - ROX Monitoring Site Map with Major Streets and Major Emission Sources



				2012 EMISSIONS (in TONS/YR)						
PLID	CLASS CODE	NAME	STREET	CO	NOX	PB	PM10	PM2.5	SO2	VOC
01566	A	PAPERWORKS IND INC/MILL DIV	5000 FLAT ROCK RD.	42.62	92.75	0.00	2.84	2.84	0.31	20.87
			TOTAL	**42.62**	**92.75**	**0.00**	**2.84**	**2.84**	**0.31**	20.87

Figure 5 - ROX North Aerial View



NEA

Table 4 – Detailed NEA Information with Monitoring Station Picture

AMS SITE ID: NEA
AQS Site ID: 421010024
Street Address: Grant & Ashton Roads Phila NE Airport
Geographical Coordinates
Latitude: 40.076389
Longitude: -75.011944

Parameter	Sampling Type	Operating Schedule	Collection Method	Analysis Method	Comments	Parameter Code	POC	AQS Method	Spatial Scale	Monitoring Objective	Probe Height (m)	Begin Date
Ozone	SLAMS	Continuous	Instrumental	Ultra Violet		44201	1	87	Neighborhood	Population Exposure	6	1/1/1974
Meteorological	SLAMS	Continuous										

Figure 6 - NEA Monitoring Site Map with Major Streets and Major Emission Sources

Figure 7 - NEA North Aerial View

CHS

Table 5 - Detailed CHS Information with Monitoring Station Picture

AMS SITE ID: CHS
AQS Site ID: 421010047
Street Address: 500 S. Broad St
Geographical Coordinates
Latitude: 39.944722
Longitude: -75.166111

Parameter	Sampling Type	Operating Schedule	Collection Method	Analysis Method	Comments	Parameter Code	POC	AQS Method	Spatial Scale	Monitoring Objective	Probe Height (m)	Begin Date
NO2	SLAMS	Continuous	Instrumental	Chemiluminescence		42602	1	99	Neighborhood	Population Exposure	11	1/1/1982
Metals	SLAMS	1/6 days	Hi-Vol	ICP-MS	Analysis by WV (TSP sampler with quartz)			92/89				
Carbonyls	Urban Air Toxics	1/6 days	DNPH-Coated Cartridges					102				
Toxics	Urban Air Toxics	1/6 days	Canister Subambient Pressure	Multi-Detector GC				150				
PM2.5 Continuous	SLAMS	Continuous		BAM =Beta Attenuation Monitor Met One BAM -1020		88101	3	170				

Figure 8 - CHS Monitoring Site Map with Major Streets and Major Emission Sources

Figure 9 - CHS North Aerial View

NEW

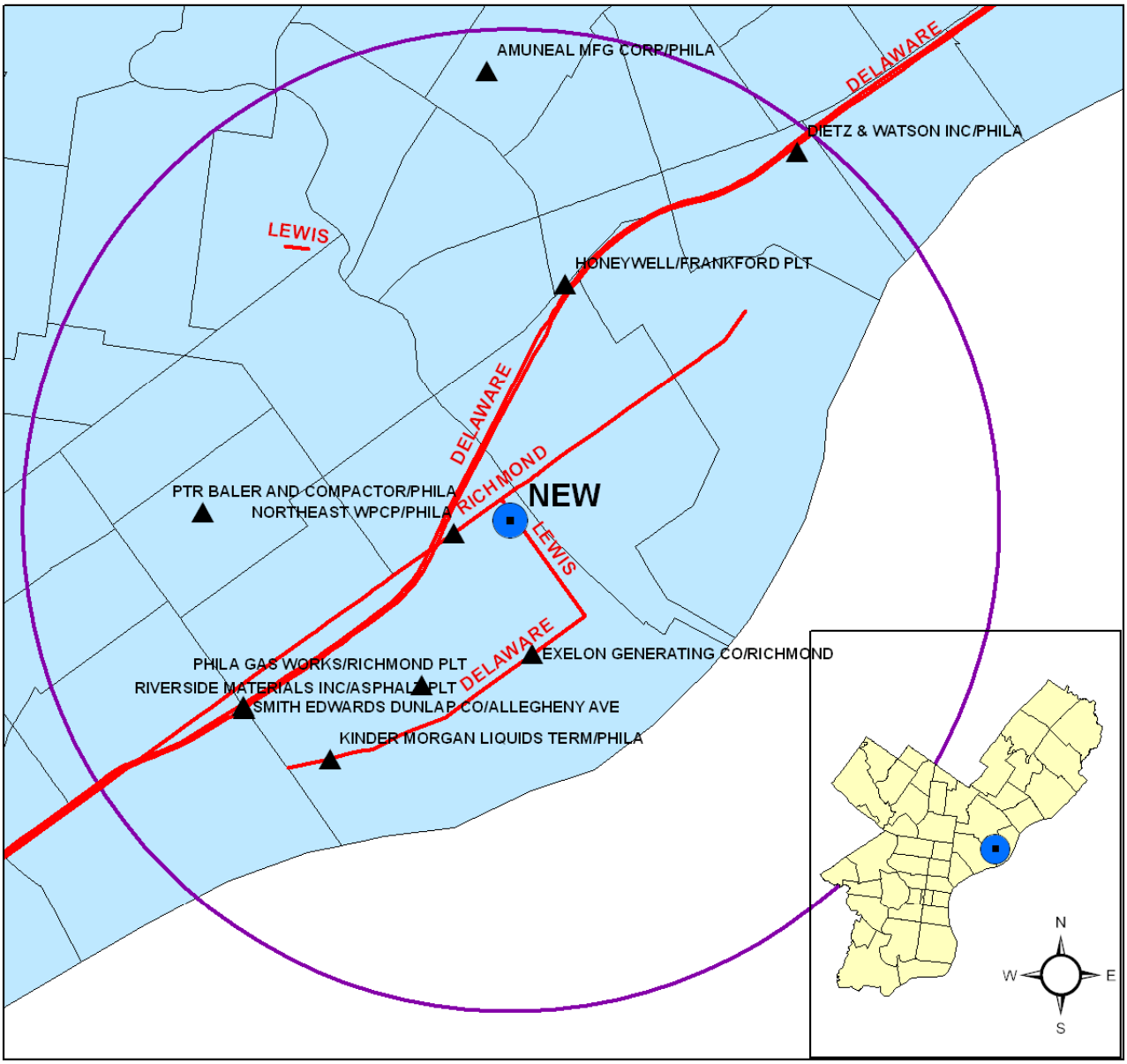
Table 6 - Detailed NEW Information with Monitoring Station Picture

AMS SITE ID: NEW
AQS Site ID: 421010048
Street Address: 2861 Lewis Street
Geographical Coordinates
Latitude: 39.991389
Longitude: -75.080833

Parameter	Sampling Type	Operating Schedule	Collection Method	Analysis Method	Comments	Parameter Code	POC	AQS Method	Spatial Scale	Monitoring Objective	Probe Height (m)	Begin Date
CO (trace)	Ncore	Continuous	Instrumental	ARM utilizing trace level Non-dispersive infrared	High sensitivity	42101	1	093	Neighborhood	Population Exposure		1/1/2011, moved 10/2/13
SO2 (trace)	NCore	Continuous	Instrumental	ARM utilizing trace level UV Flurorescence	High sensitivity	42401	2	100	Neighborhood	Population Exposure		
Ozone	Ncore/AQI	Continuous	Instrumental	ARM utilizing Ultra Violet photomentry	Year-round operation	44201	1	087	Neighborhood	Population Exposure		
NOy/ NO	Ncore	Continuous	Instrumental	ARM utilizng chemiluminescence	High sensitivity external converter mounted at 10m	42600/42601	1	599	Neighborhood	Population Exposure		
PM10 Continuous	SLAMS	Continuous		BAM =Beta Attenuation Monitor Met One BAM -1020		81102	1	122				2/20/2007
PM2.5 Continuous	Ncore/AQI	Continuous	BAM =Beta Attenuation Monitor Met One BAM -1020		FEM	88101	3	170	Neighborhood	Population Exposure		
PM2.5 Speciated	Ncore	1/3 days	Met One SASS	Energy Dispersive XRF	Analysis by EPA			811	Neighborhood	Population Exposure		
PM2.5 FRM	Ncore	1/3 days	R&P PM2.5	Gravimetric	NEW-D	88101	1	145	Neighborhood	Population Exposure		
*PM10 - PM2.5 (PM Coarse)	Ncore	1/3 days			NEW-S (*NEW-S minus NEW-D is PM Coarse)	86502	1	105	Neighborhood	Population Exposure		
TSP-HVAS	Ncore	1/6 days	Hi-Vol-SA/GMW-321-B	Gravimetric	Integrated samplers. Weighed by AMS	11101	1	91	Neighborhood	Population Exposure		
TSP - Lead Only	Ncore	1/6 days	Hi-Vol	Atomic Absorption	TSP-HVAS sample collected and sent to InterMountain Laboratory (IML)	14129	1	43	Neighborhood	Population Exposure		
Meteorological	Ncore	Continuous										

Figure 10 - NEW Monitoring Site Map with Major Streets and Major Emission Sources

NORTHEAST WASTE - LEWIS & RICHMOND STS.
EPA AIRS CODE:421010048



				2012 EMISSIONS (in TONS/YR)						
PLID	CLASS CODE	NAME	STREET	CO	NOX	PB	PM10	PM2.5	SO2	VOC
01421	SM	RIVERSIDE MATERIALS INC/ASPHALT PLT	2870 E ALLEGHENY AVE	13.81	2.79	0.00	1.39	0.43	0.36	5.07
01551	A	HONEYWELL/FRANKFORD PLT	4700 BERMUDA STREET	81.23	215.08	0.00	71.85	57.90	28.88	119.17
02094	SM	DIETZ & WATSON INC/PHILA	5701 TACONY ST	5.08	3.13	0.00	0.47	0.46	0.10	0.34
02255	SM	SMITH EDWARDS DUNLAP CO/ALLEGHENY AVE	2867 E ALLEGHENY AVE	0.04	0.20	0.00	0.01	0.01	1.20	4.03
03506	SM	PTR BALER AND COMPACTOR/PHILA	2207 E ONTARIO ST	0.02	0.10	0.00	0.01	0.01	0.04	23.83
04903	A	EXELON GENERATING CO/RICHMOND	3901 N DELAWARE AVE	0.04	6.50	0.00	0.18	0.04	1.35	0.00
04922	A	PHILA GAS WORKS/RICHMOND PLT	3100 E VENANGO ST	2.06	4.21	0.00	0.17	0.14	0.01	0.16
05003	A	KINDER MORGAN LIQUIDS TERM/PHILA	3300 N DELAWARE AVE	3.65	4.77	0.00	0.31	0.23	0.09	41.69
09513	A	NORTHEAST WPCP/PHILA	3899 RICHMOND ST	29.21	6.73	0.00	2.01	2.01	6.08	12.66
T0034	SM	AMUNEAL MFG CORP/PHILA	4737 DARRAH STREET	0.00	0.00	0.00	0.00	0.00	0.00	0.17
			TOTAL	**135.14**	**243.50**	**0.00**	**76.39**	**61.22**	**38.13**	**207.13**

Figure 11 - NEW North Aerial View

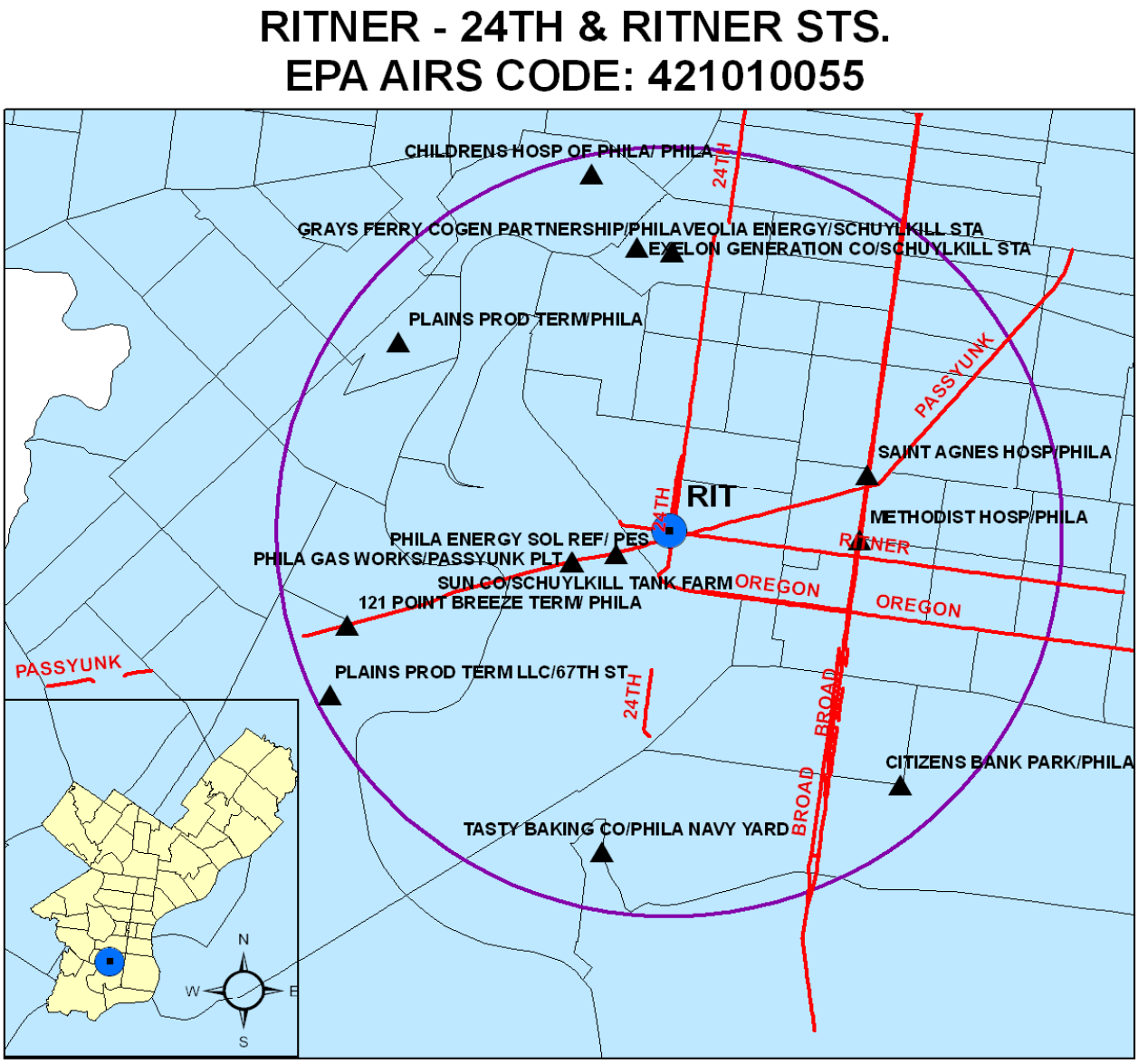
RIT

Table 7 - Detailed RIT Information with Monitoring Station Picture

AMS SITE ID: RIT
AQS Site ID: 421010055
Street Address: 24th & Ritner Streets
Geographical Coordinates
Latitude: 39.922517
Longitude: -75.186783

Parameter	Sampling Type	Operating Schedule	Collection Method	Analysis Method	Comments	Parameter Code	POC	AQS Method	Spatial Scale	Monitoring Objective	Probe Height (m)	Begin Date
SO2	SLAMS	Continuous	Instrumental	Pulsed Fluorescent		42401	1	100	Neighborhood	Population Exposure	4	11/1/2004
PM2.5 Speciated	SLAMS	Continuous	Met One SASS Teflon	Energy Dispersive XRF	Analysis by EPA			811				1/15/2011
Metals	SLAMS	1/6 days	Hi-Vol	ICP-MS	Analysis by WV (TSP sampler with quartz)			92 /89				11/1/2004
Carbonyls	Urban Air Toxics	1/6 days	DNPH-Coated Cartridges					102				11/1/2004
Toxics	Urban Air Toxics	1/6 days	Canister Subambient Pressure	Multi-Detector GC				150				11/1/2004
PM2.5 Continuous	SLAMS	Continuous		BAM =Beta Attenuation Monitor Met One BAM -1020		88101	3	170				6/1/2011
Meteorological		Continuous		Air quality measurements approved instrumentation for wind speed, wind direction, humidity, barometric pressure,rainfall and solar radiation								4/1/2010

Figure 12 - RIT Monitoring Site Map with Major Streets and Major Emission Sources



PLID	CLASS CODE	NAME	STREET	2012 EMISSIONS (in TONS/YR) CO	NOX	PB	PM10	PM2.5	SO2	VOC
01501	A	PHILA ENERGY SOL REF/ PES	3144 PASSYUNK AVE	1,779.95	1,296.94	0.00	467.39	466.94	567.54	606.97
01507	A	SUNOCO LOGISTICS/BELMONT TERM	2700 PASSYUNK AVE	29.00	11.63	0.00	0.35	0.00	0.12	35.62
01517	A	SUN CO/SCHUYLKILL TANK FARM	3144 PASSYUNK AVE	0.96	0.18	0.00	0.00	0.00	0.00	104.48
04904	A	EXELON GENERATION CO/SCHUYLKILL STA	2800 CHRISTIAN ST	0.35	2.66	0.00	0.20	0.09	2.11	0.03
04921	SM	PHILA GAS WORKS/PASSYUNK PLT	3100 PASSYUNK AVE	2.01	3.26	0.00	0.14	0.09	0.09	0.18
04942	A	VEOLIA ENERGY/SCHUYLKILL STA	2600 CHRISTIAN ST	31.21	120.80	0.00	12.79	12.79	89.50	6.90
04944	A	GRAYS FERRY COGEN PARTNERSHIP/PHILA	2600 CHRISTIAN ST	9.43	249.40	0.00	19.11	19.11	13.06	15.41
05009	SM	PLAINS PROD TERM/PHILA	1630 S 51ST ST	0.00	0.00	0.00	0.00	0.00	0.00	1.51
05013	A	PLAINS PROD TERM LLC/67TH ST	3400 S 67TH ST	0.18	0.22	0.00	0.00	0.00	0.00	63.02
08016	SM	SAINT AGNES HOSP/PHILA	1930 S BROAD ST	1.68	2.16	0.00	0.16	0.13	0.04	0.12
08047	SM	METHODIST HOSP/PHILA	2301 S BROAD ST	2.32	3.04	0.00	0.10	0.00	0.04	0.16
08069	A	CHILDRENS HOSP OF PHILA/ PHILA	34TH & CIVIC CENTER BLVD	21.25	21.83	0.00	2.35	2.35	0.86	1.93
10029	SM	121 POINT BREEZE TERM/ PHILA	6310 W PASSYUNK AVE	9.18	3.67	0.00	0.00	0.00	0.00	18.24
10236	SM	TASTY BAKING CO/PHILA NAVY YARD	4300 S 26TH ST	2.80	3.35	0.00	0.29	0.29	0.00	0.50
T0147	SM	CITIZENS BANK PARK/PHILA	1001 PATTISON AVE	5.76	4.19	0.00	0.24	0.24	0.02	1.16
			TOTAL	**1,896.09**	**1,723.32**	**0.00**	**503.13**	**502.03**	**673.37**	**856.23**

Figure 13 - RIT North Aerial View

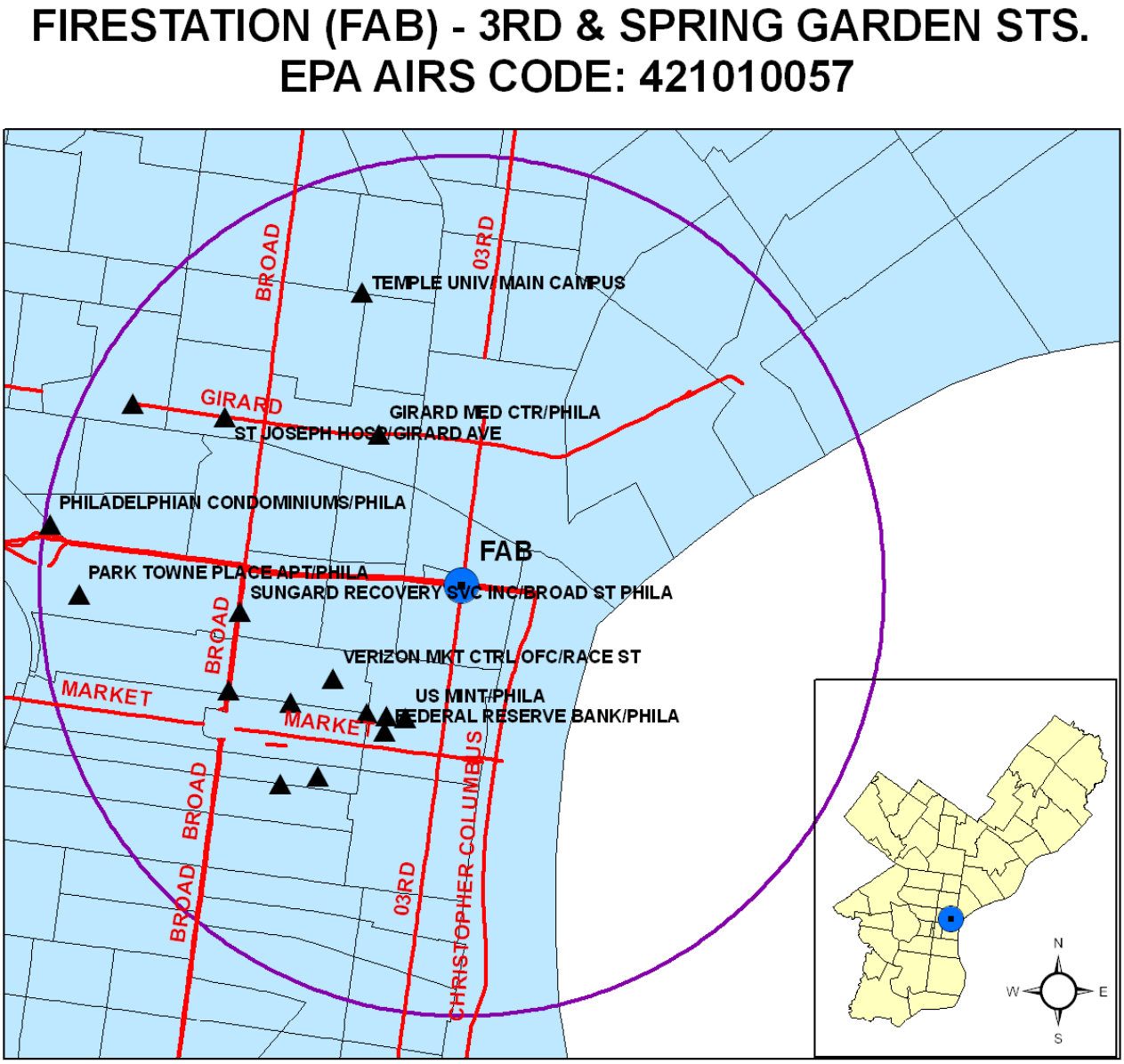
FAB

Table 8 - Detailed FAB Information with Monitoring Station Picture

AMS SITE ID: FAB
AQS Site ID: 421010057
Street Address: 240 Spring Garden Street, 19123
Geographical Coordinates
Latitude: 39.960291
Longitude: -75.142388

Parameter	Sampling Type	Operating Schedule	Collection Method	Analysis Method	Comments	Parameter Code	POC	AQS Method	Spatial Scale	Monitoring Objective	Probe Height (m)	Begin Date
PM2.5 Continuous	SLAMS	Continuous		BAM =Beta Attenuation Monitor Met One BAM -1020		88101	3	170	Neighborhood	Highest Concentration		10/1/2012

Figure 14 - FAB Monitoring Site Map with Major Streets and Major Emission Sources



PLID	CLASS CODE	NAME	STREET	2012 EMISSIONS (in TONS/YR) CO	NOX	PB	PM10	PM2.5	SO2	VOC
01014	SM	VERIZON MKT CTRL OFC/RACE ST	900 RACE ST	0.13	1.13	0.00	0.10	0.00	0.09	0.08
03321	SM	SUNGARD RECOVERY SVC INC/BROAD ST PHILA	401 N BROAD ST SUITE 600	0.14	0.28	0.00	0.01	0.01	0.10	0.03
04902	A	VEOLIA ENERGY EDISON/PHILA	908 SANSOM ST	2.89	33.53	0.00	3.82	2.49	44.52	0.16
06020	SM	FEDERAL RESERVE BANK/PHILA	100 N 6TH ST	3.69	4.44	0.00	0.10	0.10	0.03	0.25
06512	SM	PHILADELPHIAN CONDOMINIUMS/PHILA	2401 PENNSYLVANIA AVE	8.40	10.02	0.00	0.31	0.31	0.12	0.55
06526	SM	PARK TOWNE PLACE APT/PHILA	2200 BEN FRANKLIN PKWY	1.62	1.92	0.00	0.06	0.00	0.01	0.11
08027	SM	ST JOSEPH HOSP/GIRARD AVE	16TH & GIRARD	0.85	1.32	0.00	0.10	0.10	0.03	0.07
08044	SM	GIRARD MED CTR/PHILA	8TH & GIRARD	0.45	1.15	0.00	0.10	0.10	0.67	0.05
08901	SM	THOMAS JEFFERSON UNIV/PHILA	11 & WALNUT ST	0.66	2.05	0.00	0.15	0.15	0.29	0.11
08905	A	TEMPLE UNIV/ MAIN CAMPUS	1009 W MONTGOMERY AVE	28.96	37.71	0.00	1.28	1.28	0.58	8.02
08918	SM	GIRARD COLL/BOARDING SCH	GIRARD & CORINTHIAN AVE	1.98	2.39	0.00	0.07	0.00	0.10	0.13
09703	A	US MINT/PHILA	151 N INDEPENDENCE MALL EAST	2.53	1.58	0.00	0.01	0.01	0.01	0.68
09723	SM	WILLIAM J GREEN JR FED BLDG/GSA	600 ARCH ST	2.17	2.60	0.00	0.08	0.08	0.02	0.21
09726	SM	FEDERAL BUR OF PRISONS/ PHILA COURT	700 ARCH STREET	1.61	2.05	0.00	0.02	0.00	0.03	0.11
10092	SM	PA CONV CTR/ARCH ST	1101 ARCH ST	2.00	2.87	0.20	0.28	0.12	0.06	0.16
10353	SM	PA CONVENTION CTR ANNEX/BROAD ST	111 N BROAD ST	1.20	2.80	0.59	0.72	0.39	0.13	0.15
			TOTAL	59.28	107.82	0.79	7.21	5.14	46.79	10.86

Figure 15 - FAB North Aerial View

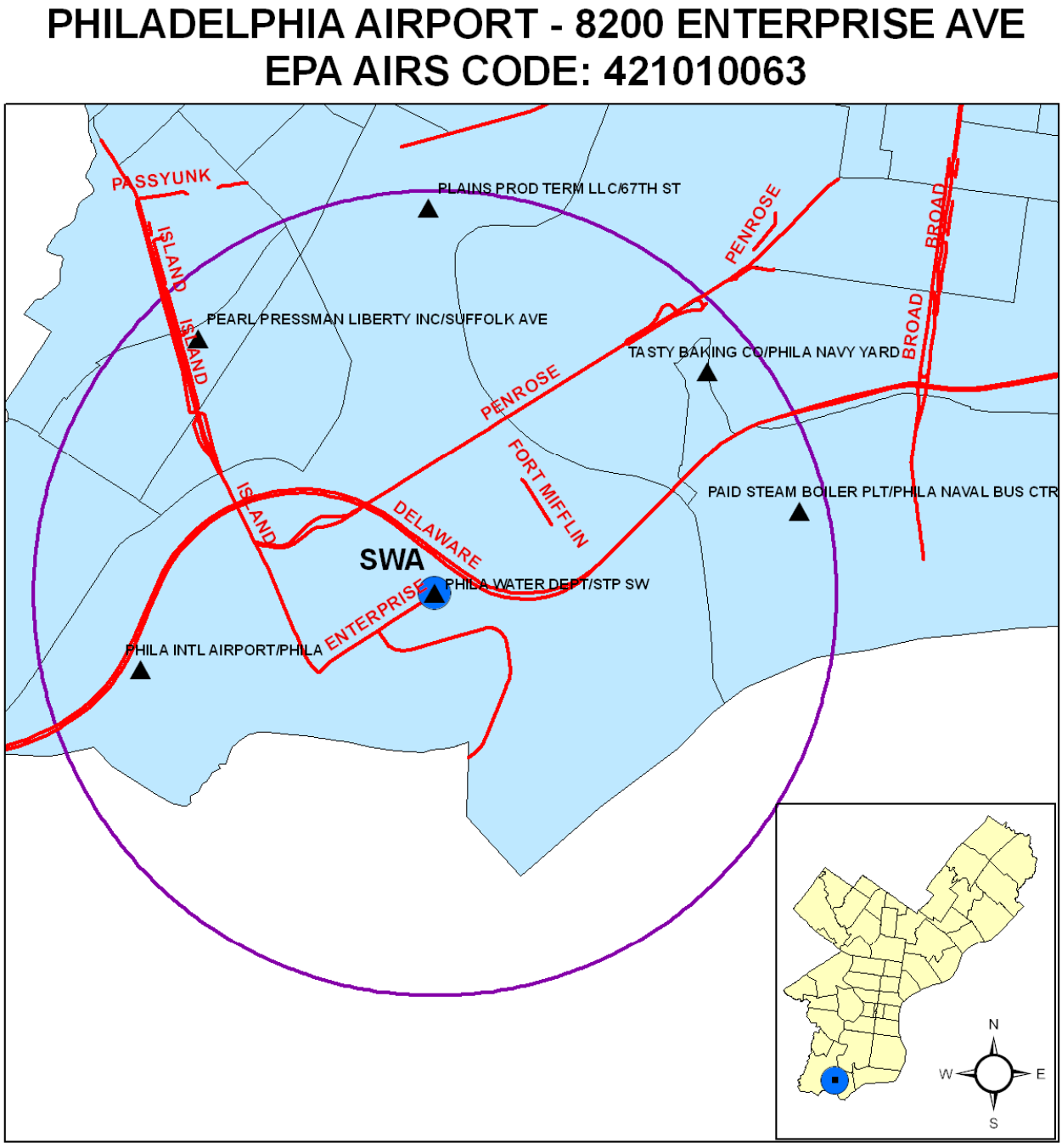
SWA

Table 9 - Detailed SWA Information with Monitoring Station Picture

AMS SITE ID: SWA
AQS Site ID: 421010063
Street Address: 8200 Enterprise Avenue, 19153
Geographical Coordinates
Latitude: 39.880115
Longitude: -75.222784

Parameter	Sampling Type	Operating Schedule	Collection Method	Analysis Method	Comments	Parameter Code	POC	AQS Method	Spatial Scale	Monitoring Objective	Probe Height (m)	Begin Date
Metals	SLAMS	1/6 days	Hi-Vol	ICP-MS	Analysis by WV (TSP sampler with quartz)			92 /89				9/10/2009
Carbonyls	Urban Air Toxics	1/6 days	DNPH-Coated Cartridges					102				9/10/2009
Toxics	Urban Air Toxics	1/6 days	Canister Subambient Pressure	Multi-Detector GC				150				9/10/2009

Figure 16 - SWA Monitoring Site Map with Major Streets and Major Emission Sources



PLID	CLASS CODE	NAME	STREET	2012 EMISSIONS (in TONS/YR)						
				CO	NOX	PB	PM10	PM2.5	SO2	VOC
03679	SM	PEARL PRESSMAN LIBERTY INC/SUFFOLK AVE	7625 SUFFOLK AVE	0.08	0.10	0.00	0.01	0.01	0.00	5.68
05013	A	PLAINS PROD TERM LLC/67TH ST	3400 S 67TH ST	0.18	0.22	0.00	0.00	0.00	0.00	63.02
09502	SM	PHILA INTL AIRPORT/PHILA	INDUSTRIAL HWY	9.12	17.45	0.00	1.38	1.27	0.20	0.92
09515	A	PHILA WATER DEPT/STP SW	8200 ENTERPRISE AVE	22.99	6.42	0.00	2.07	2.07	4.91	20.53
09715	A	PAID STEAM BOILER PLT/PHILA NAVAL BUS CTR	2000 CONSTITUTION AVENUE	3.50	2.08	0.00	0.32	0.32	0.02	0.23
10236	SM	TASTY BAKING CO/PHILA NAVY YARD	4300 S 26TH ST	2.80	3.35	0.00	0.29	0.29	0.00	0.50
			TOTAL	**38.67**	**29.62**	**0.00**	**4.07**	**3.96**	**5.13**	**90.88**

