

QUALITATIVE PM2.5 HOT-SPOT ANALYSIS

HAM-IR75-10.10- PID 76256

(THRU THE VALLEY)

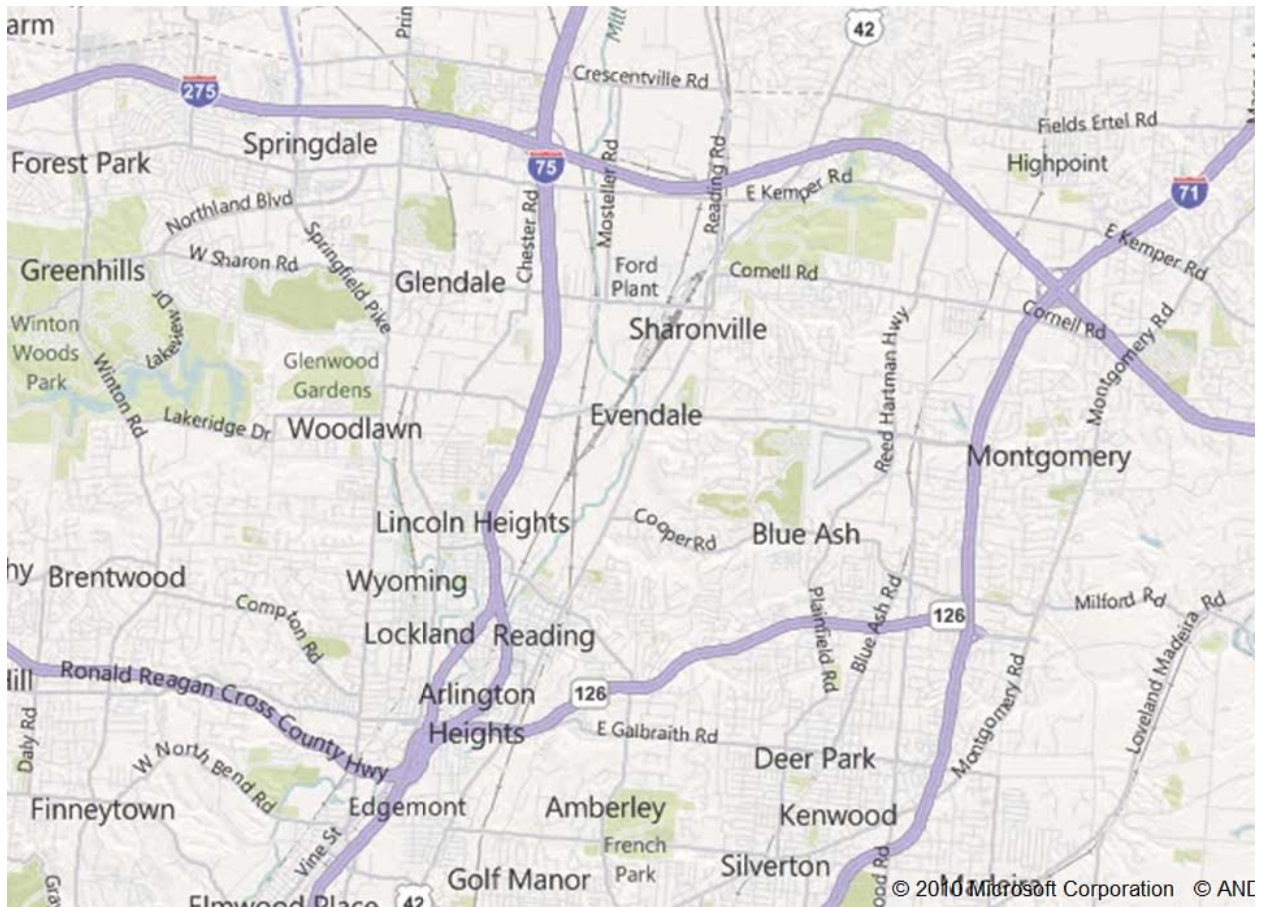


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LIST OF EXHIBITS

Exhibit 1	Project Location and Study Area
Exhibit 2	Refined Feasible Alternative
Exhibit 3	Ohio Department of Transportation - OTS Memo October 22, 2007
Exhibit 4	PM2.5 Monitor Location - Memo August 2, 2006
Exhibit 5	PM2.5 Monitor Location and Monitor Values Report
Pages 13-19	Surrogate monitor Locations

