Air Quality Conformity Determination
Allen County

2035 Long Range Transportation Plan

Prepared By:
Northeastern Indiana Regional Coordinating Council

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Table of Contents

Executive Summary

The Air Quality Conformity Determination for the 2035 Transportation Plan (referred to throughout this document as the 2035 Transportation Plan or TP) was performed in order to meet federal regulations from the Clean Air Act Amendments of 1990 and the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). Allen County was re-designated from non-attainment to attainment for the pollutant ozone in February 2007. Allen County is considered a maintenance area for conformity purposes with an established budget in the State Implementation Plan (SIP). As a maintenance area for ozone, the Northeastern Indiana Regional Coordinating Council (NIRCC) must demonstrate that its transportation plan will conform to air quality emission budgets for the ozone precursor pollutants of volatile organic compounds (VOC) and nitrogen oxides (NOx) for the year 2020. In addition, the analysis must demonstrate that Allen County, the designated maintenance area, in its entirety will conform to the established 2020 SIP budget.

Air quality conformity for the 2035 Transportation Plan was determined based on the analysis included in this report. As required, an emissions analysis was performed for each of the study years of this plan and it was determined that the emissions of VOC's and NOx would not exceed the 2020 SIP budget, if the transportation projects are implemented as proposed by the TP. The 2010 emissions are listed to show baseline emissions. The emissions analysis addresses all of Allen County. Figure 1 displays the MPA / Allen County boundaries. The conformity analysis demonstrates that vehicle emissions based on the 2035 Transportation Plan are below the 2020 budget for analysis year 2020, 2030, and 2035. Thus, the NIRCC 2035 Transportation Plan conforms to the Clean Air Act as amended. The analysis also demonstrates that Allen County meets the conformity requirements of the Clean Air Act as amended.

Table 1: 2015, 2020, 2030 and 2035 Analysis Year Comparison to 2020 SIP Budget

Analysis Year	Total VOC Emissions tons/day	2020 VOC SIP Budget tons/day	Total NOx Emissions tons/day	2020 NOx SIP Budget tons/day
2010	8.47	NA	19.59	NA
2015	5.38	NA	12.17	NA
2020	3.79	4.52	8.03	9.72
2030	3.20	4.52	6.31	9.72
2035	3.25	4.52	6.48	9.72

The conformity determination was coordinated with stakeholder and regulatory agencies through an Interagency Consultation process to formally deliberate any issues. A consultation group conference call was conducted on December 27, 2012 at which time representatives from Indiana Department of Environmental Management (IDEM), Federal Highway Administration (FHWA), US Environmental Protection Agency (USEPA), Indiana Department of Transportation (INDOT), Corradino Group and Northeastern Indiana Regional Coordinating Council (NIRCC). Dunn Munn of the Corradino Group presented a Power Point presentation describing NIRCC's updated Travel Demand Model and its processes to ensure all procedures are correct. Representatives from the Federal Transit Administration (FTA) and Citilink were invited to the meeting but were unable to attend.

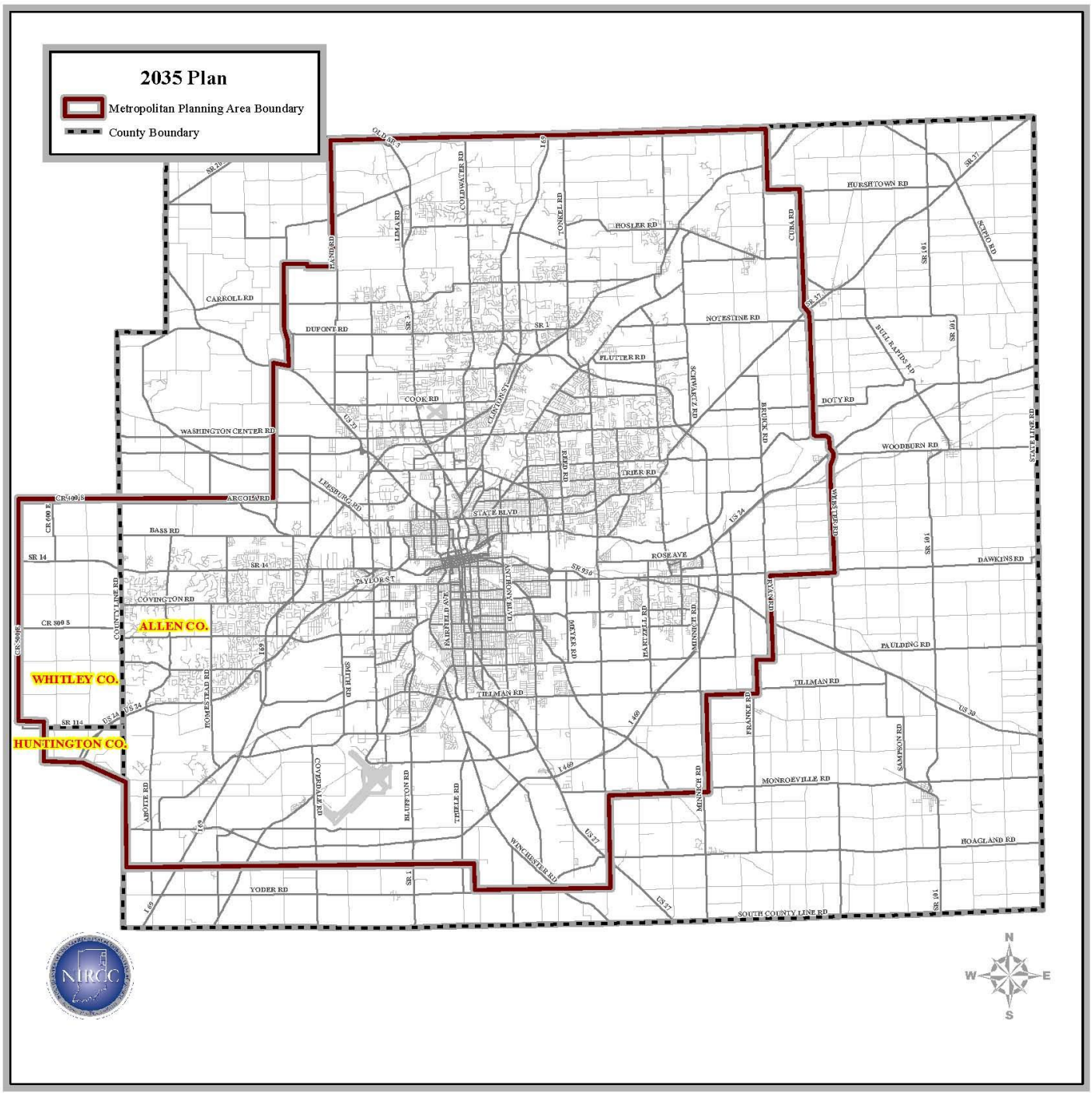

FIGURE 1: MPA/ Allen County Boundaries

A second conference call consultation meeting was held March 25, 2013 at which time representatives from Indiana Department of Environmental Management (IDEM), Federal Highway Administration (FHWA), US Environmental Protection Agency (USEPA), Indiana Department of Transportation (INDOT) and Northeastern Indiana Regional Coordinating Council (NIRCC) participated. Representatives from the Federal Transit Administration (FTA) was invited to the meeting but were unable to attend. The meeting discussed the transportation planning assumptions for the 2035 Transportation Plan.

A Third conference call consultation meeting was held May 6, 2013 at which time representatives from Indiana Department of Environmental Management (IDEM), Federal Highway Administration (FHWA), US Environmental Protection Agency (USEPA), Indiana Department of Transportation (INDOT), Citilink and Northeastern Indiana Regional Coordinating Council (NIRCC) participated. Representatives from the Federal Transit Administration (FTA) was invited to the meeting but were unable to attend. The MOVES Emission Estimates, 2035 TP project list, and the AQ Determination Draft document were discussed at the meeting. NIRCC inquired about any concerns stakeholders may have with the three documents.

In an effort to be proactive in working with our partners, the Indiana MPO Council has also scheduled monthly Air Quality Conformity meetings. IDEM, FHWA, INDOT and USEPA have been invited to attend every meeting, to discuss timing, modeling parameters, and related conformity issues. IDEM, INDOT and FHWA have been in regular attendance. The Indiana Traffic Modelers group has also met throughout the model update process (this includes IDEM, INDOT and FHWA representatives) to provide an open forum to discuss the process, modeling parameters, and as a mechanism for assuring that the partners have more than adequate opportunity to participate in the travel demand forecasting process.

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1.0 Introduction

As part of the joint regulatory requirements of the Clean Air Act, the U.S. Department of Transportation (DOT), and the U.S. Environmental Protection Agency (EPA) NIRCC is required to conduct an air quality conformity analysis for the Transportation Plan (TP). This was triggered by the fact that Allen County was designated as being in non-attainment of the National Ambient Air Quality Standard (NAAQS) for ozone. Allen County has since been re-designated as attainment and establishing Allen County as a maintenance area.

Under the Clean Air Act (CAA), Allen County, Indiana was re-designated as meeting attainment for ozone under the 8-hour ozone standard in February 12, 2007. This process establishes Allen County as a maintenance area for air quality conformity demonstration and requires Allen County, and the Metropolitan Planning Area within Allen County, to meet conformity rules and regulations. The Northeastern Indiana Regional Coordinating Council, the Metropolitan Planning Organization for the Fort Wayne-New Haven-Allen County Area is the agency responsible for conducting the air quality analyses. All plans, programs and projects must be reviewed for conformity with the standards to assure that they do not exceed the established budget. Through the process, a 2020 SIP Budget was developed through consultation.

There is a need to efficiently and effectively calculate emissions inventories for any area that is in non-attainment of the National Ambient Air Quality Standards (NAAQS). The current version of the mobile source emissions model developed by the U.S. Environmental Protection Agency (EPA) is the Motor Vehicle Emissions Simulator (MOVES). MOVES replaces its predecessor model, Mobile6.2. On March 2, 2010 EPA released a federal register notice officially announcing the release of MOVES and its adoption by EPA as the standard emissions model for the development of State Implementation Plans (SIP) and regional transportation conformity analyses. The current version of MOVES is MOVES2010b.