Figure 17 - SWA North Aerial View

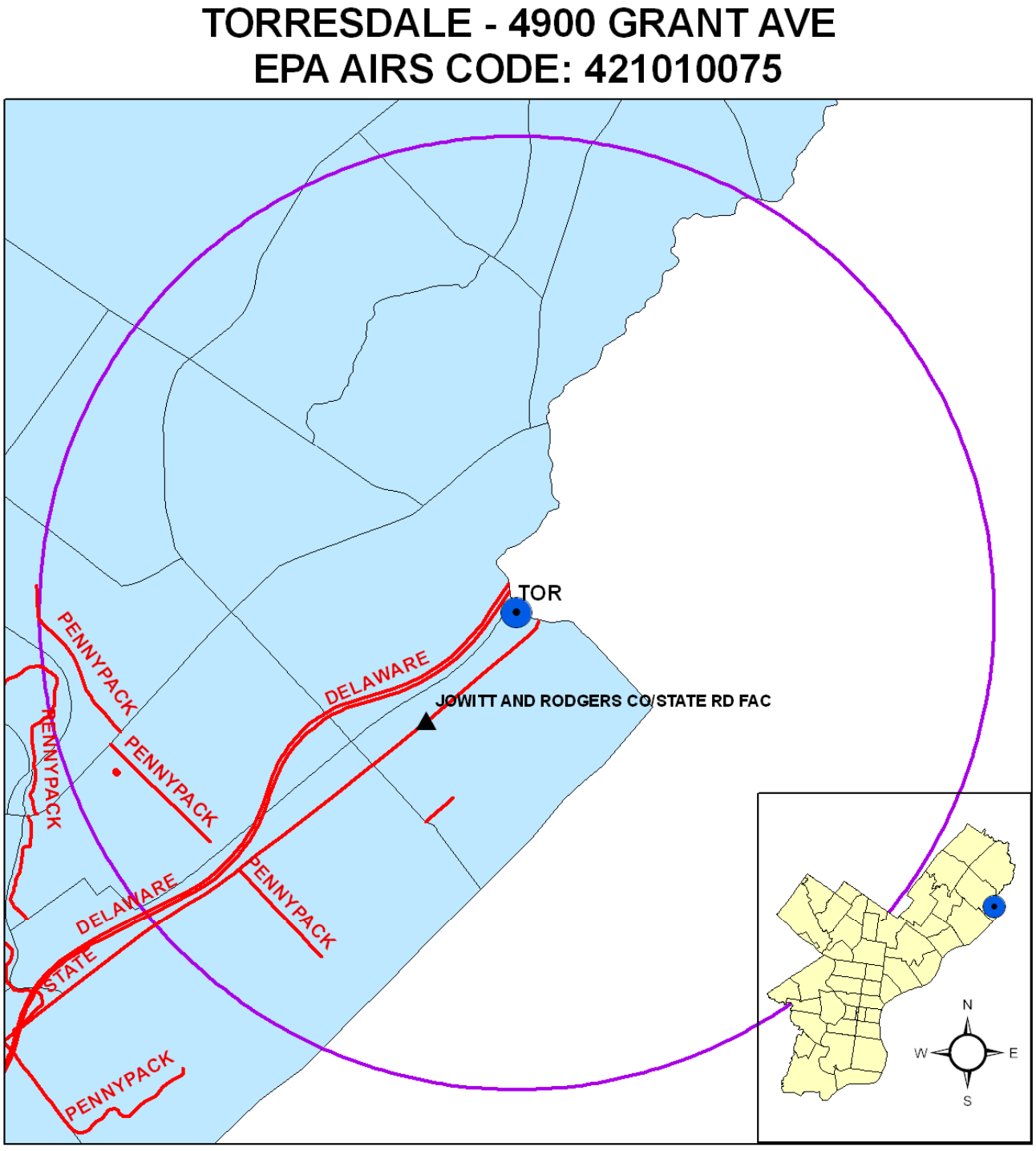
TOR

Table 10 - Detailed TOR Information with Monitoring Station Picture

AMS SITE ID: TOR
AQS Site ID: 421010075
Street Address: 4901 Grant Ave. & James St., 19114
Geographical Coordinates
Latitude: 40.054171
Longitude: -74.985166

Parameter	Sampling Type	Operating Schedule	Collection Method	Analysis Method	Comments	Parameter Code	POC	AQS Method	Spatial Scale	Monitoring Objective	Probe Height (m)	Begin Date
CO	SLAMS	Continuous	Instrumental	Nondispersive infrared		42101	1	93	Micro	Highest Concentration/ Source Oriented		1/1/2014
NO2	SLAMS	Continuous	Instrumental	Chemiluminescence		42602	1	99	Micro	Highest Concentration/ Source Oriented		1/1/2014
PM2.5 Continuous	SLAMS	Continuous		BAM =Beta Attenuation Monitor Met One BAM -1020		88101	1	170	Micro	Highest Concentration/ Source Oriented		1/1/2014
Meteorological		Continuous		Air quality measurements approved instrumentation for wind speed, wind direction, humidity, barometric pressure,rainfall and solar radiation								

Figure 18 - TOR Monitoring Site Map with Major Streets and Major Emission Sources



				2012 EMISSIONS (in TONS/YR)						
PLID	CLASS CODE	NAME	STREET	CO	NOX	PB	PM10	PM2.5	SO2	VOC
03154	SM	JOWITT AND RODGERS CO/STATE RD FAC	9400 STATE ROAD	0.03	0.16	0.00	0.01	0.00	0.00	5.95
			TOTAL	**0.03**	**0.16**	**0.00**	**0.01**	**0.00**	**0.00**	**5.95**

Figure 19 - TOR North Aerial View

PHA

Table 11 - Detailed PHA Information with Monitoring Station Picture

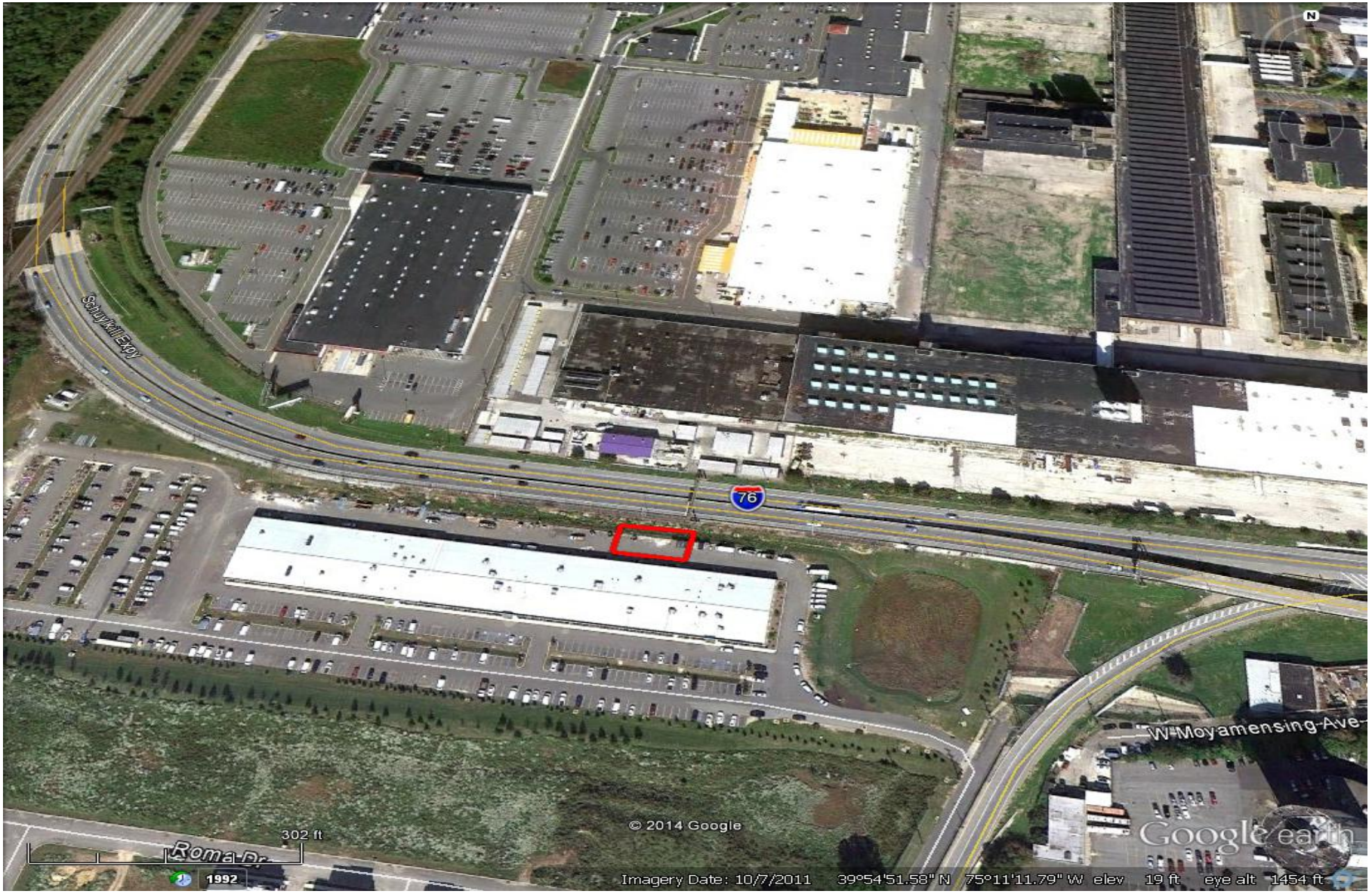
AMS SITE ID: PHA
Street Address: 3100 Penrose Ferry Road, 19145
Geographical Coordinates
Latitude: 39.913176
Longitude: -75.185409

Parameter	Sampling Type	Operating Schedule	Collection Method	Analysis Method	Comments	AQS Method	Spatial Scale	Monitoring Objective	Probe Height (m)	Begin Date
Toxics	Continuous Open Path	Continuous								2/1/2014

Figure 20 – PHA Monitoring Site Map with Major Streets and Major Emission Sources

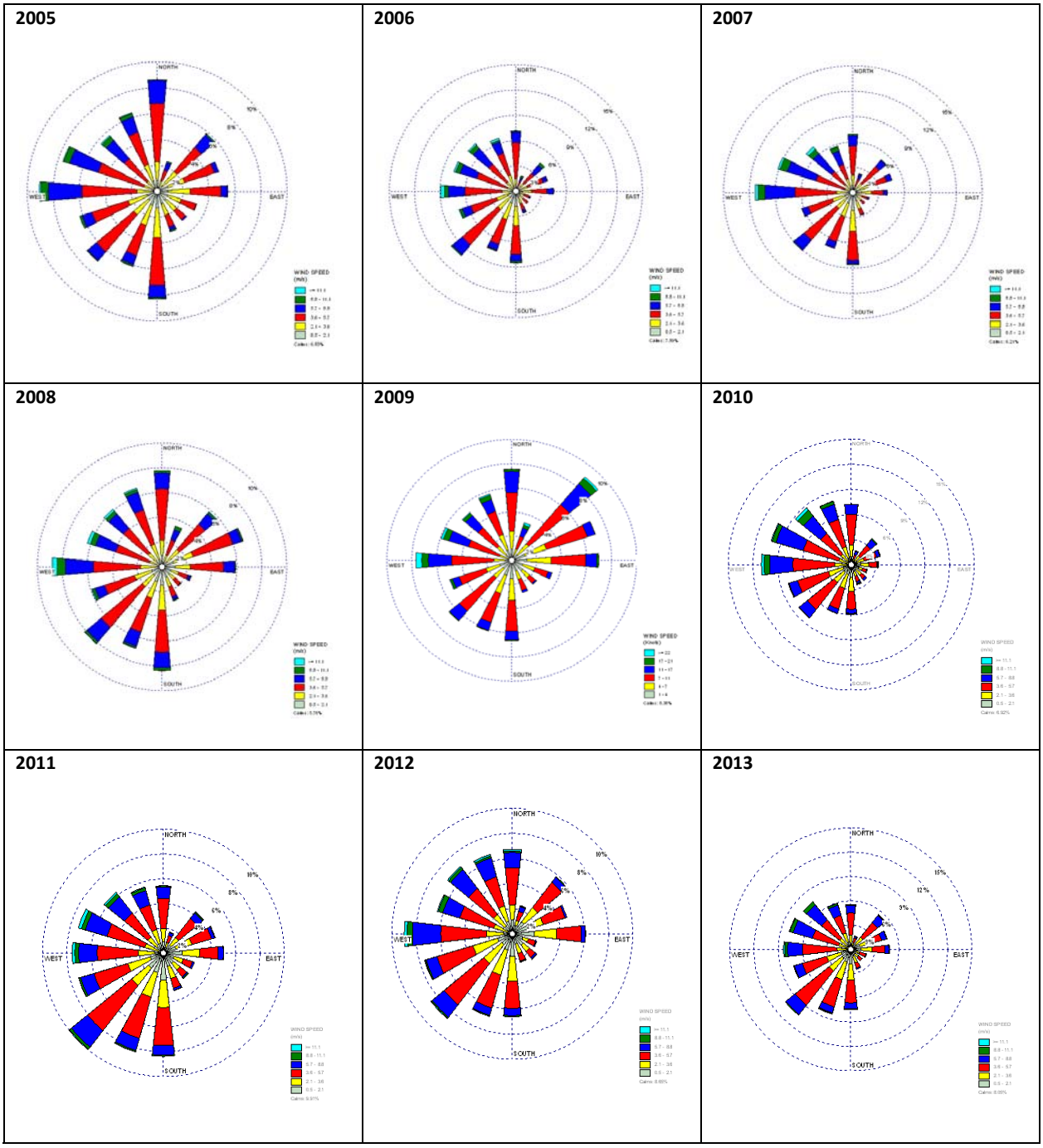
PLID	CLASS CODE	NAME	STREET	2012 EMISSIONS (in TONS/YR) CO	NOX	PB	PM10	PM2.5	SO2	VOC
01501	A	PHILA ENERGY SOL REF/ PES	3144 PASSYUNK AVE	1,779.95	1,296.94	0.00	467.39	466.94	567.54	606.97
01507	A	SUNOCO LOGISTICS/BELMONT TERM	2700 PASSYUNK AVE	29.00	11.63	0.00	0.35	0.00	0.12	35.62
01517	A	SUN CO/SCHUYLKILL TANK FARM	3144 PASSYUNK AVE	0.96	0.18	0.00	0.00	0.00	0.00	104.48
04921	SM	PHILA GAS WORKS/PASSYUNK PLT	3100 PASSYUNK AVE	2.01	3.26	0.00	0.14	0.09	0.09	0.18
08016	SM	SAINT AGNES HOSP/PHILA	1930 S BROAD ST	1.68	2.16	0.00	0.16	0.13	0.04	0.12
08047	SM	METHODIST HOSP/PHILA	2301 S BROAD ST	2.32	3.04	0.00	0.10	0.00	0.04	0.16
09715	A	PAID STEAM BOILER PLT/PHILA NAVAL BUS CTR	2000 CONSTITUTION AVENUE	3.50	2.08	0.00	0.32	0.32	0.02	0.23
10236	SM	TASTY BAKING CO/PHILA NAVY YARD	4300 S 26TH ST	2.80	3.35	0.00	0.29	0.29	0.00	0.50
T0147	SM	CITIZENS BANK PARK/PHILA	1001 PATTISON AVE	5.76	4.19	0.00	0.24	0.24	0.02	1.16
			TOTAL	**1,827.99**	**1,326.82**	**0.00**	**469.00**	**468.00**	**567.86**	**749.42**

Figure 21 – PHA North Aerial View



Appendix A
Wind Rose Plots

Figure A. 1 - Philadelphia Wind Rose Plots (2005-2013)



Appendix B
Second Near-Road Monitoring Station

OMB Number: 4040-0004
Expiration Date: 04/31/2012

Application for Federal Assistance SF-424

Version 02

*1. Type of Submission	*2. Type of Application	*If Revision, select appropriate letter(s):
☐ Preapplication	☑ New	
☑ Application	☐ Continuation	* Other (Specify)
☐ Changed/Corrected Application	☐ Revision	

*3. Date Received: 4. Application Identifier:

5a. Federal Entity Identifier: *5b. Federal Award Identifier:

State Use Only:

6. Date Received by State: 7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name: City of Philadelphia/Department of Public Health

* b. Employer/Taxpayer Identification Number (EIN/TIN): *c. Organizational DUNS: 834466463

d. Address:

*Street1: 321 University Ave, 2nd floor
Street 2:
*City: Philadelphia
County:
*State: Pennsylvania
Province:
Country: United States *Zip/ Postal Code: 19104

e. Organizational Unit:

Department Name: Public Health

Division Name: Air Management Services

f. Name and contact information of person to be contacted on matters involving this application:

Prefix: First Name: Thomas
Middle Name:
*Last Name: Huynh
Suffix:

Title: Director, Air Management Services

Organizational Affiliation:

*Telephone Number: 215-685-7584 Fax Number: 215-685-9451

*Email: Health.EPAGrant@phila.gov

OMB Number: 4040-0004
Expiration Date: 04/31/2012

Application for Federal Assistance SF-424 Version 02

9. Type of Applicant 1: Select Applicant Type: B. County Government

Type of Applicant 2: Select Applicant Type:

- Select One -

Type of Applicant 3: Select Applicant Type:

- Select One -

*Other (specify):

*10. Name of Federal Agency:
Environmental Protection Agency

11. Catalog of Federal Domestic Assistance Number:

66.034

CFDA Title:

*12. Funding Opportunity Number:

*Title:

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

City of Philadelphia

*15. Descriptive Title of Applicant's Project:

Near Road Monitoring Station

Attach supporting documents as specified in agency instructions.

OMB Number: 4040-0004
Expiration Date: 04/31/2012

Application for Federal Assistance SF-424

Version 02

16. Congressional Districts Of:

*a. Applicant PA-001

*b. Program/Project:

Attach an additional list of Program/Project Congressional Districts if needed.

17. Proposed Project:

*a. Start Date: 04/01/2014

*b. End Date: 03/31/2016

18. Estimated Funding ($):

*a. Federal	$200,000.00
*b. Applicant	
*c. State	
*d. Local	
*e. Other	
*f. Program Income	
*g. TOTAL	$200,000.00

***19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☑ a. This application was made available to the State under the Executive Order 12372 Process for review on 03/11/2014
☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.
☐ c. Program is not covered by E.O. 12372

*20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes", provide explanation.)
☐ Yes ☑ No

21. *By signing this application, I certify (1) to the statements contained in the list of certifications** and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)

☑ **I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix:

*First Name: Donald

Middle Name:

*Last Name: Schwarz

Suffix:

*Title: Health Commissioner

*Telephone Number: 215-686-9009

Fax Number: 215-686-5212

*Email: Health.EPAGrant@phila.gov

*Signature of Authorized Representative:

Date Signed: 2/28/14

BUDGET INFORMATION - Non-Construction Programs

OMB Approval No. 0348-0044

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Near Road Monitorin	66.034	$	$	$ 200,000.00	$	$ 200,000.00
2.						0.00
3.						0.00
4.						0.00
5. Totals		$ 0.00	$ 0.00	$ 200,000.00	$ 0.00	$ 200,000.00

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY (1)	(2)	(3)		Total (5)
a. Personnel	$	$	$	$	$ 0.00
b. Fringe Benefits					0.00
c. Travel					0.00
d. Equipment	104,434.00				104,434.00
e. Supplies	5,566.00				5,566.00
f. Contractual	90,000.00				90,000.00
g. Construction					0.00
h. Other					0.00
i. Total Direct Charges *(sum of 6a-6h)*	200,000.00	0.00	0.00	0.00	200,000.00
j. Indirect Charges					0.00
k. TOTALS *(sum of 6i and 6j)*	$ 200,000.00	$ 0.00	$ 0.00	$ 0.00	$ 200,000.00
7. Program Income	$	$	$	$	$ 0.00

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Prescribed by OMB Circular A-102

Previous Edition Usable

SECTION C - NON-FEDERAL RESOURCES				
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTALS
8.	$	$	$	$ 0.00
9.				0.00
10.				0.00
11.				0.00
12. TOTAL *(sum of lines 8-11)*	$ 0.00	$ 0.00	$ 0.00	$ 0.00

SECTION D - FORECASTED CASH NEEDS					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$ 200,000.00	$ 50,000.00	$ 50,000.00	$ 50,000.00	$ 50,000.00
14. Non-Federal	0.00				
15. TOTAL *(sum of lines 13 and 14)*	$ 200,000.00	$ 50,000.00	$ 50,000.00	$ 50,000.00	$ 50,000.00

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT				
(a) Grant Program	FUTURE FUNDING PERIODS (Years)			
	(b) First	(c) Second	(d) Third	(e) Fourth
16.	$	$	$	$
17.				
18.				
19.				
20. TOTAL *(sum of lines 16-19)*	$ 0.00	$ 0.00	$ 0.00	$ 0.00

SECTION F - OTHER BUDGET INFORMATION	
21. Direct Charges:	22. Indirect Charges:
23. Remarks:	

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ASSURANCES - NON-CONSTRUCTION PROGRAMS

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0040), Washington, DC 20503.

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.

NOTE: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project cost) to ensure proper planning, management and completion of the project described in this application.

2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.

3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.

4. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.

5. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards for merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).

6. Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee-3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and, (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.

7. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.

8. Will comply, as applicable, with provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

9. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. §874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333), regarding labor standards for federally-assisted construction subagreements.

10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is $10,000 or more.

11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clean Air) Implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).

12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.

13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq.).

14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.

15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. §§2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.

16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.

17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."

18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL	TITLE
[signature]	Health Commissioner
APPLICANT ORGANIZATION	DATE SUBMITTED
	February 28, 2014

Standard Form 424B (Rev. 7-97) Back

Near-Road NO_2 Monitoring Grant Application
RFP Number:
CDFA Number: 66.034

Project Title: Near-Road NO_2 Monitoring
Organization: Air Management Services
Address: 321 University Avenue, 2nd Floor, Philadelphia, PA 19104
Contact: Thomas Huynh
Phone: 215-685-7585
Fax: 215-685-7451
Email: Thomas.Huynh@phila.gov
Total Project Cost: $200,000
Project Period (dates): 3/1/2014 – 1/1/2015
DUNS Number: 834466463

1. Background

EPA recognized that the combination of increased vehicle-miles-traveled (VMT), which correspond to on-road mobile source emissions, with higher urban population densities can result in an increased potential for exposure and associated risks to human health and welfare. As a result, on February 9, 2010, EPA promulgated (75 FR 6474) new minimum monitoring requirements for the nitrogen dioxide (NO_2) monitoring network in support of a newly revised 1-hour NO_2 National Ambient Air Quality Standard (NAAQS). In this rule, EPA required changes to the monitoring network. State and local air monitoring agencies are required to install near-road NO_2 monitoring stations in larger urban areas where hourly NO_2 concentrations in the near-road environment are believed to be the highest in that urban area. The monitoring network will focus monitoring resources to capture short-term NO_2 concentrations near heavily trafficked roads, to assess area-wide (or community-wide) NO_2 concentrations, and to assess NO_2 concentrations for vulnerable and susceptible populations. State and local air agencies are required to consider traffic volumes, fleet mix, roadway design, traffic congestion patterns, local terrain or topography, and meteorology in the implementation process of any required near-road NO_2 monitor. Monitoring requirements are based upon population levels and a specific traffic metric within Core Based Statistical Areas (CBSAs). State and local ambient air monitoring agencies are required (per 40 CFR Part 58 Appendix D, Section 4.3.2.a) to use the latest available census figures (e.g., census counts and/or estimates) and available traffic data in assessing what may be required of them under this new rule. The NO_2 NAAQS was revised to include a 1-hour standard with a 98th percentile form and a level of 100 ppb, reflecting the maximum allowable NO_2 concentration anywhere in an area, while retaining the annual standard of 53 ppb.

The CBSA in which Philadelphia County is located is the "Philadelphia" CBSA which is comprised of five counties in PA: Philadelphia, Bucks, Chester, Delaware, and Montgomery, four counties in NJ: Burlington, Camden, Gloucester and Salem, one county in DE: New Castle, and one county in MD: Cecil. The Philadelphia CBSA has an estimated population of 6,018,800. The Pennsylvania Department of Environmental Protection serves as the air agency for all counties in PA, except Allegheny County which is served by the Allegheny County Health

Department and Philadelphia, the most populous county in Pennsylvania, which is served by the Philadelphia Department of Public Health, Air Management Services (AMS). AMS is the local air pollution control agency for the City of Philadelphia. AMS is responsible for the prevention, abatement, and control of air pollution and air pollution nuisances, achieving and maintaining federal NAAQS in Philadelphia, and protecting the health and quality of life of the Philadelphia community from the adverse effects of air contaminants and noise.

Due to the complexities associated with the implementation of the near-road monitoring component of the recently revised minimum monitoring requirements, the EPA created the Technical Assistance Document (TAD). The TAD has been drafted in a collaborative effort among local, state, and federal air monitoring and transportation agencies to provide a set of recommendations by which required near-road NO_2 stations would be deployed.

2. Scope of Work

In 2010, EPA strengthened the health-based NAAQS for NO_2 by adding a new 1-hour standard. NO_2 is the component of greatest interest and the indicator for the larger group of NO_x, a group of highly reactive gasses. NO_2 forms quickly from emissions from cars, trucks and buses, power plants, and off-road equipment. In addition to contributing to the formation of ground-level ozone, and fine particle pollution, NO_2 is linked to a number of adverse effects on the respiratory system. The new NO_2 standard protects public health by limiting short-term exposures to NO_2 concentrations that could worsen the control of asthma and that have been linked to hospital admissions and emergency room visits for respiratory illnesses, particularly in at-risk populations such as children, the elderly, and asthmatics. The revised NAAQS defines the maximum allowable NO_2 concentration anywhere in an area. Specifically, monitoring studies and modeling efforts indicate that NO_2 concentrations in heavy traffic or near major roadways can be twice as high as concentrations measured away from such roads. With the elevated NO_2 concentrations near major roads and the potential for peak human exposures to occur on or near such roads, and given that the public health protection envisioned under the revised NO_2 NAAQS depends on States monitoring peak 1-hour NO_2 concentrations, the final NO_2 NAAQS requires monitors near major roadways in large urban areas including the Philadelphia CBSA.

The Philadelphia CBSA is the second most populous CBSA following the New York CBSA in Mid-Atlantic Regional States. As an urban area, Philadelphia faces many of the same pollution challenges as other densely populated areas, such as emissions from vehicles and industries. More than 70% of Nitrogen Oxides (NO_x) Emissions in Philadelphia come from mobile sources[1]. Two busy major roadways run through the City: Interstates 76 and 95. There are also several smaller roadways that connect center city and Philadelphia's suburbs, such as US 1, Route 30, Route 63 and Route 73.

The first step in deciding on candidate near-road NO_2 monitoring locations as stated in the EPA TAD is to identify the extent to which monitoring requirements apply. In 40 CFR Part 58 Appendix D, the EPA requires state and local air agencies to operate one near-road NO_2 monitor

[1] http://www.epa.gov/cgi-bin/broker?_service=data&_debug=0&_program=dataprog.state_1.sas&pol=NOX&s fips=42

in each CBSA with a population of 500,000 or more persons. CBSAs with 2,500,000 or more persons, or those CBSAs with one or more roadway segments carrying traffic volumes of 250,000 or more vehicles (as measured by AADT counts), shall have two near-road NO_2 monitors within that CBSA. State and local ambient air monitoring agencies are required to use the most up-to-date census information and traffic data in assessing what may be required of them under this rule, per 40 CFR Part 58 Appendix D, Section 4.3.2.a. Based on the 2012 estimated population by the Census Bureau, the Philadelphia CBSA has a population of 6,018,800 which requires two near-road NO_2 monitors. In 2012, AMS applied for and was awarded the grant for the 1st near-road NO_2 monitoring site at Torresdale Train Station (4901 Grant Ave. & James St., 19114).

The next step in identifying candidate NO_2 near-road monitoring sites is collecting and analyzing traffic data. AMS used the latest traffic data from Pennsylvania Department of Transportation's (PennDOT) Internet Traffic Monitoring System (ITMS) to identify road segments and their traffic volumes in Philadelphia County. Ten candidate sites are listed on Table 2.1. based on Fleet Equivalent (FE) AADT rankings, which accounts for traffic volume and fleet mix.

Table 2.1 – Eleven Candidate Sites

SITE	TRAF. RT. NO	STREET NAME	LOCATION	FE AADT
A	I-95	Delaware Expwy	Between Exit 22 (I-676/US 30 - Central Phila/Callowhill St) & Exit 25 (Allegheny Ave/Castor Ave)	260440
B	I-95	Delaware Expwy	Between I-95 North - Trenton & Exit 30 (Cottman Ave/Rhawn St)	255123
C	I-76	Schuylkill Expwy	Between Exit 340A (Lincoln Dr/Kelly Dr) & Exit 341 (Montgomery Dr/West River Dr)	253965
D	I-95	Delaware Expwy	Between Exit 32 (Academy Rd/ Linden Ave) & Exit 33 (Grant Ave - Boundary with Bucks Co.)	253490
E	I-76	Schuylkill Expwy	Between Exit 341 (Montgomery Dr/West River Dr) to Exit 343 (Spring Garden St/Harverford Ave)	244046
F	I-95	Delaware Expwy	Between Exit 25 (Allegheny Ave/Castor Ave) & I-95 North – Trenton	240924
G	I-76	Schuylkill Expwy	Between Exit 343 (Spring Garden St/Harverford Ave) & Exit 346A (South St)	221028
H	I-95	Delaware Expwy	Between Boundary with Delco & Exit 12 (PA 291 - Cargo City)	211887
I	I-95	Delaware Expwy	Between Exit 17 (PA 611 N. Broad St/Pattison Ave) & Exit 19 (I-76 E - Walt Whitman Br/Packer Ave)	194493
J	I-95	Delaware Expwy	Between Exit 12 (PA 291 - Cargo City) & Exit 13 (to I-76 W/PA 291-Valley Forge/Island Ave)	192354
K	I-95	Delaware Expwy	Between Exit 19 (I-76 E - Walt Whitman Br/Packer Ave) & Exit 22 (I-676/US 30 - Central Phila/Callowhill St)	164131

Possible locations will be chosen based on the criteria in section 6 of EPA's Near-Road NO_2 Monitoring TAD dealing with physical considerations as shown in Table 2.2.

Table 2.2 – Physical Considerations for Near-road Candidate Sites

Physical Site Component	Impact on Site Selection	Desirable Attributes	Less Desirable Attributes	Potential Information Source
Roadway design or configuration	Feasibility of monitor placements; affects pollutant transport and dispersion	Near ramps, intersections, lane merge locations/interchanges; at grade with surrounding terrain	Cut-section/below grade; above grade (bridge)	Field reconnaissance; satellite imagery
Roadside Structures	Feasibility of monitor placement; affects pollutant transport and dispersion	No barriers present besides low (<2 min height) safety features such as guardrails	Presence of sound walls, high vegetation, obstructive buildings	Field reconnaissance; satellite imagery
Terrain	Affect pollutant dispersion, local atmospheric stability	Flat or gentle terrain, within a valley, or along road grade	Along mountain ridges or peaks, hillsides, or other naturally windswept areas	Field reconnaissance; digital elevation models and vegetation files; satellite imagery
Meteorology	Affects pollutant transport and dispersion	Relative downwind locations – winds from roads to monitor	Strongly predominant upwind positions	Local data; NOAA/NWS; AQS

Furthermore, sampling network design and monitoring site selection must comply with:

- 40 CFR Part 58, Appendix A - Quality Assurance Requirements for State and Local Air Monitoring Stations (SLAMS)
- 40 CFR Part 58, Appendix D - Network Design for State and Local Air Monitoring Stations (SLAMS) and National Air Monitoring Stations (NAMS), and Photochemical Assessment Monitoring Stations (PAMS)
- 40 CFR Part 58, Appendix E - Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring.

Near-road NO_2 monitoring is classified under the SLAMS network.

AMS will conduct site visits to assess each site's potential, advantages, and disadvantages. We will work with Howard Schmidt of EPA Region III to determine the best location for the near-road monitor taking into account the physical considerations of Table 2.2

Equipment, supplies, and related services recommended for a permanent near-road monitoring station by EPA and AMS are in Table 2.3 and the budget detail is in Table 2.4.

Table 2.3 – Equipment, Supplies and Related Services
(EPA Recommendations and AMS Comments)

	EPA Recommendations	AMS Comments
Air Monitoring Shelter	• Shelter should be large enough for multi-pollutant monitoring • Consider potential future needs for roof-top sampling	• 14'x8'x8' Shelter-One Mobile Shelter with Air Condition • Including roof railing and vertical steps
Air Sampling Instrumentation	• Federal Reference or Equivalent NO_2 analyzer • Trace-level CO analyzer	• Teledyne NO_2 analyzer model T200 • Teledyne Trace-level CO analyzer model 300E
Meteorological Instrumentation	• 2-D or 3-D Sonic Anemometer (at 10 meters, possibly at 2 meters as well) • Temperature • Relative Humidity	• MET Tower & MET System, Vaisala WXT520
Data logging hardware, software and supporting documentation	• These items should match up or improve upon a State or locals' existing data acquisition infrastructure	• Computer includes software, data acquisition and wireless modem
Communication equipment and supplies	• Such as broadband or wireless internet access, routers, etc.	• Is included on wireless modem on data logging hardware, software and supporting documentation item
Gas calibration standards	• Such as high-end zero gas generators, calibration systems and plumbing, and gas cylinders	• Calibration Equipment (Calibrator and zero air Generator)
Utility connections	• Including power, telecom, etc	• Power (220 Volt/100 Amp Service)
Safety and Security Equipment	• Such as fencing around site • Possible installation of protective traffic guard rail or barrier	• Fencing, Signs, Safety Bollards

Table 2.4 – The Budget Detail for Near-Road Monitoring

NO_2 Analyzer	$10,014
CO Analyzer	$9,214
MET Tower & MET System	$2,778
Calibration Equipment (Calibrator & Zero Air generator)	$25,336
PM2.5 BAM Analyzer	$22,227
Computer including software, data acquisition, and wireless modem	$5,200
Shelter, air conditioner	$28,565
Racks, Panels	$500
Port Switches	$500
Total Equipment	**$104,434**
Calibration gases	$2,000
Precision Equipment - Handheld Multimeters, Temperature Probes, Pressure Calibrator, etc.	$1,466
Manifold Supplies, Aluminum Bar, Fiberglass Screen	$1,800
Signs	$300
Total Supplies	**$5,566**
Contractor to level the site, construction materials, fencing around the site, securing the site, concrete pad	$90,000
Total Contractual	**$90,000**
[redacted]	$200,000

3. Data Analysis

Real time continuous analyzers will be used to collect NO_2 and CO measurements from the near-road monitoring site in accordance with Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM). No physical collection of samples for analytical analysis will be collected for this project. Review of the continuous data will be conducted by the quality assurance (QA) Engineer or QA Staff.

The data compiled is a combination of meteorological and criteria pollutant data. The pollutant concentrations to be measured are CO and NO_2, NO_x, and NO. The meteorological data to be measured are wind speed, wind direction, relativity humidity and ambient temperature.

Data reduction activities aggregate raw data into averages that are required to compare against the NAAQS criteria pollutant limits. These values obtained from reducing these data sets establish whether or not the NAAQS have been exceeded. AMS' field and laboratory personnel and QA engineer, are provided the raw data sets from the instrument dowr load for each monitoring site. These data sets are verified, corrected, and flagged by the appropriate AMS Lab personnel and returned to the data management personnel for updating and archiving.

The appropriate field and/or laboratory personnel or QA engineer monitors and reviews the data sets for invalid flags. If the data are deemed invalid, they are disqualified from the data set, and consequently, not used. Criteria for the quantity of valid data points required within a data set are defined in 40 CFR Part 50, Appendix S. These criteria are adhered to when performing the data reduction operations. The network-provided raw data sets are reduced, yielding the appropriate averaging period values. These results are compared to the NAAQS for the specific criteria pollutants under consideration. Acceptable values are those that do not exceed the established NAAQS values.