PROJECT DESCRIPTION

This project is located in Hamilton County, Ohio (see Exhibit 1). It is comprised of 7.3 miles of improvements to I-75 and its associated interchanges between I-275 and Paddock Road. This project is located within the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) Metropolitan Planning Organization (MPO). This project is listed in OKI's Transportation Improvement Program and Ohio's Statewide Transportation Improvement Program.

The three alternatives, Feasible Alternatives A, B and C, were evaluated during Step 6 of the Preliminary Development Process. Feasible Alternative A is considered the baseline of the three alternatives. It includes widening I-75 to four lanes with some ramp closures. Alternative B is considered the full build-out of the three alternatives. It includes widening I-75 to four lanes with some ramps closures and adding ramps in various locations. Feasible Alternative C is considered the mid-way option of the three alternatives. It includes widening I-75 to four lanes with some ramp closures and adding ramps in various locations.

Following a review of the Assessment of Feasible Alternatives report by FHWA and the ODOT Office of Roadway Engineering Services, it was determined that the Recommended Alternative for this project should be more closely aligned with FHWA policy on interchanges. This additional analysis led to the development of the Refined Feasible Alternative. This alternative combines the best aspects of Feasible Alternative B and Feasible Alternative C. It will allow for improved local road access as well as increase regional access. It will also increase capacity through the addition of lanes, improve safety and is compatible with local land use plans. The Refined Feasible Alternative will be carried forward for further development.

Based on planning level traffic modeling, there is minimal difference between the four feasible Build alternatives when compared to the 2030 No Build volumes. In all Build alternatives, the same additional capacity is added to the I-75 mainline. The only difference between the Build alternatives is in the number of local (service) access points. Because of this, Certified Traffic was supplied by ODOT only for the Refined Feasible Build Alternative and this traffic was used for PM2.5 analysis.

APPLICABILITY

Transportation conformity is required under Clean Air Act section 176(c) (42 U.S.C. 7506(c)) to ensure that federally supported highway and transit project activities are consistent with (“conform to”) the purpose of the state air quality implementation plan (SIP). Conformity to the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant national ambient air quality standards (NAAQS or “standards”). EPA’s transportation conformity rule (40 CFR 51.390 and Part 93) establishes the criteria and procedures for determining whether transportation activities conform to the SIP.

On March 10, 2006, the Environmental Protection Agency (EPA) published a final rule that establishes the transportation conformity criteria and procedures for determining which transportation projects must be analyzed for local air quality impacts in PM2.5 and PM10 nonattainment and maintenance areas (“areas”) (71 FR 12468). The final rule also provides flexibility so that state and local resources are used efficiently.

Hamilton County was designated as in non-attainment for PM2.5 in December 2004 by the U.S. EPA. OEPA submitted a redesignation request to USEPA for Hamilton County. The redesignation application was requesting designation to “maintenance” status from the current “non-attainment” status. The air quality monitors in the area have not shown a violation of the applicable standard in the last three years.

Ohio Kentucky Indiana (OKI) is the metropolitan planning organization (MPO) for the Greater Cincinnati/Northern Kentucky area responsible for transportation planning and air quality conformity. In April 2005, OKI adopted its FY 2006-2009 Transportation Improvement Program (TIP) and amendment to the OKI 2030 Regional Transportation Plan. The TIP is a subset of the OKI 2030 Regional Transportation Plan. All TIP projects appear in the OKI 2030 Regional Transportation Plan. This project is listed on the updated OKI 2008 - 2011 TIP.