While it is possible to use MOVES to calculate emissions inventories directly, EPA policy does support the use of emissions rates produced by MOVES as applied to key outputs developed by a travel demand model. These outputs include vehicle-miles-traveled (VMT), vehicle-hours traveled (VHT), and speeds. The benefits of using the emissions rates from MOVES as part of an air quality post-processor for a travel demand model are greater ease and precision in assessing the benefits to air quality achieved by improvements to the area's transportation system.

It is for these reasons that the Indiana Department of Transportation (INDOT) developed a post-processing tool for applying emissions rates developed in MOVES to the output data produced by the travel demand models used in Indiana. Since the majority of the travel demand models used in Indiana run on the TransCAD modeling platform, this tool was developed in that platform. For those cases in which a model exists in a platform other than TransCAD, the requisite input data can be imported into the proper TransCAD formats and used with this tool.

Methodology

The Indiana Department of Transportation Air Quality Post-Processor (INDOT AQPP) was developed to calculate emissions estimates through the application of emissions rates developed in MOVES to the outputs of travel demand models. Though MOVES can calculate emissions inventories directly, the

effort involved in preprocessing the input data sets needed to accurately reflect each transportation and land use scenario being analyzed can be quite effort intensive. Though the initial pre-processing required to developing emissions rates in MOVES is comparable to running MOVES in emissions inventory mode, once the emissions rates have been developed, they can continue to be applied to travel demand model outputs without further preprocessing. This is particularly advantageous if one is planning to test a variety of transportation scenarios. The methodology employed in the INDOT AQPP is fairly straightforward. The INDOT AQPP takes travel demand model data as an input along with the emissions rates developed in MOVES. The travel demand model vehicle-miles-traveled are then disaggregated into a finer level of detail and factored by the emissions rates to produce emissions estimates.

2.0 Regulations Governing Conformity Determinations

Federal Regulations for Metropolitan Planning in 23 CFR (Code of Federal Regulations) Part 450 require that federally funded highway and transit projects be included in a conforming plan and Transportation Improvement Program (TIP). 40 CFR Part 93, as revised July 1, 2006, outlines the requirements for making conformity determinations under Subpart A. Applicable requirements are listed below.

1. The Transportation Plan must specifically describe the transportation system envisioned for certain future years, which are called horizon years.

- The horizon years may be no more than 10 years apart.
- The first horizon year may not be more than 10 years from the base year used to validate the travel demand model.
- If the attainment year is in the time span of the Transportation Plan, the attainment year must be a horizon year.
- The last horizon year must be the last year of the Transportation Plan's forecast year.

The base year for validation of the travel demand model is 2010. A State Implementation Plan (SIP) established a 2020 budget for Allen County as part of the re-designation process to attainment status. Section 3 Travel Demand Model Validation contains documentation on the validation of the travel demand model to the 2010 base year. The base and horizon years used in developing the conformity analysis of the NIRCC 2035 Transportation Plan are:

- 2010: The validated base year for the transportation network
- 2015: Analysis near year
- 2020: Year selected to be no more than ten years between analysis years and SIP Budget Year
- 2030: Year selected to be no more than ten years between analysis years
- 2035: Final horizon year of the Transportation Plan

2. The Transportation Plan will quantify and document the demographic and employment factors influencing the expected transportation demand; and the highway and transit system shall be described in terms of the regionally significant additions or modifications to the existing transportation network, which the transportation plan envisions to be operational in the horizon years.

The socio-economic data for all study-years is included in the Transportation Plan. This data represents the estimates of population, households, automobiles and employment. Assumptions on the future land use were made after reviewing the general land use plans adopted by local governments and then verifying the information with appropriate agencies. Areas targeted for economic development activities were included. The development of the socioeconomic estimates used numerous tools including the geographic information system for Allen County, aerial photography, and zoning maps. These methodologies are clearly documented in the 2035 Transportation Plan.

The vehicle miles traveled (VMT) estimates for Allen County were developed with the TransCAD computer software program. TransCAD, a travel demand forecasting application, provided vehicle miles traveled (VMT) by functional classification for the base year (2010) and each analysis year (2015, 2020, 2030 and 2035). Table 5-1 contains the VMT for Allen County.

The MOVES software program was used to determine the appropriate Volatile Organic Compounds (VOC) and Oxides of Nitrogen (NOx) emission factors for Allen County. The INDOT AQPP was used to calculate the emissions estimates for each functional classification.

The highway and transit systems are detailed as part of the Transportation Plan. Each lists regionally significant projects. Highway improvement projects that will be completed prior to the individual analysis years are identified. Transit ridership in the MPA represents less than one percent of the total regional trips. At this level of transit usage, a reliable representation and accurate assignment of transit trips can not be accomplished through the travel forecasting procedures. This does not preclude the fact that transit provides a valuable service and can assist in reducing vehicle travel. Transit projects, policies and strategies are a viable component of the Transportation Plan.

3. The Transportation Plan must be financially reasonable and the TIP must be fiscally constrained consistent with the U.S. DOT's metropolitan planning regulations at 23 CFR part 450 and U.S. EPA's conformity regulations at 40 CFR part 93 in order to be found in conformity.

The Transportation Plan contains a section on financial analysis, which demonstrates that the TP is financially reasonable. Cost information from the Indiana Department of Transportation (INDOT) and other jurisdictions have been utilized. Anticipated revenues from federal, state, and local sources have been identified. Estimated revenues exceed anticipated project costs.

4. The conformity determination must be based on the latest emission estimation model available.

Motor Vehicle Emissions Simulator (MOVES) was used during the development of this plan. Indiana Department of Transportation (INDOT) developed a post-processing tool for applying emissions rates developed in MOVES. The post processor makes use of emissions rates files developed by MOVES based on each scenario. These files are:

- Link Table: contains data from the TDM that occurs on the highway network
- Intrazonal Table: contains data on travel not on the highway network
- Rate per Distance: captures running exhaust, break wear, and tire wear
- Rate per Vehicle: capture start and idle exhaust
- Rate per Profile: capture evaporative emissions when vehicles are stationary

The Link Table and the Intrazonal Table are created in NIRCC's TDM. The Rate per Distance, Rate per Vehicle, and Rate per Profile files is exported directly from the SQL output databases generated by MOVES into a comma delimited text (CSV) format. INDOT developed emissions rates for NIRCC's analysis area. The rates were produced in consultation with the area's interagency consultation group (ICG). More details on these variables can be found in section 4.0 MOVES Inputs. The INDOT AQPP documentation can be found as an attachment to this document

The outputs used for the Allen County conformity analysis from the MOVES model include Volatile Organic Compounds (VOC) and Oxides of Nitrogen (NOx) emission factors for each of the functional classes. These outputs are based on the default inputs to MOVES and all of the inputs listed in section 4.0 MOVES Inputs. The emission factors were multiplied by the corresponding VMT for each functional classification and added to determine the total emissions. The compiled outputs are included in section 5.0 MOVES Outputs, which shows the total emissions estimated for each network year.

5. The MPO must make the conformity determination according to the interagency consultation procedures required in 40 CFR Parts 51 and 93 (sections 51.390 and 93.105), and according to the public involvement procedures established by the MPO in compliance with 23 CFR Part 450.

NIRCC in conjunction with its air quality partners held interagency consultation meetings on December 27, 2012, March 25, 2013, and May 6, 2013 to discuss the methodology being used in this conformity determination and to receive guidance on various issues. The consultation included representatives from NIRCC, IDEM, USEPA, INDOT, Citilink, and FHWA. Representatives from FTA, were invited but were unable to participate. A Draft conformity determination was also made available for review prior to final adoption of the Transportation Plan. The interagency consultations are summarized in section 6.0 Interagency Consultation and briefly defined in the Executive Summary of this document.

The Conformity Determination and 2035 Transportation Plan were made available for public comment from May 10, 2013 through May 31, 2013. A Public Meeting was held on May 22, 2013. No comments were received regarding the conformity demonstration or analysis.

A complete listing including meeting minutes of the formal and informal opportunities for partner input is listed as Appendix A of this document. Appendix D lists the public comments on the 2035 Transportation Plan.

6. The Transportation Plan must provide for the timely implementation of Transportation Control Measures (TCM) from the applicable State Implementation Plan (SIP). Nothing in the plan may interfere with the implementation of any TCM in the applicable implementation plan.

Allen County is designated as a maintenance area for the pollutant ozone. A SIP with a motor vehicle emissions budget for Allen County has been developed.

7. The Transportation Plan must be consistent with the motor vehicle emissions budget in the applicable State Implementation Plan (SIP).

Allen County is designated as a maintenance area for the pollutant ozone. A SIP with a motor vehicle emissions budget for Allen County has been developed. Through the consultation process, it was agreed that the 2020 motor vehicle emissions budgets are in tons of pollutant per day and are provided in Table 2-1 and would be used the Allen County conformity analysis.

Table 2-1: 2020 Motor Vehicle Emissions Budget

Year	VOC (HC) tons/day	NOx tons/day
2020	4.52	9.72

8. The regional emissions analysis shall estimate emissions from the entire transportation system, including all regionally significant projects contained in the Transportation Plan and all other regionally significant highway and transit projects expected in the maintenance area in the time frame of the Transportation Plan.

The analysis estimates emissions of both Volatile Organic Compounds (VOC) and Oxides of Nitrogen (NOx) as ozone precursors. Allen County is in attainment for Carbon Monoxide (CO) emissions and conformity is not required. Analysis for Carbon Monoxide (CO) emissions was not performed. Tables 2-2 and 2-3 provides a comparison of the analysis years with the 2010 baseline and 2020 emissions budgets.

Table 2-2: Baseline Test Emissions Analysis Summary

Year	Total VOC Emissions tons/day	Total NOx Emissions tons/day
2010	8.47	19.59
2015	5.38	12.17

Table 2-3: Emissions Analysis Summary and Budget Comparison

Year	Total VOC Emissions tons/day	Total NOx Emissions tons/day
2020 Budget	**4.52**	**9.72**
2020	3.79	8.03
2030	3.20	6.31
2035	3.25	6.48

Since the emissions budget test is passed for each analysis year, the Transportation Plan and other projects in Allen County are in conformity and therefore comply with the Clean Air Act and other applicable federal and state requirements.

