Appendix I

Air Quality Technical Report

APPENDIX I

Air Quality Technical Report

This technical report provides details of the quantitative air quality analyses presented in the Final Environmental Impact Statement (EIS) for the Elgin O'Hare-West Bypass (EO-WB) project. This report outlines the methodology, inputs, and results for the Annual particulate matter (where 2.5 indicates the micrometer size of the particulate) ($PM_{2.5}$) Hot-spot Analysis, Quantitative Mobile Source Air Toxics Analysis, and Greenhouse Gas (GHG) Analysis.

Annual $PM_{2.5}$ Hot-Spot Analysis

The air quality analysis for the EO-WB Final EIS included modeling techniques to estimate project-specific emission factors from vehicle exhaust and local $PM_{2.5}$ concentrations due to project operation. Emissions and dispersion modeling techniques were consistent with the United States Environmental Protection Agency (USEPA) quantitative PM hot-spot analysis guidance, "Transportation Conformity Guidance for Quantitative Hot-spot Analysis in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas" (USEPA, 2010) that was released in December 2010. Together with the guidance, USEPA also approved the MOVES emission factor model (MOVES) and started a 12-month grace period for use of the guidance. MOVES must be used for quantitative project level hot-spot analyses.

The EO-WB interagency workgroup chose to follow the quantitative approach. Prior to project-specific traffic data being finalized, a test case was performed to determine if the appropriate inputs were available for the MOVES and the CAL3QHCR dispersion model. The inputs were available and the new guidance was be implemented.

The quantitative hot-spot analysis is described in the guidance as nine steps:

1. Determine need for a PM hot-spot analysis
2. Determine approach, models, and data
3. Estimate on-road vehicle emissions
4. Estimate emissions from road dust, construction, and additional sources
5. Select an air-quality model, data inputs, and receptors
6. Determine background concentrations from nearby and other sources
7. Calculate design values and determine conformity
8. Consider mitigation or control measures
9. Document the PM hot-spot analysis

This report serves as documentation of the PM hot-spot analysis (Step 9) and includes a description of all steps.

1. Determine Need for a PM Hot-Spot Analysis

Section 93.109(b) of the conformity rule outlines the requirements for project-level conformity determinations. A $PM_{2.5}$ hot-spot analysis is required for projects of air quality concern, per Section 93.123(b)(1). The EO-WB project was discussed during an interagency consultation meeting on September 10, 2010 (CMAP, 2010), where it was determined by the group to be a project of air quality concern because the project is located in a $PM_{2.5}$ nonattainment area and is considered a new highway project that has a significant number of diesel vehicles, and would require a hot-spot analysis.

2. Determine Approach, Models, and Data

Determine Geographic Area and Emission Sources to be Covered by Analysis

Hot-spot analyses must include the entire project (40 CFR 93.123[c][2]). However, it may be appropriate in some cases to focus the PM hot-spot analysis only on the locations of highest air quality concentrations. For large projects, it may be necessary to analyze multiple locations that are expected to have the highest air quality concentrations and, consequently, the most likely new or worsened PM National Ambient Air Quality Standards (NAAQS) violations. If conformity is demonstrated at such locations, then it can be assumed that conformity is met in the entire project area.

The EO-WB interagency workgroup selected four locations to represent the areas that would most likely have the highest increase in PM concentrations due to the project. These locations were selected based on greatest increase in traffic volumes, greatest overall traffic volumes, proximity to residential areas, and proximity to other potential sources of PM emissions. The four locations chosen were:

- Elgin O'Hare and West Bypass corridors
- Elgin O'Hare corridor and I-290
- Elgin O'Hare corridor and Roselle Road
- West Bypass corridor and I-90

Each of four locations evaluated are major interchanges that have a large number of vehicles concentrated in one general location. The analysis of each location included all freeways, arterials, and collectors within an area approximately 0.6 square miles, centered on the interchange, as described below in Section 3. Vehicle emissions from roadways in the model domain were modeled to determine localized annual $PM_{2.5}$ concentrations.

Deciding the General Analysis Approach and Analysis Year(s)

In general, a hot-spot analysis compares the air quality concentrations with the proposed project (the build scenario) to the air quality concentrations without the project (the no-build scenario). These air quality concentrations are determined by calculating a "design value," a statistic that describes a future air quality concentration in the project area that can be compared to a particular NAAQS.

In some cases, selecting only one analysis year, such as the last year of the transportation plan or the year of project completion, may not be sufficient to satisfy conformity requirements. For example, if a project is being developed in two stages and the entire two-stage project is being approved, two analysis years should be modeled – one to examine the impacts of the first stage of the project and another to examine the impacts of the completed project. Because this project is being constructed in two phases, analyses were conducted for 2030 (after the initial construction phase would be completed) and 2040 (after construction of the entire project would be completed). The initial construction phase would include improvements for the entire project corridor, but with fewer travel lanes and reduced interchanges. The 2030 interim year represents the year of peak capacity after the initial construction phase would be complete. It was modeled because it was likely to produce the peak emissions associated with that phase.

A hot-spot evaluation of the no-build analysis is not required to demonstrate conformity when the Build Alternative does not show an exceedance of the NAAQS. The interagency workgroup requested an analysis of the no-build scenario for informational purposes. The no-build analysis was only performed for 2040 because it was expected to show the greatest difference in results compared to the Build Alternative.

Determining the PM NAAQS to be Evaluated

The project is located in an area designated as nonattainment for annual $PM_{2.5}$. The area is currently attaining the 24-hour $PM_{2.5}$ NAAQS and 24-hour PM_{10} NAAQS. The quantitative PM hot-spot analysis was limited to 1997 annual $PM_{2.5}$.

Deciding on the Type of PM Emissions to be Modeled

The PM hot-spot analyses include only directly emitted $PM_{2.5}$ or PM_{10} emissions. $PM_{2.5}$ and PM_{10} precursors are not considered in PM hot-spot analyses, since precursors take time at the regional level to form into secondary PM. Exhaust, brake wear, and tire wear emissions from on-road vehicles are always included in a project's $PM_{2.5}$ or PM_{10} hot-spot analysis. For this analysis only running exhaust was considered because start exhaust is unlikely to occur on the roadways included in the model domain.

Re-entrained road dust was not included because the State Implementation Plan does not identify that such emissions are a significant contributor to the $PM_{2.5}$ air quality in the nonattainment area. Emissions from construction-related activities were not included because they are considered temporary as defined in 40 CFR 93.123(c)(5) (i.e., emissions that occur only during the construction phase and last five years or less at any individual site).

Determining the Models and Methods to be Used

The latest approved emissions models must be used in quantitative PM hot-spot analyses. The latest approved model is MOVES2010a. Ground-level air concentrations of $PM_{2.5}$ were estimated using CAL3QHCR, which is listed as a recommended model for highway and intersection projects under Appendix W to 40 CFR Part 51. The methods were discussed in a series of EO-WB interagency workgroup meetings and are summarized in this document.

Obtaining Project-Specific Data

The conformity rule requires that the latest planning assumptions available at the time that the analysis begins must be used in conformity determinations (40 CFR 93.110). In addition, the regulation states that hot-spot analysis assumptions must be consistent with those assumptions used in the regional emissions analysis for any inputs that are required for both analyses (40 CFR 93.123[c][3]).

The project sponsor should use project-specific data for both emissions and air quality modeling whenever possible, though default inputs may be appropriate in some cases. The Illinois Environmental Protection Agency (IEPA) provided MOBILE6 input files that were used for regional emissions analyses, which include vehicle types and age distribution expected in the project area. The IEPA also supplied climate and fuel data in tabular form that were used for regional emissions analyses. These values were incorporated into the MOVES input files.

Project-specific data were obtained from the traffic analysts. Hourly volume, average vehicle speeds, and facility type were provided for each roadway section in the project area. Hourly vehicle volumes were provided for A.M. peak, midday, P.M. peak, and off-peak traffic conditions.

Hourly meteorological data is used for dispersion modeling and must be representative of the project area. Surface meteorological data from the National Weather Service station at O'Hare Airport was downloaded from USEPA's surface and upper air databases (http://www.epa.gov/ttn/scram/metobsdata_databases.htm) for the years 1986 through 1990. O'Hare Airport is directly adjacent to the project site. Data from 1986 through 1990 are the most recent readily-available data for download from USEPA and were used in the analysis. Upper air data describing the vertical temperature profile of the atmosphere from the Greater Peoria Airport upper air station were also obtained for the year 1986 through 1990 from USEPA.

3. Estimate On-Road Vehicle Emissions

On-road vehicle emissions were estimated using the MOVES emission factor model. MOVES inputs were consistent with the MOBILE6 inputs whenever possible to remain consistent with regional emissions estimates.

Age distribution, vehicle mix, climate data, and fuel specifications data were consistent with the provided MOBILE6 inputs. The age distribution and climate data were applied by using data converters available from USEPA. Vehicle mix was manually created using the data in the MOBLIE6. The default fuel specification and formulation data within MOVES for DuPage County was compared to the provided MOBILE6 data, and it was determined that the default data was appropriate for this analysis.

MOVES input relies on link-specific data. A link file includes the vehicle volume, average speed, facility type, and grade. The PM emissions vary by time of day and time of year. Volume and speed data for each link were provided by the traffic analysts for A.M. peak, P.M. peak, midday, and off-peak traffic conditions.

The traffic analysts provided schematic drawings for the A.M. peak and P.M. peak periods within the project area for each roadway section in the study area for 2030 and 2040 (CH2M HILL, 2012). These files represented the volumes for the two-hour A.M. peak or P.M. peak period, and the volume was multiplied by 0.52 to estimate the peak one-hour volume. Drawings were also provided for the midday and off-peak time periods, but these files presented hourly vehicle volumes and were not adjusted.

The traffic analysts provided an aggregate average vehicle speed by facility type for the entire project area for A.M. peak, P.M. peak, midday, and off-peak traffic for 2030 and 2040. Typically, MOVES input would use unique average speed values for each link. The estimated vehicle speeds are especially consistent throughout the EO-WB project area, both by location and by travel direction. Therefore, the aggregate values were used to estimate emission factors. These emission factors account for average speed that includes slower speeds and idling at signals.

Idling traffic was not considered separately for this analysis. The average vehicle speeds used to estimate emission factors are shown in Table I-1.

TABLE I-1
Average Speeds by Functional Class in Miles per Hour

Scenario	Functional Class	A.M. Peak	P.M. Peak	Midday	Off-Peak
2040 Build	Freeway	33	41	44	52
	Primary Arterial	37	37	42	46
	Secondary Arterial	27	27	32	42
	Collector	27	29	33	37
2040 No-Build	Freeway	29	42	43	52
	Primary Arterial	32	36	40	46
	Secondary Arterial	27	29	33	42
	Collector	26	28	32	38
2030 Build	Freeway	52	35	44	43
	Primary Arterial	46	41	43	41
	Secondary Arterial	42	34	37	33
	Collector	47	31	34	32

For each intersection and analysis year, MOVES was run four times a day (A.M. peak, P.M. peak, midday, and off-peak) for four different months (January, April, July, and October) to account for different climate conditions throughout the year. For every link, a set of 16 emission factors in units of grams per mile were developed for use in the 2040 dispersion model analysis, and an additional set of 16 emission factors were developed for use in the 2030 dispersion model analysis.

4. Estimate Emissions from Road Dust, Construction, and Additional Sources

Road dust emissions were not included in the analysis as described in step 2. Construction emissions were not included because construction will not occur at any individual location for more than five years. No additional sources of $PM_{2.5}$ emissions were included. It was assumed that $PM_{2.5}$ concentrations due to any nearby emissions sources are included in the ambient monitor values that are used as background concentrations. In addition, this transportation project is not expected to result in changes to emissions from nearby sources.

5. Select an Air-Quality Model, Data Inputs, and Receptors

The USEPA's CAL3QHCR air dispersion model was used to estimate concentrations of $PM_{2.5}$ due to project operation. The model uses traffic data, emission factor data, and meteorological data to estimate ground-level concentrations of $PM_{2.5}$ at a series of receptors.

For each modeled scenario, the model setup included a series of links in the vicinity of interchange identified as a hot-spot. A link is a section of roadway with similar traffic/activity conditions and characteristics, which primarily include volume, speed, and facility type. For example, a link would be a road section between other road sections to account for volume changes at each intersection. When possible, links of similar characteristics (facility type and average speed) were combined to reduce the overall number of links input. This method was used primarily for freeway sections where volumes from longer parallel sections could be combined. Link-specific inputs included length, mixing zone width, hourly volume, and emission factor. Mixing zone width is defined as the road with plus 20 feet for free flow links, according to modeling guidance (PM guide). A conservative link height of 0 feet was assumed for all links for simplicity.