BACKGROUND INFORMATION

PROJECT SETTING

The project study area is located in central Hamilton County, Ohio and includes a 7.3-mile section of I-75 from Paddock Road to I-275 (see Exhibit 1). For this project, the southern terminus is the I-75/Paddock Road interchange; however Paddock Road and its associated ramps will not be studied because they are part of a different study (HAM-75-2.30, PID: 76257). The northern terminus for this project is near I-275 at Standard Linear Mileage 16.58; however, I-275 and its associated ramps will not be studied as part of this project because they are part of a different study (HAM-75-15.39, PID: 77278). These interchanges were selected as the logical termini for the project because they are existing interchanges that serve as points of access to the regional and interstate highway system in the area. The western limit of the project is Wayne Avenue/Chester Road and the eastern limit is Reading Road. These roadways were selected as project limits because they are adjacent, parallel roadways to I-75 that accommodate through movements for local traffic and achieve a seamless connection with the existing transportation system without creating additional new access points to the I-75 mainline.

The project area is comprised of portions of the communities of Arlington Heights, Evendale, Glendale, Lincoln Heights, Lockland, Reading and Sharonville. The communities of Woodlawn and Wyoming are located outside of the project area but are still viewed as having a significant impact on the project area traffic. The predominant land uses in the study area include industrial, residential, commercial, and institutional areas. The southern portion of the study area from Seymour Avenue to the Village of Lincoln Heights is occupied by residential dwellings and interspersed with a small number of institutional and industrial complexes. East of I-75 and north from Smalley Avenue to I-275, the area is predominately industrial with some pockets of commercial and residential areas intermixed. West of I-75 and north of Lincoln Heights, the study area becomes a mix of industrial, commercial and institutional land uses with some small areas of residential land use.

EXISTING CONDITIONS

This section of I-75 serves a dual purpose: first as a portion of the I-75 corridor of nationwide and regional importance for commercial and passenger car traffic and second as a vital transportation link for residents of the surrounding communities. A special feature of this portion of I-75 is the C-D network located on both sides of the freeway between the Shepherd Lane and Glendale Milford interchanges. In addition to serving the adjacent General Electric plant, the C-D lanes also function as an integral part of the local street system for the surrounding communities. The freeway access points within the study area consist of four complete interchanges and six partial interchanges, some of which contain only one movement. In another special feature known as the "Lockland Split," the freeway northbound and

southbound lanes diverge around the community of Arlington Heights.

The traffic volumes and especially commercial traffic within the corridor continue to increase and are expected to reach virtual gridlock by the 2030 horizon year. Current Levels of Service within the analysis area for the typical morning and afternoon peak periods is mostly LOS D and E. Current Levels of Service for weekends, holidays and special event traffic days are, by anecdotal experience, notably worse than the typical weekday situation calculated for this study. By 2030 using the Existing + Committed network, LOS F is expected on most freeway links as well as at the merge and diverge points within the analysis area.

Many of the ramps within this section contain substandard design features that contribute to motorist uncertainty and traffic crashes. Almost the entire study area along I-75 is listed in both ODOT's Highway Safety Program and Hot Spot listings, making this one of the most crash prone sections of interstate in Ohio. The combination of ever increasing traffic volumes, high commercial traffic composition and high traffic crash rates establish this as a section of I-75 that will likely act as a constraint on local and regional travel in a few years if major changes are not made to capacity and geometry.

PROPOSED CONSTRUCTION

The Refined Feasible Alternative includes the following elements (see Exhibit 2).

- One lane will be added to Interstate I-75 in each direction with auxiliary lanes where needed to achieve interchange spacing requirements.
- The existing Evendale-Neumann Way collector-distributor system has the highest accident rate of any section of the corridor and will be eliminated.
- The ramps at Cooper Avenue and Mangham Drive will be relocated to Anthony Wayne Avenue and Shepherd Lane, respectively. The GE Loop Ramps will be closed.
- The I-75 northbound to Galbraith Road left exit will be replaced with a right exit connecting with Galbraith Road in its current location.
- A new set of ramps will be added to and from I-75 southbound to Anthony Wayne Avenue. The ramps will be placed at-grade just south of the walled section and Moxy Trucks.
- The Shepherd Lane/I-75 Interchange will be reconstructed as a full interchange, serving both northbound and southbound traffic.
- Necessary capacity improvement to existing interchange ramp terminal intersections to accommodate future traffic.
- Improvements to the SR 126 and I-75 interchange

Proposed Construction

The Refined Feasible Alternative includes the following elements (see Exhibit 2).