9. The emissions analysis methodology shall meet the requirement of section 93.119: (a) Regional emissions analysis for the Transportation Plan shall include all regionally significant projects expected in the maintenance area. Projects that are not regionally significant are not required to be explicitly modeled, but VMT from such projects must be estimated in accordance with reasonable professional practices. The effects of TCM's and similar projects that are not regionally significant may also be estimated in accordance with reasonable professional practices. (b) For TCM's demonstrating a quantifiable emission reduction benefit, the emissions analysis may include that emissions reduction credit. (c) For areas with a Transportation Plan that meets the content requirements of section 93.106, the emissions analysis shall be performed for each horizon year.

The emissions analysis methodology meets the requirement of section 93.119.

(a) The transportation model includes all regionally significant projects that are planned to occur over the life of this plan. In addition, the VMT from projects not specifically modeled, have been accounted for with the validation of the travel demand model output.

(b) There are no required TCM's for the Allen County maintenance area. There are also no additional credits being sought from the Congestion Mitigation and Air Quality (CMAQ) program funded projects that will be implemented in Allen County.

(c) The emissions analysis was performed for the baseline year 2010 and each analysis year; the results were then summarized in a spreadsheet and included in section 5.0 MOVES Outputs.

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3.0 Travel Demand Model Validation

The following analysis was performed to determine the validity of the Travel Demand Model (TDM) being used for the 2035 Transportation Plan. In addition, this section includes the methodology used to convert the TDM outputs into inputs for the air quality model, for purposes of the Conformity Determination.

3.1 Background

The model being used to forecast future traffic on the transportation network being proposed by the 2035 Transportation Plan is based on the traditional 4-step travel demand forecasting process - trip generation, trip distribution, mode split, and traffic assignment.

The NIRCC model was based on the in MINUTP software, and calibrated to a 1990 base year. Since that time, the model has been converted to the TransCAD software platform and recalibrated to a 2010 base year. The socioeconomic data utilized for the 2010 base year was developed from 2010 Census information and employment data obtained from Indiana Business Research Center Kelley School of Business.

3.2 TDM Network Preparation

The 2010 base year network was developed using street centerline data from the geographical information system and aerial photography. Link attributes were updated as necessary to reflect the 2010 highway network. Traffic count data was also updated with the most recent Annual Average Daily Traffic (AADT) count data, adjusted to 2010 numbers. The baseline, analysis, and horizon year networks were based upon the 2010 network. Modifications were made to represent the network for the appropriate analysis year. The 2015, 2020, 2030 and 2035 networks correspond to the Transportation Plan project list and expected completion dates.

Socioeconomic data for the baseline, analysis, and horizon years was determined using data from the previous 2030-II Transportation Plan, the 2010 Census information including the Census Transportation Planning Package, and forecasts from STATS Indiana. This data was disaggregated to traffic analysis zones using input from local officials, planners, and developers, to derive future year numbers. A complete description of the process and methods used can be found in the 2035 Transportation Plan.

3.3 Base Year Model Output Validation

The TransCAD model was calibrated for the base year to the traffic counts from NIRCC's three-year traffic count program. This program includes state traffic counts, HPMS traffic counts, and counts collected at all railroad crossings. The model was calibrated within an acceptable tolerance (0.22%) based on traffic count data, as compared to the TDM's assigned values. A comparison of TDM and actual traffic volume is provided in Table 3-1.

Table 3-1: Travel Demand Model and Actual Traffic Count VMT Comparison

Facility Type	Traffic Count	Total Loading	Percent Diff	Percent RMSE	VMT Percent Diff
Freeway	879,772	825,063	-6.22	19.99	-8.62
Major Arterial	2,023,514	2,087,813	3.18	24.26	5.44
Minor Arterial	269,231	242,724	-9.85	32.31	-9.44
Collector	140,024	164,149	17.23	45.78	10.54
Total	**3,312,541**	**3,319,749**	**0.22**	**26.60**	**-4.96**

The model is under-calculating the VMT for the interstate and minor arterials, and over-calculating the VMT for the major arterials and collectors. All major roadway facility types are within a eleven- percent range of difference. The TDM VMT for local roadways is generally expected to have a larger percent difference from actual traffic count VMT since the local network is represented by centroid connectors. The overall total VMT for the model compared to the total VMT from the traffic counts represents a difference of only 4.96 percent.

4.0 MOVES Inputs

The following tables represent the data used as inputs to MOVES when the defaults are not utilized. The input files used to test for conformity are too large to be included in this document, but can be supplied upon request.

Table 4-1: MOVES Inputs

Command	Description
LINK TABLE	Travel demand occurring on roadway network
INTRAZONAL TABLE	Travel demand on facilities on captured on the model's network
RATE PER DISTANCE	This file contains emissions rates that are applied by the INDOT AQPP to travel demand model VMT
RATE PER VEHICLE	This file contains emissions rates that are applied by the INDOT AQPP to vehicle population data.
RATE PER PROFILE	This file contains emissions rates that are applied by the INDOT AQPP to vehicle population data.
HOUR VMT FRACTION	This file contains the factors necessary to divide daily VMT into hourly VMT.
HPMS ADJUSTMENT FACTORS	This file contains adjustment factors that can be used to convert the model VMT inputs to values more consistent with HPMS VMT estimates. Though the consistent consensus throughout the ICG process for analysis areas in Indiana has been to not use HPMS adjustment factors, this feature has been included as an option should the use of adjustment factors be desired at some point in the future.
VEHICLE CLASS DISTRIBUTIONS	This file is used in combination with the source type population data for any given scenario to disaggregate the total vehicle flows on each link into thirteen distinct vehicle flows based on MOVES source types.
SOURCE TYPE POPULATIONS	This file contains scenario specific source type population data. These data identify the number of vehicles for each MOVES source type that are believed to be located in the analysis area.
YEAR LIST	This file contains a list of all available years four up to eight possible scenarios per analysis area.

Hourly Speed Estimation

The INDOT AQPP provides an estimate of hourly speeds for each link in the model network being analyzed. It does this by applying the Bureau of Public Roads (BPR) volume-delay function (VDF) found in many travel demand models. MOVES makes use of sixteen speed bins that further disaggregate emissions rates on the basis of the speed being encountered by a given source type for a given road type in a given hour. Each speed bin covers a range of travel speeds centered on an average speed for that bin. The INDOT AQPP identifies two speed bins for every speed estimated by the post-processor. One speed bin represents the bin which average bin speed is just below the estimated speed. The other speed bin represents the bin which average bin speed is just above the estimated speed.

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5.0 MOVES Outputs

The following tables represent the emissions analyses performed for the Conformity Determination on the 2035 Transportation Plan. The TransCAD transportation model was run to determine the amount of vehicle miles of travel for each horizon year by functional classification of the road. The MOVES model computed the emission factors for volatile organic compounds (VOC), and nitrogen oxides (NOx). Copies of the descriptive outputs are included in Appendix B.

The total emissions generated for VOC and NOx by functional classification of roadway are compared against the allowable budget set by the year 2020 Budget. The Emissions Budget test was passed for each analysis year, and therefore the 2035 Transportation Plan is in conformity.

Table 5-1: VMT Data

Functional Classification	2010 VMT	2015 VMT	2020 VMT	2030 VMT	2035 VMT
Rural Interstate	608,145	643,924	678,785	752,531	798,655
Rural Other Principal Arterial	618,567	663,786	717,446	841,058	911,723
Rural Minor Arterial	67,944	71,202	75,233	83,375	88,413
Rural Major Collector	619,959	666,627	721,864	835,614	906,034
Rural Minor Collector	136,008	150,533	166,266	206,767	230,542
Urban Interstate	1,228,503	1,333,579	1,400,894	1,540,982	1,602,673
Urban Other Freeway/Expressway	54,715	57,120	60,617	62,391	65,261
Urban Other Principal Arterial	1,463,521	1,506,382	1,559,009	1,630,940	1,682,588
Urban Minor Arterial	1,980,887	2,032,397	2,131,712	2,442,968	2,587,133
Urban Collector	462,138	505,441	531,636	549,346	567,984
Urban Local	609,302	636,195	660,337	722,322	750,327
Rural Local	208,255	237,917	261,054	314,652	340,807
Total Local	817,557	874,112	921,391	1,036,974	1,091,134
Grand Total	**8,057,942**	**8,505,103**	**8,964,852**	**9,982,947**	**10,532,140**

Table 5-2: 2010 Network Emissions Analysis

Functional Class	Vehicle Miles Traveled	VOC Emissions (Tons/Day)	NOx Emissions (Tons/Day)
Rural Interstate	608,145	0.15	2.23
Rural Other Principal Arterial	618,567	0.15	1.70
Rural Minor Arterial	67,943	0.01	0.10
Rural Major Collector	619,959	0.14	1.09
Rural Minor Collector	136,008	0.03	0.24
Urban Interstate	1,228,503	0.20	2.28
Urban Other Freeway/Expressway	54,714	0.01	0.09
Urban Other Principal Arterial	1,463,521	0.36	1.89
Urban Minor Arterial	1,980,887	0.50	2.42
Urban Collector	462,138	0.13	0.59
Rural and Urban Local	817,557	0.39	1.60
Total Running		2.07	14.25
Total Non-Running		6.40	5.34
Totals:	**8,057,942**	**8.47**	**19.59**

Table 5-3: 2015 Network Emissions Analysis

Functional Class	Vehicle Miles Traveled	VOC Emissions (Tons/Day)	NOx Emissions (Tons/Day)
Rural Interstate	643,924	0.085	1.18
Rural Other Principal Arterial	663,786	0.082	0.93
Rural Minor Arterial	71,202	0.007	0.05
Rural Major Collector	666,627	0.076	0.57
Rural Minor Collector	150,533	0.017	0.13
Urban Interstate	1,333,579	0.143	1.53
Urban Other Freeway/Expressway	57,120	0.007	0.06
Urban Other Principal Arterial	1,506,382	0.187	0.99
Urban Minor Arterial	2,032,397	0.255	1.26
Urban Collector	505,441	0.068	0.32
Rural and Urban Local	874,112	0.203	0.87
Total Running		1.13	7.91
Total Non-Running		4.25	4.26
Totals:	**8,505,103**	**5.38**	**12.17**