Each quarter, AMS will report to AQS the results of all precision, bias, and accuracy tests it has carried out during the previous quarter. The quarterly reports will be submitted consistent with the data reporting requirements specified for air quality data as set forth in 40 CFR Part 58, Appendix A, Section 4. The data reporting requirements of 40 CFR Section 58.16 apply to those stations designated SLAMS or NAMS. Required accuracy and precision data are to be reported on the same schedule as quarterly monitoring data submittals.

The minimum number of samples required for appropriate summary statistics should be taken. At least 75% of the total possible observations must be present before summary statistics are calculated. Tables 3.1 and 3.2 list the monitoring requirements for calculating summary statistics and the monitoring frequency.

Table 3.1: Roadside Monitoring Requirements for Calculating Summary Statistics

Pollutant	Completeness Requirement	Time Frame
CO	75%	Per quarter
NO_2, NO, NOx	75%	Per quarter

Table 3.2: Roadside Monitoring Frequency

Pollutant	Time Frame	Frequency	Monitor Type
CO	Midnight to Midnight	24/7	Continuous
NO_2, NO, NOx	Midnight to Midnight	24/7	Continuous
Wind Speed	Midnight to Midnight	24/7	Continuous
Wind Direction	Midnight to Midnight	24/7	Continuous
Ambient Temperature	Midnight to Midnight	24/7	Continuous
Relative Humidity	Midnight to Midnight	24/7	Continuous

This data will be used to:

- Evaluate compliance with the NAAQS;
- Establish a historical baseline concentration of natural and anthropogenic air pollutants;
- Monitor the current dynamic concentrations of these pollutants;
- Monitor progress made toward meeting national ambient air quality standards;
- Activate emergency control procedures that prevent or alleviate air pollution episodes;
- Provide data, upon which long-term control strategies can be reliably developed;
- Observe pollution trends throughout the region; and
- Provide a database for researching and evaluating effects.

Quality Assurance:

A data quality assessment (DQA) is the statistical analysis of environmental data to determine whether the data meet the assumptions that the Data Quality Objectives (DQOs) and data collection design were developed under and whether the total error in the data is tolerable. Calculations for DQA activities shall follow the requirements and equations identified in 40 CFR Part 58, Appendix A, Section 5. The DQA process is described in detail in the Guidance for the Data Quality Assessment Process, EPA QA/G-9.

Five Steps of the Data Quality Assessment Process

Step 1. Review Data Quality Objectives (DQOs) and Sampling Design - The Data and Modeling Analyst shall review the project's sampling design Data Quality Indicators (DQIs), i.e., precision, bias, comparability, representativeness and completeness, and DQOs to verify that they are still applicable.

Step 2. Conduct Preliminary Data Review - The Data and Modeling Analyst and the Data Management Supervisor shall review the various submitted QA reports to identify any corresponding anomalous conditions. The first phase of the preliminary data review is to review the QA reports. The second phase of the preliminary data review is to calculate basic summary statistics (number of samples, median concentration, standard deviations, maximum concentration, minimum concentration, inter-quartile range), generate graphical presentations of the data and review these summary statistics and graphs.

Additionally, basic histograms or other appropriate graphs such as box plots or CDF plots may be created for each of the primary and QA samplers and for the percent difference at the collocated sites. These graphs will be useful in identifying anomalies and evaluating the normality assumption in the measurement errors.

Step 3. Select the Statistical Test - The Data and Modeling Analyst will determine whether the primary objective of Philadelphia's Ambient Air Quality Monitoring Network, which is compliance with the NAAQS established by the EPA for criteria pollutant concentrations, has been attained for the prior monitoring period

Step 4. Verify the Assumptions of the Statistical Test - The Data and Modeling Analyst, QA Staff, and/or AMS manager shall evaluate the assumptions upon which the DQOs, and the bias and precision (measurement error) assumptions are based.

Steps 5. Draw Conclusions from the Data - Perform the calculations required for the statistical test and document the Inferences drawn as a result of these calculations. If the design is to be used again, evaluate the performance of the sampling design.

Each year, a thorough DQA process will be conducted. For this section, the AMS Lab Administrative Engineer or appropriate AMS Lab Supervisor assumes that the assumptions for developing the DQOs have been met. If not, the AMS Lab Supervisor must first revisit the impact of the violation on the bias and precision limits determined by the DQO process.

If the conclusion from the DQA process is that each of the ambient air monitors is operating with less than 10% bias and precision, then the field supervisor/ QA Staff may pursue action to reduce the QA/QC burden associated with the monitor. Possible courses of actior may include the following:

- **Modifying the QA Monitoring Network** - 40 CFR Part 58 requires that each QA monitor be the same designation as the primary monitor. Once it is demonstrated that the data collected from the network are within tolerable levels of errors, the Administrative Engineer or Administrative Scientist may request that it be allowed to modify these requirements.
- **Data from a collocated network** (Local Program, nearby reporting organizations, national),
- **Data from performance audits** (contracted or NPAP), and QC trails.

Some particular courses of action include:

- **Determining the level of aggregation at which DQOs are violated** - The DQA process tells which monitors are having problems, since the DQOs were developed at the monitor level. Examination of these reports may assist in determining the level at which the DQOs are being violated.
- **Communicating with EPA Region III** - If a violation of the bias and precision DQIs are found, AMS will remain in close contact with EPA for both assistance and for communication.
- **Extensively reviewing quarterly data until DQOs are achieved** - The Administrative Engineer or Administrative Scientist will continue to extensively review the quarterly QA reports and the QC summaries until the bias and precision tolerable limits are attained.

Corrective action measures in the near-road NO_2 monitoring will be taken to ensure the data quality objectives are attained. There is the potential for many types of sampling and measurement system corrective actions. Each approved standard operating procedure details some expected problems and corrective actions needed for a well-run monitoring network.

The data obtained from the electronic evaluation of criteria pollutant concentrations shall be validated and verified utilizing both manual and electronic methods. Specific criteria are

employed that identify the range of acceptable data, the minimum and maximum acceptable values, the rate of change of specific values, and other criteria that are indicative of valid qualifying data.

4. Timeline

Projected Timeline for Installation and Operation of the Near Roadway Monitoring Station

Milestones	Date
Identify location of monitoring site, considering the required factors prescribed in 40 CFR Part 58 Appendix D, along with the logistics and availability of space at candidate sites – estimated timeframe 1 - 2 months.	2/1/14 – 4/1/14
Complete EPA S103 application for Near Roadway NO2 Monitoring Station.	3/1/14
If necessary, obtain permissions/permits from respective transportation authorities.	5/1/14
Survey site with *Construction Management and General Contractor – estimated timeframe* 1 month.	6/1/14
Purchase equipment for monitoring station – estimated timeframe 1 month from receipt of grant award.	7/1/14
Site prep—installation of building, foundation, fencing, barriers, met tower, utility and phone lines. Installation and conditioning of equipment—estimate 2 weeks from site prep completion.	9/1/14
Official start-up date—estimate one week from installation and conditioning of equipment.	1/1/15

5. EPA Strategic Plan Linkage and Anticipated Outcomes, Outputs and Performance Measures

Pursuant to Section 6(a) of EPA Order 5700.7, "Environmental Results under EPA Assistance Agreements," EPA must link proposed assistance agreements to the Agency's Strategic Plan. EPA also requires that grant applicants and recipients adequately describe environmental outputs and outcomes to be achieved under assistance agreements (see EPA Order 5700.7, Environmental Results under Assistance Agreements, http://www.epa.gov/ogd/grants/award/5700.7.pdf

Linkage to EPA Strategic Plan

This proposal supports Goal 1: Taking Action on Climate Change, and Improving Air Quality; Objective 1.2: Improve Air Quality, of EPA's 2011-2015 Strategic Plan

Specifically, the proposed activities will protect human health and the environment by focusing on monitoring resources to capture short-term NO_2 concentrations near heavily trafficked roads, to assess area-wide (or community-wide) NO_2 concentrations, and to assess NO_2 concentrations for vulnerable and susceptible populations.

Environmental Results: Anticipated Outcomes, Outputs and Performance Measures:

Outcomes from this project include:

Short-term Outcomes	Long-term Outcomes
• Improved procedures and expertise at AMS in operating monitoring equipment. • Relocated existing NO_2 monitors to other areas in need of study, discontinued redundant NO_2 monitors to save time and money.	• Provides the appropriate public health protection by limiting the higher short-term peak exposure concentrations expected to occur on and near major roadways, as well as the lower short-term exposure concentrations expected to occur away from those roadways. • Provides data that can be used for comparison to the NAAQS and to assess population exposures to those who live, work, play, go to school, or commute within the near-roadway environment. • Provides a clear means to determine whether or not the NAAQS is being met within the near-road environment throughout a particular urban area.

Outputs from this project include:

- Collection of data necessary for determining compliance with the standards as well as to protect public health and the environment.

- Focus of monitoring resources to capture short-term NO_2 concentrations near heavily trafficked roads, to assess area-wide (or community-wide) NO_2 concentrations, and to assess NO_2 concentrations in low-income or minority at-risk communities.

- Gathering of sufficient information from these monitors based on which the Grantee would consider options including proposing changes to the required near-road network as part of the continuing air pollution control program or reconsider the near-road population threshold requirement in a future rulemaking.

- Quarterly progress reports and a Final Report.

Performance Measures

NO_2 sampling is continuous. The data are measured and collected in a real-time manner. The revised NAAQS defines the maximum allowable NO_2 concentration anywhere in an area. Based on the results of this enhanced monitoring, AMS may make recommendations or conduct other

interventions to reduce NO_2 emissions from heavy duty vehicle specifically and all motor vehicles generally to promote healthier and cleaner air outdoors.

Programmatic Capability and Past Performance

AMS is responsible for enforcement of the Philadelphia Air Management Code, the Regulations of the Air Pollution Control Board, the Noise and Excessive Vibration Code, and Regulations of the Board of Health. AMS also has authority through EPA and Pennsylvania DEP to enforce state & federal regulations controlling air pollution. In addition to providing engineering, enforcement and laboratory services, AMS also operates a citywide air sampling network to continuously monitor Philadelphia's air for comparison with Federal air quality standards. AMS has more than 70 staff members who are charged with monitoring air quality in the City of Philadelphia and ensuring compliance with the Philadelphia Air Code as well as State and Federal regulations. The agency maintains 11 air monitoring stations across the city, responds to citizen complaints about pollution, noise and odors, and handles permitting and inspection of industrial and residential facilities where pollution may arise.

Since the City of Philadelphia first established air pollution control measures in 1948, there has been significant progress toward improving the quality of air in the City. AMS has been an important part of that effort by enforcing local, state and federal regulations, by monitoring and analyzing levels of air pollution, and by collaborating with its partners on compulsory and voluntary measures across the region. Our staff members possess extensive technical expertise in fields related to air quality tracking, analysis and modeling. For more information on AMS, please visit our website at: http://www.phila.gov/health/airmanagement/.

Grants Received from EPA by AMS:

Grants received from EPA by AMS have successfully generated significant benefits during the past three years. Outcomes include increased compliance with air quality regulations and public health benefits. Outputs include the following:

In Fiscal Year 2012, 408,501 air samples were taken, 57 violations were issued to major facilities, 2,722 asbestos inspections were conducted, and 1,378 citizen complaints were serviced.

In Fiscal Year 2011, 360,658 air samples were taken, 45 violations were issued to major facilities, 3,515 asbestos inspections were conducted, and 1,466 citizen complaints were serviced.

In Fiscal Year 2010, 375,932 air samples were taken, 45 violations were issued to major facilities, 2,358 asbestos inspections were conducted, and 1,480 citizen complaints were serviced.

As part of AMS Section 103 and 105 commitments, the AMS Voluntary Programs Coordinator also sends quarterly reports to EPA on the number and status of known diesel retrofit projects, both public and private, within the City of Philadelphia. Reports include the number of vehicles

retrofitted, the type of technology used, and an estimate of emissions reduces by the retrofits based on vehicle miles traveled. This reporting mechanism was initiated in fall of 2005 and the first report was submitted by the reporting deadline of December 31, 2005 Subsequent reports have been submitted on time. Reporting is now done on a semiannual basis. AMS is currently in good standing with all grant commitments, including those to EPA. Grants from EPA that were managed during the period January 2008 – December 2013 include:

Project Title: Air Pollution Control Program
Received by AMS: 2008-2014 (Most recent: Oct. 1, 2013 – Sept. 30, 2014)
Funding Agency: EPA, Agreement # A-00304511
Reporting frequency: Various reports are sent on a monthly, quarterly, and semiannual basis
CDFA number: 66.001 (Section 105 of the Clean Air Act)

AMS receives Air Pollution Control Program funding to support several major goals: Achieving attainment and maintenance with NAAQS for the six criteria pollutants (ozone, particulate matter, carbon monoxide, lead, sulfur dioxide and nitrogen dioxide), meeting visibility goals, reducing or eliminating risks to human health from toxic air contaminants and mitigating the effects of air pollution on the environment, particularly to the City's land, buildings and waterways which can be damaged by acid rain. AMS activities funded by this grant include monitoring, data analysis, attainment plan development, and other functions that address multiple pollutant, cross-media, interstate, trans-boundary as well as traditional local air quality concerns.

AMS tracks the six criteria pollutants as well as approximately 51 air toxics and a number of other pollutants. There are numerous outputs and activities generated by this grant. Reports are submitted that track the city's outreach and inter-agency collaboration, progress on regulatory and attainment-related measures such as State Implementation Plan revision, and voluntary programs such as those that reduce diesel emissions. Air monitoring and analysis activities are also supported by this grant, and data and planning documents are submitted to EPA and PADEP periodically. These include emissions inventories for criteria pollutants and air toxics. AMS participates in a number of workshops and training events related to these activities each year. Finally, AMS reports to EPA's central databases on permitting, compliance and enforcement activities for emissions sources as well as air monitoring within the City of Philadelphia as part of this grant.
All reports for this Section 105 grant have been submitted in a timely fashion and AMS is meeting guidelines established by EPA for carrying out grant functions.

Project Title: National Air Toxics Trend Site Grant (NATTS)
Received by AMS: 2008-2014 (Most recently Jul. 1, 2013 – Jun. 30, 2014)
Funding Agency: EPA, Agreement # XA-97333003
Reporting frequency: Quarterly
CDFA number: 66.034 (Section 103 of the Clean Air Act)

The NATTS laboratory network is a system designed to help EPA track and evaluate trends in high-risk air contaminants, particularly six priority pollutants: formaldehyde, arsenic, hexavalent chromium, benzene, 1,3 butadiene, and acrolein. Light absorbing carbon is also tracked at these sites. Air Management Services supports the network by conducting laboratory analysis that

assists in examining health effects on the public. NATTS is funded under Section 103 of the Clean Air Act.

AMS is up to date in its submission of reports related to the NATTS grant.

Project Title: $PM_{2.5}$ Ambient Air Monitoring Program
Received by AMS: 2009-2014 (Most recent Apr. 1, 2013 – March 31, 2014)
Funding Agency: EPA, Agreement #PM-97311802
Reporting frequency: Data is updated periodically and email confirmations are sent to EPA central database system accordingly.
CDFA number: 66.034 (Section 103 of the Clean Air Act)

The $PM_{2.5}$ Ambient Air Monitoring Program is intended to track the region's progress toward achieving attainment with Clean Air Act standards for fine particulates. National Ambient Air Quality Standards for $PM_{2.5}$ were enacted in 1997 to help reduce human exposure to fine particulates, which can be inhaled deep into the lungs and can exacerbate health problems such as asthma. Funds have been used to upgrade and maintain the City's monitoring system for particulate matter. Notably, the grant has helped to purchase continuous monitors and to replace non-continuous ones. EPA has also provided in-kind contributions under this grant in the form of supplies (e.g. filters) and laboratory services. AMS submits data generated by this monitoring system periodically, and is up to date on all submissions. The $PM_{2.5}$ Ambient Air Monitoring Program falls under Section 103 of the Clean Air Act.

AMS is up to date in its submission of reports related to the $PM_{2.5}$ grant.

Project Title: South Philly Community Scale Monitoring
Received by AMS: 2012-2014 (Most recent Jan. 1, 2012 – June 30, 2014)
Funding Agency: EPA, Agreement # XA-96311601
Reporting frequency: Quarterly
CDFA number: 66.034 (Section 103 of the Clean Air Act)

This project is intended to assist AMS in assessing the degree and extent to which air toxics from the Refinery impact the immediate area in the South Philadelphia community. The open path monitors (Cerex Sentry and Spectra-1 systems) allows continuous real time reporting of the following air toxics: acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, hydrogen fluoride, m-xylene, nitrogen oxide, o-xylene, p-xylene, styrene, sulfur dioxide, toluene, and trimethylbenzene. In February 2014, AMS has begun the monitoring on top of two Sea Boxes in the parking lot of the Philadelphia Housing Authority facility at 3100 Penrose Ferry Rd near the Refinery and is working with the manufacturer, Cerex, to optimize the data collection. Future plans include continued work with the University of Pennsylvania and the Girard Academic Music Program (GAMP) School to provide outreach to the South Philadelphia community. AMS plans to correlate the data with the agency's non-continuous toxics monitors in South Philadelphia, and with the EPA's passive sampling monitors in this region. The grant from EPA has recently been extended to June 2016.

AMS is up to date in its submission of reports related to the South Philadelphia Community Scale Monitoring grant.

Staff Expertise/Qualifications

Staff members involved in this project have extensive experience in install ng and maintaining sophisticated air pollution monitoring equipment as well as quality assurin ɜ the data produced. Lab Administrative Engineer Hallie Weiss and Administrative Chemist Dennis Sosna will be responsible for the installation and maintenance of the equipment, as well as data collection activities, and will compile reports to EPA to track progress in implementation of the project. Program Services Chief Henry Kim will coordinate the data analysis. Air Director Thomas Huynh will oversee all activities to ensure that all project milestones are achieved. Mr. Huynh has successfully managed numerous projects related to air programs for many years and frequently communicates with community members regarding the quality of Philadelphia's air.

EPA United States Environmental Protection Agency

66.034
EPA Project Control Number

CERTIFICATION REGARDING LOBBYING

CERTIFICATION FOR CONTRACTS, GRANTS, LOANS AND COOPERATIVE AGREEMENTS

The undersigned certifies, to the best of his or her knowledge and belief, that:

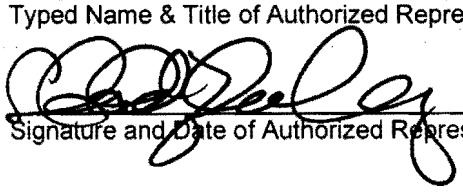
(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including sub-contracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31 U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Donald Schwarz, Health Commissioner
Typed Name & Title of Authorized Representative



Signature and Date of Authorized Representative

EPA Form 6600-06 (Rev. 06/2008) Previous editions are obsolete.

DISCLOSURE OF LOBBYING ACTIVITIES

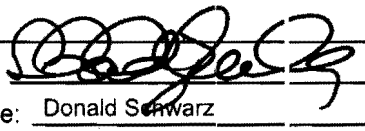
Approved by OMB
0348-0046

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352
(See reverse for public burden disclosure.)

1. Type of Federal Action:	2. Status of Federal Action:	3. Report Type:
[b] a. contract b. grant c. cooperative agreement d. loan e. loan guarantee f. loan insurance	[a] a. bid/offer/application b. initial award c. post-award	[a] a. initial filing b. material change **For Material Change Only:** year _____ quarter _____ date of last report _____

4. Name and Address of Reporting Entity:	5. If Reporting Entity in No. 4 is a Subawardee, Enter Name and Address of Prime:
[x] Prime [ ] Subawardee Tier _____, *if known*: **Congressional District**, *if known*:	**Congressional District**, *if known*:
6. Federal Department/Agency: Environmental Protection Agency	**7. Federal Program Name/Description:** Near Road Monitoring Station CFDA Number, *if applicable*: 66.034
8. Federal Action Number, *if known*:	**9. Award Amount**, *if known*: $
10. a. Name and Address of Lobbying Registrant (*if individual, last name, first name, MI*): N/A	**b. Individuals Performing Services** (*including address if different from No. 10a*) (*last name, first name, MI*):

11. ation requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less that $10,000 and not more than $100,000 for each such failure.

Signature: 
Print Name: Donald Schwarz
Title: Health Commissioner
Telephone No.: 215-686-5206 Date: 2/28/14

Federal Use Only:

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Standard Form LLL (Rev. 4/2012

FORM

Approved By OMB No. 2030-0020 Expires 04-30-2012

Preaward Compliance Review Report for
All Applicants and Recipients Requesting EPA Financial Assistance
Note: Read instructions on other side before completing form.

I. Applicant/Recipient (Name, Address, State, Zip Code).	DUNS No.
PDPH - Air Management Services, 321 University Ave, Philadelphia, PA 19104	834466463

II. Is the applicant currently receiving EPA assistance?

Yes

III. List all civil rights lawsuits and administrative complaints pending against the applicant/recipient that allege discrimination based on race, color, national origin, sex, age, or disability. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7. See instructions on reverse side.)

See attached document

IV. List all civil rights lawsuits and administrative complaints decided against the applicant/recipient within the last year that allege discrimination based on race, color, national origin, sex, age, or disability and enclose a copy of all decisions. Please describe all corrective action taken. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7. See instructions on reverse side.)

See attached document

V. List all civil rights compliance reviews of the applicant/recipient conducted by any agency within the last two years and enclose a copy of the review and any decisions, orders, or agreements based on the review. Please describe any corrective action taken. (40 C.F.R. § 7.80(c)(3))

N/A

VI. Is the applicant requesting EPA assistance for new construction? If no, proceed to VII; if yes, answer (a) and/or (b) below.

Yes ✓ No

a. If the grant is for new construction, will all new facilities or alterations to existing facilities be designed and constructed to be readily accessible to and usable by persons with disabilities? If yes, proceed to VII; if no, proceed to VI(b). Yes ✓ No

b. If the grant is for new construction and the new facilities or alterations to existing facilities will not be readily accessible to and usable by persons with disabilities, explain how a regulatory exception (40 C.F.R. § 7.70) applies. Yes ✓ No

VII.* Does the applicant/recipient provide initial and continuing notice that it does not discriminate on the basis of race, color, national origin, sex, age, or disability in its programs or activities? (40 C.F.R. § 5.140 and § 7.95) ✓ Yes No

a. Do the methods of notice accommodate those with impaired vision or hearing? Yes ✓ No

b. Is the notice posted in a prominent place in the applicant's offices or facilities or, for education programs and activities, in appropriate periodicals and other written communications? ✓ Yes No

c. Does the notice identify a designated civil rights coordinator? ✓ Yes No

VIII.* Does the applicant/recipient maintain demographic data on the race, color, national origin, sex, age, or handicap of the population it serves? (40 C.F.R. § 7.85(a))

No

IX.* Does the applicant/recipient have a policy/procedure for providing access to services for persons with limited English proficiency? (40 C.F.R. Part 7, E.O. 13166)

Yes

X.* If the applicant/recipient is an education program or activity, or has 15 or more employees, has it designated an employee to coordinate its compliance with 40 C.F.R. Parts 5 and 7? Provide the name, title, position, mailing address, e-mail address, fax number, and telephone number of the designated coordinator.

N/A

XI* If the applicant/recipient is an education program or activity, or has 15 or more employees, has it adopted grievance procedures that assure the prompt and fair resolution of complaints that allege a violation of 40 C.F.R. Parts 5 and 7? Provide a legal citation or Internet address for, or a copy of, the procedures.

N/A

For the Applicant/Recipient

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law. I assure that I will fully comply with all applicable civil rights statutes and EPA regulations.

A. Signature of Authorized Official	B. Title of Authorized Official	C. Date
	Health Commissioner	2/28/14

For the U.S. Environmental Protection Agency

I have reviewed the information provided by the applicant/recipient and hereby certify that the applicant/recipient has submitted all preaward compliance information required by 40 C.F.R. Parts 5 and 7; that based on the information submitted, this application satisfies the preaward provisions of 40 C.F.R. Parts 5 and 7; and that the applicant has given assurance that it will fully comply with all applicable civil rights statutes and EPA regulations.

A. Signature of Authorized EPA Official	B. Title of Authorized EPA Official	C. Date

See ** note on reverse side

EPA Form 4700-4 (Rev. 04/2009). Previous editions are obsolete.

CITY OF PHILADELPHIA

DEPARTMENT OF PUBLIC HEALTH
Donald F. Schwarz, MD, MPH
Deputy Mayor for Health & Opportunity
Health Commissioner

Nan Feyler, JD, MPH
Chief of Staff

Air Management Services
Thomas Huynh
Director

321 University Avenue, 2nd Floor
Philadelphia, PA 19104

Telephone (215) 685-7584
Fax (215) 685-9451

March 6, 2014

Mr. Michael Thompson
Philadelphia Planning Commission
1515 Arch Street, 13th Floor
Philadelphia, PA 19102

Dear Mr. Thompson:

Enclosed please find a copy of the grant application for Philadelphia's Near Road Monitoring Program for the budget period of May 1, 2014 through May 1, 2016.

I would appreciate your reviewing this submission and forwarding the necessary approval to me as soon as possible. If you have any questions or need additional information, you may contact me at 215-685-9476.

Thank you for your attention to this matter.

Sincerely,

Edward Braun, Program Manager
Air Management Services

Thomas Huynh
Air Director
Air Management Services
Philadelphia Department of Public Health
321 University Avenue, 2nd fl.
Philadelphia, PA 19104

March 6, 2014

RE: Application for Near Road Monitoring Grant

Dear Mr. Huynh:
The Philadelphia City Planning Commission has completed the review of the Philadelphia Department of Public Health, Air Management Service's "Near Road Monitoring Grant" grant application.

The proposed program activities, as detailed in the application for Federal assistance (SF-424), are consistent with the City's Phila2035 Comprehensive Plan. Therefore, the Philadelphia City Planning Commission endorses this program and requests the funding agency to award a grant for this application.

Sincerely yours,
Michael J. Thompson
City Planner

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION III
ASSISTANCE AGREEMENT/AMENDMENT NOTICE

RECIPIENT NAME AND ADDRESS: **DATE:** APR - 1 2014

Donald F. Schwarz, M.D., M.P.H.
Health Commissioner
Philadelphia Department of Public Health
Municipal Services Building
15th & JFK Boulevard, Suite 600
Philadelphia, Pennsylvania 19102

Re: Assistance #XA-963264-01-0

Enclosed is a digitally signed Assistance Agreement/Amendment from the U.S. Environmental Protection Agency.

A signature from a representative of your organization is **not** required on this agreement. The recipient demonstrates its commitment to carry out this award by either: 1) drawing down funds within 21 days after the EPA award/amendment mailing date; or 2) not filing a notice of disagreement with the award terms and conditions within 21 days after the EPA award/amendment mailing date.

If the recipient disagrees with the terms and conditions specified in this award, the recipient's authorized representative must submit a notice of disagreement to the EPA Award Official within 21 days after the EPA award/amendment mailing date. The notice of disagreement should be sent to R3_Grant_Awards@epa.gov.

In the case of a disagreement, and until the disagreement is resolved, the recipient should not draw funds under this award/amendment, and any costs incurred by the recipient are at its own risk.

The Assistance Agreement should be distributed and reviewed within your organization and retained for your official records.

If you have any questions on drawdowns, please contact Peter Puglisi at 702-798-2426 or puglisi.peter@epa.gov.

To assist you with your post-award management responsibilities, please see Managing Your EPA Grant. This document contains important post-award reporting requirements and instructions on how to receive payments. To view this and other EPA grant-related information, visit our Region 3 Grants Office website at:

http://www.epa.gov/region3/grants/grants.htm

Please reference the EPA Assistance Number on all future correspondence regarding this Assistance Agreement. Questions on technical matters should be directed to the Project Officer and questions on administrative matters should be directed to the Grants Specialist identified in the Assistance Agreement/Amendment.

U.S. ENVIRONMENTAL PROTECTION AGENCY

Grant Agreement

GRANT NUMBER (FAIN): 96326401 MODIFICATION NUMBER: 0 PROGRAM CODE: XA	DATE OF AWARD 03/25/2014
TYPE OF ACTION New	MAILING DATE 04/01/2014
PAYMENT METHOD: ASAP	ACH# 30309

RECIPIENT TYPE: Municipal	**Send Payment Request to:** N/A
RECIPIENT:	**PAYEE:**
City of Philadelphia 321 University Ave 2nd Flr Philadelphia, PA 19104-4543 **EIN:** 23-6003047	City of Philadelphia 321 University Ave 2nd Flr Philadelphia, PA 19104-4543

PROJECT MANAGER	EPA PROJECT OFFICER	EPA GRANT SPECIALIST
Mr. Thomas Huynh 321 University Ave 2nd Flr Philadelphia, PA 19104-4543 **E-Mail:** Health.EPAGrant@Phila.gov **Phone:** 215-685-7584	Ellen Wentworth 1650 Arch Street, 3AP00 Philadelphia, PA 19103-2029 **E-Mail:** Wentworth.Ellen@epamail.epa.gov **Phone:** 215-814-2034	Donna Armstrong Grants and Audit Management Branch, 3PM70 **E-Mail:** Armstrong.Donna@epamail.epa.gov **Phone:** 215-814-5393

PROJECT TITLE AND DESCRIPTION

Near Road Monitoring Station

This grant will provide funds for equipment, supplies and related services in order to establish a near-road monitoring site in the Philadelphia area, to capture short-term, near-road NO2 concentrations near heavily trafficked roads to assess the concentrations for vulnerable and susceptible populations.

BUDGET PERIOD	PROJECT PERIOD	TOTAL BUDGET PERIOD COST	TOTAL PROJECT PERIOD COST
04/01/2014 - 03/31/2016	04/01/2014 - 03/31/2016	$200,000.00	$200,000.00

NOTICE OF AWARD

Based on your Application dated 02/28/2014 including all modifications and amendments, the United States acting by and through the US Environmental Protection Agency (EPA) hereby awards $200,000. EPA agrees to cost-share 100.00% of all approved budget period costs incurred, up to and not exceeding total federal funding of $200,000. Recipient's signature is not required on this agreement. The recipient demonstrates its commitment to carry out this award by either: 1) drawing down funds within 21 days after the EPA award or amendment mailing date; or 2) not filing a notice of disagreement with the award terms and conditions within 21 days after the EPA award or amendment mailing date. If the recipient disagrees with the terms and conditions specified in this award, the authorized representative of the recipient must furnish a notice of disagreement to the EPA Award Official within 21 days after the EPA award or amendment mailing date. In case of disagreement, and until the disagreement is resolved, the recipient should not draw down on the funds provided by this award/amendment, and any costs incurred by the recipient are at its own risk. This agreement is subject to applicable EPA statutory provisions. The applicable regulatory provisions are 40 CFR Chapter 1, Subchapter B, and all terms and conditions of this agreement and any attachments.

ISSUING OFFICE (GRANTS MANAGEMENT OFFICE)	AWARD APPROVAL OFFICE
ORGANIZATION / ADDRESS	**ORGANIZATION / ADDRESS**
US EPA Region 3, 3PM70 1650 Arch Street Philadelphia, PA 19103-2029	U.S. EPA, Region 3 Air Protection Division 3AP00 1650 Arch Street Philadelphia, PA 19103-2029

THE UNITED STATES OF AMERICA BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY

Digital signature applied by EPA Award Official Ronald J. Borsellino - Assistant Regional Administrator for Policy and Management	**DATE** 03/25/2014

EPA Funding Information

FUNDS	FORMER AWARD	THIS ACTION	AMENDED TOTAL
EPA Amount This Action	$	$ 200,000	$ 200,000
EPA In-Kind Amount	$	$	$ 0
Unexpended Prior Year Balance	$	$	$ 0
Other Federal Funds	$	$	$ 0
Recipient Contribution	$	$	$ 0
State Contribution	$	$	$ 0
Local Contribution	$	$	$ 0
Other Contribution	$	$	$ 0
Allowable Project Cost	$ 0	$ 200,000	$ 200,000

Assistance Program (CFDA)	Statutory Authority	Regulatory Authority
66.034 - Surveys-Studies-Investigations-Demonstrations and Special Purpose Activities relating to the Clean Air Act	Clean Air Act: Sec. 103	40 CFR PART 31

Fiscal

Site Name	Req No	FY	Approp. Code	Budget Organization	PRC	Object Class	Site/Project	Cost Organization	Obligation / Deobligation
-	1403MH0009	14	E1	03M4	102A04	4112	-	-	200,000
									200,000

Budget Summary Page

Table A - Object Class Category (Non-construction)	Total Approved Allowable Budget Period Cost
1. Personnel	$0
2. Fringe Benefits	$0
3. Travel	$0
4. Equipment	$104,434
5. Supplies	$5,566
6. Contractual	$90,000
7. Construction	$0
8. Other	$0
9. Total Direct Charges	$200,000
10. Indirect Costs: % Base	$0
11. Total (Share: Recipient 0.00 % Federal 100.00 %.)	$200,000
12. Total Approved Assistance Amount	$200,000
13. Program Income	$0
14. Total EPA Amount Awarded This Action	$200,000
15. Total EPA Amount Awarded To Date	$200,000

Administrative Conditions

1. **General Terms and Conditions**

The recipient agrees to comply with the current EPA general terms and conditions available at: http://www.epa.gov/ogd/tc_jan_2014.pdf. These terms and conditions are in addition to the assurances and certifications made as part of the award and the terms, conditions or restrictions cited below.

The EPA repository for the general terms and conditions by year can be found at: http://www.epa.gov/ogd/tc.htm.

2. Annual Federal Financial Report

Pursuant to 40 CFR 30.52(a)(1) or 31.41(b), the recipient agrees to submit to EPA an annual Federal Financial Report (FFR) (SF-425) when the budget period is longer than one year. The following reporting period end dates shall be used for interim reports: 3/31, 6/30, 9/30, or 12/31. Interim reports shall be submitted no later than 90 days after the end of each reporting period.

The form is available on the internet at http://www.epa.gov/financial/forms. **All FFRs must be submitted to the Las Vegas Finance Center (LVFC) via email** LVFC-grants@epa.gov **or fax at 702-798-2423.**

3. UTILIZATION OF SMALL, MINORITY AND WOMEN'S BUSINESS ENTERPRISES

GENERAL COMPLIANCE, 40 CFR, Part 33
The recipient agrees to comply with the requirements of EPA's Disadvantaged Business Enterprise (DBE) Program for procurement activities under assistance agreements, contained in 40 CFR, Part 33.

FAIR SHARE OBJECTIVES, 40 CFR, Part 33, Subpart D
A recipient must negotiate with the appropriate EPA award official, or his/her designee, fair share objectives for MBE and WBE participation in procurement under the financial assistance agreements.