CAL3QHCR requires the vehicle volume and emission factor for each hour of the day. The PM hot-spot guidance suggests 3-hour A.M. and P.M. peak periods, but the traffic analysis for this project assumed 2-hour A.M. and P.M. peak periods. The volume in vehicles per hour was calculated for each roadway section as described above in Section 3. The hourly volume was assigned to each hour of the day, as shown in Table I-2, to be consistent with the PM hot-spot guidance.

Meteorological input files were processed using surface data and upper air data. Surface meteorological data from O'Hare Airport was used in the analysis. Data from O'Hare Airport is considered representative of the project based on both proximity and land use types. Upper air data consists of twice daily radiosonde measurements that are taken at a limited number of stations throughout the country.

The upper air station, located at the Greater Peoria Airport in Peoria, Illinois, was considered the representative upper air station based on latitude and distance from the project area. Although the project area is located near Lake Michigan, an inland upper air station at a similar latitude is appropriate. As recommended in EPA's "Guideline on Air Quality Models" (Appendix W to 40 CFR Part 51), five consecutive years of the most recent and readily available meteorological data were used for the dispersion modeling analysis. The five most recent years of data publicly available from EPA's Support Center for Regulatory Atmospheric Modeling were 1986 through 1990.

Hourly O'Hare surface data was processed with Peoria upper air data for the years 1986-1990 using the RAMMET meteorological data preprocessor.

For each scenario, CAL3QHCR was run separately for each of the five years of meteorological data. CAL3QHCR does not distinguish between emissions changes due to seasonal differences; therefore, each season was run separately, for a total of 20 model runs per scenario. Table I-2 summarizes CAL3QHCR modeling options.

TABLE I-2
CAL3QHCR Model Input Summary

Parameter	Description
Surface Roughness Length	108 cm (city land use – single family residential)
Surface Meteorological Data	O'Hare Airport (1986-1991)
Upper Air Data	Peoria Upper Air Station (1986-1991)
Source Height	0 meters
Re captor Height	1.8 meters
A.M. Peak Hours [a]	6-8

TABLE I-2
CAL3QHCR Model Input Summary

Parameter	Description
Midday Hours [a]	9-15
P.M. Peak Hours [a]	16-18
Off-peak Hours [a]	1-5, 19-24

[a] Traffic volumes and emission factors varied by time of day and were input in CAL3QHCR for each of the listed hours. The hours represent the times recommended in the PM hot-spot guidance.

Receptors were placed in order to estimate the highest concentrations of $PM_{2.5}$ to determine any possible violations of the NAAQS. The software used to run CAL3QHCR had a limitation of 600 receptors in a single model run. A receptor grid was placed over the project area with the smallest receptor spacing that would include the desired area. Highest concentrations were expected to occur at the intersections of the highest-volume roadways. Identical receptor grids were used for No-Build and Build Alternatives in order to directly compare project effects. Each grid was 1,700 meters by 950 meters with 50-meter resolution between receptors. The receptor spacing is coarser than what is recommended in the guidance; however, the receptors were placed as close to the roadways as possible to capture maximum concentrations. In addition, because the model assumed flat terrain, it is unlikely that elevated concentrations occurred in locations not covered by the receptors. The grid was centered over each modeled interchange, and gridded receptors that fell within five meters of any project feature or other locations where public would normally be present for a limited timed were removed, according to the PM guidance.

Exhibits I-1 through I-8 show the graphical representation of roadway links and receptor locations for each modeled scenario.

6. Determine Background Concentrations from Nearby and Other Sources

The 2010 annual $PM_{2.5}$ design values were provided by IEPA for monitors in the project vicinity. The design value of 13.0 μg/m^3 from Schiller Park was used at the background concentration for the hot-spot analysis. This monitor represents the highest monitored concentration in the project area, and it is located within 10 miles of each modeled location. There was 13.0 μg/m^3 added to the CAL3QHCR modeled design values for comparison to the NAAQS. This value is likely conservative because it is expected that ambient $PM_{2.5}$ concentrations will be lower in future years, as a result of the State Implementation Plan and the general trend in declining vehicle emissions due to technological advances.

It was assumed that emissions from other nearby sources are already included in the ambient monitoring data. Nearby sources include O'Hare Airport, local industrial sources, and railroads. The project addresses vehicle transportation needs, and emissions from these sources are not expected to change as a result of the project.

7. Calculate Design Values and Determine Conformity

The previous steps of the PM hot-spot analysis were combined to determine a design value that was compared to the NAAQS for each modeled scenario. The annual $PM_{2.5}$ design value is currently defined as the average of three consecutive years' annual averages, each estimated using equally-weighted quarterly averages. This NAAQS is met when the three-year average concentration is less than or equal to the annual $PM_{2.5}$ NAAQS (currently 15.0 µg/m^3).

CAL3QHCR output provides the maximum quarterly average $PM_{2.5}$ concentration at each receptor. For the receptor with the maximum modeled concentration in each scenario, the following steps were used to determine the design value, as outlined in the guidance.

1. For each year of meteorological data, determine the average concentration in each quarter.
2. Within each year of meteorological data, add the average concentrations of all four quarters and divide by four to calculate the average annual modeled concentration for each year of meteorological data.
3. Sum the modeled average annual concentrations from each year of meteorological data, and divide by the number of years of meteorological data used.
4. Add the average annual background concentration (13.0 µg/m^3 as described in step 6) to the average annual modeled concentration to determine the total average annual concentration.

Table I-3 summarizes the design values that correspond to the receptor with the maximum modeled concentration for each of the modeled scenarios. All design values for the maximum receptor location are below the annual $PM_{2.5}$ NAAQS of 15.0 µg/m^3. It is implied that the design value for all other receptors within the model domain are equal to, or lower than, the values in Table I-3, and therefore, are also below the NAAQS.

The $PM_{2.5}$ concentrations in the vicinity of Elgin O'Hare and West Bypass corridors are greater for the 2040 Build Alternative than the concentrations for the 2040 No-Build Alternative; however, all concentrations for the 2040 Build Alternative are lower than the 1997 annual $PM_{2.5}$ NAAQS. This is due to the localized increases in traffic volumes on the new roadway. The other three scenarios do not show as much variation between No-Build and Build concentrations and the design values for all scenarios are dominated by the background concentration.

The 2030 interim year $PM_{2.5}$ concentrations are similar to the modeled concentrations for 2040 Build Alternative. The emission rates are greater in 2030; thus, all variations are due to the differences in projected volumes between 2030 and 2040.

TABLE I-3
Annual $PM_{2.5}$ Concentrations (µg/m^3)

Location	2040 No-Build Alternative	2040 Build Alternative	2030 Interim Year
Elgin O'Hare and West Bypass corridors	13.2	14.0	13.8
Elgin O'Hare corridor and I-290	13.8	13.5	13.6
Elgin O'Hare corridor and Roselle Road	13.4	13.4	13.4
West Bypass corridor and I-90	13.8	13.6	13.8

Notes: All concentrations are for the receptor with the maximum concentration and include a background concentration of 13 µg/m^3
Annual $PM_{2.5}$ NAAQS is 15 µg/m^3
µg/m^3= micrograms per cubic meter

The project does not create a violation of the annual $PM_{2.5}$ NAAQS or worsen an existing exceedance of the NAAQS, which supports the project level conformity determination.

8. Consider Mitigation or Control Measures

No mitigation of air quality effects was proposed. All modeled annual $PM_{2.5}$ concentrations are below the NAAQS.

9. Document the PM Hot-Spot Analysis

This report documents the PM hot-spot analysis. Because of the large amount of input and output files, they are not included in this report and are available electronically upon request.

Quantitative Mobile Source Air Toxics Analysis

The USEPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) (FHWA, 2009). These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter. While the Federal Highway Administration (FHWA) considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future USEPA rules.

The FHWA developed a tiered approach for analyzing Mobile Source Air Toxics (MSAT) in National Environmental Protection Act (NEPA) documents, depending on specific project circumstances. The FHWA has identified three levels of analysis:

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

For projects warranting MSAT analysis, the seven priority MSAT should be analyzed. The EO-WB project is considered a project with higher potential for MSAT effects because it meets the following criteria outlined in the MSAT guidance:

> "Create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the AADT is projected to be in the range of 140,000 to 150,000 or greater by the design year; and also, Proposed to be located in proximity to populated areas."

Projects falling within this category should be more rigorously assessed for impacts. A quantitative analysis was performed to forecast project area-specific emission trends of the priority MSAT for the 2010 existing conditions, 2040 No-Build Alternative, and 2040 Build Alternative.

Incomplete or Unavailable Information for Project-Specific Mobile Source Air Toxics Health Impacts Analysis

When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an EIS, and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking. The following information is from Appendix C of the *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA* (FHWA, 2009).

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

USEPA Role

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

Role of Other Organizations

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA* (FHWA, 2009). Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI, http://pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions substantially decrease (HEI, http://pubs.healtheffects.org/view.php?id=306).

Problems with Modeling Methodologies

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts (each step in the process build on the model predictions obtained in the previous step). All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 years) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable. The results produced by the USEPA's MOBILE6.2 model, the California EPA's Emfac2007 model, and the USEPA's DraftMOVES2009 model in forecasting MSAT emissions are highly inconsistent. Indications from the development of the MOVES model are that MOBILE6.2 significantly underestimates diesel PM emissions and significantly overestimates benzene emissions.

Regarding the air dispersion modeling, an extensive evaluation of USEPA's guideline CAL3QHC model was conducted in an NCHRP study (http://www.epa.gov/scram001/dispersion_alt.htm#hyroad), which documents poor model performance at ten sites across the country. Intensive monitoring was conducted at three of those sites, and less intensive monitoring was conducted at seven sites. The study indicates a bias of the CAL3QHC model to overestimate concentrations near highly congested intersections and underestimate concentrations near uncongested intersections. The consequence of this is a tendency to overstate the air quality benefits of mitigating congestion at intersections. Such poor model performance is less difficult to manage for demonstrating compliance with NAAQS for relatively short time frames than it is for forecasting individual exposure over an entire lifetime, especially given that some information needed for estimating 70-year lifetime exposure is unavailable. It is particularly difficult to reliably forecast MSAT exposure near roadways, and to determine the portion of time that people are actually exposed at a specific location.

MSAT Toxicity Estimates

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, which is a concern expressed by HEI (http://pubs.healtheffects.org/view.php?id=282). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The USEPA (http://www.epa.gov/risk/basicinformation.htm#g) and the HEI (http://pubs.healtheffects.org/getfile.php?u=395) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

Level of Risk

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

Conclusions

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

MSAT Analysis

Emissions were estimated with MOVES using the average daily traffic (ADT) for each freeway, primary arterial, secondary arterial, and collector in the study area and the average daily vehicle speed (see Table I-4). All roadways for which ADT volumes were available were included in the analysis. Exhibit I-9 visually shows the ADT of the roadways that were included in the MSAT emission estimate. Attachment I-1 lists each link with the respective hourly volume, average speed, and estimated link length for each scenario.

Local inputs for age distribution, vehicle mix, meteorology, and fuel data were consistent with the inputs used for the $PM_{2.5}$ hot-spot analysis. Hourly emissions of each pollutant were calculated for and each link. Emissions from each link were summed and then multiplied by 24 hours to estimate the total hours per day of emissions of each pollutant.

TABLE I-4
Average Daily Vehicle Speeds in Miles per Hour)

Functional Class	2010 Existing Condition	2040 No-Build Alternative	2040 Build Alternative
Access-controlled Highway	41.5	41.5	42.5
Primary Arterial	39.75	38.5	40.5
Secondary Arterial	34.25	32.75	32
Collector	32	31	31.5

MOVES has the capability to directly estimate emissions for acrolein, benzene, 1,3-butadiene, formaldehyde, and naphthalene. Diesel particulate matter was assumed to the PM_{10} running exhaust, crankcase exhaust, brake wear, and tire wear from all diesel vehicles. MOVES does not calculate polycyclic organic matter (POM) emissions, and it is assumed that POM emissions follow a trend similar to the other pollutants.

Total predicted emissions in the study area are summarized in Table I-5. There are currently no standards for determining MSAT impacts. The analysis shows that emissions from the 2040 Build scenario are greater than the 2040 No-Build emissions. However, Table I-5 also shows a significant decrease in all MSAT emissions as compared to existing conditions.