Table 5-4: 2020 Network Emissions Analysis

Functional Class	Vehicle Miles Traveled	VOC Emissions (Tons/Day)	NOx Emissions (Tons/Day)
Rural Interstate	678,785	0.049	0.64
Rural Other Principal Arterial	717,446	0.049	0.53
Rural Minor Arterial	75,233	0.004	0.03
Rural Major Collector	721,864	0.046	0.32
Rural Minor Collector	166,266	0.011	0.08
Urban Interstate	1,400,894	0.095	0.95
Urban Other Freeway/Expressway	60,617	0.004	0.03
Urban Other Principal Arterial	1,559,009	0.111	0.54
Urban Minor Arterial	2,131,712	0.152	0.69
Urban Collector	531,636	0.042	0.18
Rural and Urban Local	921,391	0.124	0.48
Total Running		0.69	4.49
Total Non-Running		3.10	3.54
Totals:	**8,964,852**	**3.79**	**8.03**
Budget:		**4.52**	**9.72**
Passed By:		**0.73**	**1.69**

Table 5-5: 2030 Network Emissions Analysis

Functional Class	Vehicle Miles Traveled	VOC Emissions (Tons/Day)	NOx Emissions (Tons/Day)
Rural Interstate	752,531	0.037	0.40
Rural Other Principal Arterial	841,058	0.036	0.34
Rural Minor Arterial	83,375	0.003	0.02
Rural Major Collector	835,614	0.037	0.22
Rural Minor Collector	206,767	0.009	0.06
Urban Interstate	1,540,982	0.074	0.61
Urban Other Freeway/Expressway	62,391	0.003	0.02
Urban Other Principal Arterial	1,630,940	0.084	0.34
Urban Minor Arterial	2,442,968	0.127	0.48
Urban Collector	549,346	0.031	0.11
Rural and Urban Local	1,036,974	0.101	0.32
Total Running		0.55	2.91
Total Non-Running		2.65	3.40
Totals:	**9,982,947**	**3.20**	**6.31**
Budget:		**4.52**	**9.72**
Passed By:		**1.32**	**3.41**

Table 5-5: 2035 Network Emissions Analysis

Functional Class	Vehicle Miles Traveled	VOC Emissions (Tons/Day)	NOx Emissions (Tons/Day)
Rural Interstate	798,655	0.038	0.41
Rural Other Principal Arterial	911,723	0.038	0.35
Rural Minor Arterial	88,413	0.003	0.02
Rural Major Collector	906,034	0.039	0.23
Rural Minor Collector	230,542	0.010	0.06
Urban Interstate	1,602,673	0.074	0.60
Urban Other Freeway/Expressway	65,261	0.003	0.02
Urban Other Principal Arterial	1,682,588	0.084	0.33
Urban Minor Arterial	2,587,133	0.129	0.48
Urban Collector	567,984	0.031	0.11
Rural and Urban Local	1,091,134	0.103	0.32
Total Running		0.55	2.92
Total Non-Running		2.70	3.55
Totals:	**10,532,140**	**3.25**	**6.48**
Budget:		**4.52**	**9.72**
Passed By:		**1.27**	**3.24**

6.0 Interagency Consultation

The Northeastern Indiana Regional Coordinating Council provided opportunity for interagency consultation on the 2035 Transportation Plan (TP). The interagency consultation process began with the identification of the necessary stakeholder agencies that required involvement. The list of participants included representatives from the Federal Highway Administration (FHWA), Environmental Protection Agency (EPA), Indiana Department of Transportation (INDOT), Indiana Department of Environment Management (IDEM), Federal Transit Administration (FTA), Fort Wayne Public Transportation Corporation-Citilink, and Northeastern Indiana Regional Coordinating Council.

Attachment A lists the interagency and partner formal and informal opportunities for consultation.

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7.0 Air Quality Analysis Exempt Projects

The transportation improvement project list is documented as part of the 2035 Transportation Plan as Amended. There are two categories that the projects can fall into for air quality purposes: exempt, and non-exempt. The transportation projects in the 2035 Transportation Plan have been classified as either exempt or non-exempt. A list of the exempt and non-exempt projects, including the time period corresponding to the air quality analysis years has been included in Appendix D.

The following are definitions of the exempt and non-exempt categories as provided in the conformity rules.

Exempt Projects
Safety
Railroad/highway crossing.
Hazard elimination program.
Safer non-Federal-aid system roads.
Shoulder improvements.
Increasing sight distance.
Safety improvement program.
Traffic control devices and operating assistance other than signalization projects.
Railroad/highway crossing warning devices.
Guardrails, median barriers, crash cushions.
Pavement resurfacing and/or rehabilitation.
Pavement marking demonstration.
Emergency relief (23 U.S.C. 125).
Fencing.
Skid treatments.
Safety roadside rest areas.
Adding medians.
Truck climbing lanes outside the urbanized area.
Lighting improvements.
Widening narrow pavements or reconstructing bridges (no additional travel lanes).
Emergency truck pullovers.

Mass Transit
Operating assistance to transit agencies.
Purchase of support vehicles.
Rehabilitation of transit vehicles [1] .
Purchase of office, shop, and operating equipment for existing facilities.
Purchase of operating equipment for vehicles (e.g., radios, fareboxes, lifts, etc.).
Construction or renovation of power, signal, and communications systems.
Construction of small passenger shelters and information kiosks.
Reconstruction or renovation of transit buildings and structures (e.g., rail or bus buildings, storage and maintenance facilities, stations, terminals, and ancillary structures).
Rehabilitation or reconstruction of track structures, track, and trackbed in existing rights-of-way.
Purchase of new buses and rail cars to replace existing vehicles or for minor expansions of the fleet [1] .

Construction of new bus or rail storage/maintenance facilities categorically excluded in 23 CFR part 771.

Air Quality
Continuation of ride-sharing and van-pooling promotion activities at current levels.
Bicycle and pedestrian facilities.

Other
Specific activities which do not involve or lead directly to construction, such as:
Planning and technical studies.
Grants for training and research programs.
Planning activities conducted pursuant to titles 23 and 49 U.S.C.
Federal-aid systems revisions.
Engineering to assess social, economic, and environmental effects of the proposed action or alternatives to that action.
Noise attenuation.
Emergency or hardship advance land acquisitions (23 CFR 710.503).
Acquisition of scenic easements.
Plantings, landscaping, etc.
Sign removal.
Directional and informational signs.
Transportation enhancement activities (except rehabilitation and operation of historic transportation buildings, structures, or facilities).
Repair of damage caused by natural disasters, civil unrest, or terrorist acts, except projects involving substantial functional, locational or capacity changes.

Note:
[1] In PM_{10} non-attainment or maintenance areas, such projects are exempt only if they are in compliance with control measures in the applicable implementation plan.
[62 FR 43801, Aug. 15, 1997, as amended at 69 FR 40081, July 1, 2004]

Projects Exempt From Regional Emissions Analyses

Intersection channelization projects.
Intersection signalization projects at individual intersections.
Interchange reconfiguration projects.
Center Turn Lane projects
Changes in vertical and horizontal alignment.
Truck size and weight inspection stations.
Bus terminals and transfer points.

Non-Exempt Projects
These projects are included in the Air Quality analysis and travel demand-forecasting model and are generally comprised of added capacity projects greater than a mile in length or new road construction.

Appendix A

Consultation Meetings Minutes

December 27, 2012
Conformity Consultation Conference Call – Discussion of Onroad MOVES Emission Estimates for Allen County

Attendees: NIRCC – Dan Avery, Jeff Bradtmiller
IDEM – Shawn Seals
INDOT – Jerry Halperin, Ben Schaffer, Frank Baukert
FHWA – Joyce Newland, Larry Heil
EPA – Pat Morris, Tony Maietta
Corradino – Dean Munn

Call began at 2:00 PM

I. Dan Avery discussed the intent of the call was to describe NIRCC's new TDM. Mr. Avery stated that Dean Munn from The Corradino Group would discuss the new model.
II. Mr. Munn presented a power point depiction of the new model highlighting some of the major components.
III. Mr. Heil stated that he is pleased that the Air Quality Post-Processor (AQPP) was incorporated into the new model.
IV. Ms. Munn stated that the Air Quality numbers listed in the presentation are based on unadjusted volumes, no HPMS or local adjustments were made. The model doesn't capture all the VMT in the region; it doesn't capture the Intrazonal trips.
    i. Mr. Heil stated that the Intrazonal trips are captured as part of the AQPP.
V. Pat Morris asked if the emission numbers are adjusted for summer weekdays. And why the VMT from 2004 is the same as the 2010 VMT.
    i. Dean yes the rates used in the AQPP are for the summer months.
        1. Pat stated that the explanations helped.
    ii. Dan stated that NIRCC has reported 2004 VMT higher then what the back-casted data was showing. We reviewed our VMT data and our 2010 and 2004 VMT for the region were almost identical. So we decided to hold the VMT for 2004 as the same as 2010 and run it through the AQPP. We felt that would be more accurate then back-casting to 2004.
        1. Pat says that makes sense. Did this account for all the VMT in Allen County?
            a. Dan stated yes it does.
VI. Mr. Avery asked if there were any other comments or questions. No additional comments or questions were noted.
VII. Mr. Seals stated he has everything he needs. He asked for us to send him 2035 emission data so they can make sure the 2020 budget will still be met in 2035.
    i. Dan asked is there a margin of safety on the 2020 budget.
        1. Mr. Seals stated it usually is set at about 15% which is consistent with other areas.
VIII. Mr. Avery stated that for conformity we will be doing a 2010 base year, 2015 near year, 2020 budget year, 2030, and 2035 horizon year. Everyone state that sounded good.

There were no more questions so the meeting adjourned at approximately 2:40 PM.

March 25, 2013
Conformity Consultation Conference Call – Review of Socioeconomics Data for the 2035 Transportation Plan Update

Attendees: NIRCC – Dan Avery, Jeff Bradtmiller
IDEM – Shawn Seals, Gale Ferris
INDOT – Jerry Halperin, Ben Shaffer
FHWA – Joyce Newland
EPA – Tony Maietta

Call began at 9:30 am.