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- The existing Evendale-Neumann Way C-D system has the highest accident rate of any section of the corridor and will be eliminated.
- The ramps at Cooper Avenue and Mangham Drive will be relocated to Anthony Wayne Avenue and Shepherd Lane, respectively. The GE Loop Ramps will be closed.
- The I-75 northbound to Galbraith Road left exit will be replaced with a right exit connecting with Galbraith Road in its current location.
- A new set of ramps will be added to and from I-75 southbound to Anthony Wayne Avenue. The ramps will be placed at-grade just south of the walled section and Moxy Trucks.
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TRAFFIC

Design year average daily traffic volumes are provided below. Traffic volumes reported for major project sections are maximum traffic volumes (see table below and Exhibit 3).

Project Traffic Volumes

Project Section	2010 ADT	2015 ADT	2030 ADT	Truck % (T24)
I75 North of I275	154,600	168,000	208,100	19
I75 north of Glendale-Milford Road	144,400	155,000	186,800	19
I75 south of Glendale-Milford Road	144,300	151,800	174,200	18
I75 south of Shepherd Lane	142,600	149,000	167,100	17

CONSIDERATION OF DATA*Meteorology*

The meteorology at the project location can generally be categorized as variable, since wind speed and intensity varies during the day. There is some wind that acts to disperse PM2.5 emissions at the site. Temperature, humidity and rainfall do not seem to influence the level of PM2.5 pollution at this site.

Re-entrained Road Dust

Re-entrained road dust is primarily generated by traffic on non-paved roads (i.e. dirt or graveled roads). The project area is within a densely populated urban area with no unpaved roads. Neither USEPA nor OEPA has determined that re-entrained road dust is a significant contributor to PM2.5 concentrations in Hamilton County. Also, the proposed construction schedule for the improvements will be broken down into eight phases starting in 2013 with Phase 1. This strategy is based primarily on funding availability, logical construction sequencing and MOT considerations. The overall *I-75 Thru the Valley Project* construction phases schedule has the project starting in 2013 with Phase 1. Based on the current future funding situation, funding will not be available for Phases 2, 3, 4, 5, 6, 7 and 8 earlier than 2020 or beyond. These Phases will begin depending on when their schedules are determined and construction funding is in place.

PARTICULATE MATTER DISCUSSION

QUALITATIVE EFFECTS ANALYSIS

Based on information from the EPA, particles less than 10 micrometers in diameter (PM₁₀) pose a health concern because they can be inhaled into and accumulate in the respiratory system. Sources of fine particles include all types of combustion (motor vehicles, power plants, wood burning, etc.) and some industrial processes. Particles with diameters between 2.5 and 10 micrometers are referred to as "coarse." Sources of coarse particles include crushing or grinding operations, and dust from paved or unpaved roads.

In 1997, EPA established NAAQS for PM_{2.5} for the first time as well as revised NAAQS for PM₁₀. The current National Ambient Air Quality Standards (NAAQS) for PM₁₀ levels are a maximum of 50 µg/m³ annually and 150 µg/m³ in a 24-hour period; for PM-2.5, levels should not exceed 15.0 mg/m³ annually and 35.0 mg/m³ in a 24-hour period.

PM₁₀

As of July, 2008, the U.S. EPA has not designated any areas in Ohio as being in nonattainment for PM₁₀. Although there are no PM₁₀ nonattainment areas, there are 2 maintenance areas for PM₁₀ in Ohio. These are Cuyahoga Co. and part of Jefferson County. No evaluation of PM₁₀ is needed for this project in Hamilton County. Projects in PM₁₀ maintenance areas must also evaluate PM₁₀. No further evaluation of PM₁₀ is required for this project.

PM_{2.5}

There are areas in Ohio in nonattainment for PM_{2.5}, including Hamilton County. As a result, a qualitative analysis for PM_{2.5} was performed for this project because the design year ADT is greater than 125,000 and the diesel truck volume is greater than 10,000.