In accordance with 40 CFR, Section 33.411 some recipients may be exempt from the fair share objectives requirements described in 40 CFR, Part 33, Subpart D. Recipients should work with their DBE coordinator, if they think their organization may qualify for an exemption.

Current Fair Share Objective/Goal
The dollar amount of this assistance agreement or the total dollar amount of all of the recipient's financial assistance agreements in the current federal fiscal year from EPA is $250,000, or more. The **CITY OF PHILADELPHIA** has negotiated the following, applicable MBE/WBE fair share objectives/goals with EPA as follows:

MBE: CONSTRUCTION 12.0; EQUIPMENT 4.0; SERVICES 4.0; SUPPLIES 3.0
WBE: CONSTRUCTION 8.0; EQUIPMENT 4.0; SERVICES 3.0; SUPPLIES 2.0

Negotiating Fair Share Objectives/Goals
In accordance with 40 CFR, Part 33, Subpart D, established goals/objectives remain in effect for three fiscal years unless there are significant changes to the data supporting the fair share objectives. The recipient is required to follow requirements as outlined in 40 CFR Part 33, Subpart D when renegotiating the fair share objectives/goals.

SIX GOOD FAITH EFFORTS, 40 CFR, Part 33, Subpart C
Pursuant to 40 CFR, Section 33.301, the recipient agrees to make the following good faith efforts whenever procuring construction, equipment, services and supplies under an EPA financial assistance agreement, and to require that sub-recipients, loan recipients, and prime contractors also comply. Records documenting compliance with the six good faith efforts shall be retained:

(a) Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, State and Local and Government recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.

(b) Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.

(c) Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs. For Indian Tribal, State and local Government recipients, this will include dividing total requirements when economically feasible into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.

(d) Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.

(e) Use the services and assistance of the SBA and the Minority Business Development Agency of the Department of Commerce.

(f) If the prime contractor awards subcontracts, require the prime contractor to take the steps in paragraphs (a) through (e) of this section.

MBE/WBE REPORTING, 40 CFR, Part 33, Subpart E

MBE/WBE reporting is limited to annual reports and only required for assistance agreements where one or more the following conditions are met:

(a) there are any funds budgeted in the contractual, equipment or construction lines of the award;
(b) $3,000 or more is included for supplies; or
(c) there are funds budgeted for subawards or loans in which the expected budget(s) meet the conditions as described in items (a) and (b).

This award meets one or more of the conditions as described above, therefore, the recipient agrees to complete and submit a "MBE/WBE Utilization Under Federal Grants, Cooperative Agreements and Interagency Agreements" report (EPA Form 5700-52A) on an annual basis.

When completing the annual report, recipients are instructed to check the box titled "annual" in section 1B of the form. For the final report, recipients are instructed to check the box indicated for the "last report" of the project in section 1B of the form. Annual reports are due by October 30th of each year. Final reports are due within 90 days after the end of the project period, whichever comes first.

The reporting requirement is based on planned procurements. Recipients with funds budgeted for non-supply procurement and/or $3,000 or more in supplies are required to report annually whether the planned procurements take place during the reporting period or not. If no procurements take place during the reporting period, the recipient should check the box in section 5B when completing the form.

MBE/WBE reports should be **emailed to R3_MBE-WBE_Reports@epa.gov as a pdf file, or if that is not possible, mailed to Stacie Pratt, Acting Diversity/EEO Manager (3DA10), U.S. EPA - Region III, 1650 Arch Street, Philadelphia, PA 19103-2029 with a courtesy copy to the Grants Specialist**. The current EPA Form 5700-52A can be found at the EPA Office of Small Business Program's Home Page at http://www.epa.gov/osbp/dbe_reporting.htm.

This provision represents an approved deviation from the MBE/WBE reporting requirements as described in 40 CFR, Part 33, Section 33.502; however, the other requirements outlined in 40 CFR Part 33 remain in effect, including the Fair Share Objectives negotiation as described in 40 CFR Part 33 Subpart D.

CONTRACT ADMINISTRATION PROVISIONS, 40 CFR, Section 33.302
The recipient agrees to comply with the contract administration provisions of 40 CFR, Section 33.302.

BIDDERS LIST, 40 CFR, Section 33.501(b) and (c)
Recipients of a Continuing Environmental Program Grant or other annual reporting grant, agree to create and maintain a bidders list. Recipients of an EPA financial assistance agreement to capitalize a revolving loan fund also agree to require entities receiving identified loans to create and maintain a bidders list if the recipient of the loan is subject to, or chooses to follow, competitive bidding requirements. Please see 40 CFR, Section 33.501 (b) and (c) for specific requirements and exemptions.

Programmatic Conditions

1. Semi-annual Performance Reports - Part 31.

The recipient shall submit semi-annual performance reports, which are due 30 days after the reporting period. (September 30 and March 31). Reports shall be submitted to the EPA Project Officer and may be provided electronically.

In accordance with 40 C.F.R., section 31.40, the recipient agrees to submit performance reports that include brief information on each of the following areas:

a) a comparison of actual accomplishments to the outputs/outcomes established in the assistance agreement work plan for the period

b) the reasons for slippage if established outputs/outcomes were not met;

c) additional pertinent information, including, when appropriate, analysis and information of cost overruns or high unit costs.

In addition to the semi-annual performance reports, the recipient shall immediately notify the EPA Project Officer of developments that have a significant impact on the award-supported activities. In accordance with 40 C.F.R., Part 31.40(d), as appropriate, the recipient agrees to inform the EPA Project Officer as soon as problems, delays or adverse conditions become known, which will materially impair the ability to meet the outputs/outcomes specified in the assistance agreement work plan. This notification shall include a statement of the action taken or contemplated, and any assistance needed to resolve the situation.

2. Final Performance Report.

In addition to the periodic performance reports, the recipient shall submit a final performance report, which is due 90 calendar days after the expiration or termination of the award. The report shall be submitted to the EPA Project Officer and may be provided electronically. The report shall generally contain the same information as in the periodic reports, but should cover the entire project period. After completion of the project, the EPA Project Officer may waive the requirement for a final performance report if the EPA Project Officer deems such a report is inappropriate or unnecessary.

3. Other Recipient Responsibilities.

Per 40 C.F.R. section 31.30, prior written approval is required from EPA if there is any revision to the scope or objectives of the project (regardless of whether there is an associated budget revision requiring prior approval).

Near-Road NO_2 Monitoring Analysis for Philadelphia County (2^{nd} Monitor)

City of Philadelphia
Department of Public Health
Air Management Services

April, 2014

Table of Contents

Tables

Figures

Background

On February 9, 2010, EPA promulgated (75 FR 6474) new minimum monitoring requirements for the nitrogen dioxide (NO_2) monitoring network in support of a newly revised 1-hour NO_2 National Ambient Air Quality Standard (NAAQS). In the new monitoring requirements, state and local air monitoring agencies are required to install near-road NO_2 monitoring stations in larger urban areas where hourly NO_2 concentrations in the near-road environment are believed to be the highest in that urban area. State and local air agencies are required to consider traffic volumes, fleet mix, roadway design, traffic congestion patterns, local terrain or topography, and meteorology in the implementation process of any required near-road NO_2 monitor.

EPA recognized that the combination of increased vehicle-miles-traveled (VMT), which correspond to on-road mobile source emissions, with higher urban population densities can result in an increased potential for exposure and associated risks to human health and welfare. As a result, the EPA promulgated requirements for near-road NO_2 monitors in urban areas where peak, ambient 1-hour NO_2 concentrations can be expected to occur that are particularly attributable to on-road mobile sources. Monitoring requirements are based upon population levels and a specific traffic metric within Core Based Statistical Areas (CBSAs). State and local ambient air monitoring agencies are required (per 40 CFR Part 58 Appendix D, Section 4.3.2.a) to use the latest available census figures (e.g., census counts and/or estimates) and available traffic data in assessing what may be required of them under this new rule.

Section 1 - Identifying the Extent of Required Near-Road Monitoring for the Philadelphia CBSA

The first step in implementing the required monitoring for Philadelphia CBSA, is to identify the extent to which monitoring requirements apply. The review is presented below. The result is that the Philadelphia CBSA needs two near-road NO_2 monitors.

Review. In 40 CFR Part 58 Appendix D, the EPA requires state and local air agencies to operate one near-road NO_2 monitor in each CBSA with a population of 500,000 or more persons. *CBSAs with 2,500,000 or more persons, or those CBSAs with one or more roadway segments carrying traffic volumes of 250,000 or more vehicles (as measured by annual average daily traffic [AADT] counts), shall have two near-road NO2 monitors within that CBSA.* State and local ambient air monitoring agencies are required to use the most up-to-date census information and traffic data in assessing what may be required of them under this rule, per 40 CFR Part 58 Appendix D, Section 4.3.2.a.

Identifying Census Data for the Philadelphia CBSA. Philadelphia Air Management Services (AMS) used the U.S. Census Bureau as the source of its population estimate (http://www.census.gov/popest/data/metro). The "Philadelphia" CBSA which is comprised of five counties in PA: Philadelphia, Bucks, Chester, Delaware, and Montgomery, four counties in NJ: Burlington, Camden, Gluocester,and Salem, one county in DE: New Castle, and one county in MD: Cecil. The Philadelphia CBSA has a population of 6,018,800 per 2012 estimated population http://www.census.gov/popest/data/metro/totals/2012/index.html.

Identifying Roadway Traffic Volumes in Excess of 250,000 AADT. AMS obtained Pennsylvania Department of Transportation's (PennDOT) traffic volume data, including AADT data, from the following sources:

- Internet Traffic Monitoring System (ITMS) http://www.dot7.state.pa.us/itms/main.htm
- Traffic Volume Map http://www.dot.state.pa.us/Internet/Bureaus/pdPlanRes.nsf/infoBPRTrafficInfoTrafficVolumeMap , and specifically ftp://ftp.dot.state.pa.us/public/pdf/BPR_pdf_files/MAPS/Traffic/Traffic_Volume/2012/philadelphia_2012_tv.pdf
- Traffic Counts found at the Pennsylvania Spatial Data Access (PASDA), the official public access geospatial clearinghouse for the Commonwealth of Pennsylvania http://www.pasda.psu.edu/uci/MetadataDisplay.aspx?entry=PASDA&file=PaTraffic2014_02.xml&dataset=56 and http://www.pasda.psu.edu/uci/MetadataDisplay.aspx?entry=PASDA&file=PaStateRoads2014_02.xml&dataset=54

Given that the Philadelphia CBSA has a population of more than 2,500,000 persons, it will need two near-road NO_2 monitors

Meeting Requirements in CBSAs Covering Multiple Geo- Political Boundaries (Multi-Agency/Multi-State). The Philadelphia CBSA covers an area that includes Philadelphia, Bucks, Chester, Delaware, Montgomery, Burlington, Camden, Gluocester, Salem, New Castle, and Cecil counties. The Pennsylvania Department of Environmental Protection serves as the air agency for all counties in PA, except Philadelphia, the most populous, which is served by AMS, and Allegheny which is served by Allegheny County Health Department (ACHD). AMS analyzed AADT for roadway segments located in Philadelphia County. The result is that the first near-road NO_2 monitor for the Philadelphia CBSA will be located in Philadelphia County and be installed and operated by AMS. AMS discussed with the EPA Region III, the determination of where the near-road monitoring should be conducted. These discussions were conducted before and during the traffic data analysis process and while determining an initial list of candidate road segments.

Section 2 - Traffic Data for Use in Identifying Candidate Road Segments for Near-Road NO_2 Monitoring

The second step in identifying the candidate NO_2 near-road monitoring site in Philadelphia County is to collect and analyze traffic data. Traffic data indicate the anticipated level and type of activity on road segments that can be used to compare anticipated pollutant emissions among multiple road segments in the Philadelphia CBSA. This section summarizes the data and sources that were used in generating a list of candidate road segments for evaluation as potential near-road NO_2 monitoring sites. The purpose of using these recommended data and sources was ultimately to identify a location where the highest motor vehicle emissions leading to peak near-road NO_2 concentrations was likely to occur.

Annual Average Daily Traffic. AADT is a measure of the total volume of traffic on a roadway segment for one year divided by the number of days in the year. This parameter can be used to identify the relative traffic activity and corresponding potential for pollutant emissions experienced along roads. Generally, AADT is representative of the traffic volume along a length of road, or "road segment", where individual road segments are typically defined as a length of road between two points, such as intersections, highway exits, highway mile markers, geo-political boundaries, or other features where the traffic volume

or pattern is likely to change. *The sources of AADT data analyzed by AMS to determine the appropriate location of the near-road NO_2 monitor for the Philadelphia County are defined in Step 1, above.*

Fleet Mix Data. While AADT describes the total volume of traffic on a road, fleet mix data provides specific counts, or percentages of total traffic volume, of different types of vehicles that comprise the total traffic volume. Most commonly, fleet mix data differentiate between light-duty (LD) passenger vehicles and heavy-duty (HD) trucks. LD vehicles typically burn gasoline, while HD trucks operate on diesel fuel. Understanding the number or percentage of HD vehicles within the total traffic volume is important because the difference in the amount of nitrogen oxides (NO_X) emitted on a per vehicle basis between the two vehicle types varies greatly. HD vehicles typically emit much higher amounts of NO_X than LD vehicles. Since these NO_X emissions include NO_2 (as well as nitrogen oxide [NO], which readily converts to NO_2 in the near-road environment in the presence of ozone, and which also can be oxidized to NO_2 through other photochemical processes), these emission differences are important in identifying locations where peak NO_2 concentrations may occur. For all vehicles, NO_X emissions vary by vehicle type, load, speed, and highway grade. *AMS used the truck count data found on the Penn DOT Internet Travel Monitoring System,* **http://www.dot7.state.pa.us/itms/main.htm**, *linked to the specific roadway map segment.*

Congestion Patterns. Congestion patterns is an important factor in the near-road NO_2 site selection process because traffic congestion can lead to vehicle operating conditions, particularly stop-and-go traffic, that may increase emissions per vehicle (as compared to vehicles operating at steady-state highway speeds). Congestion pattern data can be presented as:

- **Level of service (LOS),** which describes the effectiveness of a transportation facility, such as a road segment, and is determined for individual road segments by the evaluation of multiple pieces of traffic information, including time-resolved traffic counts, traffic speeds, and the relative frequency of occurrence of congested conditions. The LOS is presented as a qualitative measure, using a letter grading system with grading ranges from A to F. Those road segments with higher relative congestion (e.g., a worse letter grade) may be more likely to have relatively higher NO_2 emissions potential per vehicle than otherwise similar road segments with less congestion. *A complete LOS data was not available for Philadelphia County.*

- **Volume-to-capacity (v/c) ratio** which compares peak traffic volumes on a road segment with the capacity of the road based on the number of lanes. This calculation typically accounts for the larger size of HD vehicles and focuses on traffic conditions during peak hours of operation. *This data was also not available for Philadelphia County.*

- **"AADT by lane"** for individual road segments. This indicator is determined by dividing the total AADT by the number of lanes on a road segment. AADT by lane is used to aid in understanding the potential congestion of a road segment in the absence of LOS or Volume-to-capacity ratio information (*as is the case for Philadelphia County*) by accounting for how much traffic volume is using a given number of available driving lanes. As such, a larger number of vehicles per lane indicate a greater potential for traffic congestion. Since AADT by lane is not based on the multiple metrics that LOS and v/c ratio are based upon, *it should be viewed only as a rough surrogate* to what these data might represent for a given road segment, and is used only because LOS or v/c ratio data are not available. The equation is:

$$\text{AADT by Lane} = \frac{\text{AADT}}{\text{Number of Lane}}$$

  where, AADT is the actual total traffic volume on the road segment, and the number of lanes is the *total number of lanes*, *in both directions*, on that road segment.

Section 3 - Creating an Initial List of Candidate Road Segments Using Traffic Data

The site selection process for required near-road NO_2 monitors, per 40 CFR Part 58 Appendix D, includes the ranking of road segments in a CBSA by AADT, followed by the consideration of five other factors: fleet mix, congestion patterns, roadway design, terrain, and meteorology.

3.1 Using AADT to Initially Rank Road Segments

The first step in the traffic data evaluation process is to satisfy the requirement in 40 CFR Part 58 Appendix D, section 4.3, to rank road segments in a CBSA based on the total traffic volume, represented by AADT. The intent of this first step is to begin to focus the evaluation process to road segments that are more likely to have higher potential for NO_X emissions due to their higher volumes of traffic.

The following is a list of road segments in the Philadelphia County ranked by total AADT using the recent traffic data available from PennDOT. The data is arranged in descending order, where the segment with the highest total AADT is ranked first. This list includes the road segment ID, road information, and AADT value. Philadelphia County has two main interstates, I-76 that stretches from east to west and I-95 that stretches from north to south. The top sixteen sites from both interstates are listed on Table 1 below.

There is another concern about traffic resulting from events in the Citizen Bank Park stadium, as well as the traffic from Walt Whitman Bridge. The current AADT and the route information of the stadium area are listed below on State Route No. 67B3. With the mentioned current AADT, it puts the area on the eleventh rank on the **Table 1**.

Table 1 - Rank by AADT for the Grouped Segments Representing Lanes for Both Directions

St. Rt. No	Seg No.	Seg Length (ft)	Width	Lane Count	Current AADT	Total AADT	Street Name	AADT Rank
I-95	0264	4229	67	3	77040	179487	Del Expwy NB	1
	0270	2710	43	3	77040	179487	Del Expwy NB	1
	0274	2270	48	4	77040	179487	Del Expwy NB	1
	0280	2728	48	4	77040	179487	Del Expwy NB	1
	0284	2681	36	4	77040	179487	Del Expwy NB	1
	0290	1990	48	4	77040	179487	Del Expwy NB	1
	0265	4254	67	3	102447	179487	Del Expwy SB	1
	0271	2750	36	3	102447	179487	Del Expwy SB	1
	0275	2226	48	4	102447	179487	Del Expwy SB	1
	0281	2731	48	4	102447	179487	Del Expwy SB	1
	0285	2695	48	4	102447	179487	Del Expwy SB	1
	0291	1944	48	4	102447	179487	Del Expwy SB	1
I-76	3394	2416	41	3	96776	174342	Sch Expwy EB	2
	3400	2691	50	4	96776	174342	Sch Expwy EB	2
	3404	2655	50	4	96776	174342	Sch Expwy EB	2
	3410	2640	50	4	96776	174342	Sch Expwy EB	2
	3395	2303	76	4	77566	174342	Sch Expwy WB	2
	3401	2937	50	4	77566	174342	Sch Expwy WB	2
	3405	2705	50	4	77566	174342	Sch Expwy WB	2
	3411	2667	50	4	77566	174342	Sch Expwy WB	2
I-95	0250	3226	65	4	86781	172578	Del Expwy NB	3
	0254	2453	52	5	86781	172578	Del Expwy NB	3
	0260	1535	55	4	86781	172578	Del Expwy NB	3
	0245	1814	48	4	85797	172578	Del Expwy SB	3

	0251	3242	65	4	85797	172578	Del Expwy SB	3
	0255	2414	60	5	85797	172578	Del Expwy SB	3
	0261	1537	48	4	85797	172578	Del Expwy SB	3
I-95	0214	2259	36	3	73651	157984	Del Expwy NB	4
	0220	1682	48	4	73651	157984	Del Expwy NB	4
	0224	3284	66	4	73651	157984	Del Expwy NB	4
	0230	3680	59	3	73651	157984	Del Expwy NB	4
	0234	2619	57	4	73651	157984	Del Expwy NB	4
	0240	1829	50	4	73651	157984	Del Expwy NB	4
	0244	1808	60	4	73651	157984	Del Expwy NB	4
	0211	3043	36	3	84333	157984	Del Expwy SB	4
	0215	2274	36	3	84333	157984	Del Expwy SB	4
	0221	1728	36	3	84333	157984	Del Expwy SB	4
	0225	3378	48	4	84333	157984	Del Expwy SB	4
	0231	3680	59	3	84333	157984	Del Expwy SB	4
	0235	2619	57	4	84333	157984	Del Expwy SB	4
	0241	1835	50	4	84333	157984	Del Expwy SB	4
I-76	3414	2640	38	3	85308	154955	Sch Expwy EB	5
	3420	2640	66	3	85308	154955	Sch Expwy EB	5
	3424	2640	38	3	85308	154955	Sch Expwy EB	5
	3430	2640	38	3	85308	154955	Sch Expwy EB	5
	3415	2575	38	3	69647	154955	Sch Expwy WB	5
	3421	2579	66	3	69647	154955	Sch Expwy WB	5
	3425	2731	38	3	69647	154955	Sch Expwy WB	5
	3431	2584	38	3	69647	154955	Sch Expwy WB	5
I-76	3434	2640	38	3	71287	143529	Sch Expwy EB	6
	3440	2651	25	2	71287	143529	Sch Expwy EB	6
	3444	3156	27	2	71287	143529	Sch Expwy EB	6
	3435	2687	38	3	72242	143529	Sch Expwy WB	6
	3441	2112	25	2	72242	143529	Sch Expwy WB	6
	3445	3156	27	2	72242	143529	Sch Expwy WB	6
I-95	0114	1917	48	4	59201	128925	Del Expwy NB	7
	0115	2300	61	4	69724	128925	Del Expwy SB	7
I-95	0320	2744	36	3	63399	124610	Del Expwy NB	8
	0324	2793	36	3	63399	124610	Del Expwy NB	8
	0321	2781	36	3	61211	124610	Del Expwy SB	8
	0325	2782	36	3	61211	124610	Del Expwy SB	8
I-95	0180	2471	55	3	54241	118195	Del Expwy NB	9
	0184	2599	55	3	54241	118195	Del Expwy NB	9
	0190	2978	67	3	54241	118195	Del Expwy NB	9
	0194	4418	67	4	54241	118195	Del Expwy NB	9
	0200	1786	36	3	54241	118195	Del Expwy NB	9
	0204	1826	61	4	54241	118195	Del Expwy NB	9
	0210	3049	36	3	54241	118195	Del Expwy NB	9
	0185	2574	60	3	63954	118195	Del Expwy SB	9
	0191	2978	67	3	63954	118195	Del Expwy SB	9
	0195	4418	67	4	63954	118195	Del Expwy SB	9
	0201	1781	48	4	63954	118195	Del Expwy SB	9
	0205	1819	66	3	63954	118195	Del Expwy SB	9
I-95	0164	3923	52	3	64412	116634	Del Expwy NB	10
	0170	5191	52	3	64412	116634	Del Expwy NB	10
	0165	3927	52	3	52222	116634	Del Expwy SB	10
	0171	5191	52	3	52222	116634	Del Expwy SB	10
	0181	2435	60	3	52222	116634	Del Expwy SB	10

67B3	0010	5280	84	7		103000	Walt Whitman Brg.	11
	0020	5280	84	7		103000	Walt Whitman Brg.	11
	0030	4752	84	7		103000	Walt Whitman Brg.	11
I-95	0144	3378	55	4	47581	97238	Del Expwy NB	12
	0150	5167	48	3	47581	97238	Del Expwy NB	12
	0160	1946	55	3	47581	97238	Del Expwy NB	12
	0145	3124	55	4	49657	97238	Del Expwy SB	12
	0151	5167	48	3	49657	97238	Del Expwy SB	12
	0161	1949	55	3	49657	97238	Del Expwy SB	12
I-76	3450	2612	30	2	52000	95101	Sch Expwy EB	13
	3454	3946	27	2	52000	95101	Sch Expwy EB	13
	3460	1434	36	3	52000	95101	Sch Expwy EB	13
	3464	2544	37	3	52000	95101	Sch Expwy EB	13
	3470	1483	57	3	52000	95101	Sch Expwy EB	13
	3451	2602	33	2	43101	95101	Sch Expwy WB	13
	3455	3927	27	2	43101	95101	Sch Expwy WB	13
	3461	1411	37	3	43101	95101	Sch Expwy WB	13
	3465	2509	37	3	43101	95101	Sch Expwy WB	13
	3471	1709	37	3	43101	95101	Sch Expwy WB	13
I-95	0294	2975	55	4	50048	93539	Del Expwy NB	14
	0300	2814	57	4	50048	93539	Del Expwy NB	14
	0304	2759	47	4	50048	93539	Del Expwy NB	14
	0310	2640	47	4	50048	93539	Del Expwy NB	14
	0314	2615	36	3	50048	93539	Del Expwy NB	14
	0295	3017	36	3	43491	93539	Del Expwy SB	14
	0301	2745	57	4	43491	93539	Del Expwy SB	14
	0305	2788	48	4	43491	93539	Del Expwy SB	14
	0311	2640	48	4	43491	93539	Del Expwy SB	14
	0315	2638	36	3	43491	93539	Del Expwy SB	14
I-95	0134	3021	72	4	45727	92549	Del Expwy NB	15
	0140	2677	72	3	45727	92549	Del Expwy NB	15
	0135	3244	72	4	46822	92549	Del Expwy SB	15
	0141	2680	72	3	46822	92549	Del Expwy SB	15
I-95	0120	2528	60	5	33927	69855	Del Expwy NB	16
	0124	2775	36	3	33927	69855	Del Expwy NB	16
	0130	2640	36	3	33927	69855	Del Expwy NB	16
	0121	2416	60	5	35928	69855	Del Expwy SB	16
	0125	2809	60	3	35928	69855	Del Expwy SB	16
	0131	2640	36	3	35928	69855	Del Expwy SB	16

Note: Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)
Delaware (Del); Schuylkill (Sch); Expressway (Expwy)
Brg: Bridge

3.2 Combining Fleet Mix Data and AADT Data to Rank Road Segments

The fleet mix metric accounts for the amount of HD (heavy duty) vehicles on a roadway, or the ratio of HD vehicles to LD (light duty) vehicles on a road. Fleet mix is an important factor because of the higher amount of NO_X emitted per vehicle for HDVs. Therefore, accounting for fleet mix in the near-road NO_2 monitoring site selection process more accurately focuses the search on road segments where potential on-road emissions may more consistently lead to peak NO_2 concentrations in the near-road environment.

HD vehicles AADT is added to each road segment. The grouped rows then were re-ranked based on total HD vehicles on **Table 2** below. In the stadium area, there was 5% of AADT truck which was counted as HD vehicles AADT and placed the area on the fifteenth rank based on HD Vehicle AADT.

Table 2 - Rank by Heavy Duty Vehicle AADT

St. Rt. No	Seg No.	Seg Length	Width	Lane Count	Current AADT	Total AADT	Street Name	Location	AADT Rank	HD Veh AADT	Total HD Veh AADT	HD Veh AADT Rank
I-95	0320	2744	36	3	63399	124610	Del Expwy NB	Exit 32 (Academy Rd/Linden Ave) to Exit 33	8	6974	14320	1
	0324	2793	36	3	63399	124610	Del Expwy NB	Exit 32 (Academy Rd/Linden Ave) to Exit 33	8	6974	14320	1
	0321	2781	36	3	61211	124610	Del Expwy SB	Exit 33 to Exit 32 (Academy Rd/Linden Ave)	8	7346	14320	1
	0325	2782	36	3	61211	124610	Del Expwy SB	Exit 33 to Exit 32 (Academy Rd/Linden Ave)	8	7346	14320	1
I-95	0120	2528	60	5	33927	69855	Del Expwy NB	Exit 12 to Exit 13	16	6785	13611	2
	0124	2775	36	3	33927	69855	Del Expwy NB	Exit 12 to Exit 13	16	6785	13611	2
	0130	2640	36	3	33927	69855	Del Expwy NB	Exit 12 to Exit 13	16	6785	13611	2
	0121	2416	60	5	35928	69855	Del Expwy SB	Exit 13 to Exit 12	16	6826	13611	2
	0125	2809	60	3	35928	69855	Del Expwy SB	Exit 13 to Exit 12	16	6826	13611	2
	0131	2640	36	3	35928	69855	Del Expwy SB	Exit 13 to Exit 12	16	6826	13611	2
I-95	0214	2259	36	3	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3
	0220	1682	48	4	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3
	0224	3284	66	4	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3
	0230	3680	59	3	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3
	0234	2619	57	4	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3
	0240	1829	50	4	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3
	0244	1808	60	4	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3
	0211	3043	36	3	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3
	0215	2274	36	3	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3
	0221	1728	36	3	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3
	0225	3378	48	4	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3
	0231	3680	59	3	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3
	0235	2619	57	4	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3
	0241	1835	50	4	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3
I-76	3414	2640	38	3	85308	154955	Sch Expwy EB	Exit 341 (Montgomery Dr/West River Dr) to Exit 343 (Spring Garden St/Harverford Ave)	5	4812	9899	4
	3420	2640	66	3	85308	154955	Sch Expwy EB	Exit 341 (Montgomery Dr/West River Dr) to Exit 343 (Spring Garden St/Harverford Ave)	5	4812	9899	4
	3424	2640	38	3	85308	154955	Sch Expwy EB	Exit 341 (Montgomery Dr/West River Dr) to Exit 343 (Spring Garden St/Harverford Ave)	5	4812	9899	4
	3430	2640	38	3	85308	154955	Sch Expwy EB	Exit 341 (Montgomery Dr/West River Dr) to Exit 343 (Spring Garden St/Harverford Ave)	5	4812	9899	4
	3415	2575	38	3	69647	154955	Sch Expwy WB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 341 (Montgomery Dr/West River Dr)	5	5087	9899	4
	3421	2579	66	3	69647	154955	Sch Expwy WB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 341 (Montgomery Dr/West River Dr)	5	5087	9899	4
	3425	2731	38	3	69647	154955	Sch Expwy WB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 341 (Montgomery	5	5087	9899	4

								Dr/West River Dr)				
	3431	2584	38	3	69647	154955	Sch Expwy WB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 341 (Montgomery Dr/West River Dr)	5	5087	9899	4
I-95	0114	1917	48	4	59201	128925	Del Expwy NB	Boundary with Delco to Exit 12 (PA 291 - Cargo City)	7	3970	9218	5
	0115	2300	61	4	69724	128925	Del Expwy SB	Exit 12 (PA 291 - Cargo City) to boundary with Delco	7	5248	9218	5
I-76	3394	2416	41	3	96776	174342	Sch Expwy EB	Exit 340A (Lincoln Dr/Kelly Dr) to Exit 341 (Montgomery Dr/West River Dr)	2	4818	8847	6
	3400	2691	50	4	96776	174342	Sch Expwy EB	Exit 340A (Lincoln Dr/Kelly Dr) to Exit 341 (Montgomery Dr/West River Dr)	2	4818	8847	6
	3404	2655	50	4	96776	174342	Sch Expwy EB	Exit 340A (Lincoln Dr/Kelly Dr) to Exit 341 (Montgomery Dr/West River Dr)	2	4818	8847	6
	3410	2640	50	4	96776	174342	Sch Expwy EB	Exit 340A (Lincoln Dr/Kelly Dr) to Exit 341 (Montgomery Dr/West River Dr)	2	4818	8847	6
	3395	2303	76	4	77566	174342	Sch Expwy WB	Exit 341 (Montgomery Dr/West River Dr) to Exit 340A (Lincoln Dr/Kelly Dr)	2	4029	8847	6
	3401	2937	50	4	77566	174342	Sch Expwy WB	Exit 341 (Montgomery Dr/West River Dr) to Exit 340A (Lincoln Dr/Kelly Dr)	2	4029	8847	6
	3405	2705	50	4	77566	174342	Sch Expwy WB	Exit 341 (Montgomery Dr/West River Dr) to Exit 340A (Lincoln Dr/Kelly Dr)	2	4029	8847	6
	3411	2667	50	4	77566	174342	Sch Expwy WB	Exit 341 (Montgomery Dr/West River Dr) to Exit 340A (Lincoln Dr/Kelly Dr)	2	4029	8847	6
I-95	0164	3923	52	3	64412	116634	Del Expwy NB	Exit 17 to Exit 19	10	3477	8651	7
	0170	5191	52	3	64412	116634	Del Expwy NB	Exit 17 to Exit 19	10	3477	8651	7
	0165	3927	52	3	52222	116634	Del Expwy SB	Walt Whitman Br. To Stadium (Exit 17)	10	5174	8651	7
	0171	5191	52	3	52222	116634	Del Expwy SB	Walt Whitman Br. To Stadium (Exit 17)	10	5174	8651	7
	0181	2435	60	3	52222	116634	Del Expwy SB	Walt Whitman Br. To Stadium (Exit 17)	10	5174	8651	7
I-76	3434	2640	38	3	71287	143529	Sch Expwy EB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 346A (South St)	6	4276	8611	8
	3440	2651	25	2	71287	143529	Sch Expwy EB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 346A (South St)	6	4276	8611	8
	3444	3156	27	2	71287	143529	Sch Expwy EB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 346A (South St)	6	4276	8611	8
	3435	2687	38	3	72242	143529	Sch Expwy WB	Exit 346A (South St) to Exit 343 (Spring Garden St/Harverford Ave)	6	4335	8611	8
	3441	2112	25	2	72242	143529	Sch Expwy WB	Exit 346A (South St) to Exit 343 (Spring Garden St/Harverford Ave)	6	4335	8611	8
	3445	3156	27	2	72242	143529	Sch Expwy WB	Exit 346A (South St) to Exit 343 (Spring Garden St/Harverford Ave)	6	4335	8611	8
I-95	0264	4229	67	3	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9
	0270	2710	43	3	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9
	0274	2270	48	4	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9
	0280	2728	48	4	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9
	0284	2681	36	4	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9
	0290	1990	48	4	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9
	0265	4254	67	3	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9
	0271	2750	36	3	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9
	0275	2226	48	4	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9
	0281	2731	48	4	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9
	0285	2695	48	4	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9
	0291	1944	48	4	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9