TABLE I-5
Daily Project Area MSAT Emissions in Pounds Per Day

Pollutant	2010 Existing Condition	2040 No-Build Alternative	2040 Build Alternative
Benzene	50.85	11.81	13.44
Acrolein	3.7	0.5	0.6
1,3-Butadiene	12.2	2.4	2.8
Diesel PM [a]	685.9	31.9	27.8

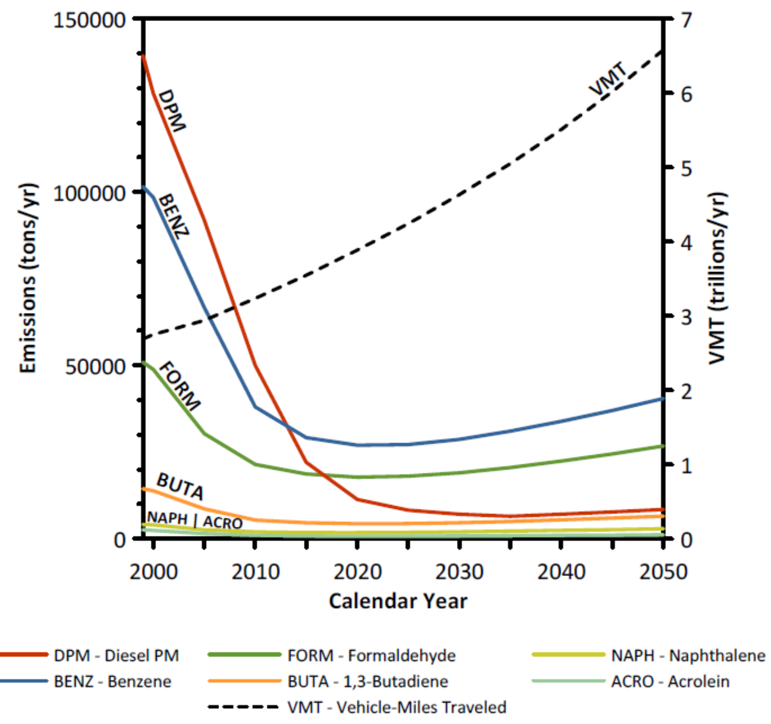
TABLE I-5
Daily Project Area MSAT Emissions in Pounds Per Day

Pollutant	2010 Existing Condition	2040 No-Build Alternative	2040 Build Alternative
Formaldehyde	75.8	8.4	9.6
Naphthalene	23.2	23.2	19.4
POM [b]	NA	NA	NA

[a] PM_{10} emissions from diesel running exhaust and crankcase exhaust.
[b] POM emissions are not calculated by MOVES, but the trend would be similar to that for naphthalene.

Regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of USEPA's national control programs that are projected to reduce annual MSAT emissions by 72 percent between 1999 and 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, vehicle miles of travel (VMT) growth rates, and local control measures. However, the magnitude of the USEPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases. This downward trend is shown in the figure below.

NATIONAL MSAT EMISSION TRENDS 1999 – 2050
FOR VEHICLES OPERATING ON ROADWAYS
USING EPA's MOBILE6.2 MODEL



Notes:
(1) Annual emissions of POM are projected to be 561 tons/year for 1999, decreasing to 373 tons/year for 2050.
(2) Trends for specific locations may be different, depending on locally derived information representing VMT, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors.

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

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

Greenhouse Gas (GHG) Emissions Evaluation

Climate change is an important national and global concern. While the earth has gone through many natural changes in climate in its history, there is general agreement that the earth's climate is currently changing at an accelerated rate and will continue to do so in the foreseeable future. Anthropogenic (human-caused) greenhouse gas (GHG) emissions contribute to this rapid change. Carbon dioxide (CO_2) makes up the largest component of these GHG emissions. Other prominent transportation GHGs include methane (CH_4) and nitrous oxide (N_2O).

Many GHGs occur naturally. Water vapor is the most abundant GHG and makes up approximately two-thirds of the natural greenhouse effect. However, the burning of fossil fuels and other human activities are adding to the concentration of GHGs in the atmosphere. Many GHGs remain in the atmosphere for time periods ranging from decades to centuries. GHGs trap heat in the earth's atmosphere. Because the atmospheric concentration of GHGs continues to climb, our planet will continue to experience climate-related phenomena. For example, warmer global temperatures can cause changes in precipitation and sea levels.

To date, no national standards have been established regarding GHGs, nor has EPA established criteria or thresholds for ambient GHG emissions pursuant to its authority to establish motor vehicle emission standards for CO_2 under the Clean Air Act. However, there is a considerable body of scientific literature addressing the sources of GHG emissions and their adverse effects on climate, including reports from the Intergovernmental Panel on Climate Change, the U.S. National Academy of Sciences, and EPA and other Federal agencies. GHGs are different from other air pollutants evaluated in Federal environmental reviews because their impacts are not localized or regional due to their rapid dispersion into the global atmosphere, which is characteristic of these gases. The affected environment for CO_2 and other GHG emissions is the entire planet. In addition, from a quantitative perspective, global climate change is the cumulative result of numerous and varied emissions sources (in terms of both absolute numbers and types), each of which makes a relatively small addition to global atmospheric GHG concentrations. In contrast to broad scale actions such as actions involving an entire industry sector or very large geographic areas, it is difficult to isolate and understand the GHG emissions impacts for a particular transportation project. Furthermore, there is presently no scientific methodology for attributing specific climatological changes to a particular transportation project's emissions.

Under NEPA, detailed environmental analysis should be focused on issues that are significant and meaningful to decisionmaking.[1] Based on the nature of GHG emissions and the exceedingly small potential GHG impacts of the proposed action, as discussed below and shown in Table I-6, the GHG emissions from the proposed action will not result in "reasonably foreseeable significant adverse impacts on the human environment" (40 CFR 1502.22[b]).

The context in which the emissions from the proposed project will occur, together with the expected GHG emissions contribution from the project, illustrate why the project's GHG emissions will not be significant and will not be a substantial factor in the decisionmaking. The transportation sector is the second largest source of total GHG emissions in the United States, behind electricity generation. The transportation sector was responsible for approximately 27 percent of all anthropogenic (human-caused) GHG emissions in the United States in 2009.[2] The majority of transportation GHG emissions are the result of fossil fuel combustion. CO_2 makes up the largest component of these GHG emissions. United States CO_2 emissions from the consumption of energy accounted for about 18 percent of worldwide energy consumption CO_2 emissions in 2009.[3] United States transportation CO_2 emissions accounted for about six percent of worldwide CO_2 emissions.[4]

While the contribution of GHGs from transportation in the United States, as a whole, is a large component of United States' GHG emissions, as the scale of analysis is reduced the GHG contributions become quite small. Table I-6 presents the relationship between current and projected Illinois highway GHG emissions and total global GHG emissions, as well as information on the scale of the project relative to statewide travel activity. The emissions in Table I-6 are presented as carbon dioxide equivalent (CO_2e) emissions, which take into account the global warming potential of chemical emissions from a source. The combustion of fossil fuels emits small amounts of N_2O and CH_4. The global warming potential of N_2O and CH_4 are 310 and 21 times that of CO_2, respectively.

The potential CO_2e emissions due to the project were estimated using the MOVES emission factor model. The estimates used ADT volumes and average speeds for access-controlled highways, primary arterials, and secondary arterials in the project area. The results were multiplied by 365 to present the GHG emissions in terms of million metric tons of CO_2e ($MMTCO_2e$) per year (see Table I-6). The annual CO_2e emissions due to the project were compared to projected global emissions and projected emissions from the entire State of Illinois.

[1] See 40 CFR 1500.1(b), 1500.2(b), 1500.4(g), and 1501.7.

[2] Calculated from data in U.S. Environmental Protection Agency, Inventory of Greenhouse Gas Emissions and Sinks, 1990-2009.

[3] Calculated from data in U.S. Energy Information Administration International Energy Statistics, Total Carbon Dioxide Emissions from the Consumption of Energy, http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=90&pid=44&aid=8, accessed 9/12/11.

[4] Calculated from data in EIA figure 104: http://205.254.135.24/oiaf/ieo/graphic_data_emissions.html and EPA table ES-3: http://epa.gov/climatechange/emissions/downloads11/US-GHG-Inventory-2011-Executive-Summary.pdf.

TABLE I-6
Annual Project GHG Emissions in Million Metric Tons CO_2 Equivalent per Year

Pollutant	Global CO_2e[a]	Illinois CO_2e[b]	Illinois % of Global Total	Project CO_2e[c]
Existing Conditions (2010)	31,305	60.8	0.19%	0.92
Future Projections (2040)	46,103	84.0	0.18%	0.96

[a] Global emissions from EIA's International Energy Outlook 2011. The 2040 emissions were estimated by applying 1.3 percent growth rate to 2035 emissions.
[b] Illinois emissions from MOVES using Illinois defaults.
[c] Project emissions from MOVES using project volume and speed data.

Based on emissions estimates from MOVES, and global CO_2e estimates and projections from the Energy Information Administration, CO_2e emissions from motor vehicles in the entire state of Illinois contributed less than one percent of global emissions in 2010 (0.19 percent), and are projected to contribute an even smaller fraction (0.18 percent) in 2040. Illinois emissions represent a smaller share of global emissions in 2040 because global emissions increase at a faster rate. Based on modeled project CO_2e emissions, the proposed project could result in a potential increase in global CO_2 emissions in 2040 (0.0021 percent), and a corresponding increase in Illinois's share of global emissions in 2040 (1.14 percent). This very small change in global emissions is well within the range of uncertainty associated with future emissions estimates.[5, 6]

Mitigation for Global GHG Emissions

To help address the global issue of climate change, USDOT is committed to reducing GHG emissions from vehicles traveling on our nation's highways. USDOT and EPA are working together to reduce these emissions by substantially improving vehicle efficiency and shifting toward lower carbon intensive fuels. The agencies have jointly established new, more stringent fuel economy, and also the first GHG emissions standards for model year 2012-2016 cars and light trucks. The agencies have issued a notice of intent to propose even more stringent standards for model year 2017-2025 vehicles, with an ultimate fuel economy standard of 54.5 miles per gallon for cars and light trucks by model year 2025. Further, on August 9, 2011, the agencies jointly proposed the first fuel economy and GHG emissions standards for heavy-duty trucks and buses.[7] Increasing use of technological innovations that can improve fuel economy, such as gasoline- and diesel-electric hybrid vehicles, will improve air quality and reduce CO_2 emissions future years.

[5] For example, Figure 114 of the Energy Information Administration's *International Energy Outlook 2010* shows that future emissions projections can vary by almost 20 percent, depending on which scenario for future economic growth proves to be most accurate.

[6] When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an Environmental Impact Statement, and there is incomplete or unavailable information, the agency is required make clear that such information is lacking (40 CFR 1502.22). The methodologies for forecasting GHG emissions from transportation projects continue to evolve, and the data provided should be considered in light of the constraints affecting the currently available methodologies. As previously stated, tools such as EPA's MOVES model can be used to estimate vehicle exhaust emissions of CO_2 and other GHGs. However, only rudimentary information is available regarding the GHG emissions impacts of highway construction and maintenance. Estimation of GHG emissions from vehicle exhaust is subject to the same types of uncertainty affecting other types of air quality analysis, including imprecise information about current and future estimates of vehicle miles traveled, vehicle travel speeds, and the effectiveness of vehicle emissions control technology. Finally, there is presently no scientific methodology that can identify causal connections between individual source emissions and specific climate impacts at a particular location.

[7] For more information on fuel economy proposals and standards, see the National Highway Traffic Safety Administration's Corporate Average Fuel Economy website: http://www.nhtsa.gov/fuel-economy/.

Consistent with its view that broad-scale efforts hold the greatest promise for meaningfully addressing the global climate change problem, FHWA is engaged in developing strategies to reduce transportation's contribution to GHGs (particularly CO_2 emissions) and to assess the risks to transportation systems and services from climate change. In an effort to assist States and Metropolitan Planning Organizations in performing GHG analyses, FHWA has a project underway to develop a *Handbook for Estimating Transportation GHG Emissions for Integration into the Planning Process.* The Handbook will present methodologies reflecting good practices for the evaluation of GHG emissions at the transportation program level, and will demonstrate how such evaluation may be integrated into the transportation planning process. FHWA is also working to refine a web-based tool for use at the statewide level to model a large number of GHG reduction scenarios and alternatives for use in transportation planning, climate action plans, scenario planning exercises, and in meeting state GHG reduction targets and goals. To assist states and MPOs in assessing climate change vulnerabilities to their transportation networks, FHWA has developed a draft vulnerability and risk assessment conceptual model, and is piloting it in five locations.