OEPA submitted a redesignation request to USEPA for Hamilton County. The redesignation application was requesting designation to "maintenance" status from the current "non-attainment" status. The air quality monitors in the area have not shown a violation of the applicable standard in the last three years.

FUTURE YEAR ANALYSIS

Method A: Surrogate Project Locations

For this analysis, an effort was made to identify an appropriate surrogate monitor close to the project area to effectively simulate the air pollution generated at the project location for the project design year (2030) and opening year 2015. The surrogate site would need to include a nearby roadway that *currently* carries traffic

volumes and percentage of trucks similar to those predicted for I-75 in project area in the design year 2030 and opening year 2015.

Surrogate Monitor Location for 2030 Build

The surrogate monitor is located within Hamilton County at 11590 Grooms Road in Cincinnati. As shown in on the attached mapping, the monitor location is identified as 39-061-0006 in Cincinnati. The monitor location is approximately 4 miles east of I-75 and sits along IR275. The land use in the area surrounding the monitor is comprised of commercial, light industrial, and residential. The attached mapping shows the location of Surrogate 1 in relation to the project corridor.

As provided by ODOT's Office of Technical Services web-based traffic monitoring data, the most recent traffic count (2009) along the section of IR275 east of the surrogate location was 104,230 vehicles per day and 129,700 along IR71. The total ADT for the surrogate monitor is 234,000, 13% higher than the 2030 build ADT. The truck % for the surrogate monitor is 12%, comparable to 18% for the 2030 build. Data from the Surrogate Monitor Location (EPA monitor 39-061-0006) for the last three full years of monitoring (2007-2009) was averaged to evaluate potential PM2.5 levels for the subject project location. The 98th percentile of 24-hour PM2.5 concentrations averaged 28.6 microns per cubic meter for the period. This pollutant level is below the 24-hour PM2.5 NAAQS of 35 micrograms per cubic meter. The arithmetic mean of the annual mean PM2.5 concentrations for the same measurement period averaged 13.1 micrograms per cubic meter. This pollutant level is well below the annual NAAQS of 15.0 micrograms per cubic meter. If this site is considered an appropriate representative site, the HAM-75-10.10 project area from Shepard Lane to Glendale-Milford Road will conform to NAAQS for PM2.5 levels in the project design year 2030.

Surrogate Monitor Locations for 2015 opening year

This surrogate monitor is located within Franklin County, at 5750 Maple Canyon Avenue in Columbus, Ohio. The land use in the area immediately surrounding the monitor is comprised primarily of office, institutional, retail, residential and other commercial uses, comprising high density urban development typical of an older mid-sized downtown area. In addition to I-71, this monitor is located just north of SR161, a 6- lane roadway that runs east-west. The attached mapping identifies the monitor location and provides an aerial photograph of the surrounding area.

This surrogate monitor location was selected because it is located near I-71, has average daily traffic volumes within 1 percent of the traffic volumes projected for the design year for the subject project and has a similar truck % and has similar

development in the surrounding area. Table 2 below provides comparative data on the subject site and the surrogate sites examined for this analysis.

Data from Surrogate Monitor Location (EPA monitor #39-049-0081) for the last three full years (2007 to 2009) was averaged to evaluate potential PM2.5 levels for the subject project location. Air quality monitoring data was provided by the *United States Environmental Protection Agency Air Quality System - Quick Look Report AMP450*. The 98th percentile of 24-hour PM2.5 concentrations averaged 28.2 micrograms per cubic meter for this period. This pollutant level is below the 24-hour PM2.5 NAAQS of 35 micrograms per cubic meter. The arithmetic mean of the annual mean PM2.5 concentrations for the same period averaged 11.7 micrograms per cubic meter. This pollutant level is well below the annual NAAQS of 15.0 micrograms per cubic meter. Therefore, if this site is considered an appropriate representative site, the HAM-75-10.10 project area from Shepard Lane to Glendale-Milford Road will conform to NAAQS for PM2.5 levels in the project opening year (2015).