I-95	0250	3226	65	4	86781	172578	Del Expwy NB	Exit 25 to I-95 North-Trenton	3	2534	7594	10
	0254	2453	52	5	86781	172578	Del Expwy NB	Exit 25 to I-95 North-Trenton	3	2534	7594	10
	0260	1535	55	4	86781	172578	Del Expwy NB	Exit 25 to I-95 North-Trenton	3	2534	7594	10
	0245	1814	48	4	85797	172578	Del Expwy SB	I-95 North-Trenton to Exit 25	3	5060	7594	10
	0251	3242	65	4	85797	172578	Del Expwy SB	I-95 North-Trenton to Exit 25	3	5060	7594	10
	0255	2414	60	5	85797	172578	Del Expwy SB	I-95 North-Trenton to Exit 25	3	5060	7594	10
	0261	1537	48	4	85797	172578	Del Expwy SB	I-95 North-Trenton to Exit 25	3	5060	7594	10
I-95	0294	2975	55	4	50048	93539	Del Expwy NB	Exit 30 (Cottman Ave/Rhawn St) to Exit 32 (Academy Rd/Linden Ave)	15	2834	7195	11
	0300	2814	57	4	50048	93539	Del Expwy NB	Exit 30 (Cottman Ave/Rhawn St) to Exit 32 (Academy Rd/Linden Ave)	15	2834	7195	11
	0304	2759	47	4	50048	93539	Del Expwy NB	Exit 30 (Cottman Ave/Rhawn St) to Exit 32 (Academy Rd/Linden Ave)	15	2834	7195	11
	0310	2640	47	4	50048	93539	Del Expwy NB	Exit 30 (Cottman Ave/Rhawn St) to Exit 32 (Academy Rd/Linden Ave)	15	2834	7195	11
	0314	2615	36	3	50048	93539	Del Expwy NB	Exit 30 (Cottman Ave/Rhawn St) to Exit 32 (Academy Rd/Linden Ave)	15	2834	7195	11
	0295	3017	36	3	43491	93539	Del Expwy SB	Exit 32 (Academy Rd/Linden Ave) to PA-73	15	4361	7195	11
	0301	2745	57	4	43491	93539	Del Expwy SB	Exit 32 (Academy Rd/Linden Ave) to PA-73	15	4361	7195	11
	0305	2788	48	4	43491	93539	Del Expwy SB	Exit 32 (Academy Rd/Linden Ave) to PA-73	15	4361	7195	11
	0311	2640	48	4	43491	93539	Del Expwy SB	Exit 32 (Academy Rd/Linden Ave) to PA-73	15	4361	7195	11
	0315	2638	36	3	43491	93539	Del Expwy SB	Exit 32 (Academy Rd/Linden Ave) to PA-73	15	4361	7195	11
I-95	0144	3378	55	4	47581	97238	Del Expwy NB	W. Fort Mifflin Rd. to Exit 17	12	3688	6977	12
	0150	5167	48	3	47581	97238	Del Expwy NB	W. Fort Mifflin Rd. to Exit 17	12	3688	6977	12
	0160	1946	55	3	47581	97238	Del Expwy NB	W. Fort Mifflin Rd. to Exit 17	12	3688	6977	12
	0145	3124	55	4	49657	97238	Del Expwy SB	Exit 17 to Exit 15	12	3289	6977	12
	0151	5167	48	3	49657	97238	Del Expwy SB	Exit 17 to Exit 15	12	3289	6977	12
	0161	1949	55	3	49657	97238	Del Expwy SB	Exit 17 to Exit 15	12	3289	6977	12
I-76	3450	2612	30	2	52000	95101	Sch Expwy EB	Exit 346A (South St) to Exit 347B (End of I-76)	13	3466	5686	13
	3454	3946	27	2	52000	95101	Sch Expwy EB	Exit 346A (South St) to Exit 347B (End of I-76)	13	3466	5686	13
	3460	1434	36	3	52000	95101	Sch Expwy EB	Exit 346A (South St) to Exit 347B (End of I-76)	13	3466	5686	13
	3464	2544	37	3	52000	95101	Sch Expwy EB	Exit 346A (South St) to Exit 347B (End of I-76)	13	3466	5686	13
	3470	1483	57	3	52000	95101	Sch Expwy EB	Exit 346A (South St) to Exit 347B (End of I-76)	13	3466	5686	13
	3451	2602	33	2	43101	95101	Sch Expwy WB	Beginning of I-76 (S.26th St) to Exit 346A (South St)	13	2220	5686	13
	3455	3927	27	2	43101	95101	Sch Expwy WB	Beginning of I-76 (S.26th St) to Exit 346A (South St)	13	2220	5686	13
	3461	1411	37	3	43101	95101	Sch Expwy WB	Beginning of I-76 (S.26th St) to Exit 346A (South St)	13	2220	5686	13
	3465	2509	37	3	43101	95101	Sch Expwy WB	Beginning of I-76 (S.26th St) to Exit 346A (South St)	13	2220	5686	13
	3471	1709	37	3	43101	95101	Sch Expwy WB	Beginning of I-76 (S.26th St) to Exit 346A (South St)	13	2220	5686	13
I-95	0134	3021	72	4	45727	92549	Del Expwy NB	Exit 13 to W. Fort Mifflin Rd.	14	2229	5162	14
	0140	2677	72	3	45727	92549	Del Expwy NB	Exit 13 to W. Fort Mifflin Rd.	14	2229	5162	14
	0135	3244	72	4	46822	92549	Del Expwy SB	Exit 15 to Bartram Ave	14	2933	5162	14
	0141	2680	72	3	46822	92549	Del Expwy SB	Exit 15 to Bartram Ave	14	2933	5162	14
67B3	0010	5280	84	7		103000	Walt Whitman Brg.	Packer Ave (Citizen Bank Park)	11		5150	15
67B3	0020	5280	84	7		103000	Walt Whitman Brg.	Packer Ave (Citizen Bank Park)	11		5150	15
67B3	0030	4752	84	7		103000	Walt Whitman Brg.	Packer Ave (Citizen Bank Park)	11		5150	15

I-95	0180	2471	55	3	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	16
	0184	2599	55	3	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	16
	0190	2978	67	3	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	16
	0194	4418	67	4	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	16
	0200	1786	36	3	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	16
	0204	1826	61	4	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	16
	0210	3049	36	3	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	16
	0185	2574	60	3	63954	118195	Del Expwy SB	Arch St and N. Front St to Walt Whitman Br.	9	2975	5104	16
	0191	2978	67	3	63954	118195	Del Expwy SB	Arch St and N. Front St to Walt Whitman Br.	9	2975	5104	16
	0195	4418	67	4	63954	118195	Del Expwy SB	Arch St and N. Front St to Walt Whitman Br.	9	2975	5104	16
	0201	1781	48	4	63954	118195	Del Expwy SB	Arch St and N. Front St to Walt Whitman Br.	9	2975	5104	16
	0205	1819	66	3	63954	118195	Del Expwy SB	Arch St and N. Front St to Walt Whitman Br.	9	2975	5104	16

Note:

1. Del Expwy: Delaware Expressway; Sch Expwy: Schuylkill Expressway
2. Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)
3. Brg.: Bridge

Fleet Equivalent Metric

In order to more easily compare one road segment to another, particularly when those road segments have a varied amount of both total traffic volume and heavy-duty vehicle volume, the EPA recommends the use of a unique *metric that accounts for both total traffic volume and fleet mix for comparison purposes*, called Fleet Equivalent (FE) AADT. With the FE AADT metric, roads can be re-ranked in an order that reflects both AADT and fleet mix within one numerical value. *Re-ranking by FE AADT presents a prioritized list of road segments that are more likely representative of estimated or potential NOX emissions than either AADT or fleet mix alone.* The determination of FE AADT per segment depends on three variables: (1) total traffic volume, presented as AADT counts, (2) fleet mix, presented as HD vehicle number counts, and (3) the heavy-duty to light-duty vehicle NOX emission ratio. The following equation can be used to determine a Fleet-Equivalent AADT value for each road segment:

Fleet-Equivalent (FE) AADT = (AADT – HDc) + (HDm * HDc)

Where: AADT is the total traffic volume count for a particular road segment;
HDc is the total number of heavy-duty vehicles for a particular road segment; and
HDm is a multiplier that represents the heavy-duty to light-duty NOx emission ratio for a particular road segment.

The *HDm* multiplier can be obtained from national average motor vehicle emission factors, from local emissions estimates obtained in a given CBSA that can provide a specific *HDm* value across the CBSA or for each individual road segment, or a national default value of 10 can be used. Philadelphia County is using the national default *HDm* equal to 10, where the assumption is made that the NOx emissions from one HD vehicle are equivalent to the NOx emissions from ten LD vehicles operating on the same road segment and under the same environmental and relative operating conditions. The equation can be simplified to: **FE-AADT = (AADT – HDc) + (10 * HDc)**
An additional column to reflect FE AADT is added. The road segments have been re-ranked based on the FE AADT value on **Table 3**.

Table 3 - Rank by FE AADT (The Top 16 Ranks)

St. Rt. No	Seg No.	Seg Length	Width	Lane Count	Current AADT	Total AADT	Street Name	Location	AADT Rank	Heavy Duty Vehicle AADT	Total HD Vehicle AADT	HD Vehicle AADT Rank	FE AADT	FE AADT Rank
I-95	0214	2259	36	3	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3	260440	1
	0220	1682	48	4	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3	260440	1
	0224	3284	66	4	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3	260440	1
	0230	3680	59	3	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3	260440	1
	0234	2619	57	4	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3	260440	1
	0240	1829	50	4	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3	260440	1
	0244	1808	60	4	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3	260440	1
	0211	3043	36	3	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3	260440	1
	0215	2274	36	3	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3	260440	1
	0221	1728	36	3	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3	260440	1
	0225	3378	48	4	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3	260440	1
	0231	3680	59	3	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3	260440	1
	0235	2619	57	4	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3	260440	1
	0241	1835	50	4	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3	260440	1
I-95	0264	4229	67	3	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9	255123	2
	0270	2710	43	3	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9	255123	2
	0274	2270	48	4	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9	255123	2
	0280	2728	48	4	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9	255123	2
	0284	2681	36	4	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9	255123	2
	0290	1990	48	4	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9	255123	2
	0265	4254	67	3	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9	255123	2
	0271	2750	36	3	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9	255123	2

	0275	2226	48	4	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9	255123	2
	0281	2731	48	4	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9	255123	2
	0285	2695	48	4	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9	255123	2
	0291	1944	48	4	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9	255123	2
I-76	3394	2416	41	3	96776	174342	Schuylkill Expwy EB	Exit 340A (Lincoln Dr/Kelly Dr) to Exit 341 (Montgomery Dr/West River Dr)	2	4818	8847	6	253965	3
	3400	2691	50	4	96776	174342	Schuylkill Expwy EB	Exit 340A (Lincoln Dr/Kelly Dr) to Exit 341 (Montgomery Dr/West River Dr)	2	4818	8847	6	253965	3
	3404	2655	50	4	96776	174342	Schuylkill Expwy EB	Exit 340A (Lincoln Dr/Kelly Dr) to Exit 341 (Montgomery Dr/West River Dr)	2	4818	8847	6	253965	3
	3410	2640	50	4	96776	174342	Schuylkill Expwy EB	Exit 340A (Lincoln Dr/Kelly Dr) to Exit 341 (Montgomery Dr/West River Dr)	2	4818	8847	6	253965	3
	3395	2303	76	4	77566	174342	Schuylkill Expwy WB	Exit 341 (Montgomery Dr/West River Dr) to Exit 340A (Lincoln Dr/Kelly Dr)	2	4029	8847	6	253965	3
	3401	2937	50	4	77566	174342	Schuylkill Expwy WB	Exit 341 (Montgomery Dr/West River Dr) to Exit 340A (Lincoln Dr/Kelly Dr)	2	4029	8847	6	253965	3
	3405	2705	50	4	77566	174342	Schuylkill Expwy WB	Exit 341 (Montgomery Dr/West River Dr) to Exit 340A (Lincoln Dr/Kelly Dr)	2	4029	8847	6	253965	3
	3411	2667	50	4	77566	174342	Schuylkill Expwy WB	Exit 341 (Montgomery Dr/West River Dr) to Exit 340A (Lincoln Dr/Kelly Dr)	2	4029	8847	6	253965	3
I-95	0320	2744	36	3	63399	124610	Del Expwy NB	Exit 32 (Academy Rd/Linden Ave) to Exit 33	8	6974	14320	1	253490	4
	0324	2793	36	3	63399	124610	Del Expwy NB	Exit 32 (Academy Rd/Linden Ave) to Exit 33	8	6974	14320	1	253490	4
	0321	2781	36	3	61211	124610	Del Expwy SB	Exit 33 to Exit 32 (Academy Rd/Linden Ave)	8	7346	14320	1	253490	4
	0325	2782	36	3	61211	124610	Del Expwy SB	Exit 33 to Exit 32 (Academy Rd/Linden Ave)	8	7346	14320	1	253490	4
I-76	3414	2640	38	3	85308	154955	Schuylkill Expwy EB	Exit 341 (Montgomery Dr/West River Dr) to Exit 343 (Spring Garden St/Harverford Ave)	5	4812	9899	4	244046	5
	3420	2640	66	3	85308	154955	Schuylkill Expwy EB	Exit 341 (Montgomery Dr/West River Dr) to Exit 343 (Spring Garden St/Harverford Ave)	5	4812	9899	4	244046	5
	3424	2640	38	3	85308	154955	Schuylkill Expwy EB	Exit 341 (Montgomery Dr/West River Dr) to Exit 343 (Spring Garden St/Harverford Ave)	5	4812	9899	4	244046	5
	3430	2640	38	3	85308	154955	Schuylkill Expwy EB	Exit 341 (Montgomery Dr/West River Dr) to Exit 343 (Spring Garden St/Harverford Ave)	5	4812	9899	4	244046	5

	3415	2575	38	3	69647	154955	Schuylkill Expwy WB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 341 (Montgomery Dr/West River Dr)	5	5087	9899	4	244046	5
	3421	2579	66	3	69647	154955	Schuylkill Expwy WB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 341 (Montgomery Dr/West River Dr)	5	5087	9899	4	244046	5
	3425	2731	38	3	69647	154955	Schuylkill Expwy WB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 341 (Montgomery Dr/West River Dr)	5	5087	9899	4	244046	5
	3431	2584	38	3	69647	154955	Schuylkill Expwy WB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 341 (Montgomery Dr/West River Dr)	5	5087	9899	4	244046	5
I-95	0250	3226	65	4	86781	172578	Del Expwy NB	Exit 25 to I-95 North-Trenton	3	2534	7594	10	240924	6
	0254	2453	52	5	86781	172578	Del Expwy NB	Exit 25 to I-95 North-Trenton	3	2534	7594	10	240924	6
	0260	1535	55	4	86781	172578	Del Expwy NB	Exit 25 to I-95 North-Trenton	3	2534	7594	10	240924	6
	0245	1814	48	4	85797	172578	Del Expwy SB	I-95 North-Trenton to Exit 25	3	5060	7594	10	240924	6
	0251	3242	65	4	85797	172578	Del Expwy SB	I-95 North-Trenton to Exit 25	3	5060	7594	10	240924	6
	0255	2414	60	5	85797	172578	Del Expwy SB	I-95 North-Trenton to Exit 25	3	5060	7594	10	240924	6
	0261	1537	48	4	85797	172578	Del Expwy SB	I-95 North-Trenton to Exit 25	3	5060	7594	10	240924	6
I-76	3434	2640	38	3	71287	143529	Schuylkill Expwy EB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 346A (South St)	6	4276	8611	8	221028	7
	3440	2651	25	2	71287	143529	Schuylkill Expwy EB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 346A (South St)	6	4276	8611	8	221028	7
	3444	3156	27	2	71287	143529	Schuylkill Expwy EB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 346A (South St)	6	4276	8611	8	221028	7
	3435	2687	38	3	72242	143529	Schuylkill Expwy WB	Exit 346A (South St) to Exit 343 (Spring Garden St/Harverford Ave)	6	4335	8611	8	221028	7
	3441	2112	25	2	72242	143529	Schuylkill Expwy WB	Exit 346A (South St) to Exit 343 (Spring Garden St/Harverford Ave)	6	4335	8611	8	221028	7
	3445	3156	27	2	72242	143529	Schuylkill Expwy WB	Exit 346A (South St) to Exit 343 (Spring Garden St/Harverford Ave)	6	4335	8611	8	221028	7
I-95	0114	1917	48	4	59201	128925	Del Expwy NB	Boundary with Delco to Exit 12 (PA 291 - Cargo City)	7	3970	9218	5	211887	8
	0115	2300	61	4	69724	128925	Del Expwy SB	Exit 12 (PA 291 - Cargo City) to boundary with Delco	7	5248	9218	5	211887	8
I-95	0164	3923	52	3	64412	116634	Del Expwy NB	Exit 17 to Exit 19	10	3477	8651	7	194493	9

	0170	5191	52	3	64412	116634	Del Expwy NB	Exit 17 to Exit 19	10	3477	8651	7	194493	9
	0165	3927	52	3	52222	116634	Del Expwy SB	Walt Whitman Br. To Stadium (Exit 17)	10	5174	8651	7	194493	9
	0171	5191	52	3	52222	116634	Del Expwy SB	Walt Whitman Br. To Stadium (Exit 17)	10	5174	8651	7	194493	9
	0181	2435	60	3	52222	116634	Del Expwy SB	Walt Whitman Br. To Stadium (Exit 17)	10	5174	8651	7	194493	9
I-95	0120	2528	60	5	33927	69855	Del Expwy NB	Exit 12 to Exit 13	15	6785	13611	2	192354	10
	0124	2775	36	3	33927	69855	Del Expwy NB	Exit 12 to Exit 13	15	6785	13611	2	192354	10
	0130	2640	36	3	33927	69855	Del Expwy NB	Exit 12 to Exit 13	15	6785	13611	2	192354	10
	0121	2416	60	5	35928	69855	Del Expwy SB	Exit 13 to Exit 12	15	6826	13611	2	192354	10
	0125	2809	60	3	35928	69855	Del Expwy SB	Exit 13 to Exit 12	15	6826	13611	2	192354	10
	0131	2640	36	3	35928	69855	Del Expwy SB	Exit 13 to Exit 12	15	6826	13611	2	192354	10
I-95	0180	2471	55	3	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	16	164131	11
	0184	2599	55	3	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	16	164131	11
	0190	2978	67	3	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	16	164131	11
	0194	4418	67	4	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	16	164131	11
	0200	1786	36	3	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	16	164131	11
	0204	1826	61	4	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	16	164131	11
	0210	3049	36	3	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	16	164131	11
	0185	2574	60	3	63954	118195	Del Expwy SB	Arch St and N. Front St to Walt Whitman Br.	9	2975	5104	16	164131	11
	0191	2978	67	3	63954	118195	Del Expwy SB	Arch St and N. Front St to Walt Whitman Br.	9	2975	5104	16	164131	11
	0195	4418	67	4	63954	118195	Del Expwy SB	Arch St and N. Front St to Walt Whitman Br.	9	2975	5104	16	164131	11
	0201	1781	48	4	63954	118195	Del Expwy SB	Arch St and N. Front St to Walt Whitman Br.	9	2975	5104	16	164131	11
	0205	1819	66	3	63954	118195	Del Expwy SB	Arch St and N. Front St to Walt Whitman Br.	9	2975	5104	16	164131	11
I-95	0144	3378	55	4	47581	97238	Del Expwy NB	W. Fort Mifflin Rd. to Exit 17	11	3688	6977	12	160031	12
	0150	5167	48	3	47581	97238	Del Expwy NB	W. Fort Mifflin Rd. to Exit 17	11	3688	6977	12	160031	12
	0160	1946	55	3	47581	97238	Del Expwy NB	W. Fort Mifflin Rd. to Exit 17	11	3688	6977	12	160031	12

	0145	3124	55	4	49657	97238	Del Expwy SB	Exit 17 to Exit 15	11	3289	6977	12	160031	12
	0151	5167	48	3	49657	97238	Del Expwy SB	Exit 17 to Exit 15	11	3289	6977	12	160031	12
	0161	1949	55	3	49657	97238	Del Expwy SB	Exit 17 to Exit 15	11	3289	6977	12	160031	12
I-95	0294	2975	55	4	50048	93539	Del Expwy NB	Exit 30 (Cottman Ave/Rhawn St) to Exit 32 (Academy Rd/Linden Ave)	13	2834	7195	11	158294	13
	0300	2814	57	4	50048	93539	Del Expwy NB	Exit 30 (Cottman Ave/Rhawn St) to Exit 32 (Academy Rd/Linden Ave)	13	2834	7195	11	158294	13
	0304	2759	47	4	50048	93539	Del Expwy NB	Exit 30 (Cottman Ave/Rhawn St) to Exit 32 (Academy Rd/Linden Ave)	13	2834	7195	11	158294	13
	0310	2640	47	4	50048	93539	Del Expwy NB	Exit 30 (Cottman Ave/Rhawn St) to Exit 32 (Academy Rd/Linden Ave)	13	2834	7195	11	158294	13
	0314	2615	36	3	50048	93539	Del Expwy NB	Exit 30 (Cottman Ave/Rhawn St) to Exit 32 (Academy Rd/Linden Ave)	13	2834	7195	11	158294	13
	0295	3017	36	3	43491	93539	Del Expwy SB	Exit 32 (Academy Rd/Linden Ave) to PA-73	13	4361	7195	11	158294	13
	0301	2745	57	4	43491	93539	Del Expwy SB	Exit 32 (Academy Rd/Linden Ave) to PA-73	13	4361	7195	11	158294	13
	0305	2788	48	4	43491	93539	Del Expwy SB	Exit 32 (Academy Rd/Linden Ave) to PA-73	13	4361	7195	11	158294	13
	0311	2640	48	4	43491	93539	Del Expwy SB	Exit 32 (Academy Rd/Linden Ave) to PA-73	13	4361	7195	11	158294	13
	0315	2638	36	3	43491	93539	Del Expwy SB	Exit 32 (Academy Rd/Linden Ave) to PA-73	13	4361	7195	11	158294	13
67B3	0010	5280	84	7		103000	Walt Whitman Brg.	Packer Ave (Citizen Bank Park)	11		5150	15	149350	14
	0020	5280	84	7		103000	Walt Whitman Brg.	Packer Ave (Citizen Bank Park)	11		5150	15	149350	14
	0030	4752	84	7		103000	Walt Whitman Brg.	Packer Ave (Citizen Bank Park)	11		5150	15	149350	14
I-76	3450	2612	30	2	52000	95101	Schuylkill Expwy EB	Exit 346A (South St) to Exit 347B (End of I-76)	12	3466	5686	13	146275	15
	3454	3946	27	2	52000	95101	Schuylkill Expwy EB	Exit 346A (South St) to Exit 347B (End of I-76)	12	3466	5686	13	146275	15
	3460	1434	36	3	52000	95101	Schuylkill Expwy EB	Exit 346A (South St) to Exit 347B (End of I-76)	12	3466	5686	13	146275	15
	3464	2544	37	3	52000	95101	Schuylkill Expwy EB	Exit 346A (South St) to Exit 347B (End of I-76)	12	3466	5686	13	146275	15
	3470	1483	57	3	52000	95101	Schuylkill Expwy EB	Exit 346A (South St) to Exit 347B (End of I-76)	12	3466	5686	13	146275	15
	3451	2602	33	2	43101	95101	Schuylkill Expwy WB	Beginning of I-76 (S.26th St) to Exit 346A (South St)	12	2220	5686	13	146275	15
	3455	3927	27	2	43101	95101	Schuylkill Expwy	Beginning of I-76 (S.26th St) to Exit	12	2220	5686	13	146275	15

							WB	346A (South St)						
	3461	1411	37	3	43101	95101	Schuylkill Expwy WB	Beginning of I-76 (S.26th St) to Exit 346A (South St)	12	2220	5686	13	146275	15
	3465	2509	37	3	43101	95101	Schuylkill Expwy WB	Beginning of I-76 (S.26th St) to Exit 346A (South St)	12	2220	5686	13	146275	15
	3471	1709	37	3	43101	95101	Schuylkill Expwy WB	Beginning of I-76 (S.26th St) to Exit 346A (South St)	12	2220	5686	13	146275	15
I-95	0134	3021	72	4	45727	92549	Del Expwy NB	Exit 13 to W. Fort Mifflin Rd.	14	2229	5162	14	139007	16
	0140	2677	72	3	45727	92549	Del Expwy NB	Exit 13 to W. Fort Mifflin Rd.	14	2229	5162	14	139007	16
	0135	3244	72	4	46822	92549	Del Expwy SB	Exit 15 to Bartram Ave	14	2933	5162	14	139007	16
	0141	2680	72	3	46822	92549	Del Expwy SB	Exit 15 to Bartram Ave	14	2933	5162	14	139007	16

Note:

1. Del Expwy: Delaware Expressway; Sch Expwy: Schuylkill Expressway
2. Northbound (NB); Southbound (SB); Eastbound (EB); Westbound (WB)
3. Brg.: Bridge.

3.3 Using Congestion Pattern Indicators to Supplement Road Segment Rankings

The EPA does not recommend that any of the congestion indicators be used in a quantitative manner to further re-rank or re-prioritize the whole list of candidate road segments resulting from Steps 3.1 and 3.2. Instead, such data are believed to be more useful as a qualitative measure by which one road segment might be selected over other relatively similar candidate road segments in the overall selection process. In such a situation, *it is recommended that when using AADT per lane data, a higher priority should be placed on road segments with higher AADT per lane values.*

Table 4 below, is an updated form of Table 3 with a column displaying congestion information in the form of AADT per lane data

Table 4 - Rank by FE AADT with AADT by Lane Displayed (Sites A - P)

St. Rt. No	Seg No.	Seg Length	Width	Lane Count	Current AADT	Total AADT	Street Name	Location	AADT Rank	Heavy Duty Vehicle AADT	Total HD Vehicle AADT	HD Vehicle AADT Rank	FE AADT	FE AADT Rank	AADT By Lane
Site A															
I-95	0214	2259	36	3	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3	260440	1	24550
	0220	1682	48	4	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3	260440	1	18413
	0224	3284	66	4	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3	260440	1	18413
	0230	3680	59	3	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3	260440	1	24550
	0234	2619	57	4	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3	260440	1	18413
	0240	1829	50	4	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3	260440	1	18413
	0244	1808	60	4	73651	157984	Del Expwy NB	Exit 22 to Exit 25	4	4691	11384	3	260440	1	18413
	0211	3043	36	3	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3	260440	1	28111
	0215	2274	36	3	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3	260440	1	28111
	0221	1728	36	3	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3	260440	1	28111
	0225	3378	48	4	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3	260440	1	21083
	0231	3680	59	3	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3	260440	1	28111
	0235	2619	57	4	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3	260440	1	21083
	0241	1835	50	4	84333	157984	Del Expwy SB	Exit 25 to Arch St. and N. Front St.	4	6693	11384	3	260440	1	21083

Site B															
I-95	0264	4229	67	3	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9	255123	2	25680
	0270	2710	43	3	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9	255123	2	25680
	0274	2270	48	4	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9	255123	2	19260
	0280	2728	48	4	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9	255123	2	19260
	0284	2681	36	4	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9	255123	2	19260
	0290	1990	48	4	77040	179487	Del Expwy NB	I-95 North-Trenton to Exit 30 (Cottman Ave/Rhawn St)	1	2748	8404	9	255123	2	19260
	0265	4254	67	3	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9	255123	2	34149
	0271	2750	36	3	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9	255123	2	34149
	0275	2226	48	4	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9	255123	2	25612
	0281	2731	48	4	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9	255123	2	25612
	0285	2695	48	4	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9	255123	2	25612
	0291	1944	48	4	102447	179487	Del Expwy SB	PA-73 to I-95 North - Trenton	1	5656	8404	9	255123	2	25612
Site C															
I-76	3394	2416	41	3	96776	174342	Schuylkill Expwy EB	Exit 340A (Lincoln Dr/Kelly Dr) to Exit 341 (Montgomery Dr/West River Dr)	2	4818	8847	6	253965	3	32259
	3400	2691	50	4	96776	174342	Schuylkill Expwy EB	Exit 340A (Lincoln Dr/Kelly Dr) to Exit 341 (Montgomery Dr/West River Dr)	2	4818	8847	6	253965	3	24194
	3404	2655	50	4	96776	174342	Schuylkill Expwy EB	Exit 340A (Lincoln Dr/Kelly Dr) to Exit 341 (Montgomery Dr/West River Dr)	2	4818	8847	6	253965	3	24194
	3410	2640	50	4	96776	174342	Schuylkill Expwy EB	Exit 340A (Lincoln Dr/Kelly Dr) to Exit 341 (Montgomery Dr/West River Dr)	2	4818	8847	6	253965	3	24194
	3395	2303	76	4	77566	174342	Schuylkill Expwy WB	Exit 341 (Montgomery Dr/West River Dr) to Exit 340A (Lincoln Dr/Kelly Dr)	2	4029	8847	6	253965	3	19392
	3401	2937	50	4	77566	174342	Schuylkill Expwy WB	Exit 341 (Montgomery Dr/West River Dr) to Exit 340A (Lincoln Dr/Kelly Dr)	2	4029	8847	6	253965	3	19392
	3405	2705	50	4	77566	174342	Schuylkill Expwy WB	Exit 341 (Montgomery Dr/West River Dr) to Exit 340A (Lincoln Dr/Kelly Dr)	2	4029	8847	6	253965	3	19392
	3411	2667	50	4	77566	174342	Schuylkill Expwy WB	Exit 341 (Montgomery Dr/West River Dr) to Exit 340A (Lincoln Dr/Kelly Dr)	2	4029	8847	6	253965	3	19392
Site D															
I-95	0320	2744	36	3	63399	124610	Del Expwy NB	Exit 32 (Academy Rd/Linden Ave) to Exit 33	8	6974	14320	1	253490	4	21133
	0324	2793	36	3	63399	124610	Del Expwy NB	Exit 32 (Academy Rd/Linden Ave) to Exit 33	8	6974	14320	1	253490	4	21133
	0321	2781	36	3	61211	124610	Del Expwy SB	Exit 33 to Exit 32 (Academy Rd/Linden	8	7346	14320	1	253490	4	20404

								Ave)							
	0325	2782	36	3	61211	124610	Del Expwy SB	Exit 33 to Exit 32 (Academy Rd/Linden Ave)	8	7346	14320	1	253490	4	20404
Site E															
I-76	3414	2640	38	3	85308	154955	Schuylkill Expwy EB	Exit 341 (Montgomery Dr/West River Dr) to Exit 343 (Spring Garden St/Harverford Ave)	5	4812	9899	4	244046	5	28436
	3420	2640	66	3	85308	154955	Schuylkill Expwy EB	Exit 341 (Montgomery Dr/West River Dr) to Exit 343 (Spring Garden St/Harverford Ave)	5	4812	9899	4	244046	5	28436
	3424	2640	38	3	85308	154955	Schuylkill Expwy EB	Exit 341 (Montgomery Dr/West River Dr) to Exit 343 (Spring Garden St/Harverford Ave)	5	4812	9899	4	244046	5	28436
	3430	2640	38	3	85308	154955	Schuylkill Expwy EB	Exit 341 (Montgomery Dr/West River Dr) to Exit 343 (Spring Garden St/Harverford Ave)	5	4812	9899	4	244046	5	28436
	3415	2575	38	3	69647	154955	Schuylkill Expwy WB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 341 (Montgomery Dr/West River Dr)	5	5087	9899	4	244046	5	23216
	3421	2579	66	3	69647	154955	Schuylkill Expwy WB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 341 (Montgomery Dr/West River Dr)	5	5087	9899	4	244046	5	23216
	3425	2731	38	3	69647	154955	Schuylkill Expwy WB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 341 (Montgomery Dr/West River Dr)	5	5087	9899	4	244046	5	23216
	3431	2584	38	3	69647	154955	Schuylkill Expwy WB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 341 (Montgomery Dr/West River Dr)	5	5087	9899	4	244046	5	23216
Site F															
I-95	0250	3226	65	4	86781	172578	Del Expwy NB	Exit 25 to I-95 North-Trenton	3	2534	7594	10	240924	6	21695
	0254	2453	52	5	86781	172578	Del Expwy NB	Exit 25 to I-95 North-Trenton	3	2534	7594	10	240924	6	17356
	0260	1535	55	4	86781	172578	Del Expwy NB	Exit 25 to I-95 North-Trenton	3	2534	7594	10	240924	6	21695
	0245	1814	48	4	85797	172578	Del Expwy SB	I-95 North-Trenton to Exit 25	3	5060	7594	10	240924	6	21449
	0251	3242	65	4	85797	172578	Del Expwy SB	I-95 North-Trenton to Exit 25	3	5060	7594	10	240924	6	21449
	0255	2414	60	5	85797	172578	Del Expwy SB	I-95 North-Trenton to Exit 25	3	5060	7594	10	240924	6	17159
	0261	1537	48	4	85797	172578	Del Expwy SB	I-95 North-Trenton to Exit 25	3	5060	7594	10	240924	6	21449
Site G															
I-76	3434	2640	38	3	71287	143529	Schuylkill Expwy EB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 346A (South St)	6	4276	8611	8	221028	7	23762
	3440	2651	25	2	71287	143529	Schuylkill Expwy EB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 346A (South St)	6	4276	8611	8	221028	7	35644

	3444	3156	27	2	71287	143529	Schuylkill Expwy EB	Exit 343 (Spring Garden St/Harverford Ave) to Exit 346A (South St)	6	4276	8611	8	221028	7	35644
	3435	2687	38	3	72242	143529	Schuylkill Expwy WB	Exit 346A (South St) to Exit 343 (Spring Garden St/Harverford Ave)	6	4335	8611	8	221028	7	24081
	3441	2112	25	2	72242	143529	Schuylkill Expwy WB	Exit 346A (South St) to Exit 343 (Spring Garden St/Harverford Ave)	6	4335	8611	8	221028	7	36121
	3445	3156	27	2	72242	143529	Schuylkill Expwy WB	Exit 346A (South St) to Exit 343 (Spring Garden St/Harverford Ave)	6	4335	8611	8	221028	7	36121
Site H															
I-95	0114	1917	48	4	59201	128925	Del Expwy NB	Boundary with Delco to Exit 12 (PA 291 - Cargo City)	7	3970	9218	5	211887	8	14800
	0115	2300	61	4	69724	128925	Del Expwy SB	Exit 12 (PA 291 - Cargo City) to boundary with Delco	7	5248	9218	5	211887	8	17431
Site I															
I-95	0164	3923	52	3	64412	116634	Del Expwy NB	Exit 17 to Exit 19	10	3477	8651	7	194493	9	21471
	0170	5191	52	3	64412	116634	Del Expwy NB	Exit 17 to Exit 19	10	3477	8651	7	194493	9	21471
	0165	3927	52	3	52222	116634	Del Expwy SB	Walt Whitman Br. To Stadium (Exit 17)	10	5174	8651	7	194493	9	17407
	0171	5191	52	3	52222	116634	Del Expwy SB	Walt Whitman Br. To Stadium (Exit 17)	10	5174	8651	7	194493	9	17407
	0181	2435	60	3	52222	116634	Del Expwy SB	Walt Whitman Br. To Stadium (Exit 17)	10	5174	8651	7	194493	9	17407
Site J															
I-95	0120	2528	60	5	33927	69855	Del Expwy NB	Exit Phila Airport to Exit 13	15	6785	13611	2	192354	10	6785
	0124	2775	36	3	33927	69855	Del Expwy NB	Exit Phila Airport to Exit 13	15	6785	13611	2	192354	10	11309
	0130	2640	36	3	33927	69855	Del Expwy NB	Exit Phila Airport to Exit 13	15	6785	13611	2	192354	10	11309
	0121	2416	60	5	35928	69855	Del Expwy SB	Exit 12A/B to Exit Phila Airport	15	6826	13611	2	192354	10	7186
	0125	2809	60	3	35928	69855	Del Expwy SB	Exit 12A/B to Exit Phila Airport	15	6826	13611	2	192354	10	11976
	0131	2640	36	3	35928	69855	Del Expwy SB	Exit 12A/B to Exit Phila Airport	15	6826	13611	2	192354	10	11976
Site K															
I-95	0180	2471	55	3	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	15	164131	11	18080
	0184	2599	55	3	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	15	164131	11	18080
	0190	2978	67	3	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	15	164131	11	18080
	0194	4418	67	4	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	15	164131	11	13560
	0200	1786	36	3	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	15	164131	11	18080
	0204	1826	61	4	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	15	164131	11	13560
	0210	3049	36	3	54241	118195	Del Expwy NB	Exit 19 to Exit 22	9	2129	5104	15	164131	11	18080
	0185	2574	60	3	63954	118195	Del Expwy SB	Arch St and N. Front St to Walt	9	2975	5104	15	164131	11	21318