Even though project-level mitigation measures will not have a substantial impact on global GHG emissions because of the exceedingly small amount of GHG emissions involved, the following measures during construction will have the effect of reducing GHG emissions. IDOT has three Special Provisions to reduce diesel exhaust air pollution from construction activities. These Special Provisions include: Ultra Low Sulfur Diesel Fuel, idling restrictions, and the use of diesel retrofits on older diesel construction equipment. Idling restrictions and equipment retrofits will also help to minimize GHG emissions.

Summary

This document does not incorporate an analysis of the GHG emissions or climate change effects of each of the alternatives because the potential change in GHG emissions is very small in the context of the affected environment. Because of the insignificance of the GHG impacts, those impacts will not be meaningful to a decision on the environmentally preferable alternative or to a choice among alternatives. As outlined above, FHWA is working to develop strategies to reduce transportation's contribution to GHGs (particularly CO_2 emissions) and to assess the risks to transportation systems and services from climate change. FHWA will continue to pursue these efforts as productive steps to address this important issue. Finally, the best practices for construction, described above, represent practicable project-level measures that, while not substantially reducing global GHG emissions, may help reduce GHG emissions on an incremental basis. In addition, it could contribute to a long-term and meaningful cumulative reduction when considered throughout the Federal-aid highway program.

References

Chicago Metropolitan Agency for Planning (CMAP). 2010. Interagency meeting. September.

CH2M HILL. 2012. *Peak and Off-Peak Vehicle Volumes for Air Quality Analysis*. February 1.

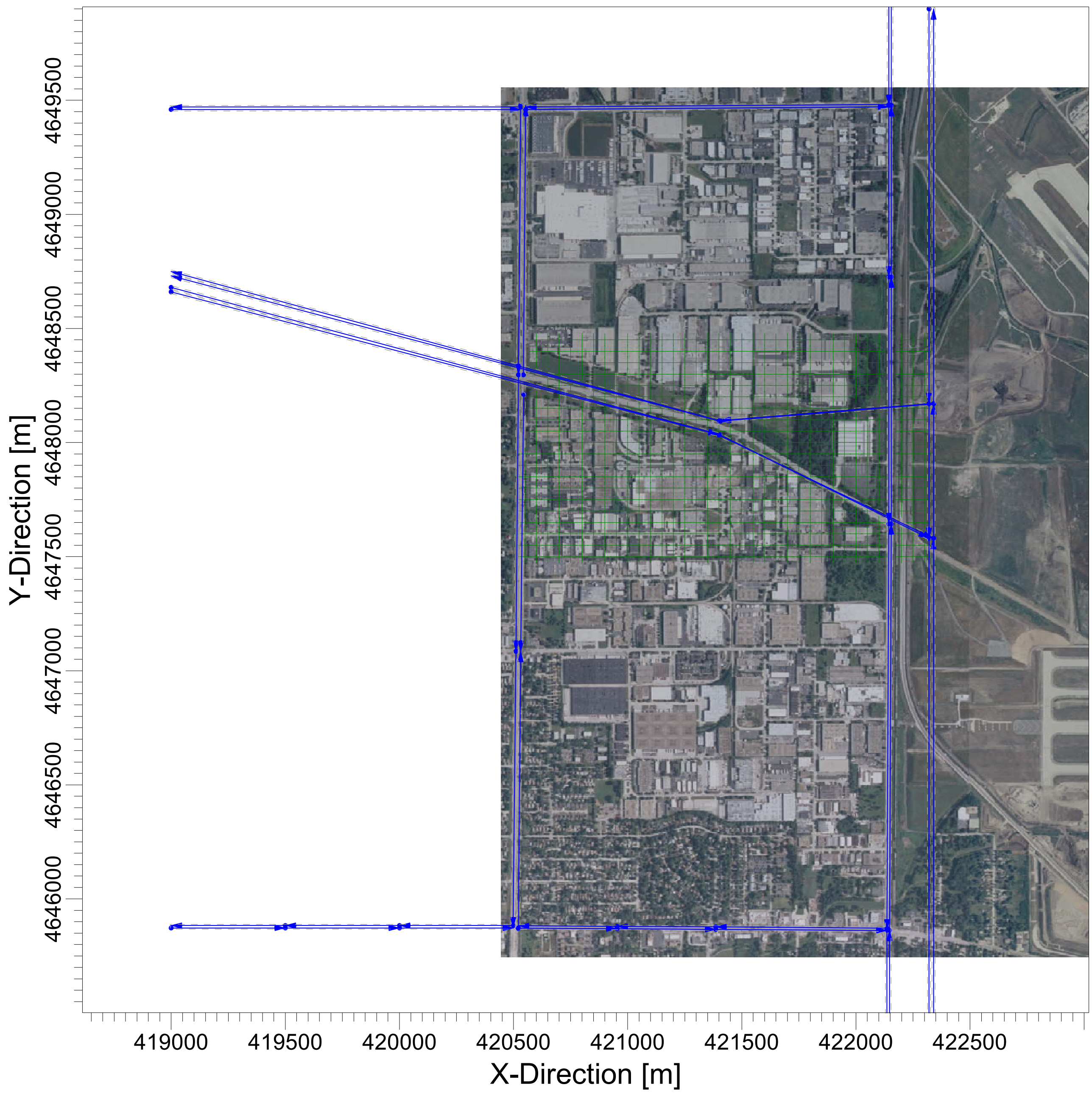
Federal Highway Administration (FHWA). 2009. *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents*. September 30.

Illinois Climate Change Advisory Group (ICCAG). 2007. Illinois Greenhouse Gas Emissions Inventory and Projections. World Resources Institute. February 22.

United States Environmental Protection Agency (USEPA). 2010. "Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas." Technical Memorandum. http://epa.gov/otaq/stateresources/transconf/policy/420b10040.pdf. December.

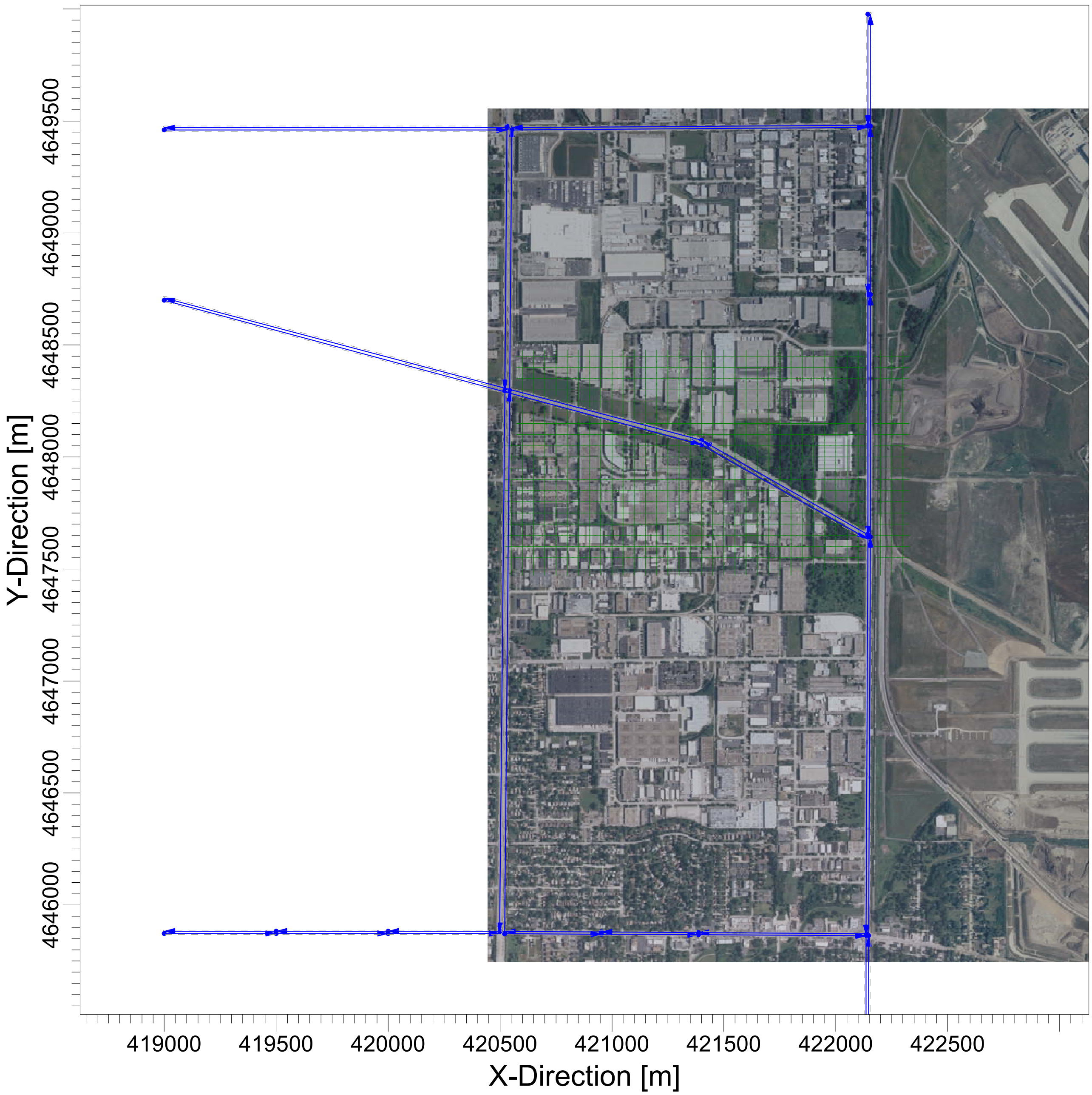
United States Environmental Protection Agency (USEPA). 2011. O'Hare Airport surface data and Peoria Airport upper air data. http://www.epa.gov/ttn/scram/metobsdata_databases.htm. Accessed on September 22.

Exhibit I-1
Elgin O'Hare and West Bypass Corridors Tollway Scenario Layout



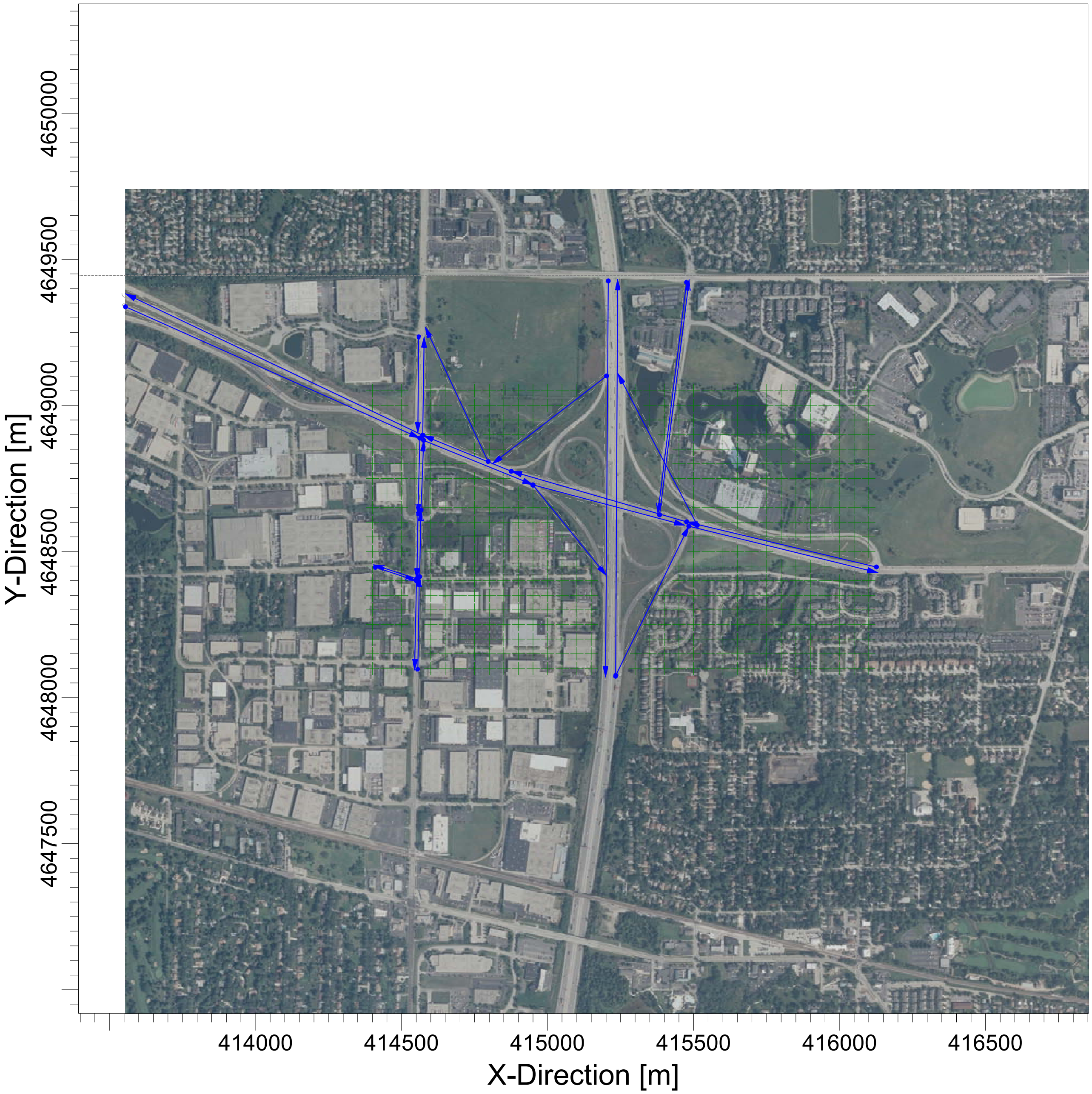
COMMENTS:	MODEL: **CAL3QHCR**	POLLUTANT: **Particulate**	COMPANY NAME: **CH2M Hill**	
			MODELER:	
	LINKS: **46**	RECEPTORS: **667**		
	SCALE: 1:28,080 0 1 m		DATE: **10/7/2011**	PROJECT / PLOT NO.:

Exhibit I-2
Elgin O'Hare and West Bypass Corridors No-Build Scenario Layout



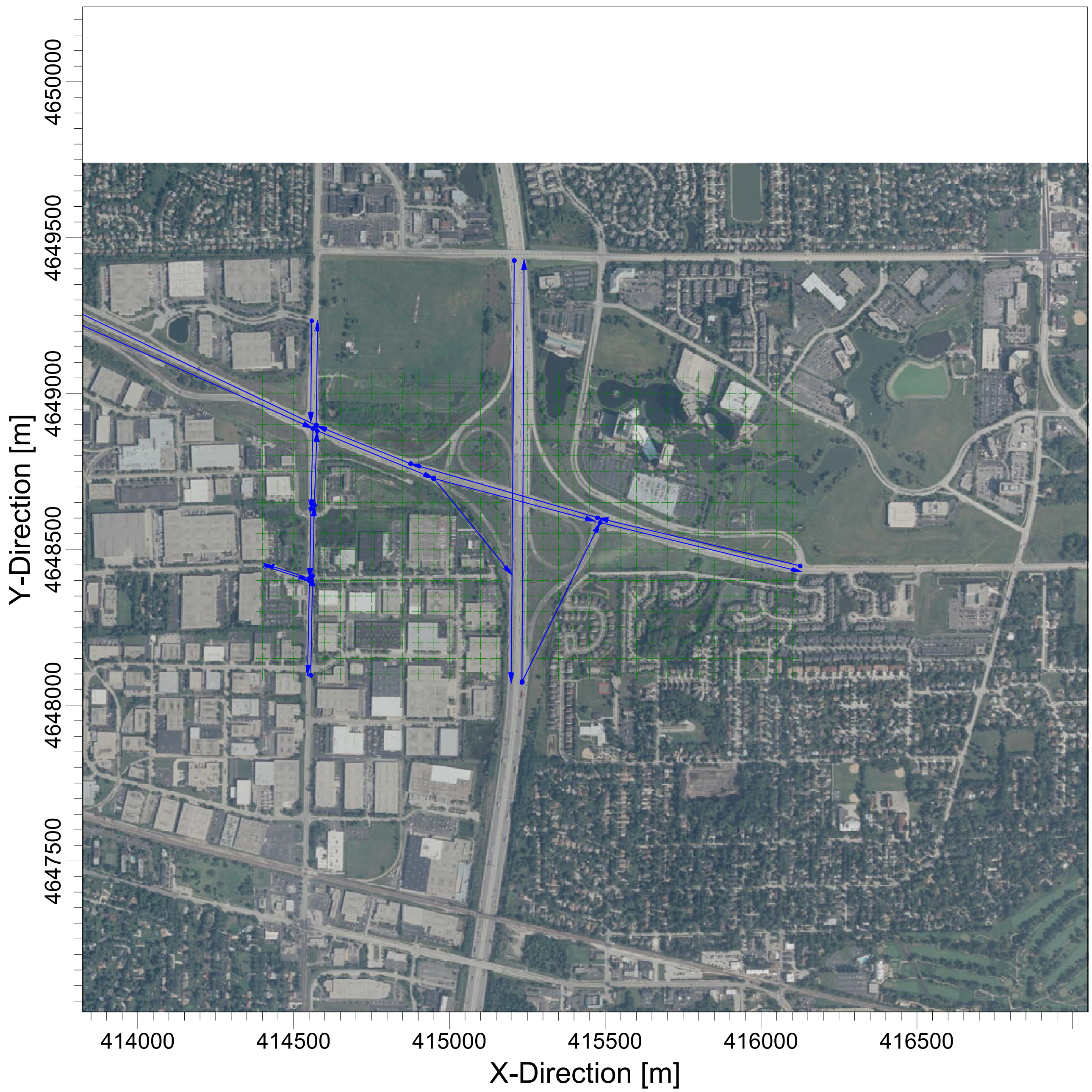
COMMENTS:	MODEL: **CAL3QHCR**	POLLUTANT: **Particulate**	COMPANY NAME: **CH2M Hill**	
			MODELER:	
	LINKS: **34**	RECEPTORS: **672**		
	SCALE: 1:28,703 (0 – 1 m)		DATE: **10/7/2011**	PROJECT / PLOT NO.:

Exhibit I-3
Elgin O'Hare Corridor and I-290 Tollway Scenario Layout



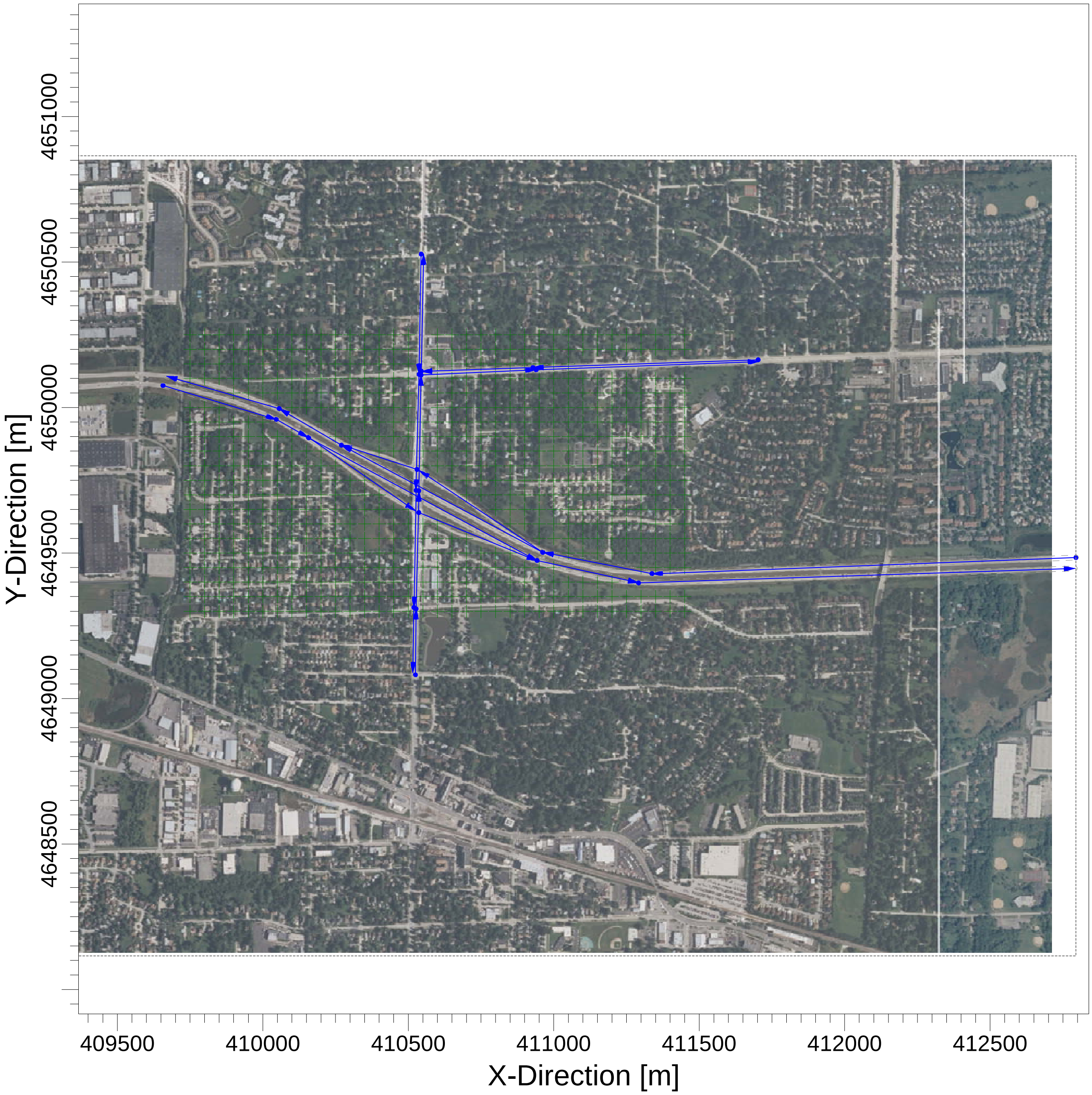
COMMENTS:	MODEL: **CAL3QHCR**	POLLUTANT: **Particulate**	COMPANY NAME: **CH2M Hill**	
			MODELER:	
	LINKS: **27**	RECEPTORS: **536**		
	SCALE: 1:22,016 0 0.5 m		DATE: **10/7/2011**	PROJECT / PLOT NO.:

Exhibit I-4
Elgin O'Hare Corridor and I-290 No-Build Scenario Layout



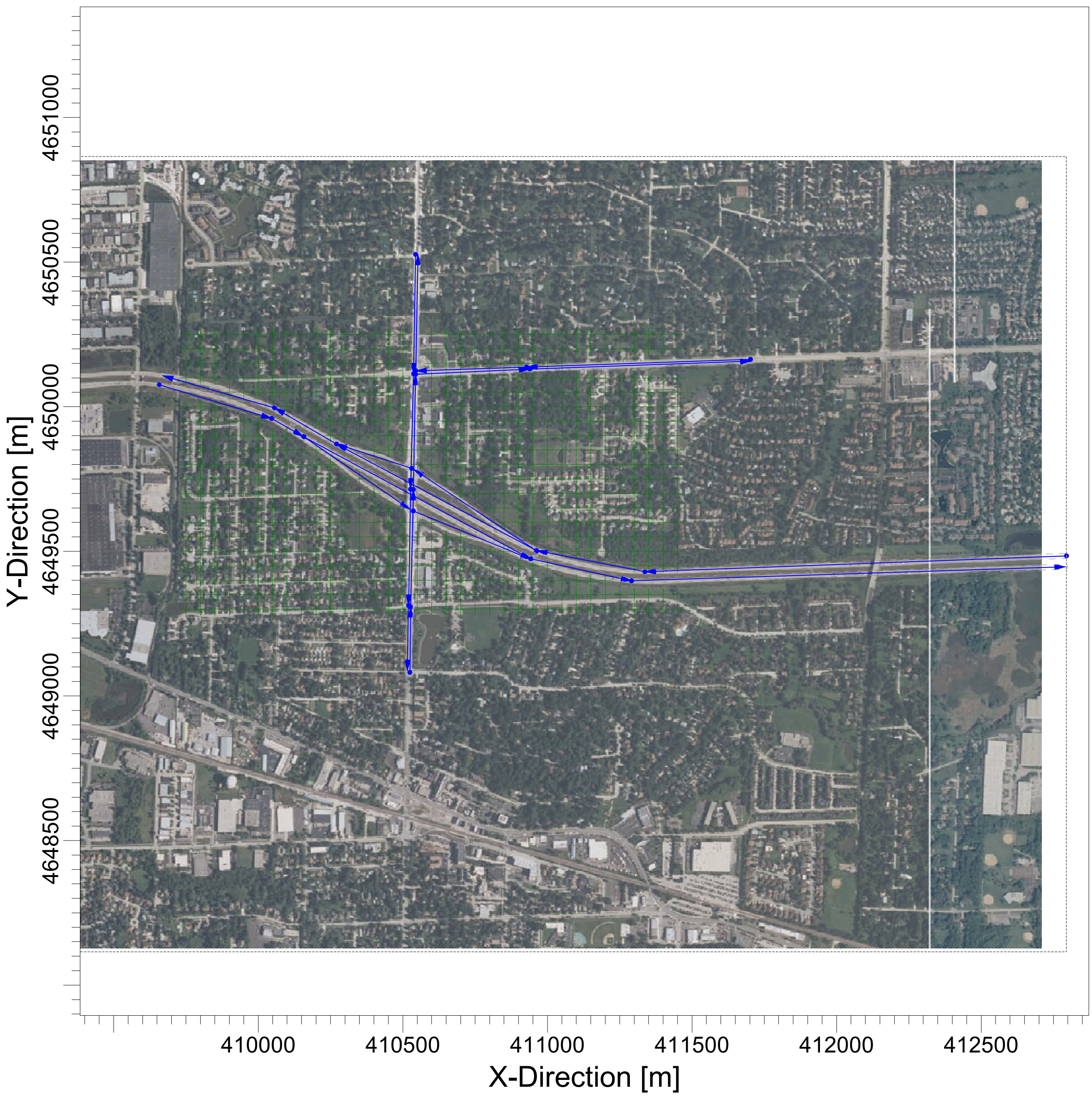
COMMENTS:	MODEL:	POLLUTANT:	COMPANY NAME:	
	CAL3QHCR	**Particulate**	**CH2M Hill**	
			MODELER:	
	LINKS: **22**	RECEPTORS: **636**		
	SCALE: 1:20,540 (0 — 0.5 m)		DATE: **10/18/2011**	PROJECT / PLOT NO.:

Exhibit I-5
Elgin O'Hare Corridor and Roselle Road Tollway Scenario Layout



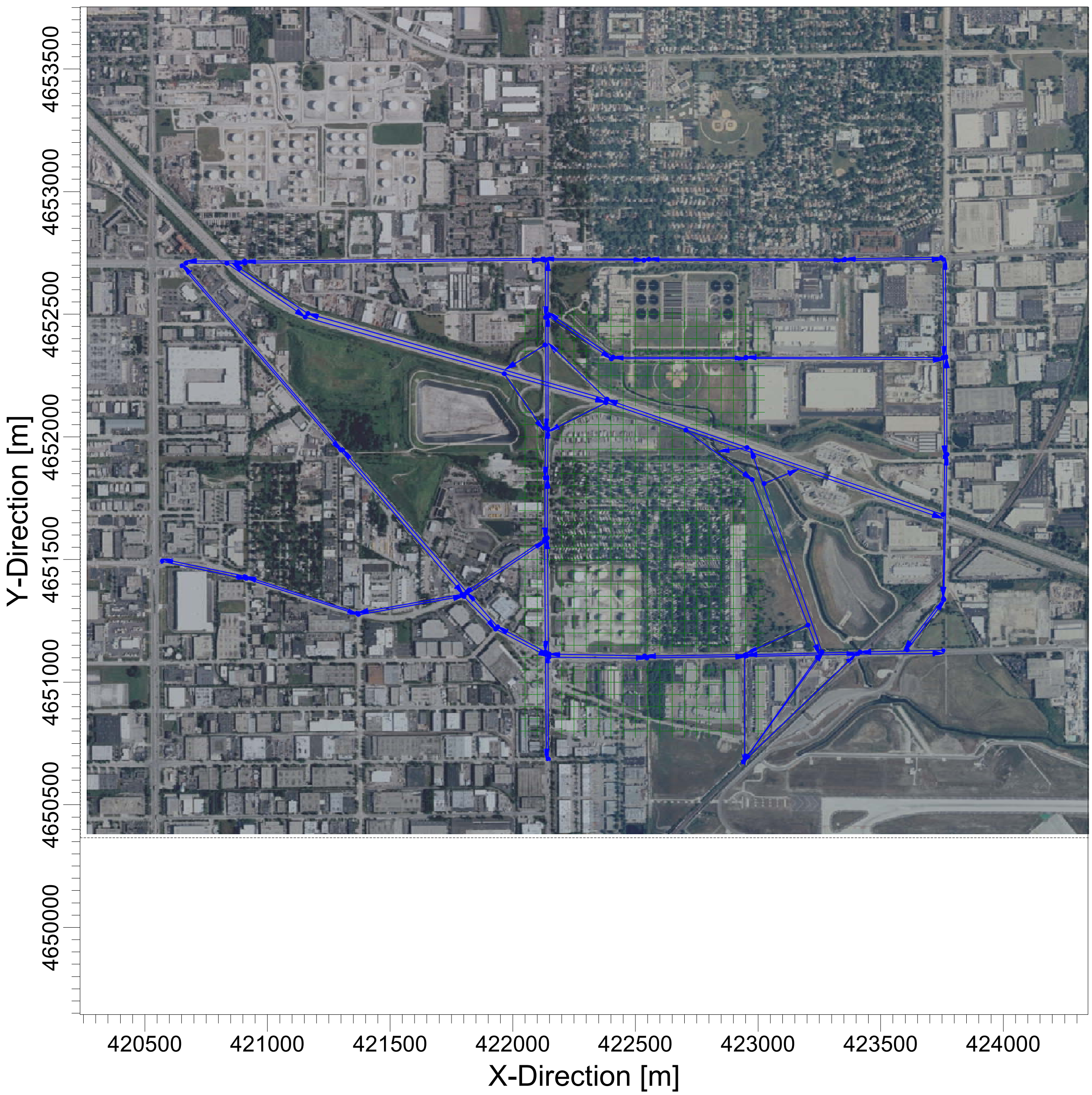
COMMENTS:	MODEL:	POLLUTANT:	COMPANY NAME:	
	CAL3QHCR	**Particulate**	**CH2M Hill**	
			MODELER:	
	LINKS: **26**	RECEPTORS: **630**		
	SCALE: 1:22,113 (0 — 0.5 m)		DATE: **10/7/2011**	PROJECT / PLOT NO.:

Exhibit I-6
Elgin O'Hare Corridor and Roselle Road No-Build Scenario Layout



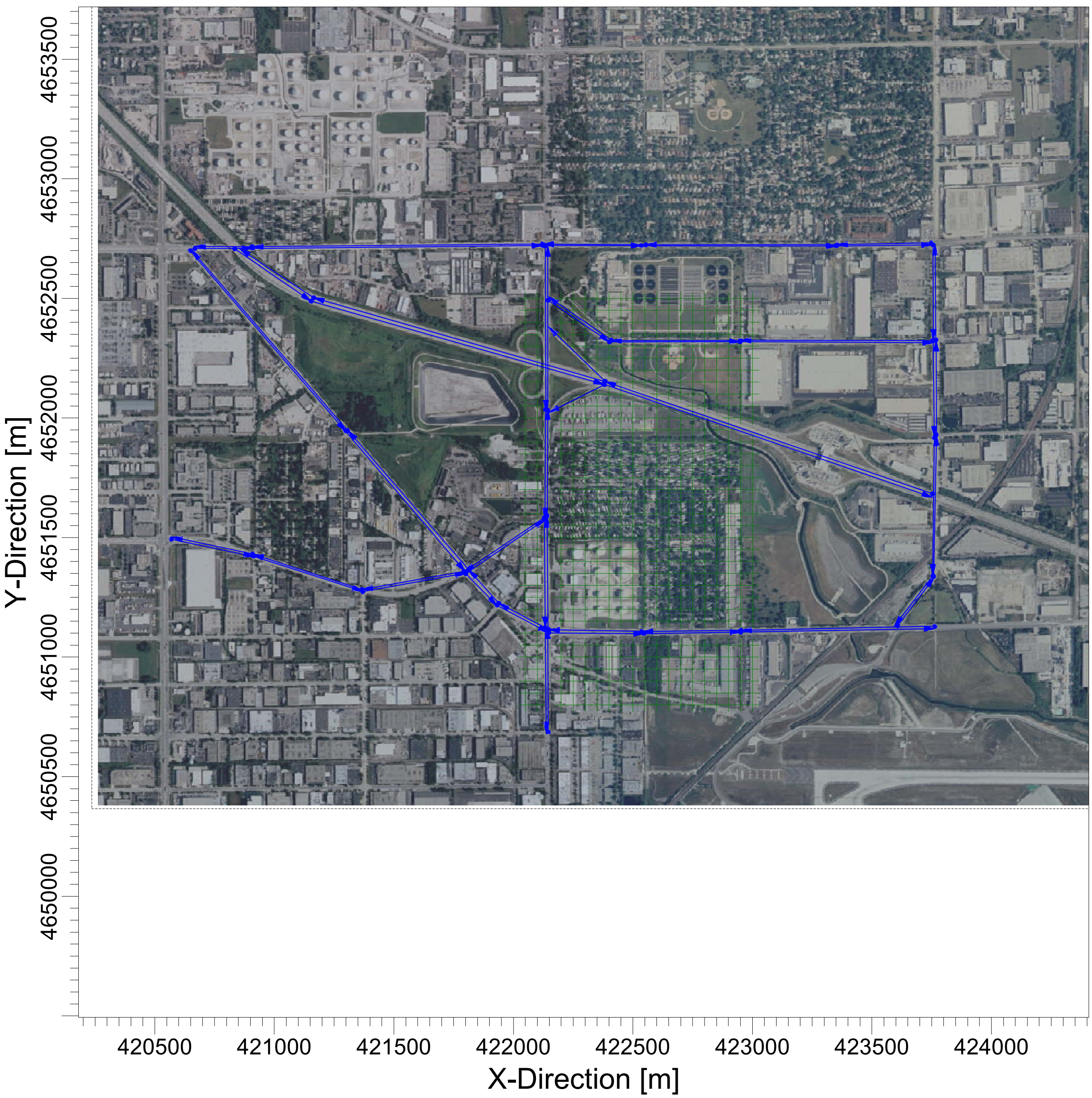
COMMENTS:	MODEL: **CAL3QHCR**	POLLUTANT: **Particulate**	COMPANY NAME: **CH2M Hill**	
			MODELER:	
	LINKS: **26**	RECEPTORS: **630**		
	SCALE: 1:22,217 0 0.5 m		DATE: **10/7/2011**	PROJECT / PLOT NO.:

Exhibit I-7
West Bypass Corridor and I-90 Tollway Scenario Layout



COMMENTS:	MODEL:	POLLUTANT:	COMPANY NAME:	
	CAL3QHCR	**Particulate**	**CH2M Hill**	
			MODELER:	
	LINKS: **80**	RECEPTORS: **595**		
	SCALE: 1:26,172	0 — 0.5 m	DATE: **10/7/2011**	PROJECT / PLOT NO.:

Exhibit I-8
West Bypass Corridor and I-90 No-Build Scenario Layout



COMMENTS:	MODEL: **CAL3QHCR**	POLLUTANT: **Particulate**	COMPANY NAME: **CH2M Hill**	
			MODELER:	
	LINKS: **62**	RECEPTORS: **621**		
	SCALE: 1:26,916 0 0.5 m		DATE: **10/7/2011**	PROJECT / PLOT NO.:

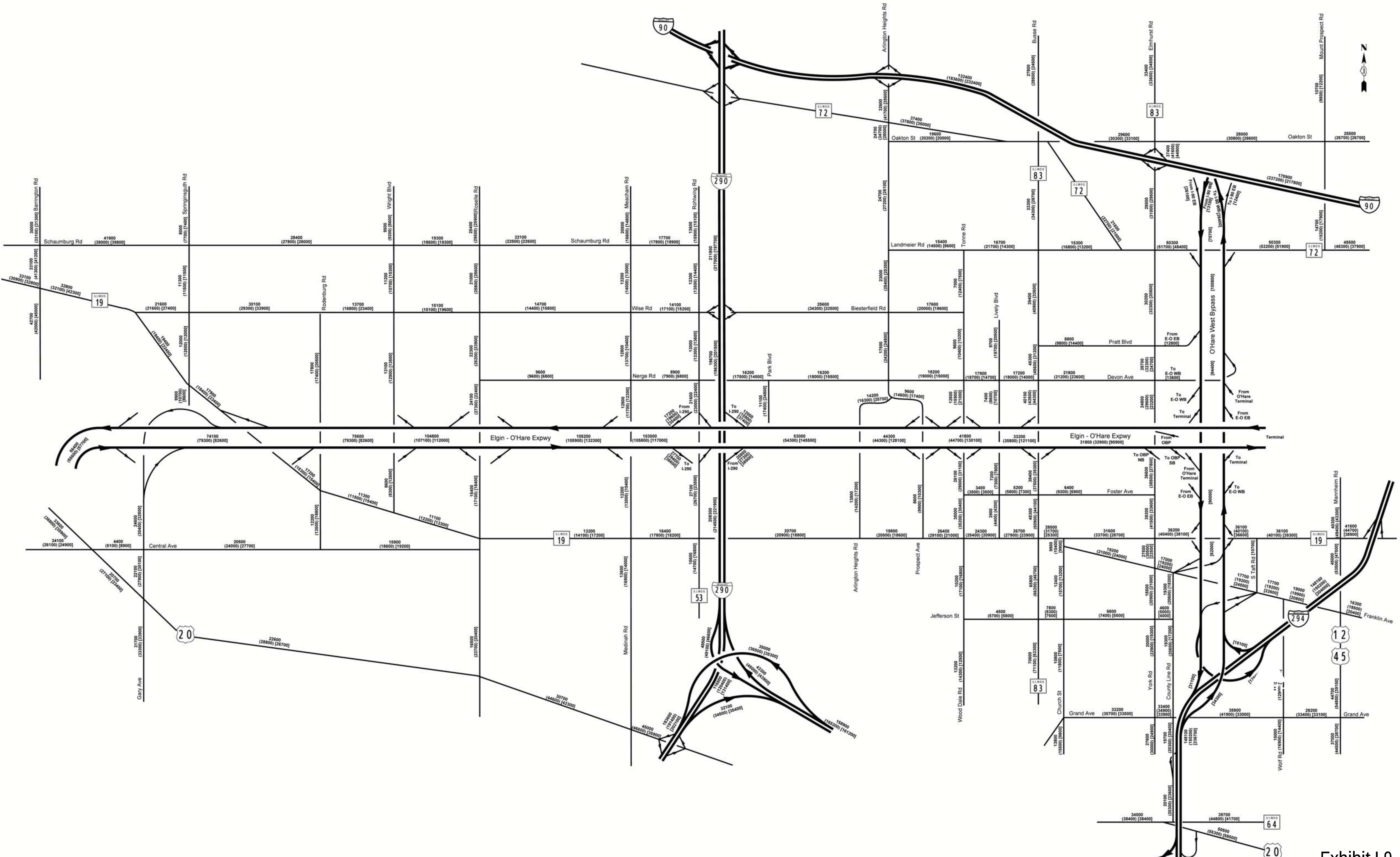


Exhibit I-9

Existing and Build ADT's

LEGEND Average Daily Traffic (ADT)
0000 = 2010 Baseline
(0000) = 2040 Baseline (No-Build)
[0000] = 2040 Toll Scenario

NOTE: THE ADT VOLUMES ARE SUBJECT TO CHANGE.

Attachment I-1

Attachment I-1

TABLE 1
Mobile Source Air Toxic Analysis Inputs
Existing 2010

Link ID	Road Type ID[a]	Link Length (miles)	Link Volume (veh/hour)	Average Speed (mph)	Description
1	4	0.5	2,350	42.5	Elgin-O'Hare Expressway
2	4	0.5	3,088	42.5	Elgin-O'Hare Expressway
3	4	0.4	3,150	42.5	Elgin-O'Hare Expressway
4	4	1.1	4,367	42.5	Elgin-O'Hare Expressway
5	4	1.75	4,383	42.5	Elgin-O'Hare Expressway
6	4	0.49	4,313	42.5	Elgin-O'Hare Expressway
7	4	1	2,208	42.5	Elgin-O'Hare Expressway
8	4	0.26	1,846	42.5	Elgin-O'Hare Expressway
9	4	1	1,742	42.5	Elgin-O'Hare Expressway
10	4	0.5	1,383	42.5	Elgin-O'Hare Expressway
11	4	1	1,325	42.5	Elgin-O'Hare Expressway
12	4	1	6,171	42.5	I-294
13	4	1	6,171	42.5	I-294
14	4	2	5,517	42.5	I-90
15	4	2	7,329	42.5	I-90
16	4	3.76	8,825	42.5	I-290
17	4	1.24	8,196	42.5	I-290
18	4	0.2	500	42.5	I-290
19	4	0.2	1,075	42.5	I-290
20	4	1.57	8,679	42.5	I-290
21	4	0.5	2,021	42.5	I-290
22	4	0.5	1,458	42.5	I-290
23	4	0.5	1,804	42.5	I-290
24	4	0.5	6,621	42.5	I-290
25	4	0.5	4,854	42.5	I-290
26	4	0.5	1,338	42.5	I-290
27	4	0.5	7,650	42.5	I-290

TABLE 1
Mobile Source Air Toxic Analysis Inputs
Existing 2010

Link ID	Road Type ID[a]	Link Length (miles)	Link Volume (veh/hour)	Average Speed (mph)	Description
28	5	1	1,400	40.5	US 20
29	5	1.2	863	40.5	US 20
30	5	2.5	942	40.5	US 20
31	5	1.5	1,279	40.5	US 20
32	5	0.5	1,875	40.5	US 20
33	5	1	1,058	40.5	Roselle Road
34	5	1.51	875	40.5	Roselle Road
35	5	0.5	929	40.5	Roselle Road
36	5	0.26	1,004	40.5	Roselle Road
37	5	0.64	642	40.5	Roselle Road
38	5	1.7	688	40.5	Roselle Road
39	5	1.5	1,558	40.5	IL 72
40	5	1.08	900	40.5	IL 72
41	5	0.5	2,096	40.5	IL 72
42	5	0.91	2,096	40.5	IL 72
43	5	1	1,896	40.5	IL 72
44	5	1	1,158	40.5	IL 83
45	5	0.76	1,388	40.5	IL 83
46	5	0.9	1,642	40.5	IL 83
47	5	0.35	1,888	40.5	IL 83
48	5	0.73	1,671	40.5	IL 83
49	5	0.75	1,600	40.5	IL 83
50	5	0.75	2,013	40.5	IL 83
51	5	1.33	2,742	40.5	IL 83
52	5	1	1,692	40.5	IL 83
53	5	1.31	1,746	32	Schaumburg Road
54	5	1	1,183	32	Schaumburg Road
55	5	1.02	804	32	Schaumburg Road
56	5	1.78	921	32	Schaumburg Road
57	5	0.8	738	32	Schaumburg Road
58	5	0.36	900	32	Wise Road/Biesterfield Road

TABLE 1
Mobile Source Air Toxic Analysis Inputs
Existing 2010

Link ID	Road Type ID[a]	Link Length (miles)	Link Volume (veh/hour)	Average Speed (mph)	Description
59	5	0.47	1,254	32	Wise Road/Biesterfield Road
60	5	0.44	571	32	Wise Road/Biesterfield Road
61	5	1.11	629	32	Wise Road/Biesterfield Road
62	5	1.75	613	32	Wise Road/Biesterfield Road
63	5	0.85	588	32	Wise Road/Biesterfield Road
64	5	1.18	1,067	32	Wise Road/Biesterfield Road
65	5	1	733	32	Wise Road/Biesterfield Road
66	5	0.5	1,379	32	IL 19
67	5	0.94	1,367	32	IL 19
68	5	0.71	808	32	IL 19
69	5	0.5	746	32	IL 19
70	5	0.35	717	32	IL 19
71	5	0.43	471	32	IL 19
72	5	1.2	463	32	IL 19
73	5	1.59	550	32	IL 19
74	5	1.41	683	32	IL 19
75	5	1.14	863	32	IL 19
76	5	0.26	825	32	IL 19
77	5	1.03	1,058	32	IL 19
78	5	0.51	1,013	32	IL 19
79	5	0.5	1,113	32	IL 19
80	5	0.5	1,188	32	IL 19
81	5	0.48	1,317	32	IL 19
82	5	1	1,508	32	IL 19
83	5	0.5	1,504	32	IL 19
84	5	1.5	1,504	32	IL 19
85	5	1	1,733	32	IL 19

TABLE 1
Mobile Source Air Toxic Analysis Inputs
Existing 2010

Link ID	Road Type ID[a]	Link Length (miles)	Link Volume (veh/hour)	Average Speed (mph)	Description
86	5	1.47	817	32	Oakton Street
87	5	1	1,233	32	Oakton Street
88	5	1	1,167	32	Oakton Street
89	5	1	1,063	32	Oakton Street
90	5	1.78	288	32	Nerge Road/Devon Avenue
91	5	0.85	371	32	Nerge Road/Devon Avenue
92	5	0.25	675	32	Nerge Road/Devon Avenue
93	5	1.04	675	32	Nerge Road/Devon Avenue
94	5	1.21	758	32	Nerge Road/Devon Avenue
95	5	0.47	746	32	Nerge Road/Devon Avenue
96	5	0.57	717	32	Nerge Road/Devon Avenue
97	5	1	908	32	Nerge Road/Devon Avenue
98	5	0.5	738	32	Franklin Avenue
99	5	0.5	738	32	Franklin Avenue
100	5	0.5	792	32	Franklin Avenue
101	5	0.5	679	32	Franklin Avenue
102	5	0.71	1,383	32	Grand Avenue
103	5	0.9	1,392	32	Grand Avenue
104	5	0.8	1,492	32	Grand Avenue
105	5	0.5	1,175	32	Grand Avenue
106	4	0.5	0	42.5	West Bypass
107	4	0.5	0	42.5	West Bypass
108	4	0.5	0	42.5	West Bypass
109	4	0.5	0	42.5	West Bypass
110	4	0.5	0	42.5	West Bypass
111	4	2	0	42.5	West Bypass
112	4	0.2	0	42.5	West Bypass
113	4	0.2	0	42.5	West Bypass
114	4	1	0	42.5	West Bypass
115	4	2	0	42.5	West Bypass
116	4	0.5	0	42.5	West Bypass

TABLE 1
Mobile Source Air Toxic Analysis Inputs
Existing 2010

Link ID	Road Type ID[a]	Link Length (miles)	Link Volume (veh/hour)	Average Speed (mph)	Description
117	4	0.5	0	42.5	West Bypass
118	4	0.5	0	42.5	West Bypass
119	4	0.5	0	42.5	West Bypass

[a] Road Type ID 4 is urban unrestricted access. Road Type ID 5 is urban restricted access

TABLE 2
Mobile Source Air Toxic Analysis Inputs
No-Build 2040

Link ID	Road Type ID	Link Length (miles)	Link Volume (veh/hour)	Average Speed (mph)	Description
1	4	0.5	2,317	42.5	Elgin-O'Hare Expressway
2	4	0.5	3,304	42.5	Elgin-O'Hare Expressway
3	4	0.4	3,304	42.5	Elgin-O'Hare Expressway
4	4	1.1	4,463	42.5	Elgin-O'Hare Expressway
5	4	1.75	4,413	42.5	Elgin-O'Hare Expressway
6	4	0.49	4,408	42.5	Elgin-O'Hare Expressway
7	4	1	2,263	42.5	Elgin-O'Hare Expressway
8	4	0.26	1,846	42.5	Elgin-O'Hare Expressway
9	4	1	1,863	42.5	Elgin-O'Hare Expressway
10	4	0.5	1,492	42.5	Elgin-O'Hare Expressway
11	4	1	1,371	42.5	Elgin-O'Hare Expressway
12	4	1	6,258	42.5	I-294
13	4	1	6,258	42.5	I-294
14	4	2	7,650	42.5	I-90
15	4	2	9,883	42.5	I-90
16	4	3.76	9,042	42.5	I-290
17	4	1.24	8,179	42.5	I-290
18	4	0.2	663	42.5	I-290
19	4	0.2	1,138	42.5	I-290
20	4	1.57	8,938	42.5	I-290
21	4	0.5	2,046	42.5	I-290
22	4	0.5	1,521	42.5	I-290