Another surrogate monitor is located within Hamilton County, at the intersection of Seymour Avenue and Vine Street in Cincinnati, Ohio. The land use in the area immediately surrounding the monitor is comprised primarily of office, industrial, institutional, retail, residential and other commercial uses, comprising high density urban development typical of an older mid-sized downtown area. The attached mapping identifies the monitor location and provides an aerial photograph of the surrounding area.

This surrogate monitor location was selected because it is located near I-75, has average daily traffic volumes within 1 percent of the traffic volumes projected for 2015 for the subject project and has a similar truck % and has similar development in the surrounding area. Table 2 below provides comparative data on the subject site and the surrogate sites examined for this analysis.

Data from Surrogate Monitor Location (EPA monitor #39-061-0014) for the last three full years (2007 to 2009) was averaged to evaluate potential PM2.5 levels for the subject project location. Air quality monitoring data was provided by the *United States Environmental Protection Agency Air Quality System - Quick Look Report AMP450*. The 98th percentile of 24-hour PM2.5 concentrations averaged 34.1 micrograms per cubic meter for this period. This pollutant level is below the 24-hour PM2.5 NAAQS of 35 micrograms per cubic meter. The arithmetic mean of the annual mean PM2.5 concentrations for the same period averaged 15.0 micrograms per cubic meter. This pollutant level is equal to the annual NAAQS of 15.0 micrograms per cubic meter. Therefore, if this site is considered an appropriate

representative site, the HAM-75-10.10 project area from Shepard Lane to Glendale-Milford Road will conform to NAAQS for PM2.5 levels in the project opening year (2015).

Traffic Volumes and percentage of trucks

	Total ADT	Truck Percentage	# of Trucks (Daily Average)	# of Diesel Trucks
HAM- IR75- 10.10 Project Site (2030 Build)	174,200 (projected 2030)	18% (projected 2030)	31,400 (projected 2030)	25,700 (projected 2030)
HAM- IR75- 10.10 Project Site (2015 Build)	151,800 (projected 2015)	18% (projected 2015)	27,324 (projected 2015)	22,400 (projected 2015)
FRA- 5750 Maple Canyon- 2015 Surrogate site	153,000 (2006 counts)	10% (2006 counts)	15,300 (2006 counts)	13,311
HAM- 11590 Grooms Road- 2030 DY Build Surrogate	234,000 (2009 counts)	12% (2009 counts)	28,080 (2009 counts)	24,430
HAM- Seymour Ave/Vine Street- 2015 Surrogate Site	153,000 (2009 counts)	13% (2009 counts)	20,570 (2009 counts)	17,896

The ODOT-Office of Technical Services (OTS) ran the Congestion Management Air quality (CMAQ) computer program developed in 1998 by ODOT to predict PM2.5 emissions resulting from the preferred alternative. The CMAQ program computes emissions using EPA MOBILE6 emission factors. The years and alternatives analyzed include the 2000 base, 2010 opening year build, the 2030 design year build, and no build alternatives. The table below contains the results of the modeling for PM2.5

Year/Criteria	Daily PM2.5 (in tons)
2000	5.0010
2010 No Build	2.3250
2010 Build	2.3230
Build-No Build in Tons	-0.0020
Build-No Build in Grams	-1814.37
2030 No Build	2.3920
2030 Build	2.3910
Build-No Build in Tons	-0.0010
Build-No Build in Grams	-907.18

Conclusion

Based on the results of the CMAQ modeling, it appears that PM2.5 emissions will be reduced by a considerable amount in the 2010 Build scenario. However, there is a slight increase (0.068 ton/185 pounds) in PM2.5 emissions from the 2010 to 2030 build scenario. But the modeling still shows a marked reduction when compared with the 2000 base data. The result is a factor of the increase in VMT over time. The 2030 No Build scenario shows a comparable increase to the 2030 Build scenario.

The results of Method A (Surrogate Method) indicate that PM2.5 levels in the HAM-75-10.00 project area from Shepard Lane to Glendale-Milford Road will not exceed air quality standards in the project opening year or design year. This method indicates that the overall HAM-75-10.10 project is not expected to worsen the existing violation of the 24-hour or annual PM2.5 standards, and therefore the project meets the conformity hot-spot requirements in 40 CFR 93.116 and 93.123 for PM2.5.