I. Dan Avery talked about last week's IDEM's ICG meeting at that we now have a SIP Air Quality Conformity 2020 budget.
II. Dan Avery discussed the intent of the call was to discuss the socioeconomic planning assumptions as approved by the Urban Transportation Advisory Board. He discussed the documents that were sent out to the group prior to this meeting.
    1. The document outlining the analysis of regional activity forecast, the spreadsheet showing the 2010 and 2035 Socioeconomics assumptions, and a map showing the planning areas.
    2. He explained that the map shows the MPA which includes parts of Huntington and Whitley Counties.
    3. He stated that we are now modeling all of Allen County, instead of modeling just the MPA and doing separate calculations for the rest of Allen County.
III. Dan also discussed that we are using 2010 as our base year, 2015, 2020, 2030, and 2035 for conformity analysis years.
IV. Ms. Newland asked if our plan went out to 2040.
    1. Dan responded no, just to 2035.
V. Dan stated that in a few weeks we should have a list of Highway improvements projects and running the model to get our emissions for the analysis. We should be scheduling a follow up ICG meeting in mid to late April to provide that information.
VI. Dan stated that we have Draft Planning documents out on our website. www.nircc.com
VII. Dan stated that we will updating out TIP at the same time as our TP update.
VIII. Mr. Avery asked if there were any more questions regarding the assumptions.
IX. Mr. Seals stated IDEM had no comments.
X. Mr. Shaffer stated he had no comments.
XI. Mr. Maietta had issues receiving the documentations that were sent out prior to the meeting. He wanted to review them before making any comments, and stated if he had any he would send out an email to the group. No comment email was received.
XII. Mr. Halperin requested an updated map showing Whitley County and Huntington County boundaries.

Meeting adjourned at 9:50 am

May 6, 2013
Conformity Consultation Conference Call – Review of MOVES Emission Estimates, 2035 TP Projects, and the AQ Determination Draft document

Attendees: NIRCC – Dan Avery, Jeff Bradtmiller
IDEM – Shawn Seals
INDOT – Roy Nunnally, Ben Shaffer
FHWA – Joyce Newland, Larry Heil
EPA – Tony Maietta
Citilink – Betsy Kachmar

Call began at 2:00 pm.

I. Larry Heil asked when the SIP update would be completed, since after July 22, 2013 a Conformity Determination would not be needed.
    1. Shawn stated it's being worked on now.
    2. Tony stated that it will take about 60 days to process once they receive it.
        i. Shawn asked is that standard?
        ii. Tony, yes since this will be a Direct Final
    3. Larry stated that the current TIP would be used in the STIP update.
    4. Dan asked so after July 22, 2013 we would not have to do anymore Conformity Determinations anymore on the TP or TIP?
        i. Larry and Tony stated correct.
        ii. Dan stated we will complete the documentation for this update since we already have the analysis.

II. Tony asked if NIRCC's plan doesn't run out before the current standard goes away
    1. Joyce stated that our plan was last updated as of January 24, 2011, so it will still be affective

III. Dan Avery asked are there any questions or concerns with what we have in the Draft documentations.
    1. Joyce stated that even though the AQ is going away we are still on a 4 year cycle for our plan updates.

IV. Larry asked when IDEM would be putting out the recommendations for the new PM standards.
    1. Shawn stated sometime in December of 2013.
    2. Tony stated that EPA would come out with their findings sometime in 2014 and the state would have 3 years to come up with their SIP.
    3. Shawn stated that Allen County should not have a problem with meeting the new PM standards.

V. There were no more questions so the meeting adjourned at approximately 2:30 PM.

Appendix B

MOVES Inputs and Outputs

Report Summary File INDOT Air Quality Post Processor

Scenario: 2010Run

Scenario Description: 2010 Emissions

Scenario File: C:\INDOT\AQPP\2010Run.scn

Analysis Area: Allen County

Analysis Year: 2010

Emission Type: Ozone

Peak Spreading: Yes

Travel Demand Model Input Files

Link Table: C:\INDOT\AQPP\link_table_2010 Run.bin

Intrazonal Table: C:\INDOT\AQPP\taz_intra_2010 Run.bin

Air Quality Rate Input Files

Rates per Distance: C:\INDOT\AQPP\Master Inputs\Alle_2010_ratesperdistance_oz.csv

Rates per Vehicle: C:\INDOT\AQPP\Master Inputs\Alle_2010_ratespervehicle_oz.csv

Rates per Profile: C:\INDOT\AQPP\Master Inputs\Alle_2010_ratesperprofile_oz.csv

HPMS Fraction: C:\INDOT\AQPP\Master Inputs\HPMS_Fraction_INStatewide.csv

Hourly Fraction: C:\INDOT\AQPP\Master Inputs\HourVMTFraction.csv

Vehicle Class Distribution: C:\INDOT\AQPP\Master Inputs\VehClassDist.csv

Source Type Population: C:\INDOT\AQPP\Master Inputs\Alle_2010_SourceTypePopulation.csv

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Output Files

Link Emissions Table: C:\INDOT\AQPP\Output_2010Run\EMIS_daily.bin

Intrazonal Emissions Table: C:\INDOT\AQPP\Output_2010Run\Intra_VMT_daily.bin

Peak Spreading Indicator Table: C:\INDOT\AQPP\Output_2010Run\Spreading_Indicator.bin

Emissions by Functional Class. Table: C:\INDOT\AQPP\Output_2010Run\Emission_by_HPMS_FC.csv

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Emissions (grams) by County, Type, and Functional Classification

County	Emission Type	HPMS Func. Class.	Dly NOx - Oz	Dly NOx - PM	Dly VOC	Dly PM
"Allen"	"Running"	"Rural Interstate"	2,024,729.04	n/a	134,264.42	n/a
"Allen"	"Running"	"Rural Principal Arterial"	1,542,599.07	n/a	136,397.94	n/a
"Allen"	"Running"	"Rural Minor Arterial"	92,825.21	n/a	11,617.41	n/a
"Allen"	"Running"	"Rural Major Collector"	985,778.12	n/a	130,630.44	n/a
"Allen"	"Running"	"Rural Minor Collector"	213,375.01	n/a	27,915.57	n/a
"Allen"	"Running"	"Rural Local"	494,237.30	n/a	83,019.87	n/a
"Allen"	"Running"	"Urban Interstate"	2,069,114.50	n/a	179,656.98	n/a
"Allen"	"Running"	"Urban Principal Arterial"	83,227.90	n/a	9,094.79	n/a
"Allen"	"Running"	"Urban Other Arterial"	1,716,727.64	n/a	326,140.76	n/a
"Allen"	"Running"	"Urban Minor Arterial"	2,197,048.05	n/a	449,793.05	n/a
"Allen"	"Running"	"Urban Collector"	537,018.70	n/a	115,883.35	n/a
"Allen"	"Running"	"Urban Local"	953,138.10	n/a	266,893.98	n/a
"Allen"	"Running"	"All HPMS Classes"	12,909,818.65	n/a	1,871,308.58	n/a
"Allen"	"Running Intrazonal"	"All HPMS Classes"	19,641.83	n/a	5,195.50	n/a
"Allen"	"Tot Running"	"All HPMS Classes"	12,929,460.47	n/a	1,876,504.08	n/a
"All"	"Non-Running"	"All HPMS Classes"	4,840,885.83	n/a	5,806,959.61	n/a
"All"	"Tot Emissions"	"All HPMS Classes"	17,770,346.31	n/a	7,683,463.69	n/a

Report Summary File INDOT Air Quality Post Processor

Scenario: 2015Run

Scenario Description: 2015 Emissions

Scenario File: C:\INDOT\AQPP\2015Run.scn

Analysis Area: Allen County

Analysis Year: 2015

Emission Type: Ozone

Peak Spreading: Yes

Travel Demand Model Input Files

Link Table: C:\INDOT\AQPP\link_table_2015 Run.bin

Intrazonal Table: C:\INDOT\AQPP\taz_intra_2015 Run.bin

Air Quality Rate Input Files

Rates per Distance: C:\INDOT\AQPP\Master Inputs\Alle_2015_ratesperdistance_oz.csv

Rates per Vehicle: C:\INDOT\AQPP\Master Inputs\Alle_2015_ratespervehicle_oz.csv

Rates per Profile: C:\INDOT\AQPP\Master Inputs\Alle_2015_ratesperprofile_oz.csv

HPMS Fraction: C:\INDOT\AQPP\Master Inputs\HPMS_Fraction_INStatewide.csv

Hourly Fraction: C:\INDOT\AQPP\Master Inputs\HourVMTFraction.csv

Vehicle Class Distribution: C:\INDOT\AQPP\Master Inputs\VehClassDist.csv

Source Type Population: C:\INDOT\AQPP\Master Inputs\Alle_2015_SourceTypePopulation.csv

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Output Files

Link Emissions Table: C:\INDOT\AQPP\Output_2015Run\EMIS_daily.bin

Intrazonal Emissions Table: C:\INDOT\AQPP\Output_2015Run\Intra_VMT_daily.bin

Peak Spreading Indicator Table: C:\INDOT\AQPP\Output_2015Run\Spreading_Indicator.bin

Emissions by Functional Class. Table: C:\INDOT\AQPP\Output_2015Run\Emission_by_HPMS_FC.csv

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Emissions (grams) by County, Type, and Functional Classification

County	Emission Type	HPMS Func. Class.	Dly NOx - Oz	Dly NOx - PM	Dly VOC	Dly PM
"Allen"	"Running"	"Rural Interstate"	1,069,810.67	n/a	76,869.67	n/a
"Allen"	"Running"	"Rural Principal Arterial"	847,249.34	n/a	74,562.38	n/a
"Allen"	"Running"	"Rural Minor Arterial"	49,202.51	n/a	6,201.70	n/a
"Allen"	"Running"	"Rural Major Collector"	517,320.06	n/a	69,124.08	n/a
"Allen"	"Running"	"Rural Minor Collector"	117,786.26	n/a	15,533.95	n/a
"Allen"	"Running"	"Rural Local"	281,544.21	n/a	47,619.24	n/a
"Allen"	"Running"	"Urban Interstate"	1,390,366.51	n/a	129,573.86	n/a
"Allen"	"Running"	"Urban Principal Arterial"	55,563.29	n/a	6,163.91	n/a
"Allen"	"Running"	"Urban Other Arterial"	899,950.96	n/a	169,832.97	n/a
"Allen"	"Running"	"Urban Minor Arterial"	1,146,741.02	n/a	231,407.74	n/a
"Allen"	"Running"	"Urban Collector"	292,577.70	n/a	61,796.15	n/a
"Allen"	"Running"	"Urban Local"	503,835.32	n/a	136,775.02	n/a
"Allen"	"Running"	"All HPMS Classes"	7,171,947.85	n/a	1,025,460.66	n/a
"Allen"	"Running Intrazonal"	"All HPMS Classes"	10,888.34	n/a	2,699.48	n/a
"Allen"	"Tot Running"	"All HPMS Classes"	7,182,836.19	n/a	1,028,160.14	n/a
"All"	"Non-Running"	"All HPMS Classes"	3,861,377.64	n/a	3,852,547.97	n/a
"All"	"Tot Emissions"	"All HPMS Classes"	11,044,213.84	n/a	4,880,708.11	n/a