								Whitman Br.								
	0191	2978	67	3	63954	118195	Del Expwy SB	Arch St and N. Front St to Walt Whitman Br.	9	2975	5104	15	164131	11	21318
	0195	4418	67	4	63954	118195	Del Expwy SB	Arch St and N. Front St to Walt Whitman Br.	9	2975	5104	15	164131	11	15989
	0201	1781	48	4	63954	118195	Del Expwy SB	Arch St and N. Front St to Walt Whitman Br.	9	2975	5104	15	164131	11	15989
	0205	1819	66	3	63954	118195	Del Expwy SB	Arch St and N. Front St to Walt Whitman Br.	9	2975	5104	15	164131	11	21318
Site L																
I-95	0144	3378	55	4	47581	97238	Del Expwy NB	W. Fort Mifflin Rd. to Exit 17	11	3688	6977	12	160031	12	11895
	0150	5167	48	3	47581	97238	Del Expwy NB	W. Fort Mifflin Rd. to Exit 17	11	3688	6977	12	160031	12	15860
	0160	1946	55	3	47581	97238	Del Expwy NB	W. Fort Mifflin Rd. to Exit 17	11	3688	6977	12	160031	12	15860
	0145	3124	55	4	49657	97238	Del Expwy SB	Exit 17 to Exit 15	11	3289	6977	12	160031	12	12414
	0151	5167	48	3	49657	97238	Del Expwy SB	Exit 17 to Exit 15	11	3289	6977	12	160031	12	16552
	0161	1949	55	3	49657	97238	Del Expwy SB	Exit 17 to Exit 15	11	3289	6977	12	160031	12	16552
Site M																
I-95	0294	2975	55	4	50048	93539	Del Expwy NB	Exit 30 (Cottman Ave/Rhawn St) to Exit 32 (Academy Rd/Linden Ave)	13	2834	7195	11	158294	13	12512
	0300	2814	57	4	50048	93539	Del Expwy NB	Exit 30 (Cottman Ave/Rhawn St) to Exit 32 (Academy Rd/Linden Ave)	13	2834	7195	11	158294	13	12512
	0304	2759	47	4	50048	93539	Del Expwy NB	Exit 30 (Cottman Ave/Rhawn St) to Exit 32 (Academy Rd/Linden Ave)	13	2834	7195	11	158294	13	12512
	0310	2640	47	4	50048	93539	Del Expwy NB	Exit 30 (Cottman Ave/Rhawn St) to Exit 32 (Academy Rd/Linden Ave)	13	2834	7195	11	158294	13	12512
	0314	2615	36	3	50048	93539	Del Expwy NB	Exit 30 (Cottman Ave/Rhawn St) to Exit 32 (Academy Rd/Linden Ave)	13	2834	7195	11	158294	13	16683
	0295	3017	36	3	43491	93539	Del Expwy SB	Exit 32 (Academy Rd/Linden Ave) to PA-73	13	4361	7195	11	158294	13	14497
	0301	2745	57	4	43491	93539	Del Expwy SB	Exit 32 (Academy Rd/Linden Ave) to PA-73	13	4361	7195	11	158294	13	10873
	0305	2788	48	4	43491	93539	Del Expwy SB	Exit 32 (Academy Rd/Linden Ave) to PA-73	13	4361	7195	11	158294	13	10873
	0311	2640	48	4	43491	93539	Del Expwy SB	Exit 32 (Academy Rd/Linden Ave) to PA-73	13	4361	7195	11	158294	13	10873
	0315	2638	36	3	43491	93539	Del Expwy SB	Exit 32 (Academy Rd/Linden Ave) to PA-73	13	4361	7195	11	158294	13	14497
Site N																
67B3	0010	5280	84	7		103000	Walt Whitman Brg.	Packer Ave (Citizen Bank Park)	11		5150	15	149350	14		
	0020	5280	84	7		103000	Walt Whitman Brg.	Packer Ave (Citizen Bank Park)	11		5150	15	149350	14		

	0030	4752	84	7		103000	Walt Whitman Brg.	Packer Ave (Citizen Bank Park)	11		5150	15	149350	14	
Site O															
I-76	3450	2612	30	2	52000	95101	Schuylkill Expwy EB	Exit 346A (South St) to Exit 347B (End of I-76)	12	3466	5686	13	146275	15	26000
	3454	3946	27	2	52000	95101	Schuylkill Expwy EB	Exit 346A (South St) to Exit 347B (End of I-76)	12	3466	5686	13	146275	15	26000
	3460	1434	36	3	52000	95101	Schuylkill Expwy EB	Exit 346A (South St) to Exit 347B (End of I-76)	12	3466	5686	13	146275	15	17333
	3464	2544	37	3	52000	95101	Schuylkill Expwy EB	Exit 346A (South St) to Exit 347B (End of I-76)	12	3466	5686	13	146275	15	17333
	3470	1483	57	3	52000	95101	Schuylkill Expwy EB	Exit 346A (South St) to Exit 347B (End of I-76)	12	3466	5686	13	146275	15	17333
	3451	2602	33	2	43101	95101	Schuylkill Expwy WB	Beginning of I-76 (S.26th St) to Exit 346A (South St)	12	2220	5686	13	146275	15	21551
	3455	3927	27	2	43101	95101	Schuylkill Expwy WB	Beginning of I-76 (S.26th St) to Exit 346A (South St)	12	2220	5686	13	146275	15	21551
	3461	1411	37	3	43101	95101	Schuylkill Expwy WB	Beginning of I-76 (S.26th St) to Exit 346A (South St)	12	2220	5686	13	146275	15	14367
	3465	2509	37	3	43101	95101	Schuylkill Expwy WB	Beginning of I-76 (S.26th St) to Exit 346A (South St)	12	2220	5686	13	146275	15	14367
	3471	1709	37	3	43101	95101	Schuylkill Expwy WB	Beginning of I-76 (S.26th St) to Exit 346A (South St)	12	2220	5686	13	146275	15	14367
Site P															
I-95	0134	3021	72	4	45727	92549	Del Expwy NB	Exit 13 to W. Fort Mifflin Rd.	14	2229	5162	14	139007	16	11432
	0140	2677	72	3	45727	92549	Del Expwy NB	Exit 13 to W. Fort Mifflin Rd.	14	2229	5162	14	139007	16	15242
	0135	3244	72	4	46822	92549	Del Expwy SB	Exit 15 to Exit 12A/B	14	2933	5162	14	139007	16	11706
	0141	2680	72	3	46822	92549	Del Expwy SB	Exit 15 to Exit 12A/B	14	2933	5162	14	139007	16	15607

3.4 Road Segment Ranking Process

Completion of steps 3.1 through 3.3 resulted in a prioritized list of candidate road segments in which the highest-ranked road segments are the locations where traffic volume, fleet mix, and congestion patterns were combined to contribute to a greater potential for and/or more frequent occurrences of peak NO_2 concentrations in the near-road environment. ***In Table 4, the group of roadway segments grouped under the designation "SITE A" ranked as the highest and, based on this information alone, either site A, site B or other site following those two sites would be the recommended selection, depend on the availability of the space.*** *However, Table 4 is recommended to guide* ***subsequent*** *evaluation processes (described in the following sections of this document) to determine where the permanent near-road NO_2 monitoring station will be installed.*

Several roadway maps are attached to this report to better identify the Table 4 road segments and Sites A – P.

Section 4 - Physical Considerations for Candidate Near-Road Monitoring Sites

With an initial list of candidate sites created, selected segments should be further evaluated to determine adequacy for a near-road monitoring station. Specifically, candidate road segments need to be inspected to account for roadway design, terrain, and meteorological factors, and also for safety and logistical considerations, and possibly for population exposure potential.

This section provides a brief review of the three, non-traffic related data considerations listed in the CFR: roadway design (including related roadside structures), terrain, and meteorology.

Table 5 - Summary of Physical Considerations for Near-Road Candidate Sites

Physical Site Component	Impact on Site Selection	Desirable Attributes	Least Desirable Attributes	Potential Information Sources
Roadway design or configuration	Feasibility of monitor placements; affects pollutant transport and dispersion.	At-grade or nearly at-grade with immediate surrounding terrain.	Deep cut-sections/significantly below grade; significantly above grade (fill or bridge); above grade (bridge).	Field reconnaissance; satellite imagery.
Roadside Structures	Feasibility of monitor placement; affects pollutant transport and dispersion.	No barriers present other than low (<2 m in height) vegetation or safety features such as guardrails.	Presence of sound walls, mature (high and thick) vegetation, obstructive buildings.	Field reconnaissance; satellite imagery.
Terrain	Affects pollutant dispersion, local atmospheric stability.	Flat or gentle terrain, within a valley, or along a road grade.	Along mountain ridges or peaks, hillsides, or other naturally windswept areas.	Field reconnaissance; digital elevation models and vegetation files; satellite imagery.
Meteorology	Affects pollutant transport and dispersion.	Relative downwind locations; winds from road to monitor.	Strongly predominant upwind positions.	Local data; National Oceanic and Atmospheric Administration's (NOAA's) National Weather Service (NWS); EPA's Air Quality System (AQS).

4.1 Roadway Design

The design (or configuration) of a roadway can influence the amount of emissions generated from motor vehicles and the transport and dispersion of those emissions along and/or away from the road. Roadway design includes features of the road itself, such as the slope or grade of a roadbed (which is often a reflection of local terrain or topography), the presence of access ramps, intersections, interchanges, or other such locations where traffic may merge or disperse, and a roadbed's position relative to the immediate surrounding terrain.

In particular, road grades create an increased load on vehicles ascending a grade, leading to increased exhaust emissions as the vehicle does more work to continue its forward motion. In addition, the presence of ramps, intersections, and lane merge locations can lead to increased but localized emissions due to the propensity for acceleration and potential for stop-and-go vehicle operations resulting from traffic congestion.

The relative position of a road to the immediate terrain around the roadway can have a significant influence on pollutant transport and dispersion along and/or away from the source road. The three general types of roadway design discussed here are at-grade, cut-section, and elevated roads.

4.1.1 At-Grade Roads

At-grade roads are those where the roadway surface (on which the vehicles are travelling) is generally at the same elevation as the surrounding terrain.

4.1.2 Below-Grade or Cut-Section Roads

Cut-section roads are those where the roadway surface elevation is below the surrounding terrain. Under perpendicular wind conditions (normal to the road), cut-section roads tend to cause lofting of the traffic plume as wind flows through, up, and out of the depressed road canyon. With wind conditions parallel or near-parallel to the source road, on-road emissions may be funneled downwind for some distance with emissions contained, akin to what happens in an urban street canyon. Channeling of winds may also occur within the cut section as a result of turbulence and wind flow generated from the vehicles operating on the road.

4.1.3 Above-Grade or Elevated Roads

Elevated roadways are those where the roadway surface is higher, in the vertical, than the surrounding topography. Elevated roads can be elevated on an earthen berm or other solid material, where such earth or material may be referred to as "fill", with no open space underneath the road surface for airflow, or on pilings or supports with open space underneath, where air may flow both above and beneath the road surface, such as a bridge.

- Elevated roads over solid fill material can have similar dispersion patterns as at-grade roads with winds normal to the road. However, some fill configurations (e.g., those with vertical or sharply sloped walls) can cause the traffic plume to loft above the ground immediately adjacent to the vertical or sharply sloped wall, with the core of the emission plume impacting the ground further downwind from the vertical or sharply sloped wall.
- Elevated roads which are open underneath can have enhanced dispersion of on-road emissions with all wind directions. In these cases, emissions are more readily dispersed due to the increased dilution air and from the turbulence caused by the elevated road structure itself. Because of this, ground-level concentrations downwind of the elevated roadbed may not be as high as concentrations found at at-grade roads or similar roads which are elevated on fill.

4.1.4 Relative Desirability in Roadway Designs

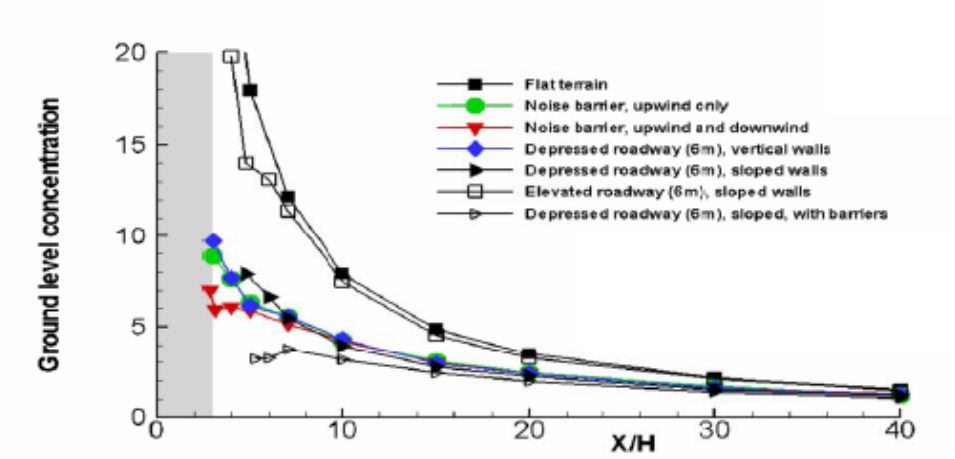
Under wind conditions normal to the source road, flat terrain, which would be representative of at-grade roads, shows the least disruption in dispersion, with a Gaussian-type gradient, where concentrations decrease with increasing distance from the source roadway. *At-grade road configurations would have the least complicated dispersion scenarios to consider while targeting maximum NO_2 concentrations, and thus be the most desirable setting for near road NO_2 monitoring stations.*

The second most desirable near-road monitoring location is adjacent to elevated roads on fill material, where maximum concentrations are found that are very close in value to concentrations found at at-grade locations.

Those roadway designs that may be less preferable when considering near-road NO_2 monitor locations would be adjacent to elevated road that are open underneath, or cut (or depressed) road beds (where deeper cuts or depressions likely present increasingly more significant impacts or complications on pollutant dispersion). Recommendations on siting a monitor probe near above and below grade roads are discussed in Section 5.

Figure 1 shows how roadside features can affect downwind pollutant concentrations under wind conditions normal to the source road.

Figure 1 - Wind Tunnel Study



4.2 Roadside Structures

In addition to the manner in which roadway design affects pollutant transport and dispersion, roadside structures may be present that also affect near-road pollutant concentrations. These structures include sound walls or noise barriers, vegetation, and buildings. Physical barriers affect pollutant concentrations around the structure by blocking initial dispersion and increasing turbulence and initial mixing of the emitted pollutants. Road configurations with noise barriers have the largest impacts on pollutant dispersion, relative to flat, at-grade roadway designs.

Roadside structures can trap pollutants upwind of the structure, the effects are very localized and likely do not contribute to peak NO_2 exposures for the nearby, adjacent population. In other situations, such as when winds blow along the roadway, the barriers may channel emissions downwind, without much dispersion occurring normal to the road. As such, even if siting criteria can be met at a site, *the EPA suggests that monitor placement adjacent to these structures be avoided when possible, particularly if other, similar candidate near-road locations are available that do not have such roadside structures.*

4.3 Vegetation

Vegetation along a road segment can affect on-road pollutant transport and dispersion. Winds flowing through vegetative structures can experience increased mixing and dilution due to the complex system of branches and leaves, while also leading to calmer winds behind the vegetation compared with similar winds in an open field situation.

4.4 Terrain

As mentioned in Section 4.1 (on roadway design), local topography is often a part of roadway design and can greatly influence pollutant transport and dispersion. However, large-scale terrain features, beyond the local roadway configuration, may also impact where peak NO_2 concentrations from on-road mobile sources can occur. The consideration of large-scale terrain in the siting process is more of a case-by-case issue for individual sites. In terms of making sure that larger scale terrain is considered in the near-road NO_2 site selection process, one example could be identifying multiple air basins within a single CBSA, and considering

how individual basins may affect pollutant build-up and dispersion. Another example might be considering roads through valleys, where, due to the increased potential for inversion conditions within the valley, higher near-road NO_2 concentrations may be found than what is found along alignments on the tops of hills, along hillsides, or in open terrain.

4.5 Meteorology

Evaluating historical meteorological data could be useful in determining whether certain candidate locations may experience a higher proportion of direct traffic emission impacts from a given target road segment due to the local winds. More specifically, an evaluation of local meteorology may also provide some indication on which side of an individual road segment under consideration, might experience a higher proportion of direct traffic emission impacts from a given target road segment. Most studies showing elevated pollutant concentrations near roads have focused on measurements when winds were from the road to the downwind monitor or receptor (typically along a line normal to the roadbed). In addition to relatively small scale impacts on a candidate road segment, other meteorological impacts, such as the frequency of inversions, which can lead to increased potential for pollutant build-up due to limited atmospheric mixing, may also be considered. In the preamble to the final NO_2 rulemaking, it is noted that downwind monitoring is not required, but the EPA strongly encouraged it. Some evidence suggests that wind direction may not always be a major factor in leading to peak concentrations in close proximity to a major roadway. Often, peak NO_2 concentrations may occur during stable, low wind speed conditions. In addition, the turbulence created by vehicles on the road can lead to "upwind meandering" of pollutants, where a monitor upwind of the target road would still be characterizing on-road emissions. However, there are situations where meteorological patterns may warrant strong consideration for the relative downwind side of a target road segment. An example might be roads in valley areas which are subject to air flows driven by diurnal mountain air flow patterns. Thus, historical wind directions should be considered in establishing NO_2 monitoring sites. In most cases, monitor placement on the climatologically down-wind side of a road segment is preferred; however this should not preclude consideration of sites located in the predominant climatologically upwind direction in light of applicable site access, safety, and other logistical issues.

Section 5 - Siting Criteria

The primary requirements related to horizontal and vertical probe placement for near-road NO_2 monitors are specified by the EPA in 40 CFR Part 58, Appendix E. Horizontal placement of near-road NO_2 monitor probes, with respect to the target roadway, are required to be installed so *"…the monitor probe shall be as near as practicable to the outside nearest edge of the traffic lanes of the target road segment; but shall not be located at a distance greater than 50 meters, in the horizontal, from the outside nearest edge of the traffic lanes of the target road segment." The key component of this passage is that the monitoring probes are to be placed "* as near as practicable" to the target road segment. Baldauf et al. (2009) note that a distance of 10 to 20 meters should be considered for near-roadway monitoring, and as such, the EPA strongly encourages state and local agencies to try to place near-road NO_2 monitor probes within 20 meters from target road segments when possible. Key requirements from 40 CFR Part 58, Appendix E are shown in here:

Table 6 - Key Near-Road Siting Criteria

Near-Road NO_2 Siting Criteria (per 40 CFR Part 58, Appendix E)	
Horizontal spacing	According to 40 CFR Part 58 Appendix E: "As near as practicable to the outside nearest edge of the traffic lanes of the target road segment; but shall not be located at a distance greater than 50 meters, in the horizontal, from the outside nearest edge of the traffic lanes of the target road segment." This TAD recommends that the target distance for near-road NO_2 monitor probes be within 20 meters of the target road whenever possible.
Vertical spacing	Microscale near-road NO_2 monitoring sites are required to have sampler inlets between 2 and 7 meters above ground level.
Spacing from supporting structures	The probe must be at least 1 meter vertically or horizontally away from any supporting structure, walls, parapets, penthouses, etc., and away from dusty or dirty areas.
Spacing from obstructions	For near-road NO_2 monitoring stations, the monitor probe shall have an unobstructed air flow, where no obstacles exist at or above the height of the monitor probe, or between the monitor probe and the outside nearest edge of the traffic lanes of the target road segment.

Vertical placement requirements of near-road NO_2 monitoring probes are *"… to have the sampler inlet between 2 and 7 meters above ground level."* There are several situations where the limits of the allowable vertical range for inlet probe heights may be appropriate. For example, if a candidate monitoring site is nearly at-grade with the target road, or if the target road is a cut-section road, the state and local air agency should consider placing the inlet probe closer to the 2 meter height limit above ground level. This recommendation is based on the information presented in Section 4.1, where the impact of the roadway designs will likely lead to peak concentrations more frequently occurring closer to ground level. Further, monitor probe placement at or near a 2 meter height above ground level is generally considered to be at or near "breathing height," which is a human exposure consideration.

Alternatively, if a near-road monitoring station is being considered for placement adjacent to an elevated fill section of road, particularly where the elevated roadbed has vertical or sharply sloped walls, the state or local air agency should consider placing the inlet probe higher in the 2 to 7 meter range above the ground level so that the sampler inlet might be closer to the elevation of the target road surface, if they are immediately adjacent to the target road. This follows the rationale, as discussed in Section 4.1, where emission plumes from elevated roads may be aloft in winds normal to the roadway (due to eddy formation immediately downwind of the roadbed) with the core of the emission plume impacting the ground further downwind from the vertical or sharply sloped wall. In this situation, depending on the relative difference in height between the target road surface and ground-level at the monitor probe location, and the steepness of the grade between the two locations, the state or local air agency could also consider placing the monitor probe slightly further away from the target road to avoid situations where the inlet probe may be in the eddy cavity downwind of the elevated road structure, causing the emission plume to potentially pass over the inlet probe.

Finally, per 40 CFR Part 58 Appendix E, near-road NO_2 monitor probes need to be spaced away from certain supporting structures and have an open, unobstructed fetch to the target road segment. In a majority of monitoring sites, gas analyzer inlet probes such as those used for NO_2, are placed on a monitoring shelter or on a tower on or adjacent to a monitoring shelter. However, for some monitoring site configurations, inlet probes may be placed upon walls, parapets, or other existing infrastructure, which could include a noise barrier in the near-road environment. In these cases, *the probe must be at least 1 meter vertically and/or horizontally away from any supporting structure, and away from dusty or dirty areas*. Further, for near-road NO_2 monitors, there will likely be some distance between the target road segment and the NO_2 inlet probe. *It is required that there is an unobstructed air flow, or open fetch, where no obstacles exist at or above the height of the monitor probe and the outside nearest edge of the traffic lanes of the target road segment.* Technically speaking, open fetch would be observed along a path directly between the road and the NO_2 inlet, normal to the roadbed. However, as the EPA noted in the preamble to the final NO_2 NAAQS rule, the NO_2 inlet will likely be influenced by various parts of the target road segment that are at a relative angle compared to the normal transect between the road and the NO_2 inlet.

When considering site locations, the recommended approach is to consider more than one linear pathway between the target road segment and the monitor probe, and to choose sites where the monitor probe will be clear of obstructions.

Section 6 - Using Exploratory Air Quality Monitoring to Identify Roadway Segments for Near-Road Site Selection Evaluation

To provide increased confidence of the likelihood for measuring peak NO_2 concentrations at a particular location, agencies may elect to conduct air quality monitoring to either identify candidate near-road monitoring sites or evaluate candidate monitoring sites identified through the process described in Sections 3 to 5. A variety of fixed and/or mobile monitoring techniques can be used to accomplish this task, other exploratory monitoring studies might use a more focused approach to create data for comparison or evaluation at a smaller number of sites, such as those derived from the process in Section 3 using traffic data, and considering any subsequent physical reconnaissance.

AMS performed no exploratory air quality monitoring to indentify roadway segments for its evaluation.

Section 7 - Using Air Quality Modeling to Identify Roadway Segments for Near-Road Site Selection Evaluation

AMS performed no air quality modeling for its selection evaluation.

Section 8 - Field Reconnaissance: Physical Characteristics of Candidate Near-Road Sites

This section provides a checklist to use in the reconnaissance. Some information suggested to be gathered to characterize any given road segment may already be reflected in the traffic data analysis that has been conducted.

Using the list of prioritized candidate near-road segments produced in the process discussed in Section 3, AMS is now in a position to perform a more detailed evaluation of potential near-road sites to further characterize and prioritize the list of candidate near-road site locations. Such characterizations and evaluations can be carried out through the use of electronic data resources including satellite imagery (e.g., Google Earth), mapping resources (e.g., Bing Maps or Google Maps), and/or ArcGIS, for example.

In addition to these resources, AMS will make efforts to conduct reconnaissance in the field to characterize candidate sites.

8.1 Road Segment Identification

The road segment identifier is part of the traffic analysis data. However, in some cases the identifying terms in the traffic analysis may not be the most commonly used or known terms. For practical means of understanding and communicating information about candidate near-road sites, a combinations of given road identifiers along with more useful identification will be used in labeling to aid in the site identification process. This should allow interested parties to more easily identify and understand which road segments are being described or characterized.

8.2 Road Segment Type

During reconnaissance AMS will note whether the road is a controlled access roadway, limited access expressway, limited or full access arterial, or other type of road. Controlled access roads (also referred to as freeways or sometimes expressways) are divided highways with full control of access. The control of access is established two ways: 1) by a lack of access to the roadway by any adjoining property (e.g., no driveways), and 2) the traffic on the road is free-flowing, where traffic flow is unhindered because there are no traffic signals or intersections that might cause traffic to stop. Access to these roads is typically provided by on and off ramps at interchanges with other roads. Limited access roads may have traffic signals, intersections, and access to adjoining properties; however, these access points are limited in number and location. Understanding the type of road for a candidate road segment can help determine the likelihood of safe, feasible monitoring shelter access. Controlled and limited access segments should not be avoided for monitoring site consideration; however, the evaluation of these segments should consider how potential monitoring sites will be accessed and maintained.

8.3 Road Segment End Points

The use of more commonly used or readily understood labeling can aid in the site identification process, making it easier for interested parties to identify and understand the location of a candidate road segment. AMS uses PennDOT Traffic Count data which road segment end points information are also available in the data.

8.4 Interchanges

AMS will note the presence of interchanges or road junctions within or at the ends of a particular road segment. Information could include the identification of the intersecting or connecting road(s) and the type of interchange. There are multiple types of interchanges including four-way (i.e., cloverleaf, stack, and diamonds) and three-way interchanges, among others. Information on the types of interchanges transportation agencies use in building transportation facilities can be found on the web at: http://en.wikipedia.org/wiki/Interchange_(road).

8.5 Roadway Design

As discussed above in Section 4.1, the roadway design can have a significant impact on pollutant transport and dispersion. During the reconnaissance of a road segment, AMS will note the design of the candidate road segment (e.g., at-grade, above-grade - on fill or open underneath, below-grade, or even a mix) including the notation of changes in design and the related local terrain along the length of the segment if present. In those cases where the road is above or below grade, attempts should be made to characterize the nature of the cut road or elevated road. For example, if a road is below grade, estimate the depth of the cut below the surrounding terrain and note what type walls – sloped or vertical. For elevated roads, note whether the road bed is on a bridge or fill section, the height of the roadbed above the surrounding land, and for a fill section, whether the road is supported by vertical or sloped walls.

8.6 Terrain

AMS will note the type of terrain on which a candidate road lays, the terrain immediately adjacent to the candidate road segment, and any larger scale terrain features within which the road may lie, or is potentially influenced by. Examples of terrain features that might be noted include whether the road segment is along a grade, along its length or for a portion of its length. Another example might be noting a road segment's proximity to hills, bluffs, canyons, ridges or other topographical features that can influence local meteorology.

8.7 Roadside Structures

Roadside structures can have a significant impact on pollutant transport and dispersion. Further, roadside structures can seriously impact the candidacy of a road segment to host a near-road monitoring station. During the reconnaissance of a road segment, AMS will note all roadside structures throughout the length of the candidate road segment. Notation on the existence, type, location, length, and approximate height of any structures will be captured for any sound walls, vegetation, earthen berms, buildings, or other structure along each side of the segment.

8.8 Existing Safety Features

Safety in the near-road environment is a very important consideration in the installation of a near-road monitoring station (a more detailed discussion on safety issues is presented below in Section 11.3). Safety of the travelling public on the road, the air monitoring staff members who services a near-road monitoring station and the monitoring station itself should be a top priority. During the reconnaissance of a candidate road segment, AMS will note of existing safety features along parts or all of the road segment, on each side of the road, including ditches, berms, guard rails, cable barriers, jersey barriers, or other features. Placement of a monitoring station behind such safety features would be preferable when possible.

8.9 Existing Infrastructure

AMS will note structures, traffic related monitoring systems, and other highway maintenance facilities that may already exist in the near-road environment along some candidate road segments. These pieces of infrastructure may provide a leveraging opportunity for a near-road monitoring site at a location that may already be accessible, have safety features, have power, and/or have other utilities, which might ease the installation of a possible near-road NO_2 station. Such infrastructure can include sign supports (traffic or billboard), light poles, automatic traffic counters, traffic camera installations, dynamic message signs, Road Weather Information System (RWIS) installations, truck weigh stations, and weigh-in-motion locations.

8.10 Surrounding Land Use

AMS will note the general or mixed use of land (e.g., urban or suburban residential, commercial, industrial, agricultural, forested) around candidate road segments during the reconnaissance process. Specific information (e.g., presence of schools, hospitals, low-rise or high-rise buildings) is also useful to note. In addition to the traditional land use categories noted above, AMS will also determine and note (through field reconnaissance and possibly emissions inventory review) if any significant sources (off-road mobile or otherwise stationary in nature) are nearby.

8.11 Current Road Construction

The potential for future road construction on candidate road segments is discussed in Section 9. However, during candidate road segment reconnaissance, AMS will note any ongoing road construction along with any immediately apparent preparations for road construction.

8.12 Frontage Roads

During candidate road segment analysis, AMS will note the presence of frontage roads. Also called service roads or access roads, frontage roads typically run parallel to major highways, and may be considered part of the major highway, thus they may be controlled access or limited access roads. They are often one-way roads with traffic flowing in the same direction of the adjacent lanes of the partnering major roadway. They can provide access to property adjacent to major roads and connect these properties with roads which have direct access to the main roadway. Frontage roads can also provide a means for traffic in and around the properties adjacent to a major road to access that road, most often at interchanges.

8.13 Meteorology

AMS will attempt to understand the general climatological wind rose for candidate road segments, which can be used to aid in the determination of what might be dominant upwind and downwind locations along a particular segment. This can likely be determined by reviewing local and regional weather and climatological data collected by NOAA and any data collected by air agencies themselves at existing air monitoring stations in the area.

Section 9 - Monitoring Site Logistics in the Near-Road Environment

A key component in the determination of whether a candidate near-road monitoring site is truly feasible is determining if AMS will be able to access the desired location, whether the site would be safe for site operators and the public during routine operations, and whether there is sufficient availability of power and telecommunications services, or the ability to procure and install those services. With emphasis on being "as near as practicable" to the target road segment and not more than 50 meters away, a number of candidate near-road sites are *expected to fall within right-of-way properties under the jurisdiction and maintenance of PennDOT* or other transportation authorities.

If a candidate near-road site is accessible without AMS having to use the right-of-way (i.e., on property not otherwise managed or governed by a transportation agency), AMS will more than likely be able to treat the site access investigation as they would for any other traditional ambient air monitoring site.

9.1 Accessing the Right-of-Way

The feasibility of a potential near-road NO_2 site requires the determination of whether a given location can be accessed. If the prospective location is located within the right-of-way (ROW) of an existing road, AMS will need to engage PennDOT to gain access to the air rights of that property. This would be most likely accomplished through *a permitting process that would ultimately lead to the development and establishment of an **air space lease***. The right to use space within the ROW by public entities or private parties for interim non-highway uses may be granted in airspace leases, as long as such uses will not interfere with the construction, operation or maintenance of the transportation facility; anticipated future transportation needs; or the safety and security of the facility for both highway and non-highway users. This means that AMS, in considering potential near-road sites within the ROW, would need to work with PennDOT to consider near and long-term construction plans, potential interference with routine highway operations and maintenance due to the presence of a monitoring station, safety, and security of the highway ROW during the development of the lease agreement. The permitting and lease agreement process will take some amount of time to complete, before physical access is granted to the AMS. The U.S. Federal Highway Administration (FHWA) maintains information on airspace access on the web at http://www.fhwa.dot.gov/realestate/airguide.htm .

When considering a site within the ROW, AMS should consider several different factors that may impact the ease of negotiating an air space lease. *The first factor is physical access*. It is anticipated that PennDOT will prefer that any potential near-road NO_2 site in the ROW be planned in a manner that the site be made accessible from outside the ROW, *or have accommodations that preclude the need to access the site from the primary travel lanes* of the target highway.

If it is determined during the evaluation of a candidate site that the installation of a locked access point (such as a gate) is required to access the ROW, PennDOT must submit justifications and obtain approval from FHWA, which is a formal federal action*, if the facility is an interstate facility*. FHWA's policies on changes in access to the interstate highway ROW are maintained on the web at http://www.fhwa.dot.gov/programadmin/fraccess.cfm. It is noted that this requirement does not preclude the establishment of a monitoring station where access is only feasible from the target highway; however, an approach requiring the use of a new locked access point may be more preferable to a transportation agency in an air space lease negotiating process than a plan relying upon access solely from the target road.