The March 29, 2006, USEPA and USDOT memorandum "Transportation Conformity Guidance for Qualitative Hot-spot Analysis in PM2.5 and PM10 Nonattainment and Maintenance Areas" states on page 15 section 3.4 that construction emissions are not required to be included unless the construction phase lasts more than 5 years. For this project, the construction emissions will need to be considered, however, the project was divided into 8 construction projects. Only one project (IR75 from

Shepard Lane to Glendale Milford Road) has construction funding allocated for it in 2013 and the duration of construction will be less than 2 years. Future projects do not have construction funding assigned and are not estimated to start construction before 2020. Therefore, construction emissions will not be considered for the first construction project but will be considered for future construction projects when their schedules are determined and construction funding is in place.

For Phases 2, 3, 4, 5, 6, 7 and 8, construction emissions will be analyzed in accordance with the latest air quality regulations in the future, once their schedule is determined and construction funding is in place.

The latest amendments to the U.S. EPA's non-road and highway diesel fuel regulations in April 2006 have implemented more stringent standards for new diesel engines and fuels beginning in 2006 and 2007, which can reduce emissions by 90 percent or more. The associated programs should yield long-term benefits for public health and the environment.

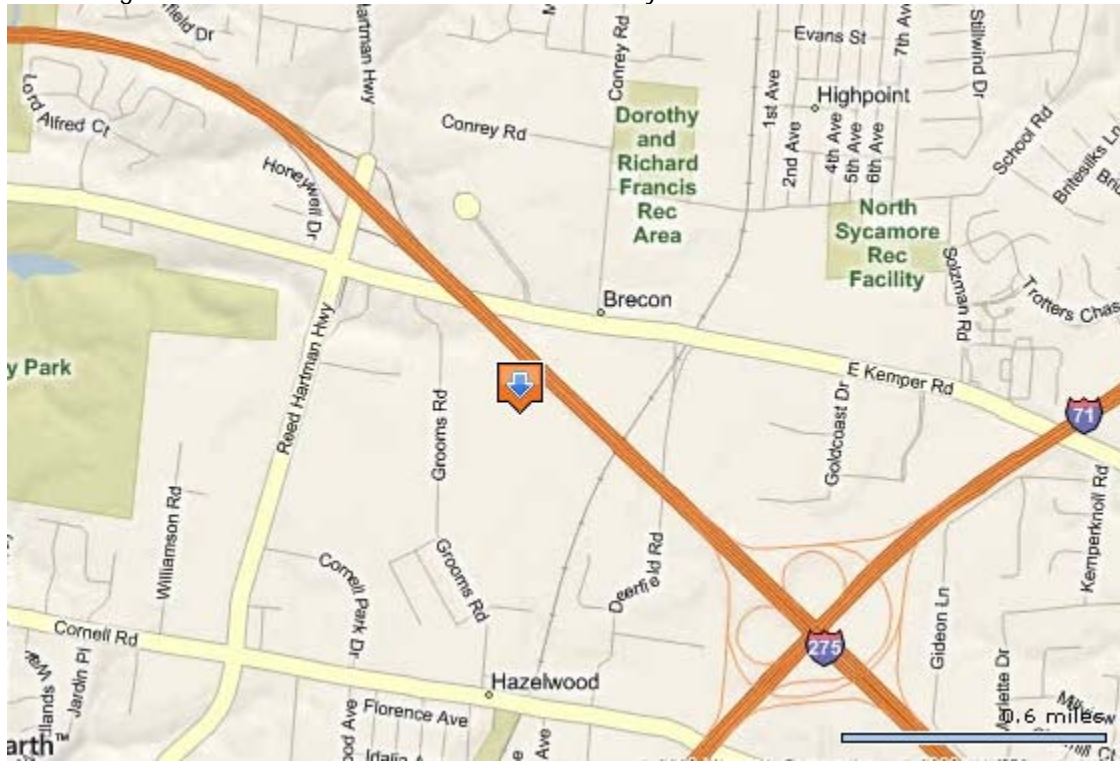
Surrogate Monitor Location for 2030 Build