Report Summary File INDOT Air Quality Post Processor

Scenario: 2020Run

Scenario Description: 2020 Emissions

Scenario File: C:\INDOT\AQPP\2020Run.scn

Analysis Area: Allen County

Analysis Year: 2020

Emission Type: Ozone

Peak Spreading: Yes

Travel Demand Model Input Files

Link Table: C:\INDOT\AQPP\link_table_2020 Run.bin

Intrazonal Table: C:\INDOT\AQPP\taz_intra_2020 Run.bin

Air Quality Rate Input Files

Rates per Distance: C:\INDOT\AQPP\Master Inputs\Alle_2020_ratesperdistance_oz.csv

Rates per Vehicle: C:\INDOT\AQPP\Master Inputs\Alle_2020_ratespervehicle_oz.csv

Rates per Profile: C:\INDOT\AQPP\Master Inputs\Alle_2020_ratesperprofile_oz.csv

HPMS Fraction: C:\INDOT\AQPP\Master Inputs\HPMS_Fraction_INStatewide.csv

Hourly Fraction: C:\INDOT\AQPP\Master Inputs\HourVMTFraction.csv

Vehicle Class Distribution: C:\INDOT\AQPP\Master Inputs\VehClassDist.csv

Source Type Population: C:\INDOT\AQPP\Master Inputs\Alle_2020_SourceTypePopulation.csv

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Output Files

Link Emissions Table: C:\INDOT\AQPP\Output_2020Run\EMIS_daily.bin

Intrazonal Emissions Table: C:\INDOT\AQPP\Output_2020Run\Intra_VMT_daily.bin

Peak Spreading Indicator Table: C:\INDOT\AQPP\Output_2020Run\Spreading_Indicator.bin

Emissions by Functional Class. Table: C:\INDOT\AQPP\Output_2020Run\Emission_by_HPMS_FC.csv

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Emissions (grams) by County, Type, and Functional Classification

County	Emission Type	HPMS Func. Class.	Dly NOx - Oz	Dly NOx - PM	Dly VOC	Dly PM
"Allen"	"Running"	"Rural Interstate"	577,487.20	n/a	44,269.57	n/a
"Allen"	"Running"	"Rural Principal Arterial"	485,041.45	n/a	44,329.07	n/a
"Allen"	"Running"	"Rural Minor Arterial"	28,224.43	n/a	3,776.25	n/a
"Allen"	"Running"	"Rural Major Collector"	292,796.40	n/a	41,576.44	n/a
"Allen"	"Running"	"Rural Minor Collector"	69,067.44	n/a	9,682.44	n/a
"Allen"	"Running"	"Rural Local"	161,847.82	n/a	29,584.11	n/a
"Allen"	"Running"	"Urban Interstate"	860,634.56	n/a	86,303.53	n/a
"Allen"	"Running"	"Urban Principal Arterial"	31,166.97	n/a	3,695.62	n/a
"Allen"	"Running"	"Urban Other Arterial"	489,461.79	n/a	100,316.29	n/a
"Allen"	"Running"	"Urban Minor Arterial"	628,962.74	n/a	137,785.78	n/a
"Allen"	"Running"	"Urban Collector"	165,087.64	n/a	38,141.95	n/a
"Allen"	"Running"	"Urban Local"	276,666.62	n/a	82,880.94	n/a
"Allen"	"Running"	"All HPMS Classes"	4,066,445.05	n/a	622,341.98	n/a
"Allen"	"Running Intrazonal"	"All HPMS Classes"	6,046.04	n/a	1,637.79	n/a
"Allen"	"Tot Running"	"All HPMS Classes"	4,072,491.09	n/a	623,979.78	n/a
"All"	"Non-Running"	"All HPMS Classes"	3,215,854.19	n/a	2,812,782.72	n/a
"All"	"Tot Emissions"	"All HPMS Classes"	7,288,345.28	n/a	3,436,762.50	n/a

Report Summary File INDOT Air Quality Post Processor

Scenario: 2030Run

Scenario Description: 2030 Emissions

Scenario File: C:\INDOT\AQPP\2030Run.scn

Analysis Area: Allen County

Analysis Year: 2030

Emission Type: Ozone

Peak Spreading: Yes

Travel Demand Model Input Files

Link Table: C:\INDOT\AQPP\link_table_2030 Run.bin

Intrazonal Table: C:\INDOT\AQPP\taz_intra_2030 Run.bin

Air Quality Rate Input Files

Rates per Distance: C:\INDOT\AQPP\Master Inputs\Alle_2030_ratesperdistance_oz.csv

Rates per Vehicle: C:\INDOT\AQPP\Master Inputs\Alle_2030_ratespervehicle_oz.csv

Rates per Profile: C:\INDOT\AQPP\Master Inputs\Alle_2030_ratesperprofile_oz.csv

HPMS Fraction: C:\INDOT\AQPP\Master Inputs\HPMS_Fraction_INStatewide.csv

Hourly Fraction: C:\INDOT\AQPP\Master Inputs\HourVMTFraction.csv

Vehicle Class Distribution: C:\INDOT\AQPP\Master Inputs\VehClassDist.csv

Source Type Population: C:\INDOT\AQPP\Master Inputs\Alle_2030_SourceTypePopulation.csv

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Output Files

Link Emissions Table: C:\INDOT\AQPP\Output_2030Run\EMIS_daily.bin

Intrazonal Emissions Table: C:\INDOT\AQPP\Output_2030Run\Intra_VMT_daily.bin

Peak Spreading Indicator Table: C:\INDOT\AQPP\Output_2030Run\Spreading_Indicator.bin

Emissions by Functional Class. Table: C:\INDOT\AQPP\Output_2030Run\Emission_by_HPMS_FC.csv

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Emissions (grams) by County, Type, and Functional Classification

County	Emission Type	HPMS Func. Class.	Dly NOx - Oz	Dly NOx - PM	Dly VOC	Dly PM
"Allen"	"Running"	"Rural Interstate"	365,870.03	n/a	33,335.52	n/a
"Allen"	"Running"	"Rural Principal Arterial"	307,475.13	n/a	32,981.09	n/a
"Allen"	"Running"	"Rural Minor Arterial"	18,071.10	n/a	2,840.70	n/a
"Allen"	"Running"	"Rural Major Collector"	199,542.99	n/a	33,500.42	n/a
"Allen"	"Running"	"Rural Minor Collector"	49,946.39	n/a	8,284.75	n/a
"Allen"	"Running"	"Rural Local"	110,084.15	n/a	24,381.02	n/a
"Allen"	"Running"	"Urban Interstate"	550,471.68	n/a	67,035.15	n/a
"Allen"	"Running"	"Urban Principal Arterial"	18,529.83	n/a	2,624.28	n/a
"Allen"	"Running"	"Urban Other Arterial"	305,056.48	n/a	75,873.54	n/a
"Allen"	"Running"	"Urban Minor Arterial"	435,694.78	n/a	114,822.27	n/a
"Allen"	"Running"	"Urban Collector"	100,780.16	n/a	28,291.28	n/a
"Allen"	"Running"	"Urban Local"	180,033.43	n/a	67,027.06	n/a
"Allen"	"Running"	"All HPMS Classes"	2,641,556.16	n/a	490,997.09	n/a
"Allen"	"Running Intrazonal"	"All HPMS Classes"	3,898.88	n/a	1,313.18	n/a
"Allen"	"Tot Running"	"All HPMS Classes"	2,645,455.03	n/a	492,310.27	n/a
"All"	"Non-Running"	"All HPMS Classes"	3,081,104.21	n/a	2,406,591.22	n/a
"All"	"Tot Emissions"	"All HPMS Classes"	5,726,559.25	n/a	2,898,901.49	n/a

Report Summary File INDOT Air Quality Post Processor

Scenario: 2035Run

Scenario Description: 2035 Emissions

Scenario File: C:\INDOT\AQPP\2035Run.scn

Analysis Area: Allen County

Analysis Year: 2035

Emission Type: Ozone

Peak Spreading: Yes

Travel Demand Model Input Files

Link Table: C:\INDOT\AQPP\link_table_2035 Run.bin

Intrazonal Table: C:\INDOT\AQPP\taz_intra_2035 Run.bin

Air Quality Rate Input Files

Rates per Distance: C:\INDOT\AQPP\Master Inputs\Alle_2035_ratesperdistance_oz.csv

Rates per Vehicle: C:\INDOT\AQPP\Master Inputs\Alle_2035_ratespervehicle_oz.csv

Rates per Profile: C:\INDOT\AQPP\Master Inputs\Alle_2035_ratesperprofile_oz.csv

HPMS Fraction: C:\INDOT\AQPP\Master Inputs\HPMS_Fraction_INStatewide.csv

Hourly Fraction: C:\INDOT\AQPP\Master Inputs\HourVMTFraction.csv

Vehicle Class Distribution: C:\INDOT\AQPP\Master Inputs\VehClassDist.csv

Source Type Population: C:\INDOT\AQPP\Master Inputs\Alle_2035_SourceTypePopulation.csv

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Output Files

Link Emissions Table: C:\INDOT\AQPP\Output_2035Run\EMIS_daily.bin

Intrazonal Emissions Table: C:\INDOT\AQPP\Output_2035Run\Intra_VMT_daily.bin

Peak Spreading Indicator Table: C:\INDOT\AQPP\Output_2035Run\Spreading_Indicator.bin

Emissions by Functional Class. Table: C:\INDOT\AQPP\Output_2035Run\Emission_by_HPMS_FC.csv

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Emissions (grams) by County, Type, and Functional Classification