A second factor to be considered for site feasibility and the impact on negotiating an air space lease is *the availability of utilities.* AMS needs to determine whether utilities are already present, need to be relocated, or need to be installed to support the air monitoring station. *Any activity to change or install utilities will require approval from PennDOT.* If the road segment in question is part of a federal-aid highway, PennDOT must

ensure that any permits to install necessary utilities must comply with the appropriate federal regulation and FHWA policies. However, identifying potential site locations adjacent to, or otherwise near, existing infrastructure within the ROW with existing power may avoid some permitting procedures and possibly reduce utility related installation costs. More information on utility considerations, particularly with respect to bringing utilities into the ROW, can be found at http://www.fhwa.dot.gov/programadmin/utility.cfm.

9.2 Safety in the Near-Road Environment

Near-road NO_2 monitoring sites must be safely sited for both the traveling public on the roadway and the personnel operating the monitoring site. Near-road monitoring sites must be accessible to station operators in a safe and legal manner, and not pose safety hazards to drivers, pedestrians, or nearby residents. Safety hazards to drivers can include obstructions to sight lines and distractions, which can lead to accidents. Safety hazards to pedestrians include obstructions that block safe movement along the road or walkways. Safety hazards to monitoring site operators include factors which inhibit the safe entrance to or egress from a site and factors that could allow vehicles to encroach upon and damage the site infrastructure. Since near-road NO_2 sites may be located on PennDOT maintained ROW, as discussed above, it is anticipated that AMS will engage PennDOT regarding access to such locations. During discussions on the potential access and use of locations within the ROW, safety should be a primary concern.

PennDOT deals with multiple roadway safety issues when building and maintaining traffic facilities. FHWA maintains a safety program addressing safety issues, on which information can be found at http://safety.fhwa.dot.gov. However, of the multiple safety categories that are dealt with, *the one category that may be most relevant with regard to the near-road NO_2 monitoring network is "roadway departure" safety*. FHWA defines a roadway departure accident as a non-intersection crash which occurs after a vehicle crosses an edge line or a center line, or otherwise leaves the traveled way. Since near-road NO_2 monitoring stations are not on the road, but relatively near the outside edge of travel lanes, *the roadway departure of vehicles likely poses the biggest safety risk to the travelling public, the air monitoring staff working at a near-road site, and the monitoring site infrastructure.* Depending upon roadway design and terrain, there are multiple means by which transportation agencies can improve or increase safety within the ROW or at the edge of ROW space. Examples include roadway paving techniques (e.g., rumble strips or safety edging), increasing pavement friction, the use of retaining barriers, and maintaining open areas within the ROW which are called "clear zones." With respect to near-road NO_2 monitoring stations, existing safety features provided by the local terrain, man-made barriers, or clear zones should be considered as positive attributes to a potential site in the site selection process.

The terrain of a road segment can, in some cases, increase safety by reducing roadway departures that impact a near-road monitoring site. Such examples are ditches or berms made of earthen fill, which might exist between the roadway and the monitoring station. *So long as these terrain features do not obstruct the fetch between the monitor probe and the target road, they may be viewed as positive attributes for a given candidate road site*.

Man-made barriers or retainers in the ROW come in many forms, most of which can generically be referred to as longitudinal barriers. FHWA maintains a list of crash-worthy longitudinal barriers on the web at http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/barriers/ .

The presence of any type of longitudinal barrier, so long as it does not obstruct the fetch between the monitor probe and the target road, may be viewed as a positive attribute for a given candidate near-road site.
Clear zones are defined by FHWA to be an unobstructed, traversable roadside area that allows a driver to stop safely, or regain control of a vehicle that has left the roadway. The width of the clear zone (e.g., the distance between the outside edge of the road to an obstacle) is based on risk, which is derived from a roadway's traffic volume, vehicle speeds, and the slope of the underlying and adjacent terrain. In practice, a clear zone is free of obstructions (including safety barriers) and would denote an area or distance from the road that a

near-road monitoring station would be placed outside of, measured from the outside edge of the travel lanes. As a rule of thumb, highways with no natural or man-made obstructions alongside the travel lanes typically might be prescribed to have a clear zone on the order of 10 meters. Although FHWA provides a summarization of clear zones on the web (http://safety.fhwa.dot.gov/roadway_dept/clear_zones/#zones), clear zone guidance is created by the American Association of State Highway and Transportation Officials (AASHTO). The guidance material is not free to the public.

Safety is a top priority in all field operations. Ambient air monitoring operations in the near-road environment present additional safety issues that must be addressed in the site selection process. As such, *AMS will fully evaluate the presence of existing protection or safety features along candidate road segments*. If appropriate safety features are not present, *AMS will consult with PennDOT to determine whether there is a need, and if so what the design and installation process might be for infrastructure additions or enhancement to ensure safety for all highway and monitoring station users.*

9.3 Engaging the Transportation Agency – PennDOT

AMS will need to obtain permission from PennDOT if a monitoring site is to be located within a ROW. This permission will come in the form of an airspace lease negotiated with PennDOT. The following sets of questions and issues are relevant, including those that will need to be answered by AMS, PennDOT, and potentially FHWA.

- Who is the public authority responsible for the ROW?
- What are the Penn DOT requirements for considering and approving leases (or permits) to allow for the subject installation?
- Is the near-road site within interstate highway ROW? If so, the request for a lease or permit to PennDOT for the ROW must include information FHWA requires to be addressed in the review and approval of such an action. These issues will likely include the air rights agreement, locked-gate access (as necessary), and compliance with applicable utilities accommodation and relocation policy.
- What other policies, procedures, standards, leases/permits required or desired by PennDOT will need to be addressed?

In addition to the overarching questions listed above, there are some anticipated questions that PennDOT may have about a potential ambient air monitoring station, and some suggested questions that AMS should consider asking their PennDOT counterparts regarding individual candidate road segments.

9.3.1 Information to Provide PennDOT

There are a number of questions that PennDOT may have when first approached by a local air agency such as AMS, regarding the placement of an ambient air monitoring station in the near-road environment. Some anticipated questions might include, but are not limited to the following:

- Who will own the monitoring equipment?
- How long would the air monitoring site be used/needed?
- What are the physical dimensions of the monitoring site and shelter? (AMS needs to consider the potential for multi-pollutant monitoring when preparing this information. Multi-pollutant monitoring in near-road NO_2 sites is discussed in Sections 10.2 and 12.)
- What type of structure (shelter) will be installed at the site? (Pictures are useful here.)
- How often would air monitoring staff need to access the site?
- If there are no existing utilities at the candidate site location, who will prepare the request for permit, and subsequently pay for the installation of required utilities?
- Who will be financially responsible for the upkeep of the monitoring station? This includes routine operations, and the inspection, maintenance, and security of the site.
- Who would be responsible for any closure, removal, and relocation of the station, if necessary?

9.3.2 Questions to Ask PennDOT

There are a variety of questions that AMS, as the local air agency, may want to ask of PennDOT about the long-term feasibility and access of a site within the highway ROW. Some general questions might include:

- What, if any, construction is planned along the candidate road segment that might impact traffic operations on the road, the safety of the monitoring site, or safe and efficient access to the monitoring site?
- What, if any, construction is planned on nearby road segments or to the CBSA transportation network that might impact traffic operations along the candidate site road segment?
- In the future, if access to the monitoring site is either temporarily or permanently affected by a highway project, what contingencies might be available for alternative access to the site or alternative sites along the same road segment?
- Will an air space lease, if awarded, be a one-time process, or will that lease need to be renewed on some interval? If it would require renewal, are there any particular criteria that might cause the renewal to be disapproved in the future?
- Under what conditions should or could safety features be added to a road segment if a near-road station is to be installed in the ROW? If a clear zone is currently in use, is that sufficient, or would additional safety features be allowed to be installed?
- If safety feature installation or improvements are desired, what types of features are available to be considered for installation (such as guardrails, barriers, etc.)?
- Are there any other safety provisions that AMS would need to conform to if it routinely accesses and works on and within a monitoring station in the ROW?

Section 10 - Prioritizing Candidate Near-Road Locations for Monitoring Site Selection

If, after performing the traffic analysis procedures and evaluating select candidate road segments through reconnaissance, possible use of optional evaluation tools (e.g., exploratory monitoring or modeling), and possible discussions with PennDOT, there are a relative wide array of candidate sites to choose from, it will be necessary to begin narrowing the options by placing weight on one or more road segment characteristics over others. It is at this point in the site selection process that two other considerations come into play, population exposure and the potential for multi-pollutant monitoring.

10.1 Considering Population Exposure as a Selection Criterion

Per 40 CFR Part 58, Appendix D, section 4.3.2(a)(1), *"where a state or local air monitoring agency **identifies multiple acceptable candidate sites** where maximum hourly NO_2 concentrations are expected to occur, the monitoring agency shall consider the potential for population exposure in the criteria utilized to select the final site location."*Therefore, when considering all the available information (particularly AADT, fleet mix, congestion patterns, roadway design, terrain, meteorology, and siting criteria) for which candidate locations are suitable for a required near-road NO_2 station, population exposure should be given subsequent consideration. Specifically, amongst a pool of otherwise similar candidate near-road sites, the site that may represent a higher population exposure should be given increased consideration.

AMS anticipates a singularly acceptable site will be identified and population exposure will not need to be considered to make the selection.

10.2 Unique Locations and Background Source Influences

In the evaluation process, state and local air agencies may encounter situations where certain road segments of interest have characteristics that make the location a unique near-road location that has elevated pollutant concentrations. In situations where a state or local air agency has a choice between road segments that otherwise have similar potential for peak NO2 concentrations, the air agencies should place a higher weight on sites that are most influenced by typical roadway activity rather than those that are heavily influenced by unique sources or features.

Since this is the second location in the CBSA, siting is a bit different than the first location. A different type of peak could make it unique compared to the 1st location.

10.3 Confounding Information

In cases where measured data (of sufficient amount, quality, and confidence) are available as compared to estimated, modeled, or otherwise approximated information, measured data may be more reliable, unless those data are suspect due to poor quality assurance or other reasons. Ultimately, the EPA expects air agencies to use their best judgment when presented with confounding information to make the best decision for their individual case.

Not applicable

10.4 Potential for Multi-pollutant Monitoring

A number of pollutants and measureable metrics of interest that exist in the near-road environment, other than NO_2, are discussed in some detail in Section 12. The EPA also encourages state and local air agencies to consider the potential of a site to house other pollutant monitors and measurement devices. This would specifically be accomplished in the site selection process by considering the footprint and layout of the infrastructure of a near-road monitoring station. *The EPA believes that the footprint of a typical NCore station* (which houses analyzers for carbon monoxide, ozone, sulfur dioxide, total oxides of nitrogen (NO_Y), a variety of PM instruments [including $PM_{2.5}$ and lead samplers], and meteorological gear, along with all the associated support equipment) *may be a conservative approximation of a multi-pollutants site footprint.* Although this NCore type footprint can be bigger than a single pollutant shelter, the EPA believes, based on research experiences, that this should not typically create additional burden or restrictions for site installation versus a single gas pollutant monitoring shelter.

AMS does anticipate installing other monitors at the selected site.

10.5 Candidate Site Comparison Matrix

Upon the completion of traffic data analysis, field reconnaissance, and the conclusion of any other evaluation efforts, a site comparison matrix will be created to consolidate the data collected in the evaluation process and present that information in a comparable format, *creating a foundation for the rationale of why one site might be selected over other candidate sites*.

The candidate site comparison matrix includes at a minimum, traffic data, field information (e.g., type of road), site feasibility information such as permission of, or lack of, access for individual candidate sites, safety issues (if applicable), probable distance between the inlet probe and the outside edge of the target road, and any other collected ambient data and/or modeled data. The matrix can be used to represent individual points along a road segment or for whole road segments under consideration. Here is includes a list of variables that could be included in the matrix:

Table 7 - Suggested Data for Each Candidate Site Entry in a Site Comparison Matrix

Site/Segment Parameters	Description of Parameter
Location	Is the entry for a specific point along a road segment, or is it representative of an entire road segment? For a point, provide a moniker and the latitude and longitude. For a road segment, identify where the segment boundaries occur (e.g., intersection, mile marker, political boundary).
Road segment name	Given road name and common name (if applicable).
Road type	Type of road (controlled access highway, limited access freeway, arterial, etc.).
Road segment end points	Location of the road segment end points, including any given names, common names, and the latitude and longitude of each individual end point.
AADT	AADT, source of data, and vintage.
HD counts	Provide HD counts (if available), source of data, and vintage.
FE-AADT	Provide FE-AADT (if available), noting HD_m value used. If not using the national default value for HD_m, provide the source of data used to calculate the site-specific value.
Congestion information	Value and type (e.g., LOS, $^{V}/_{C}$, or AADT by lane), data source, and vintage.
Roadway design	Design type or types present (flat, elevated-fill, cut, etc.). If not flat, identify whether the configuration is a vertical or sloped boundary. Include the height (and degree of slope if applicable).
Terrain	Nature of the terrain immediately around the road; also, any larger-scale terrain features of note.
Meteorology	For a point, the predominant winds and whether the point is relatively upwind or downwind. For a whole segment, the orientation of the segment to the predominant winds.
Population exposure	Assessment of population exposure and/or likeness to other road segments throughout the CBSA.
Roadside structures	Presence of any roadside structures and their height, width, and length.
Safety features	Safety features present and their height, width, and length.
Infrastructure	Existing infrastructure (light poles, billboards, etc.) and potential site proximity (distance).
Interchanges	Presence of any interchanges within or at the end points of the target road segment and potential site proximity (distance), including traffic information if available (AADT, HD counts, etc.).
Surrounding land use	Surrounding land use (residential, commercial, etc.). Also, proximity to other large roads, areas of higher relative road density, and/or locations within or near central business districts or urban downtown areas.
Nearby sources	Nearby NO_X sources if applicable (type, tonnage, etc.) and potential site proximity (distance).
Current road construction	Visible or known road construction at the candidate site location or along the target road segment.
Future road construction	Transportation agency plans (if known) for any future road construction (including time frame for completion).
Frontage roads	Presence of frontage roads, and whether those roads are included as part of the target road segment.
Available space–site footprint	Limitations in the space available for a multipollutant monitoring station.
Property type	Is it ROW or private property?
Property owner	Who manages or owns the property under evaluation?
Likelihood of access	Level of confidence and any uncertainties regarding the acquisition of access to a particular property.
Other details/local knowledge	Any other pertinent details that may have bearing on why a particular candidate site may or may not be selected. This can include information that reflects a state or local agency's own knowledge of the area or roads under consideration.

Section 11 - Final Near-Road Site Selection

AMS has engaged the EPA Regional staff as necessary during the site selection process and will do so when a choice is made that is intended to be reflected in annual monitoring plans due July 1, 2014.

The EPA indicates that they will provide feedback on any near-road site selection listed in the annual monitoring plan before issuing a network plan approval letter, as is typically done. ***The availability of data supporting the rationale behind a site selection, such as that within the candidate site comparison matrix, will facilitate the review process.***

Once a location has been selected for the installation, AMS, as the EPA suggests in its TAD, will prepare and include site record metadata about the near-road location (along with monitor record data) which would eventually be input into AQS for inclusion in annual monitoring plans.

For new near-road NO_2 sites, the EPA requires that certain metadata are entered into AQS, as is the case for any new State and Local Air Monitoring Station (SLAMS) site. The new site information should be added to AQS online or via the AQS metadata form. If using a batch transaction, refer to the AA Basic Site Information for formatting.

Table 8 - Near-road Site Information Metadata Required in AQS (AA - Basic Site Information Transaction)

AQS Metadata (AA – Basic Site Information)	
Transaction Type	Horizontal Datum
Action Indicator	Source Scale
State Code or Tribal Indicator	Horizontal Accuracy
County Code or Tribal Code	Vertical Measure
Site ID	Time Zone
Latitude	Agency Code
Longitude	Street Address
UTM Zone	Land Use Type
UTM Easting	Location Setting
UTM Northing	Date Site Established
Horizontal Collection Method	

In addition to the basic site information required for every new SLAMS site in AQS, air agencies are strongly suggested to also populate the AB Site Street Information metadata fields for near-road NO_2 monitoring sites.

Table 9 - Additional Near-road Site Information Metadata in AQS (AB Site Street Information)

AQS Metadata (AB Site Street Information)	
Transaction Type	Street Name
Action Indicator	Road Type
State Code or Tribal Indicator	Traffic Count
County Code or Tribal Code	Year of Traffic Count
Site ID	Direction from Site to Street
Tangent Street Number[a]	Source of Traffic Count

[a] Tangent Street Number (also called Tangent Road Number) is merely a unique identifier supplied by the user (i.e., "1", "2", ..., "99"); it does not refer to a physical street number.

Before a site can go into "production" status on AQS (meaning it can be seen by public users), it must have at least one monitor associated with it. This is accomplished by populating monitor record fields, as is done for any SLAMS monitor.

Section 12 – Selecting a Second Near-Road Site

According to 40 CFR Part 58, Appendix D, CBSAs meeting one of the following criteria are required to have a second near-road NO_2 monitoring site:

- the CBSA has a population of 2.5 million or more persons.
- the CBSA has a population of 500,000 or more persons and has one or more road segments of 250,000 AADT or greater.

Those second near-road NO_2 monitoring sites are suggested to be differentiated from the first near-road NO_2 monitoring site by one or more factors affecting traffic emissions and/or pollutant transport (such as fleet mix, congestion patterns, terrain, geographic area within the CBSA), or by different route, interstate, or freeway designation.

Since this is the second location in the CBSA, siting is a bit different than the first location. A different type of peak could make it unique compared to the first location.

Section 13 – Multi-pollutant Monitoring at Near-Road Monitoring Stations

13.1 Meteorological Measurements

Meteorological data measured on-site at a near-road monitoring station can provide important information that can be used to characterize the pollutant data being measured at the station. As part of the CASAC AAMMS review, the panel stated that meteorological parameters (wind speed and direction) should be one of the highest tier measurements considered as part of [the near-road NO_2] network. A key advantage to having meteorological data collected on site would be the ability to correlate the occurrence of peak NO_2 concentrations to wind conditions. Data analysis of the collected data will be greatly enhanced by knowing if winds are calm, parallel to the road, or at any other angle making the monitoring site relatively upwind or downwind when peak NO_2 concentrations are measured.
Although meteorological measurements were proposed to be required at near-road NO_2 sites, the EPA did not require them. However, the EPA strongly encourages the measuring of meteorological parameters at near-road sites whenever possible. The EPA suggests that state and local air agencies try to measure wind speed, wind direction, temperature, and relative humidity, at a minimum (which matches those parameters required at NCore stations). If possible, other measurements such as precipitation, solar radiation, and barometric pressure, among others should be considered as well.

AMS will take meteorological measurements.

13.2 Traffic Counters and/or Cameras

Traffic counting devices and/or traffic cameras are another non-pollutant measurement that could be useful to an air agency to aid in characterizing measured pollutants at a near-road monitoring site. Understanding the traffic behavior can allow for correlation to measured pollutant concentrations, such as the correlation of peak NO_2 readings to time periods when traffic is heaviest and/or experiencing increased congestion, for example. There are remote sensing methods available to characterize traffic that use radar or camera based

technology. These methods are able to be installed along-side of roads (such as on a meteorological tower or monitoring shelter) and can look down on the target road segment to characterize the traffic. The sophistication of remotely sensing instruments is variable, but the EPA suggest that if such a device is investigated for use, it should be capable of making total traffic counts for at least an hourly interval. Other data metrics that would also be useful include the ability to segregate HD from LD vehicle counts and those methods with sub-hourly time resolution capability.

In some cases, the local transportation agency might be in a position to collaborate with an air agency that is looking to collect traffic data for a particular road segment where no traffic data is currently being collected. In such a case, there may be a synergistic advantage for both the air agency and the transportation agency; allowing the air agency to gather traffic data for air quality analysis with the support of a transportation agency, while the transportation agency may gain another source of traffic data for their use as well, at no cost to them. The EPA encourages state and local air agencies to pursue such collaboration if traffic data collection is pursued at near-road monitoring sites.
http://www.dot.state.pa.us/Penndot/Districts/district6.nsf/District6WebcamsList?OpenPage

AMS will not use traffic counters or cameras.

13.3 Nitrogen Dioxide (NO_2)

NO_2 is an important target of ambient air monitoring because of its adverse impact on human health. Scientific evidence links short-term NO_2 exposures with adverse respiratory effects, including airway inflammation in healthy people and increased respiratory symptoms in people with asthma. NO_2 is one of a number of oxidized nitrogen species. Scientifically, NO and NO_2 are collectively referred to as NOx, where NO + NO_2 = NO_X. There are also other oxidized nitrogen species in the ambient air which are collectively known as NO_Z. The entire family of oxidized nitrogen species is known as NO_Y where NO_Y = NO_X + NO_Z.

13.4 Multi-pollutant Monitoring at Near-Road Monitoring Stations

The EPA has expressed the intent to pursue the integration of monitoring networks and programs through the encouragement of multi-pollutant monitoring wherever possible. Multi-pollutant monitoring is viewed by the EPA as a means to broaden the understanding of air quality conditions and pollutant interactions, furthering its capability to evaluate air quality models, develop emission control strategies, and support research, including health studies.

This section discusses a number of pollutants of interest in the near-road environment; they are of interest due to their direct emission by on-road mobile sources, or the formation from or interaction with on-road mobile source emissions. The pollutants discussed in this section are presented in the relative order of priority the CASAC AAMMS suggested to EPA in their near-road review.

AMS will monitor the following additional pollutants at the Near-Road NO_2 Monitoring Station:

13.4.1 Carbon Monoxide (CO)

CO is a colorless, odorless gas emitted from combustion processes. CO can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues. In addition, CO is a useful indicator of the transport and dispersion of inert, primary combustion emissions from on-road mobile sources, as CO does not react in the near-road environment. On August 12, 2011, the EPA promulgated minimum monitoring requirements for CO in the near-road environment. According to 40 CFR Part 58 Appendix D, one CO monitor is required to be co-located with a near-road NO2 monitor in CBSAs having populations of 1 million or more persons.

13.4.2 Particulate Matter (PM) – Mass

PM is a complex mixture of small particles and liquid droplets comprised of sulfates, nitrates, acids, ammonium, elemental carbon, organic carbon compounds, trace elements such as metals, and water. The size of particles is directly linked to their potential for causing health problems. Particles that are 10 micrometers in diameter or smaller (PM_{10}) are of concern because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. Motor vehicles emit significant amounts of PM through combustion, brake wear, and tire wear. Motor vehicles may also contribute to elevated near-road PM concentrations by re-suspending dust present on the road surface.

Both PM_{10} and $PM_{2.5}$ mass measurements (and also the coarse fraction, $PM_{10\text{-}2.5}$) and any speciation of PM mass at near-road sties can be very informative in furthering the understanding of the concentrations, properties, and behavior of PM in the near-road environment. However, per Federal Register Vol 78. No. 10, published in January 15, 2013, EPA only requires a single near-road $PM_{2.5}$ monitor installed within CBSA.

AMS will <u>not</u> monitor the following additional pollutants at the NO_2 Near Road Monitoring Station:

13.4.3 Ultrafine Particulate Matter

PM emitted through the combustion process occurs initially in the ultrafine size range (i.e., less than 0.1 µm in diameter) and a very large number of these small particles are emitted. Despite the large number of ultrafine particles emitted, the impact on PM mass is negligible. Research has shown that PM number concentration measurements often provide a good indication of primary PM exhaust emissions from motor vehicles. Several health studies suggest that ultrafine particles may lead to adverse health effects

13.4.4 Black Carbon and Elemental Carbon

The graphitic-containing portion of PM, represented by black carbon (BC) or elemental carbon (EC), also referred to as 'soot,' is emitted in motor vehicle exhaust. BC and EC are operationally-defined. BC and EC are of interest because they serve as a measure of diesel particulate matter (DPM). Long-term (i.e., chronic) inhalation exposure to diesel exhaust (combination of gases and particles) is likely to pose a lung cancer hazard to humans, as well as damage the lung in other ways depending on exposure. Short-term (i.e., acute) exposures can cause irritation and inflammatory symptoms of a transient nature, these being highly variable across the population

13.4.5 Organic Carbon (OC)

OC is a complicated mixture of thousands of individual molecules and is a combination of both primary particulate emissions and gaseous precursors that can form secondary aerosol. Some of the OC compounds, such as polycyclic aromatic hydrocarbons (PAHs), are known or suspected carcinogens. OC is often the largest component of PM in urban areas in the Western U.S. and especially in near-roadway environments. Motor vehicle fuel combustion is an important contributor of OC.

13.4.6 CO_2

Fossil fuel combustion is the primary source of CO_2 emissions, with the transportation sector contributing about 33% of U.S. CO_2 emissions. CO_2 is of concern as the most important greenhouse gas contributing to climate change. Continuous CO_2 measurements are typically made using a non-dispersive infrared system with which sub hourly sampling duration can be achieved. CO_2 concentrations can be elevated near roads, so high resolution measurement methods with good precision (high signal to noise ratios) would be needed to quantify near road impacts to relative background concentrations.

13.4.7 Ozone (O_3)

O_3 is not usually emitted directly into the air, but at ground-level is created by a chemical reaction between oxides of nitrogen (NO_X) and volatile organic compounds (VOCs) in the presence of sunlight. NO_X and VOCs are emitted by mobile sources. O3 can trigger a variety of respiratory health problems; worsen bronchitis, emphysema, and asthma; reduce lung function; and inflame the linings of the lungs.

O_3 measurements are not typically collected for near-road applications. However, the presence of elevated NO concentrations in the near-road microenvironment may lead to lower O_3 concentrations due to 'ozone scavenging' as part of the formation of NO_2 from NO and O_3. O_3 measurements may be useful in select circumstances to support health studies investigating the role of ozone and other co-pollutants on adverse health effects given the potentially lower concentrations of this pollutant relative to other pollutants in this microenvironment. O_3 measurements may also aid in understanding NO_2 concentrations in the near road environment.

13.4.8 Air Toxics

In addition to criteria pollutants, motor vehicles emit a large number of other compounds which can cause adverse health effects such as air toxics (or hazardous air pollutants). A discussion and listing of potential air toxics of concern for near-road monitoring can be found in the U.S. EPA's Mobile Source Air Toxics (MSAT) Rule (U.S. EPA, 2007). These pollutants include volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and organic and inorganic PM constituents. Reasons for monitoring these pollutants for a near-road program include concerns over adverse human health effects, ecological effects, and the evaluation of the effectiveness of mobile source control programs. Air toxics span the entire range of pollutants present in the atmosphere; they are present as particles, gases, and in semi-volatile form. No one measurement method captures all air toxics of interest in a near road environment.

From Table 4 on page 21, approximate locations for each prospective site then were determined. The Sixteen candidate's sites throughout the City are as follow

Figure 2 - Sites A, B, D, F, M (Northeast of Philadelphia)

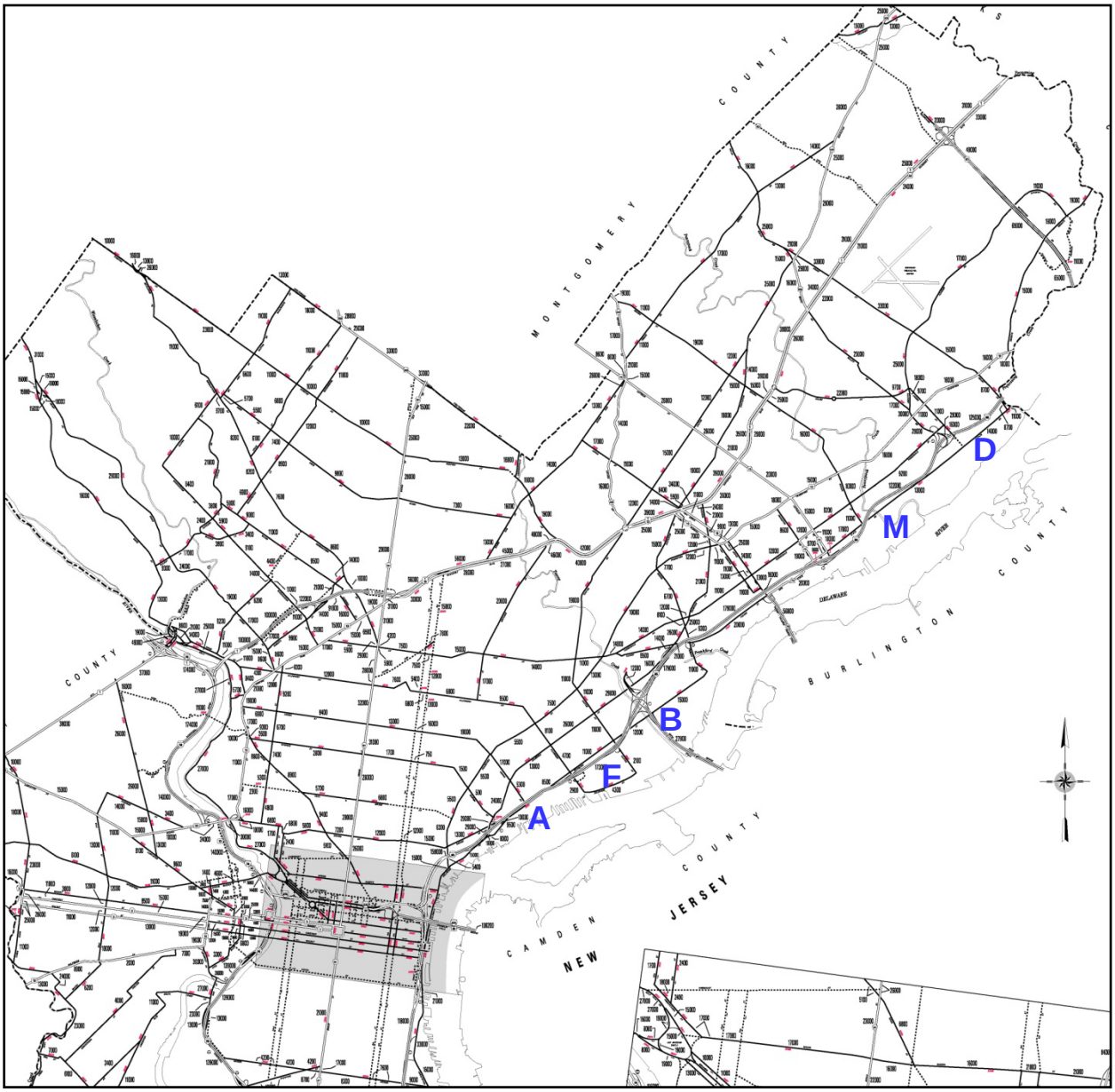


Figure 3 - Sites C, E, G (West of Philadelphia)

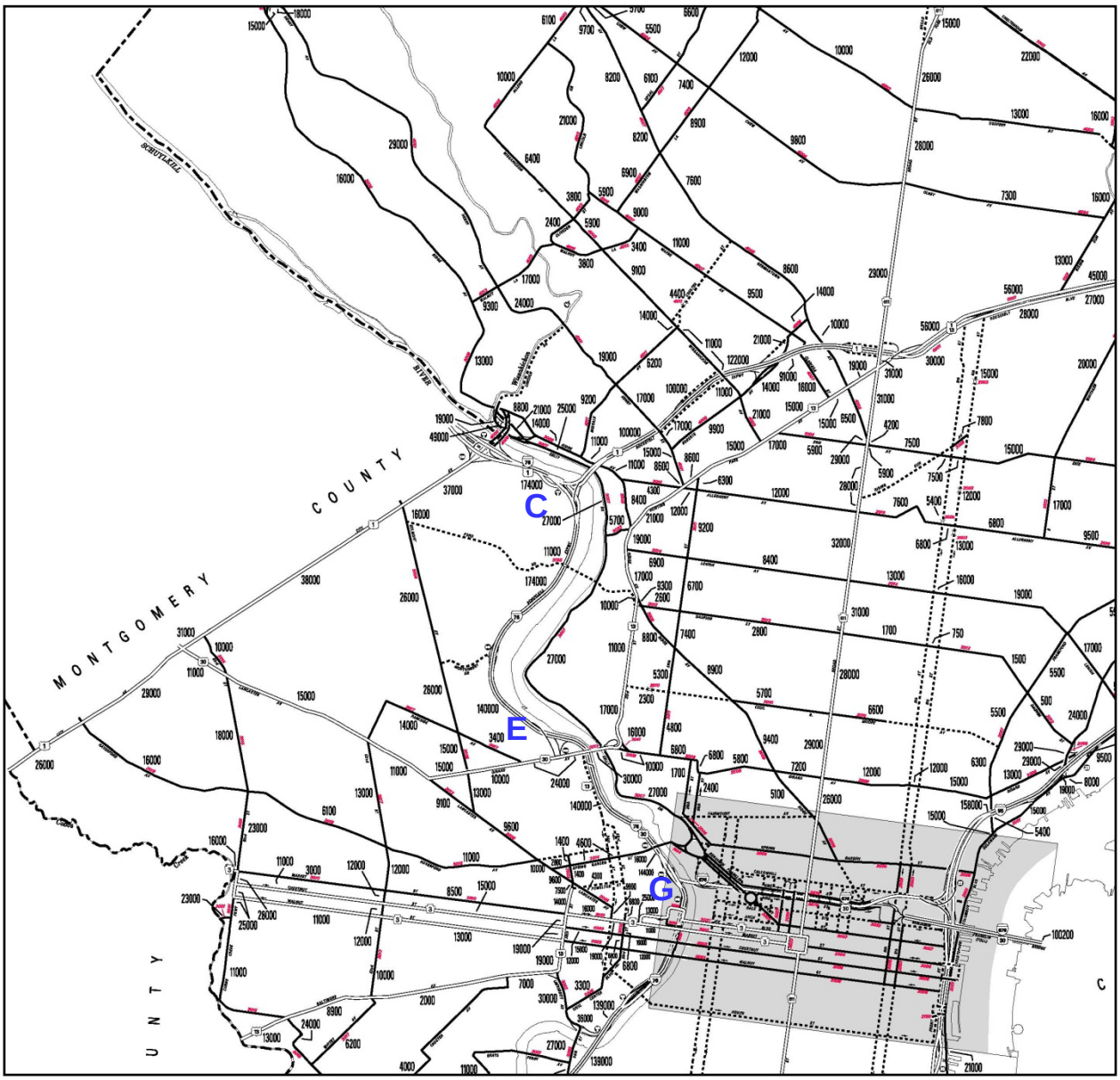


Figure 4 - Sites H, I, J, K, L, N, O, P (South, Southwest and Central of Philadelphia)