The surrogate monitor is located within Hamilton County at 11590 Grooms Road in Cincinnati



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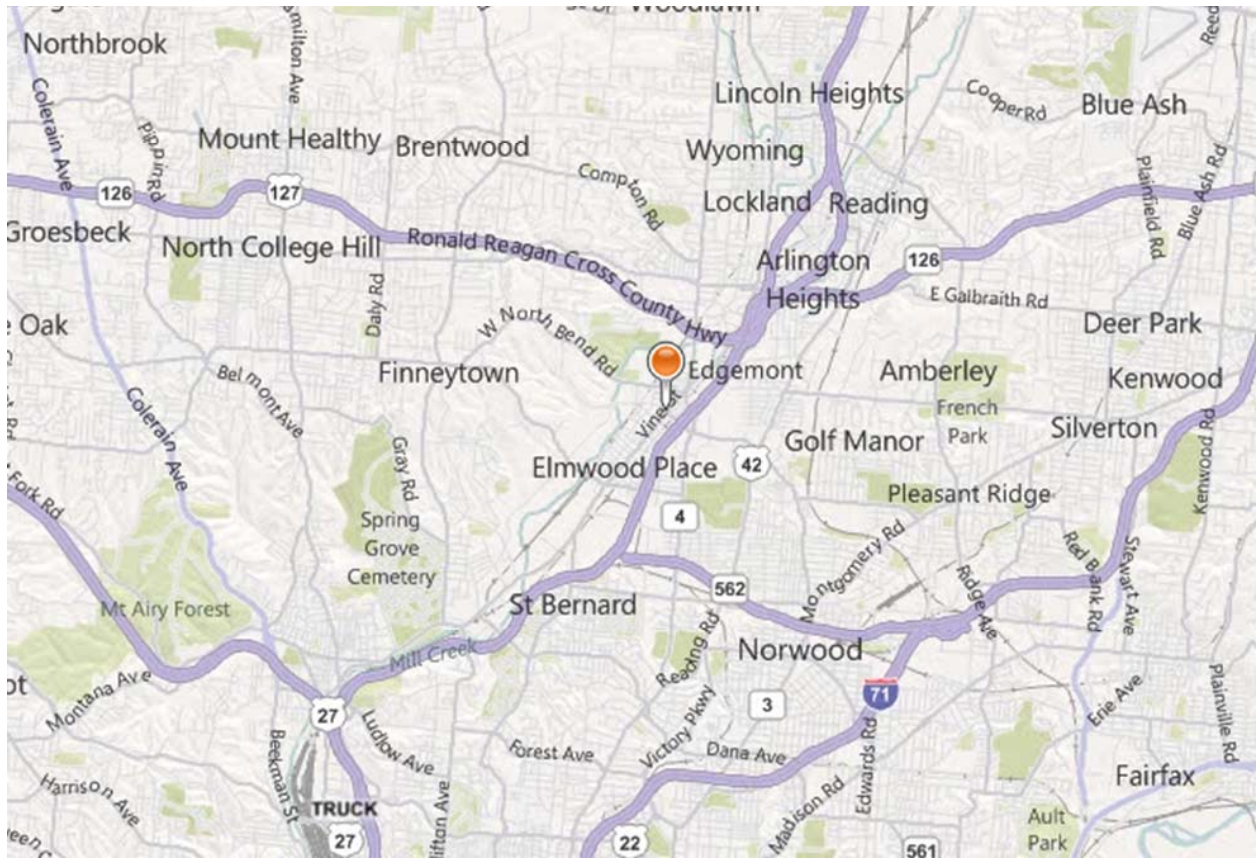
Surrogate Monitor Location for 2015 opening year- 5750 Maple Canyon Avenue, Columbus, Ohio



Surrogate Monitor Location for 2015 opening year- 5750 Maple Canyon Avenue, Columbus, Ohio



Surrogate Monitor Location for 2015 opening year- Seymour Ave and Vine Street, Cincinnati, Ohio



Surrogate Monitor Location for 2015 opening year- Seymour Ave and Vine Street, Cincinnati, Ohio