County	Emission Type	HPMS Func. Class.	Dly NOx - Oz	Dly NOx - PM	Dly VOC	Dly PM
"Allen"	"Running"	"Rural Interstate"	369,390.78	n/a	34,157.44	n/a
"Allen"	"Running"	"Rural Principal Arterial"	319,585.39	n/a	34,646.26	n/a
"Allen"	"Running"	"Rural Minor Arterial"	18,141.71	n/a	2,902.90	n/a
"Allen"	"Running"	"Rural Major Collector"	204,798.18	n/a	35,030.04	n/a
"Allen"	"Running"	"Rural Minor Collector"	52,966.16	n/a	8,944.16	n/a
"Allen"	"Running"	"Rural Local"	112,539.61	n/a	25,567.31	n/a
"Allen"	"Running"	"Urban Interstate"	546,312.78	n/a	67,534.91	n/a
"Allen"	"Running"	"Urban Principal Arterial"	18,410.05	n/a	2,653.40	n/a
"Allen"	"Running"	"Urban Other Arterial"	297,661.25	n/a	75,772.56	n/a
"Allen"	"Running"	"Urban Minor Arterial"	435,490.54	n/a	116,954.82	n/a
"Allen"	"Running"	"Urban Collector"	98,115.36	n/a	28,231.47	n/a
"Allen"	"Running"	"Urban Local"	175,454.96	n/a	67,457.58	n/a
"Allen"	"Running"	"All HPMS Classes"	2,648,866.79	n/a	499,852.85	n/a
"Allen"	"Running Intrazonal"	"All HPMS Classes"	3,850.95	n/a	1,338.37	n/a
"Allen"	"Tot Running"	"All HPMS Classes"	2,652,717.74	n/a	501,191.22	n/a
"All"	"Non-Running"	"All HPMS Classes"	3,223,877.04	n/a	2,448,079.07	n/a
"All"	"Tot Emissions"	"All HPMS Classes"	5,876,594.78	n/a	2,949,270.29	n/a

Appendix C

Citizens Comments and Responses

Appendix D

2035 Transportation Plan Project List

2035 Transportation Plan Projects - Allen County

The list below includes the air quality "Non-Exempt" and "Exempt" highway and transit projects. The numbers preceding the highway projects corresponds to the time periods analyzed for air quality conformity. The 2035 Transportation Plan Project Identification Number, as listed in the 2014-2017 TIP, has been provided following the description for each project (XX-XXX). XX- indicates the initial plan the project was listed in, -XXX indicates the project number as listed below.
The time periods are:
Period 1 2010-2015
Period 2 2016-2020
Period 3 2021-2030
Period 4 2031-2035

Highway Improvements

Air Quality Non-Exempt Projects

New Construction
New two-lane construction
3 Connector Street from Wells Street to Spy Run Avenue (30-001)
3 Paul Shaffer Drive from Clinton Street to California Road (30(II)-002)

Interchange-new construction
3 Interstate 69 at Hursh Road (25-003)

Widening Projects
Widen to six lanes
3 Crescent Avenue – Sirlin Drive to Coliseum Boulevard (30(II)-004)
2 SR 930/Coliseum Blvd – Parnell Avenue to Crescent Avenue (10-005)

Widen to four lanes
3 Adams Center Road – State Road 930 to Moeller Road (25-006)
3 Ardmore Avenue – Covington Road to Engle Road (30-007)
4 Ardmore Avenue – Engle Road to Lower Huntington Road (30-008)
3 Bluffton Road – Winchester Road to Old Trail Road (30(II)-009)
3 Clinton Street – Auburn Road to Wallen Road (25-010)
4 Clinton Street – Wallen Road to Dupont Road/State Road 1 (25-011)
2 Diebold Road – Clinton Street to Dupont Road/State Road 1 (35-012)
2 Dupont Road – Coldwater Road to Lima Road/State Road 3 (25-013)
3 Hillegas Road – s/o Bass Road to Washington Center Road (25-014)
4 Huguenard Road – Washington Center Road to Cook Road (25-015)
2 Maplecrest Road – Lake Avenue to State Boulevard (10-016)
2 Maplecrest Road – State Boulevard to Stellhorn Road (10-017)
2 Maysville Road – Stellhorn Road to Koester Ditch (30-018)
3 Saint Joe Center Road – Reed Road to Maplecrest Road (35-019)
4 State Boulevard – Maysville Road to Georgetown North Boulevard (10-020)

2 State Boulevard – Spy Run Avenue to Clinton Street (10-021)
2 State Boulevard – Clinton Street to Cass Street (10-022)
3 Stellhorn Road – Maplecrest Road to Maysville Road (35-023)
3 Tonkel Road – Dupont Road/State Road 1 to Union Chapel Road (10-024)
3 Washington Center Road – Lima Road/State Road 3 to US 33 (25-025)

Air Quality Exempt Projects

Congestion Management Strategy Implementation
Center Turn Lane Improvement
3 Auburn Road – Cook Road to Interstate 469 Exit Ramp (3-lane) (15-026)
3 Auburn Road – Dupont Road to Gump Road (3-lane) (25-027)
3 Coldwater Road – Dupont Road to Union Chapel Road (3-lane) (25-028)
3 Engle Road – Bluffton Road to Smith Road (3-lane) (30-029)
2 Gump Road – State Road 3 to Coldwater Road (3-lane) (25-030)
3 Gump Road – Coldwater Road to Auburn Road (3-lane) (25-031)
4 Hadley Road – Illinois Road/State Road 14 to Covington Road (3-lane) (25-032)
4 Hadley Road – Illinois Road/State Road 14 to Bass Road (3-lane) (30(II)-033)
3 Maysville Road – State Boulevard to Stellhorn Road (3-lane) (25-034)
2 Saint Joe Center Road – Clinton Street to River Run Trail (5-lane) (10-035)
4 Saint Joe Center Road – Maplecrest Road to Meijer Drive (3-lane) (35-036)
3 Saint Joe Road – Evard Road to Mayhew Road (3-lane) (10-037)
4 Saint Joe Road – Maplecrest Road to Eby Road (3-lane) (25-038)

Turn Lane Extension
2 Jefferson Boulevard from Lutheran Hospital Entrance to Interstate 69 Ramps (25-039)

Road Reconstruction – Road Diet
2 Anthony Boulevard – Tillman Road to Rudisill Boulevard (35-040)
3 Anthony Boulevard – Rudisill Boulevard to Pontiac Street (35-041)
3 Anthony Boulevard – Pontiac Street to Wayne Trace (35-042)
3 Anthony Boulevard – Wayne Trace to Crescent Avenue (35-043)
2 Coliseum Boulevard/Pontiac Street – New Haven Avenue to Wayne Trace (35-044)
3 McKinnie Avenue – Anthony Boulevard to Hessen Cassel Road (35-045)
3 Oxford Street – Anthony Boulevard to Hessen Cassel Road (35-046)
2 Paulding Road – US 27/Lafayette Street to Anthony Boulevard (35-047)
2 Paulding Road – Anthony Boulevard to Hessen Cassel Road (35-048)

Intersection Reconstruction
2 Auburn Road and Wallen Road, Bridge over Becketts Run (35-049)
2 Bass Road, Hadley Road and Yellow River Road (30-050)
1 Bethel Road, Huguenard Road and Till Road (35-051)
2 Broadway and Taylor Street (35-052)
2 Broadway/Landin Road and Rose Avenue (35-053)
2 Clinton Street and Wallen Road (35-054)
2 Clinton Street and Washington Center/Saint Joe Center Road (25-055)

3 Coldwater Road and Ludwig Road (35-056)
3 Corbin Road and Union Chapel Road (35-057)
3 Coverdale Road, Winters Road and Indianapolis Road (25-058)
2 Ewing Street, Fairfield Avenue, Superior Street and Wells Street (35-059)
3 Flaugh Road and Leesburg Road (30(II)-060)
3 Goshen Road, Lillian Avenue and Sherman Street (35-061)
2 Green Road and State Road 930 (35-062)
2 Landin Road, Maysville Road and Trier Road (35-063)
2 Leesburg Road and Main Street (35-064)
3 Rothman Road and Saint Joe Road (35-066)
2 Ryan Road and Dawkins Road (25-067)

Reconstruction and Realignment
3 Adams Center Road – Moeller Road to Paulding Road (35-068)
4 Adams Center Road – Paulding Road to Interstate 469 (35-069)
2 Allen County/Whitley County Line Road – US 24 to SR 14 (30-070)
2 Amstutz Road – Hosler Road to State Road 1/Leo Road (30(II)-071)
2 Bass Road – Shakespeare Blvd to Clifty Parkway (35-072)
2 Bass Road – Clifty Parkway to Thomas Road (35-073)
2 Bass Road – Thomas Road to Hillegas Road (35-074)
2 Bass Road – Hadley Road to Scott Road (35-075)
2 Carroll Road – Preserve Boulevard to Bethel Road (25-076)
3 Coliseum Boulevard – Hillegas Road to 1,500' e/o Hillegas Road (35-077)
4 Cook Road – US 33 to O'Day Road (30(II)-078)
1 Coverdale Road – Indianapolis Road to Airport Expressway (30-079)
1 Ewing Street – Baker Street to Superior Street (35-080)
1 Fairfield Avenue – Baker Street to Superior Street (35-081)
1 Flutter Road – Schwartz Road to St. Joe Road (25-082)
3 Goshen Avenue – Sherman Boulevard to Coliseum Boulevard/State Road 930(35-083)
4 Lake Avenue – Reed Road to Maysville Road (35-084)
2 Landin Road – North River Road to Maysville Road (30-085)
3 Leesburg Road – Main Street to Jefferson Boulevard (35-086)
3 Moeller Road – Hartzell Road to Adams Center (30-087)
3 Ryan Road – Dawkins Road to US 24 (35-088)
2 Till Road – Lima Road to Dawson Creek Boulevard (30-089)
3 Wallen Road – Hanauer Road to Auburn Road (30-090)
4 Wells Street – State Boulevard to Fernhill Avenue (35-091)
2 Witmer Road/Second Street – Country Shoals Lane to Main Street (30(II)-092)
4 Witmer Road – Schwartz Road to Country Shoals Lane (30(II)-093)

Other Highway Improvements
New Railroad Grade Separation
1 Anthony Boulevard and Norfolk Southern Railroad (25-094)
2 Airport Expressway and Norfolk Southern Railroad (15-095)

Reconstruct Railroad Grade Separation
1 Anthony Boulevard and CSX Railroad (25-096)
2 US 27/Lafayette Street and Norfolk Southern (10-097)