TABLE 2
Mobile Source Air Toxic Analysis Inputs
No-Build 2040

Link ID	Road Type ID	Link Length (miles)	Link Volume (veh/hour)	Average Speed (mph)	Description
23	4	0.5	1,875	42.5	I-290
24	4	0.5	6,883	42.5	I-290
25	4	0.5	5,017	42.5	I-290
26	4	0.5	1,438	42.5	I-290
27	4	0.5	7,975	42.5	I-290
28	5	1	1,533	40.5	US 20
29	5	1.2	1,129	40.5	US 20
30	5	2.5	1,200	40.5	US 20
31	5	1.5	1,858	40.5	US 20
32	5	0.5	1,942	40.5	US 20
33	5	1	1,229	40.5	Roselle Road
34	5	1.51	1,075	40.5	Roselle Road
35	5	0.5	1,050	40.5	Roselle Road
36	5	0.26	1,138	40.5	Roselle Road
37	5	0.64	713	40.5	Roselle Road
38	5	1.7	988	40.5	Roselle Road
39	5	1.5	1,575	40.5	IL 72
40	5	1.08	946	40.5	IL 72
41	5	0.5	2,154	40.5	IL 72
42	5	0.91	2,175	40.5	IL 72
43	5	1	2,013	40.5	IL 72
44	5	1	1,188	40.5	IL 83
45	5	0.76	1,429	40.5	IL 83
46	5	0.9	1,704	40.5	IL 83
47	5	0.35	1,900	40.5	IL 83
48	5	0.73	1,775	40.5	IL 83
49	5	0.75	1,563	40.5	IL 83
50	5	0.75	2,121	40.5	IL 83
51	5	1.33	2,758	40.5	IL 83
52	5	1	2,963	40.5	IL 83
53	5	1.31	1,625	32	Schaumburg Road

TABLE 2
Mobile Source Air Toxic Analysis Inputs
No-Build 2040

Link ID	Road Type ID	Link Length (miles)	Link Volume (veh/hour)	Average Speed (mph)	Description
54	5	1	1,158	32	Schaumburg Road
55	5	1.02	775	32	Schaumburg Road
56	5	1.78	938	32	Schaumburg Road
57	5	0.8	742	32	Schaumburg Road
58	5	0.36	900	32	Wise Road/Biesterfield Road
59	5	0.47	1,221	32	Wise Road/Biesterfield Road
60	5	0.44	700	32	Wise Road/Biesterfield Road
61	5	1.11	629	32	Wise Road/Biesterfield Road
62	5	1.75	600	32	Wise Road/Biesterfield Road
63	5	0.85	713	32	Wise Road/Biesterfield Road
64	5	1.18	1,429	32	Wise Road/Biesterfield Road
65	5	1	833	32	Wise Road/Biesterfield Road
66	5	0.5	1,288	32	IL 19
67	5	0.94	1,338	32	IL 19
68	5	0.71	808	32	IL 19
69	5	0.5	767	32	IL 19
70	5	0.35	638	32	IL 19
71	5	0.43	479	32	IL 19
72	5	1.2	508	32	IL 19
73	5	1.59	588	32	IL 19
74	5	1.41	742	32	IL 19
75	5	1.14	871	32	IL 19
76	5	0.26	854	32	IL 19
77	5	1.03	1,213	32	IL 19
78	5	0.51	1,058	32	IL 19
79	5	0.5	1,163	32	IL 19

TABLE 2
Mobile Source Air Toxic Analysis Inputs
No-Build 2040

Link ID	Road Type ID	Link Length (miles)	Link Volume (veh/hour)	Average Speed (mph)	Description
80	5	0.5	1,321	32	IL 19
81	5	0.48	1,404	32	IL 19
82	5	1	1,683	32	IL 19
83	5	0.5	1,671	32	IL 19
84	5	1.5	1,671	32	IL 19
85	5	1	1,863	32	IL 19
86	5	1.47	842	32	Oakton Street
87	5	1	1,263	32	Oakton Street
88	5	1	1,283	32	Oakton Street
89	5	1	1,113	32	Oakton Street
90	5	1.78	288	32	Nerge Road/Devon Avenue
91	5	0.85	329	32	Nerge Road/Devon Avenue
92	5	0.25	729	32	Nerge Road/Devon Avenue
93	5	1.04	750	32	Nerge Road/Devon Avenue
94	5	1.21	792	32	Nerge Road/Devon Avenue
95	5	0.47	779	32	Nerge Road/Devon Avenue
96	5	0.57	750	32	Nerge Road/Devon Avenue
97	5	1	883	32	Nerge Road/Devon Avenue
98	5	0.5	800	32	Franklin Avenue
99	5	0.5	800	32	Franklin Avenue
100	5	0.5	829	32	Franklin Avenue
101	5	0.5	771	32	Franklin Avenue
102	5	0.71	1,488	32	Grand Avenue
103	5	0.9	1,454	32	Grand Avenue
104	5	0.8	1,746	32	Grand Avenue
105	5	0.5	1,392	32	Grand Avenue
106	4	0.5	0	42.5	West Bypass
107	4	0.5	0	42.5	West Bypass
108	4	0.5	0	42.5	West Bypass
109	4	0.5	0	42.5	West Bypass
110	4	0.5	0	42.5	West Bypass

TABLE 2
Mobile Source Air Toxic Analysis Inputs
No-Build 2040

Link ID	Road Type ID	Link Length (miles)	Link Volume (veh/hour)	Average Speed (mph)	Description
111	4	2	0	42.5	West Bypass
112	4	0.2	0	42.5	West Bypass
113	4	0.2	0	42.5	West Bypass
114	4	1	0	42.5	West Bypass
115	4	2	0	42.5	West Bypass
116	4	0.5	0	42.5	West Bypass
117	4	0.5	0	42.5	West Bypass
118	4	0.5	0	42.5	West Bypass
119	4	0.5	0	42.5	West Bypass

TABLE 3
Mobile Source Air Toxic Analysis Inputs
Build 2040

Link ID	Road Type ID	Link Length (miles)	Link Volume (veh/hour)	Average Speed (mph)	Description
1	4	0.5	2,404	42.5	Elgin-O'Hare Expressway
2	4	0.5	3,442	42.5	Elgin-O'Hare Expressway
3	4	0.4	3,442	42.5	Elgin-O'Hare Expressway
4	4	1.1	4,667	42.5	Elgin-O'Hare Expressway
5	4	1.75	5,513	42.5	Elgin-O'Hare Expressway
6	4	0.49	4,875	42.5	Elgin-O'Hare Expressway
7	4	1	6,063	42.5	Elgin-O'Hare Expressway
8	4	0.26	5,338	42.5	Elgin-O'Hare Expressway
9	4	1	5,421	42.5	Elgin-O'Hare Expressway
10	4	0.5	5,046	42.5	Elgin-O'Hare Expressway
11	4	1	2,479	42.5	Elgin-O'Hare Expressway
12	4	1	8,500	42.5	I-294
13	4	1	9,863	42.5	I-294
14	4	2	9,683	42.5	I-90
15	4	2	9,075	42.5	I-90
16	4	3.76	8,238	42.5	I-290
17	4	1.24	8,396	42.5	I-290

TABLE 3
Mobile Source Air Toxic Analysis Inputs
Build 2040

Link ID	Road Type ID	Link Length (miles)	Link Volume (veh/hour)	Average Speed (mph)	Description
18	4	0.2	1,558	42.5	I-290
19	4	0.2	1,621	42.5	I-290
20	4	1.57	9,246	42.5	I-290
21	4	0.5	1,942	42.5	I-290
22	4	0.5	1,471	42.5	I-290
23	4	0.5	1,829	42.5	I-290
24	4	0.5	6,717	42.5	I-290
25	4	0.5	5,475	42.5	I-290
26	4	0.5	1,475	42.5	I-290
27	4	0.5	8,421	42.5	I-290
28	5	1	1,496	40.5	US 20
29	5	1.2	975	40.5	US 20
30	5	2.5	1,113	40.5	US 20
31	5	1.5	1,763	40.5	US 20
32	5	0.5	1,496	40.5	US 20
33	5	1	1,079	40.5	Roselle Road
34	5	1.51	1,067	40.5	Roselle Road
35	5	0.5	996	40.5	Roselle Road
36	5	0.26	933	40.5	Roselle Road
37	5	0.64	767	40.5	Roselle Road
38	5	1.7	850	40.5	Roselle Road
39	5	1.5	1,458	40.5	IL 72
40	5	1.08	875	40.5	IL 72
41	5	0.5	2,017	40.5	IL 72
42	5	0.91	2,163	40.5	IL 72
43	5	1	1,579	40.5	IL 72
44	5	1	1,021	40.5	IL 83
45	5	0.76	1,196	40.5	IL 83
46	5	0.9	1,358	40.5	IL 83
47	5	0.35	1,300	40.5	IL 83
48	5	0.73	1,846	40.5	IL 83

TABLE 3
Mobile Source Air Toxic Analysis Inputs
Build 2040

Link ID	Road Type ID	Link Length (miles)	Link Volume (veh/hour)	Average Speed (mph)	Description
49	5	0.75	1,638	40.5	IL 83
50	5	0.75	1,838	40.5	IL 83
51	5	1.33	1,946	40.5	IL 83
52	5	1	2,221	40.5	IL 83
53	5	1.31	1,658	32	Schaumburg Road
54	5	1	1,167	32	Schaumburg Road
55	5	1.02	804	32	Schaumburg Road
56	5	1.78	942	32	Schaumburg Road
57	5	0.8	788	32	Schaumburg Road
58	5	0.36	1,142	32	Wise Road/Biesterfield Road
59	5	0.47	1,413	32	Wise Road/Biesterfield Road
60	5	0.44	975	32	Wise Road/Biesterfield Road
61	5	1.11	817	32	Wise Road/Biesterfield Road
62	5	1.75	658	32	Wise Road/Biesterfield Road
63	5	0.85	633	32	Wise Road/Biesterfield Road
64	5	1.18	1,354	32	Wise Road/Biesterfield Road
65	5	1	775	32	Wise Road/Biesterfield Road
66	5	0.5	1,367	32	IL 19
67	5	0.94	1,763	32	IL 19
68	5	0.71	933	32	IL 19
69	5	0.5	975	32	IL 19
70	5	0.35	683	32	IL 19
71	5	0.43	642	32	IL 19
72	5	1.2	554	32	IL 19
73	5	1.59	717	32	IL 19
74	5	1.41	758	32	IL 19
75	5	1.14	783	32	IL 19
76	5	0.26	775	32	IL 19
77	5	1.03	875	32	IL 19
78	5	0.51	871	32	IL 19
79	5	0.5	996	32	IL 19

TABLE 3
Mobile Source Air Toxic Analysis Inputs
Build 2040

Link ID	Road Type ID	Link Length (miles)	Link Volume (veh/hour)	Average Speed (mph)	Description
80	5	0.5	1,054	32	IL 19
81	5	0.48	1,196	32	IL 19
82	5	1	1,588	32	IL 19
83	5	0.5	1,525	32	IL 19
84	5	1.5	1,638	32	IL 19
85	5	1	1,621	32	IL 19
86	5	1.47	833	32	Oakton Street
87	5	1	1,379	32	Oakton Street
88	5	1	1,192	32	Oakton Street
89	5	1	1,113	32	Oakton Street
90	5	1.78	283	32	Nerge Road/Devon Avenue
91	5	0.85	283	32	Nerge Road/Devon Avenue
92	5	0.25	604	32	Nerge Road/Devon Avenue
93	5	1.04	646	32	Nerge Road/Devon Avenue
94	5	1.21	625	32	Nerge Road/Devon Avenue
95	5	0.47	613	32	Nerge Road/Devon Avenue
96	5	0.57	583	32	Nerge Road/Devon Avenue
97	5	1	983	32	Nerge Road/Devon Avenue
98	5	0.5	1,021	32	Franklin Avenue
99	5	0.5	942	32	Franklin Avenue
100	5	0.5	867	32	Franklin Avenue
101	5	0.5	850	32	Franklin Avenue
102	5	0.71	1,396	32	Grand Avenue
103	5	0.9	1,413	32	Grand Avenue
104	5	0.8	1,375	32	Grand Avenue
105	5	0.5	1,379	32	Grand Avenue
106	4	0.5	1,088	42.5	West Bypass
107	4	0.5	546	42.5	West Bypass
108	4	0.5	1,100	42.5	West Bypass
109	4	0.5	517	42.5	West Bypass
110	4	0.5	3,154	42.5	West Bypass

TABLE 3
Mobile Source Air Toxic Analysis Inputs
Build 2040

Link ID	Road Type ID	Link Length (miles)	Link Volume (veh/hour)	Average Speed (mph)	Description
111	4	2	3,517	42.5	West Bypass
112	4	0.2	533	42.5	West Bypass
113	4	0.2	567	42.5	West Bypass
114	4	1	3,750	42.5	West Bypass
115	4	2	2,583	42.5	West Bypass
116	4	0.5	1,296	42.5	West Bypass
117	4	0.5	629	42.5	West Bypass
118	4	0.5	729	42.5	West Bypass
119	4	0.5	1,429	42.5	West Bypass