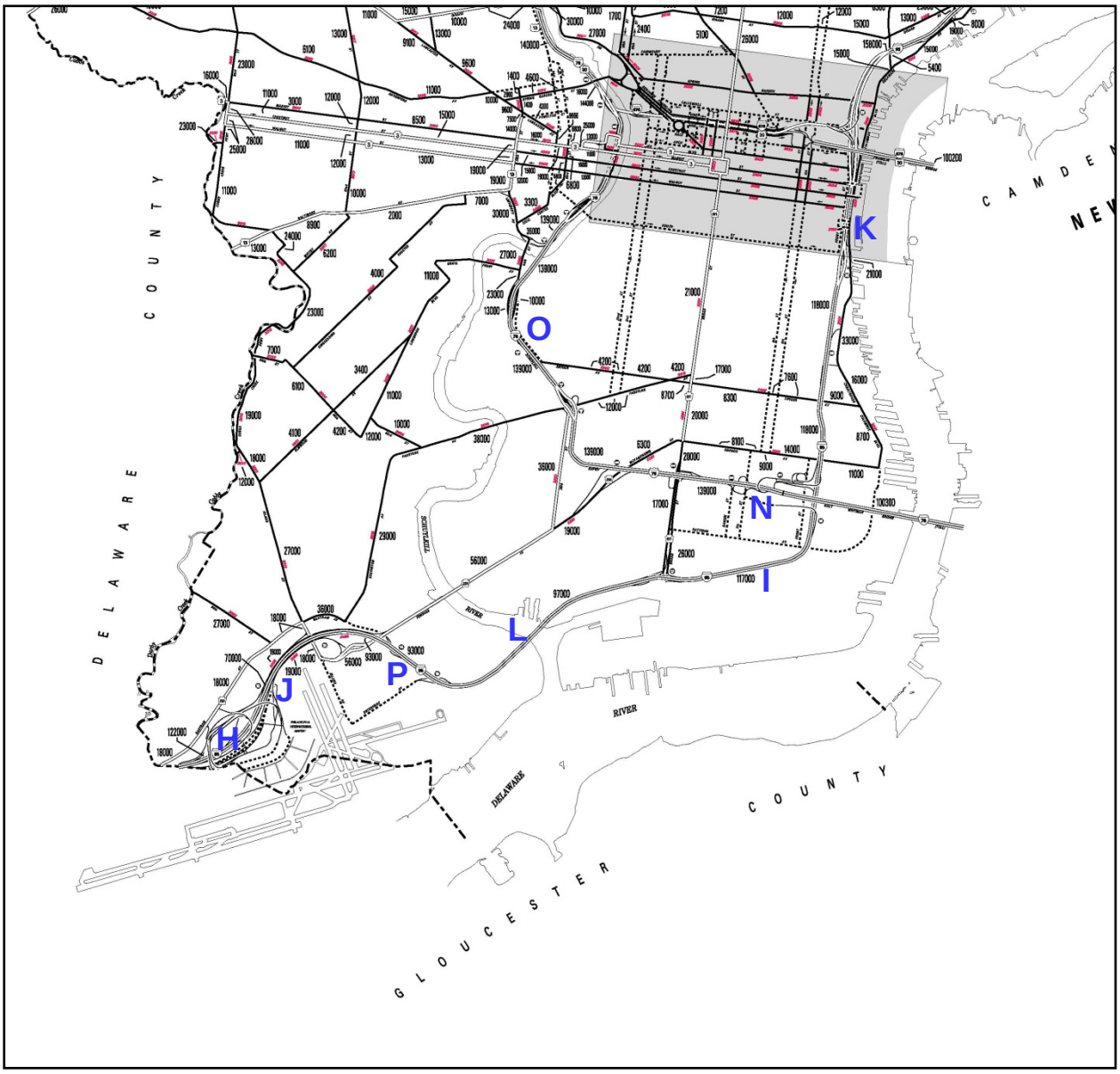
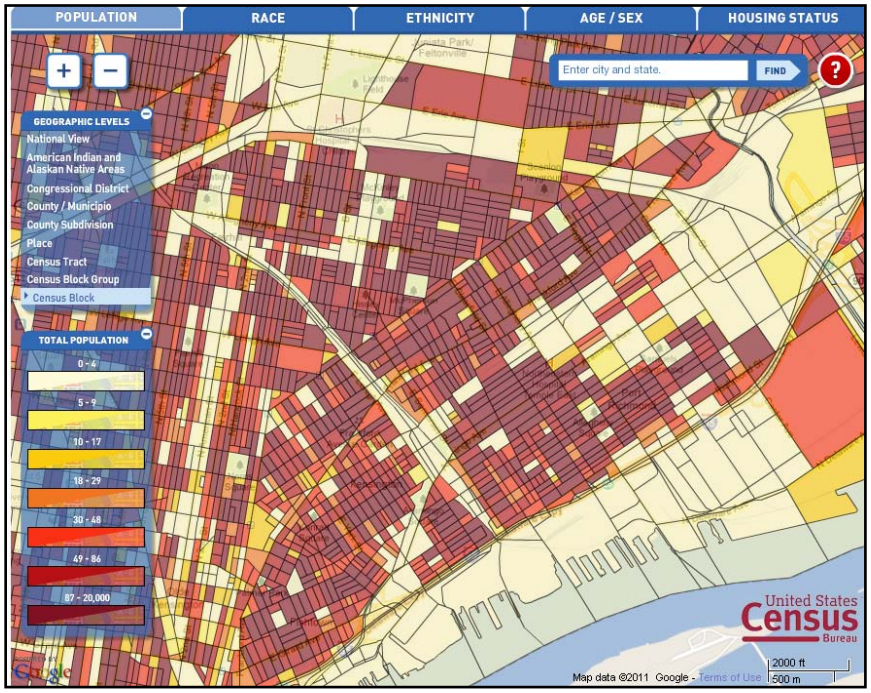
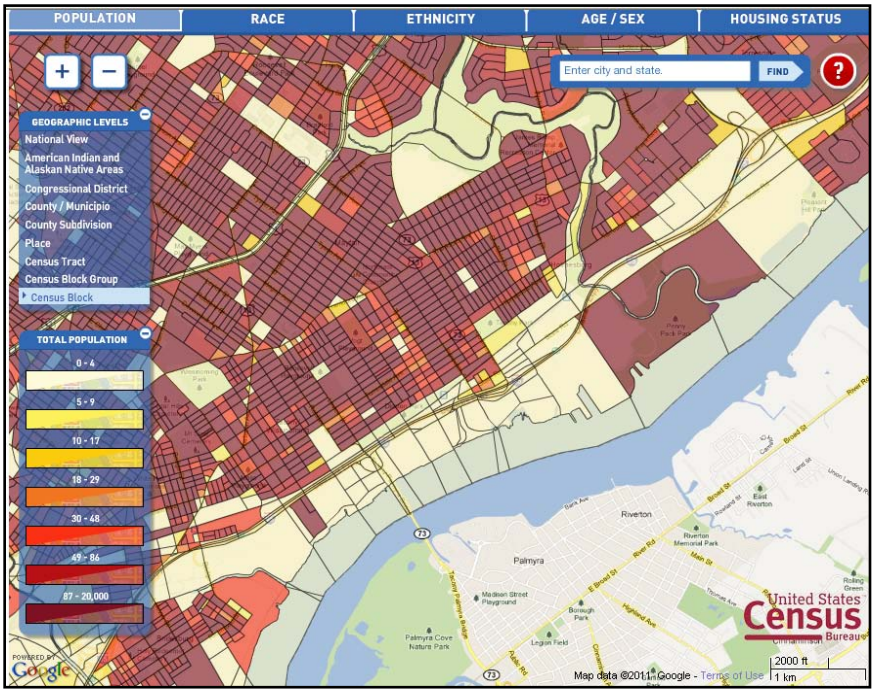


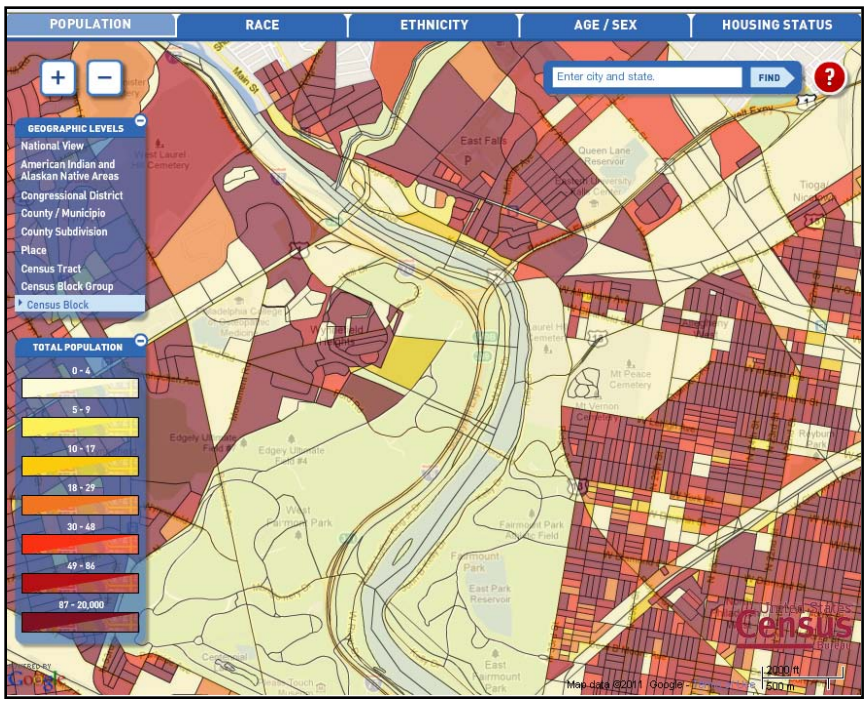
Table 10 - The Sixteen Sites Information (The Latitude and Longitude are Approximate)

SITE	ST. RT. NO	LATITUDE	LONGITUDE	STREET NAME	LOCATION
A	I-95	39.9673059	-75.1336301	Delaware Expwy	Between Exit 22 (I-676/US 30 - Central Phila/Callowhill St) & Exit 25 (Allegheny Ave/Castor Ave)
B	I-95	40.0118437	-75.0607437	Delaware Expwy	Between I-95 North - Trenton & Exit 30 (Cottman Ave/Rhawn St)
C	I-76	39.9989843	-75.1966814	Schuylkill Expwy	Between Exit 340A (Lincoln Dr/Kelly Dr) & Exit 341 (Montgomery Dr/West River Dr)
D	I-95	40.0521040	-74.9886233	Delaware Expwy	Between Exit 32 (Academy Rd/ Linden Ave) & Exit 33 (Grant Ave - Boundary with Bucks Co.)
E	I-76	39.979958	-75.204978	Schuylkill Expwy	Between Exit 341 (Montgomery Dr/West River Dr) & Exit 343 (Spring Garden St/Harverford Ave)
F	I-95	39.9885873	-75.0886013	Delaware Expwy	Between Exit 25 (Allegheny Ave/Castor Ave) & I-95 North - Trenton
G	I-76	39.9535118	-75.1818019	Schuylkill Expwy	Between Exit 343 (Spring Garden St/Harverford Ave) & Exit 346A (South St)
H	I-95	39.8770215	-75.2543225	Delaware Expwy	Between Boundary with Delaware Co. & Exit 12 (PA 291 - Cargo City)
I	I-95	39.9008931	-75.1561691	Delaware Expwy	Between Exit 17 (PA 611 N.Broad St/Pattison Ave) & Exit 19 (I-76 E - Walt Whitman Br/Packer Ave)
J	I-95	39.8914	75.235514	Delaware Expwy	Between Exit 12 (PA 291 - Cargo City) & Exit 13 (to I-76 W/PA 291 – Valley Forge/ Island Ave)
K	I-95	39.8884509	-75.2180358	Delaware Expwy	Between Exit 19 (I-76 E - Walt Whitman Br/Packer Ave) & Exit 22 (I-676/US 30 - Central Phila/Callowhill St)
L	I-95	39.898675	-75.181617	Delaware Expwy	Between Exit 15 (Enterprise Ave/ Island Ave) & Exit 17 (PA 611 N.Broad St/ Pattison Ave)
M	I-95	40.036542	-75.014428	Delaware Expwy	Between Exit 30 (Cottman Ave/ Rhawn St) & Exit 32 (Academy Rd/Linden Ave)
N	67B3	39.911714	-75.161367	Walt Whitman Bridge	Packer Ave & S.7th Street (Citizen Bank Park Stadium)
O	I-76	39.944942	-75.192019	Schuylkill Expwy	Between Exit 346A (S. Street) & Exit 347B (Passyunk & Oregon Ave)
P	I-95	39.887033	-75.214625	Delaware Expwy	Between Exit 13 (West Valley Forge) & Exit 15 (Enterprise Ave/Island Ave)

Figure 5 - Population Census Maps for Areas Near Proposed Sites






POPULATION
RACE
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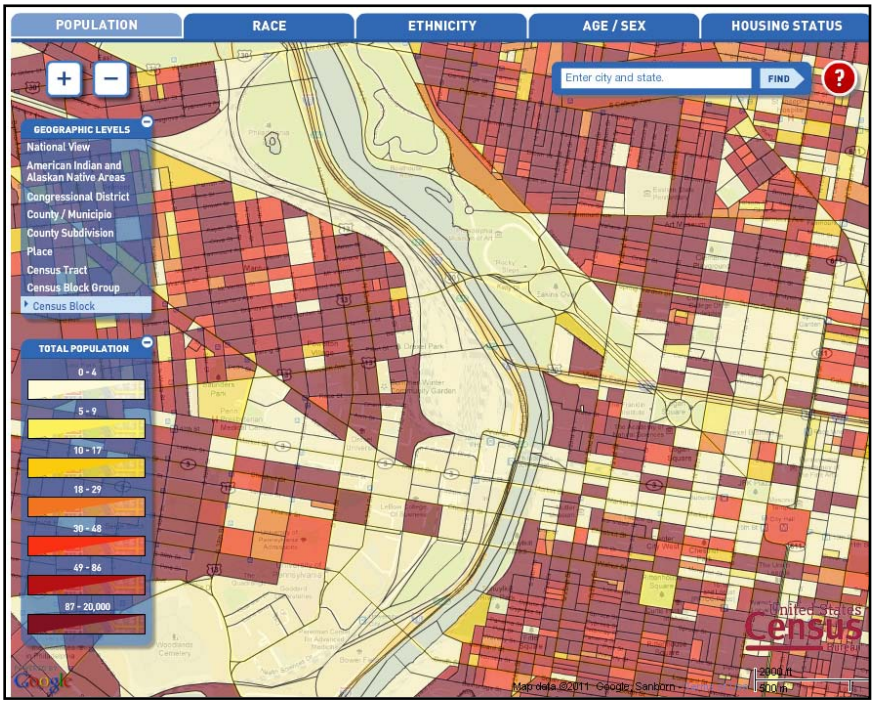
AGE / SEX
HOUSING STATUS
Enter city and state.
FIND
GEOGRAPHIC LEVELS
National View
American Indian and Alaskan Native Areas
Congressional District
County / Municipio
County Subdivision
Place
Census Tract
Census Block Group
Census Block
TOTAL POPULATION
0 - 4
5 - 9
10 - 17
18 - 29
30 - 48
49 - 86
87 - 20,000
Map data ©2011 Google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National View
American Indian and Alaskan Native Areas
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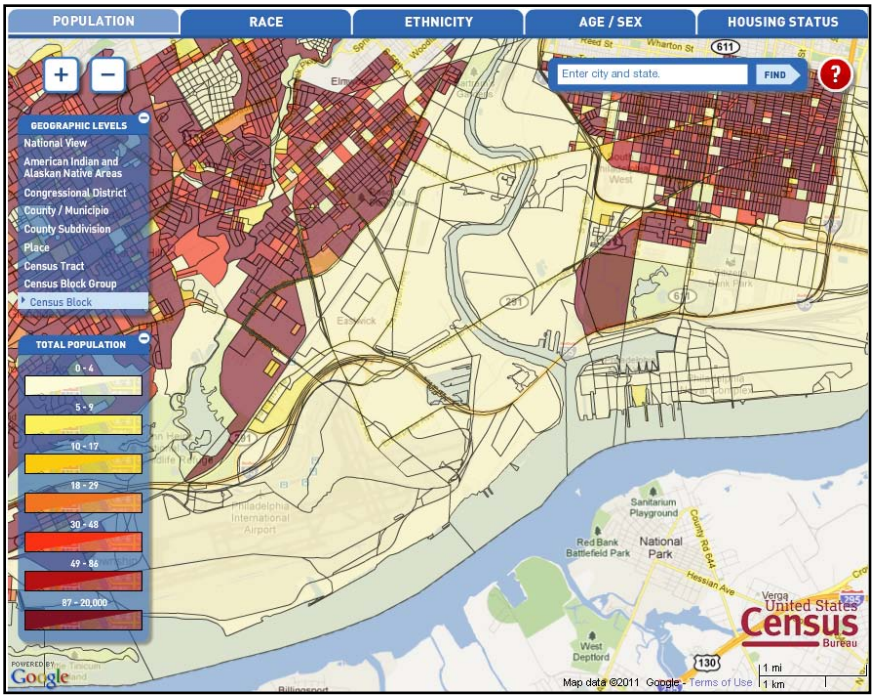
Map data ©2011 Google, Sanborn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Census Tract
Census Block Group
Census Block
TOTAL POPULATION
0 - 4
5 - 9
10 - 17
18 - 29
30 - 48
49 - 86
87 - 20,000
Sanitarium Playground
Red Bank Battlefield Park
National Park
West Deptford
Verga
United States Census Bureau
Map data ©2011 Google - Terms of Use
1 mi
1 km

Appendix C
Approval letter to Exclude $PM_{2.5}$ Continuous FEM Data

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

DEC 10 2013

Dr. Donald F. Schwarz, MD, MPH, Health Commissioner
City of Philadelphia
Department of Public Health
1401 JFK Boulevard, Room 600
Philadelphia, Pennsylvania 19102

Dear Dr. Schwarz:

By letter and enclosures dated July 1, 2013, the City of Philadelphia Air Management Services (AMS) submitted to the U.S. Environmental Protection Agency (EPA) an annual ambient air monitoring network plan in accordance with the regulatory requirements of 40 CFR Part 58 - Ambient Air Quality Surveillance. Based on our review, EPA partially approves AMS's July 1, 2013 annual ambient air monitoring network plan on the basis that the plan meets the requirements of 40 CFR Part 58.10. EPA also approves your request for exclusion of the PM2.5 continuous FEM data from site 42-101-0004 as per 40 CFR Part 58.11(e).

Additionally, 40 CFR Section 58.11(c) requires any changes to the air monitoring network or design of the following air monitoring systems be approved by the EPA Administrator:

a) Photochemical Assessment Monitoring Systems (PAMS)
b) Particulate Matter Speciation Trends Network (STN)
c) The National Core Monitoring Network (NCore)

EPA determined that AMS's July 1, 2013 annual ambient air monitoring network plan requires a separate approval from the EPA Administrator because of the relocation of the NCore monitoring site. As such, AMS's 2013 monitoring network plan has been forwarded to EPA's Office of Air Quality Planning and Standards to complete the approval process.

If you have any questions please do not hesitate to contact me or have your staff contact Mrs. Laura Mohollen, EPA's Pennsylvania Liaison, at (215) 814-3295. For questions regarding this approval action, your staff may contact Ms. Diana Esher, Director, Air Protection Division, at (215) 814-2706.

Sincerely,

Shawn M. Garvin
Regional Administrator

cc: Thomas Huynh, AMS

Appendix D
NCore Relocation from BAX to NEW

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

April 7, 2014

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Donald F. Schwarz, MD, MPH, Health Commissioner
City of Philadelphia
Department of Public Health
1401 JFK Boulevard, Room 600
Philadelphia, Pennsylvania 19102

Dear Dr. Schwarz:

This letter transmits our approval of the City of Philadelphia Air Management Services request to move the agencies NCore station from the Baxter site (BAX), AQS# 42-101-0048 to an existing station at the North East Waste (NEW) site, AQS # 42-101-0048, as required by the Ambient Air Monitoring Regulations. According to these rules (see 40 CFR 58.11(c)), NCore network design and changes must be approved by the Environmental Protection Agency's (EPA) Administrator. This authority has been delegated to the Director of the Air Quality Assessment Division in EPA's Office of Air Quality Planning and Standards.

In considering approving the move of the NCore station, we worked with EPA Region 3 on a review of your request, including the rationale why the first NCore site could no longer be supported, and assessed the proposed location and characteristics of the area at the location to be monitored. After careful consideration of your request to move the NCore station, we are pleased to approve the NEW site location as part of the NCore network.

In reviewing data reporting to the AQS database, we see that your agency successfully moved the measurements from the BAX site to the NEW site last fall and most of the measurements were already fully operational and reporting data by October of 2013. We are continuing to review reporting to the AQS database for the NCore program and will work with EPA Region 3 and your staff separately to address any issues in reporting of data or assignment of metadata.

Thank you for your program's efforts in working through the issues of having to move the NCore station measurements and establish the NEW site as your NCore station. For any technical questions, you may contact Tim Hanley at hanley.tim@epa.gov and 919-541-4417.

Sincerely,

Richard A. Wayland

Richard A. Wayland
Director
Air Quality Assessment Division

cc: Thomas Huynh, Director, Air Management Services
Loretta Hyden, EPA Region 3

CITY OF PHILADELPHIA

DEPARTMENT OF PUBLIC HEALTH
Donald F. Schwarz, MD, MPH
Deputy Mayor for Health & Opportunity
Health Commissioner

Nan Feyler, JD, MPH
Chief of Staff

Air Management Services
Thomas Huynh
Director

321 University Avenue, 2nd Floor
Philadelphia, PA 19104

Telephone (215) 685-7584
Fax (215) 685-9451

November 25, 2013

Richard A. Wayland
Director – Air Quality Assessment Division
MD: C304-02
Research Triangle Park, NC 27711

Dear Mr. Wayland:

The City of Philadelphia, Department of Public Health, Air Management Services (AMS) is providing this letter and documentation per 40 CFR 58.11(c), to request the United States Environmental Protection Agency's (EPA) approval in moving the NCore station located at Baxter Water Treatment Facility (BAX), AQS# 42-101-1002, 5200 Pennypack Street, Philadelphia, PA 19136 to Northeast Water Treatment Facility (NEW), AQS# 42-101-0048, at 2861 Lewis St, Philadelphia, PA 19137.

As part of our 2009-2010 Air Monitoring Network Plan, AMS provided documentation regarding a candidate NCore monitoring station at BAX. On October 30, 2009, AMS received a letter from the EPA approving the NCore station at BAX. As required by 40 CFR 58.13, BAX became operational on January 1, 2011.

In early 2013, AMS was notified by the Philadelphia Water Department that the property housing BAX would need to be utilized for a new underground clear well basin. AMS documented in our 2013-2014 Air Monitoring Plan, a need to relocate the current NCore monitor to another location. AMS along with local EPA Region III staff assessed NEW as a potential replacement for the BAX site. It was determined that NEW met the NCore siting requirements per 40 CFR Part 58 Appendix D. The BAX site was shutdown on September 30, 2013 and relocated to NEW on October 2, 2013.

Attached with this letter is documentation, similar to that provided in our 2009-2010 Air Monitoring Network, for the NCore station at NEW.

If you need additional information, please contact Hallie Weiss at 215-685-1085.

Sincerely,

Thomas Huynh
Air Director

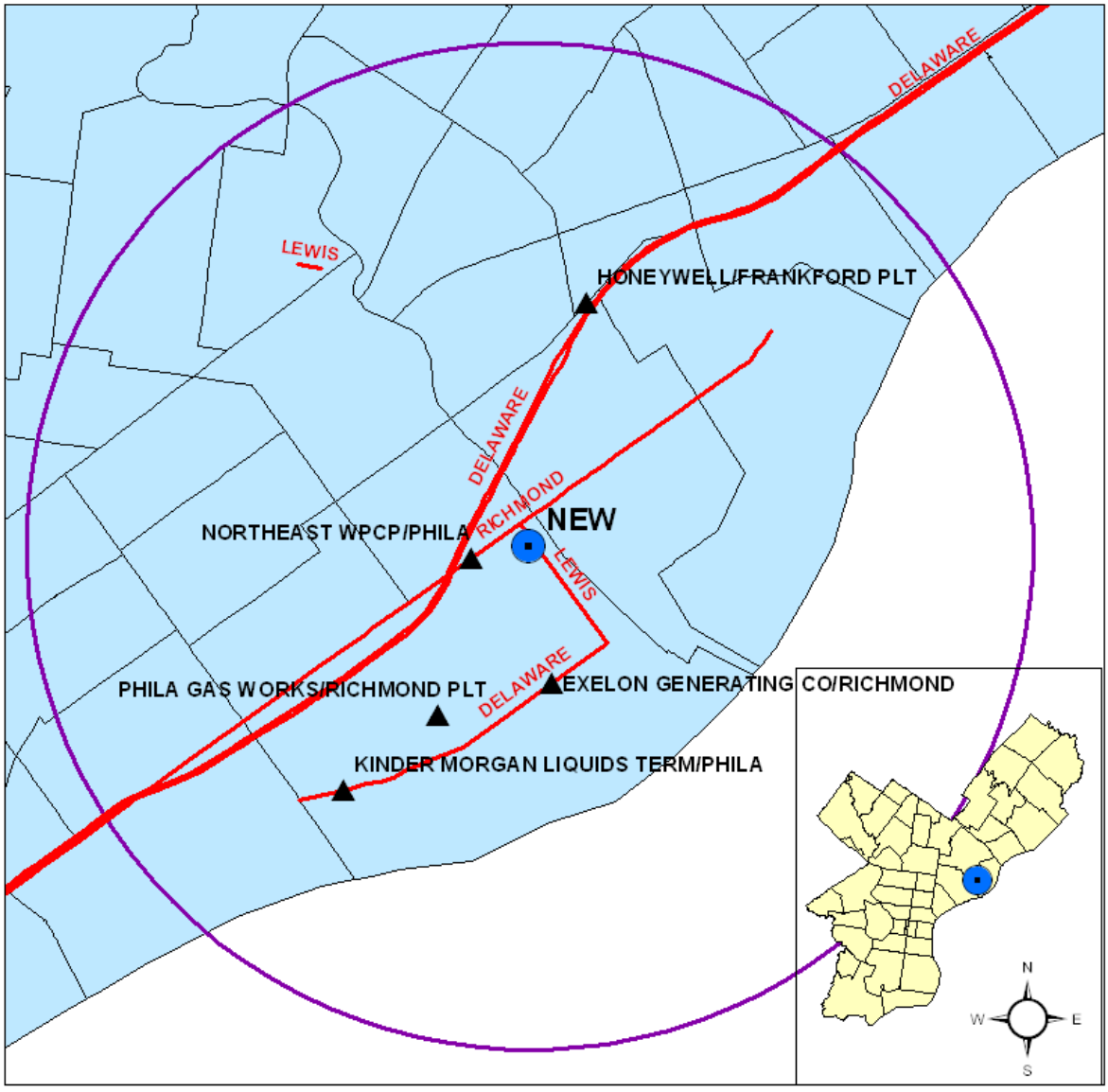
Enclosure
TH/dlr

cc: Diana Esher, EPA Region III, Director, Air Protection Division
Alice Chow, EPA Region III
Henry Kim, AMS, Chief Program Services
Hallie Weiss, AMS Lab, Administrative Engineer

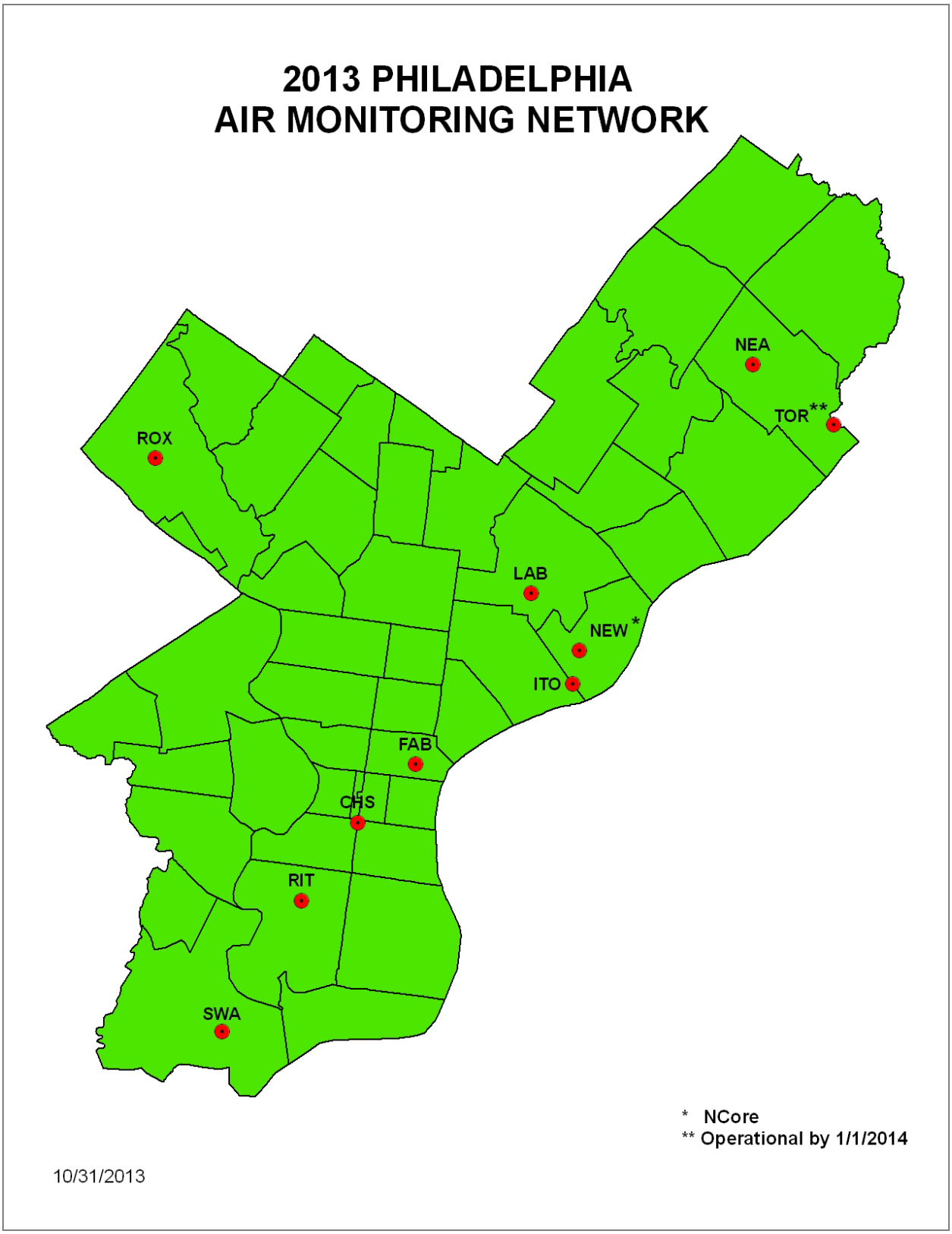
NCore Station at NEW (AQS# 42-101-0048)

AMS Current Site	Parameter	Sampling Type	Operating Schedule	Collection Method	Analysis Method	Comments	AQS Method
NEW	CO (trace)	NCore	Continuous	Instrumental	ARM utilizing trace level Non-dispersive infrared	High sensitivity	093
AQS Site Identification	SO2 (trace)	NCore	Continuous	Instrumental	ARM utilizing trace level UV Fluorescence	High sensitivity	100
421010048	Ozone	NCore/AQI	Continuous	Instrumental	ARM utilizing Ultra Violet photometry	Year-round operation	087
Street Address	NOy (trace)	NCore	Continuous	Instrumental	ARM utilizing chemiluminescence	High sensitivity external converter mounted at 10m	599
2861 Lewis Street, Philadelphia, PA 19137	PM10 Continuous	SLAMS	Continuous		BAM =Beta Attenuation Monitor Met One BAM -1020		731
	PM2.5 Continuous	NCore/AQI	Continuous	BAM =Beta Attenuation Monitor Met One BAM -1020		FEM	170
Geographical Coordinates	PM2.5 Speciated	NCore	1/3 days	Met One SASS	Energy Dispersive XRF	Analysis by EPA	811
	PM2.5 FRM	NCore	1/3 days	R&P PM2.5	Gravimetric	BAX D	145
Latitude:	*PM10 - PM2.5 (PM Coarse)	NCore	1/3 days			BAX S (*BAX-S minus BAX D is PM Coarse)	105
39.991909	TSP-HVAS	NCore	1/6 days	Hi-Vol-SA/GMW-321-B	Gravimetric	Integrated samplers. Weighed by AMS	91
Longitude:	TSP - Lead Only	NCore	1/6 days	Hi-Vol	Atomic Absorption	TSP-HVAS sample collected and sent to InterMountain Laboratory (IML)	43
-75.081099	Meteorological	NCore	Continuous				

NORTHEAST WASTE - LEWIS & RICHMOND STS.
EPA AIRS CODE:421010048



			2011 EMISSIONS (in TONS/YR)						
PLID	NAME	STREET	CO	NOX	PB	PM10	PM2.5	SO2	VOC
01551	HONEYWELL/FRANKFORD PLT	4700 BERMUDA STREET	61.69	183.15	0.00	73.42	57.73	27.85	129.89
04903	EXELON GENERATING CO/RICHMOND	3901 N DELAWARE AVE	0.05	7.07	0.00	0.15	0.15	2.10	0.01
04922	PHILA GAS WORKS/RICHMOND PLT	3100 E VENANGO ST	1.93	4.53	0.00	0.17	0.14	0.01	0.16
05003	KINDER MORGAN LIQUIDS TERM/PHILA	3300 N DELAWARE AVE	2.49	4.56	0.00	0.42	0.37	1.94	41.24
09513	NORTHEAST WPCP/PHILA	3899 RICHMOND ST	32.21	9.50	0.00	1.65	1.65	6.17	14.62
		TOTAL	**98.36**	**208.80**	**0.00**	**75.81**	**60.04**	**38.08**	**185.91**



State: Pennsylvania

City: Philadelphia
County: Philadelphia
City population: 1,526,006 (2010 census)
MSA: Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD
MSA number: 6160
Population: 3,849,647 (Philadelphia Metropolitan Division within MSA, 2003 estimate)
EPA Region: III
Class I area: Natural Wildlife Preserve near Atlantic City, NJ
Time zone: EST
UTM zone: 18

Ground Level NEW Monitoring Station Picture

Ground Level NEW Monitoring Station Picture No.2

NEW NCore Aerial View