Interchange/Ramp-Modification
2 Interstate 69 and Interstate 469 Interchange (NB to EB Ramp mm 215) (35-098)
1 Interstate 69 and State Road 1/Dupont Road (30(II)-099)
1 Interstate 69 and State Road 14/Illinois Road Interchange (WB to NB Ramp) (35-100)
2 Interstate 469 and Auburn Road Ramp (35-101)
1 Interstate 469 and US 24 Interchange (25-102)
3 US 30/US 33 Interchange (30(II)-103)
2 US 24 and Bruick/Ryan Road (30-104)

Bridge Reconstruction/Modification
2 Anthony Boulevard Bridge over the Maumee River (35-105)
4 Washington Center Road Bridge over Spy Run Creek (35-106)

Additional Projects for Illustrative Purposes Only
Widening Projects - six lanes
Clinton Street – Parnell Avenue to Auburn Road (30-107)
Interstate 69 – Interstate 469 to US 24 (10-108)
Interstate 69 – Dupont Road/State Road 1 to Hursh Road (25-109)
Interstate 469 – Maplecrest Road to Interstate 69 (25-110)
Jefferson Boulevard – Illinois Road South to Main Street (10-111)
Jefferson Boulevard – Interstate 69 to Illinois Road South (30(II)-112)
State Road 3 – Dupont Road to Gump Road (25-113)
State Road 3 – Gump Road to Allen County Line (30(II)-114)
US 24 – Interstate 69 to Homestead Road (25-115)
US 30 – Interstate 69 to US 33 (10-116)
US 30 – US 33 to Flaugh Road (10-117)
US 30 – Flaugh Road to O'Day Road (25-118)

Widening Projects - four lanes
State Road 1/Leo Road – Tonkel Road to Union Chapel Road (25-119)
State Road 1/Leo Road – Union Chapel Road to Grabill Road (30(II)-120)
State Road 1/Bluffton Road – Interstate 469 to State Road 116/124 (30-121)
State Road 14/Illinois Road – West Hamilton Road to Allen/Whitley County Line Road (25-122)
State Road 37 – Doty Road to Interstate 469 (10-123)
State Road 930 – Minnich Road to Brookwood Drive (30(II)-124)
US 33 – Cook Road to O'Day Road (10-125)
US 33 – O'Day Road to State Road 205 (30-126)

Reconstruction and Realignment
Lafayette Center Road/E 900 North Road – Fogwell Parkway to US 24 (35-127)

State Road 37 – Doty Road to Cuba Road (30-128)

Interchange – Modification
Interstate 69 and Coldwater Road Interchange - Ludwig Road (30-129)

Bridge Reconstruction/Modification
Bass Road over Interstate 69 (25-130)
Hillegas Road over Interstate 69 (25-131)
US 27/Spy Run Avenue Bridge over St. Mary's River w/Pedestrian Treatment (25-132)

Transit Improvements
Air Quality Exempt Projects
Transit Improvement Projects

Public Transit Improvement Projects

**Projects are numbered for identification purposes only, not by priority*

Project 1 Expanded transit service in the growing urbanized area where ridership warrants. Potential locations include the Fort Wayne International Airport and surrounding area, Chapel Ridge and surrounding area, and Aboite, Perry, and Cedar Creek Townships. Types of service will be determined based upon projected demands and proposed service levels.
**Policies 2, 7, 8, 9, 10, & 11*

Project 2 Replacement of transit coaches and service vehicles as necessary to maintain a dependable transit fleet.
**Policies 1 & 6*

Project 3 Install and upgrade bus shelters, benches, and other customer amenities. Placement of shelters (Bus Huts) should be consistent with Citilink service, accessible, and have sidewalk connectivity.
**Policies 1 & 5*

Project 4 Reduce headways on selected routes where current and potential ridership levels warrant.
**Policies 2 & 3*

Project 5 Expand service hours into the evening and provide Sunday service through fixed route and other types of transit services.
**Policies 2 & 3*

Project 6 Provide customer access to automatic vehicle locator (AVL) information for the transit system through Internet connections.
**Policy 3*

Project 7 Design and construct a satellite transfer center to serve the northern portion of the service area.
**Policy 2*

Project 8 Encourage the construction of accessible pedestrian facilities to and from bus stop locations, within developments, and in areas where pedestrian facilities currently do not exist (sidewalk placement and connectivity).
**Policies 1, 4, & 5*

Project 9 High Priority Corridors: Designate corridors to include amenities that allow busses and para-transit vehicles to safely pull off the corridor to load and unload as well as provide safe pedestrian facilities. These corridors should include Broadway, Wells Street, Lima Road, Calhoun Street, Lafayette Street / Spy Run Avenue, Clinton Street, Anthony Boulevard, Washington Boulevard, Jefferson Boulevard / Maumee Avenue, State Boulevard, and Washington Center Road.
**Policy 3*

Project 10 Review and update the Transit Development Plan on a four-year cycle.
- Establishing Evaluation Markers
- Establishing Performance Measures
- Providing continuous monitoring and evaluation

**Policies 1, 2, 3, 4, 5, & 6*

Specific Improvements from the Transit Development Plan

- Increased service frequency – route 1, 2, 3, 4, 6, 9, and 10
- Extend evening hours – route 2, 4, 7, and 8
- Implement 1 hour headway Sunday service – route 2, 4, and 8
- Implement new cross-town route between Glenbrook and the I-469 / Maysville area
- Design and construct a downtown intermodal transfer/ transportation center
- Update Transit Development Plan

Identified Transportation Strategies from Coordinated Transit Plan

Specific Improvements from the Transit Development Plan

- Increased service frequency – routes 1, 2 and 3
- Extend evening/nighttime service hours
- Provide limited service on Sundays
- Update Transit Development Plan

Strategies Applicable to All Programs and Providers:

1. Identify new revenue sources to increase operating budgets necessary to expand and maintain services and fleets
2. Keep costs low / maintain affordable rates

Section 5310 Enhanced Mobility of Seniors and Individuals with Disabilities Program – Capital Funding

1. Maintain existing service / fleets
2. Maintain and increase coordination / efficiency between all transportation providers
3. Expand existing service / fleets
4. Increase public awareness of available services and programs offered by providers that are available to them

Section 5310 Enhanced Mobility of Seniors and Individuals with Disabilities Program – Operational

1. Provide transportation above and beyond existing complimentary paratransit service
2. Provide transportation outside current service areas
3. Provide transportation within and outside current service schedules

Job Access Reverse Commute Related Projects Strategies:

1. Provide transportation to destinations outside of the current service area
2. Provide transportation within and in particular outside of the current service schedules
3. Facilitate multiple destination trips from a single service provider. (ie. daycare/job)
4. Inform the public about transportation services available in the community and train them to use the services to get to work, job training, and child care as efficiently as possible

Appendix E

Indiana Department of Transportation
Air Quality Post-Processor Documentation

Indiana Department of Transportation
Air Quality Post-Processor

INDOT Planning Contract

Draft

January 25, 2012

Table of Contents

Introduction

There is a need to efficiently and effectively calculate emissions inventories for any area that is in non-attainment of the National Ambient Air Quality Standards (NAAQS). The current version of the mobile source emissions model developed by the U.S. Environmental Protection Agency (EPA) is the Motor Vehicle Emissions Simulator (MOVES). MOVES replaces its predecessor model, Mobile6.2. On March 2, 2010 EPA released a federal register notice officially announcing the release of MOVES and its adoption by EPA as the standard emissions model for the development of State Implementation Plans (SIP) and regional transportation conformity analyses. The notice also kicked off a two year grace period after which Mobile6.2 will no longer be accepted for SIP and regional conformity analyses and MOVES will be required. Though as of this writing, there is a proposed rulemaking issued October 13, 2011 by EPA that would extend the grace period by another year to March 3, 2013, there is yet to be a final ruling. The previous final ruling was withdrawn on December 5, 2011 due to adverse comments. While a final rule on the grace period extension is still pending, many state agencies and metropolitan planning organizations (MPO) have begun the process of transitioning their air quality analysis practices to make use of MOVES. The current version of MOVES is MOVES2010a.

While it is possible to use MOVES to calculate emissions inventories directly, EPA policy does support the use of emissions rates produced by MOVES as applied to key outputs developed by a travel demand model. These outputs include vehicle-miles-traveled (VMT), vehicle-hours traveled (VHT), and speeds. The benefits of using the emissions rates from MOVES as part of an air quality post-processor for a travel demand model are greater ease and precision in assessing the benefits to air quality achieved by improvements to the area's transportation system.

It is for these reasons that the Indiana Department of Transportation (INDOT) developed a post-processing tool for applying emissions rates developed in MOVES to the output data produced by the travel demand models used in Indiana. Since the majority of the travel demand models used in Indiana run on the TransCAD modeling platform, this tool was developed in that platform. For those cases in which a model exists in a platform other than TransCAD, the requisite input data can be imported into the proper TransCAD formats and used with this tool.

This document contains information on the INDOT Air Quality Post Processor (AQPP) developed for Indiana Department of Transportation. The methodology, specifications of the tool, installation, setup, and application steps; file directory structure, and input / output files and data are presented. This document assumes the user has familiarity with TransCAD software. There are two general sections in this document. The first section discusses the methodology employed in the INDOT AQPP. The second section is a users' guide that provides instruction on how to use the INDOT AQPP.

Methodology

The INDOT AQPP was developed to calculate emissions estimates through the application of emissions rates developed in MOVES to the outputs of travel demand models. Though MOVES can calculate emissions inventories directly, the effort involved in preprocessing the input data sets needed to

accurately reflect each transportation and land use scenario being analyzed can be quite effort intensive. Though the initial pre-processing required to develop emissions rates in MOVES is comparable to running MOVES in emissions inventory mode, once the emissions rates have been developed, they can continue to be applied to travel demand model outputs without further preprocessing. This is particularly advantageous if one is planning to test a variety of transportation scenarios.

The methodology employed in the INDOT AQPP is fairly straightforward. The INDOT AQPP takes travel demand model data as an input along with the emissions rates developed in MOVES. The travel demand model vehicle-miles-traveled are then disaggregated into a fine level of detail and factored by the emissions rates to produce emissions estimates. **Figure 1** shows a flowchart of the post-processor's function. The rest of this section describes the data files and disaggregation methods used by the INDOT AQPP.

Travel Demand Model Inputs

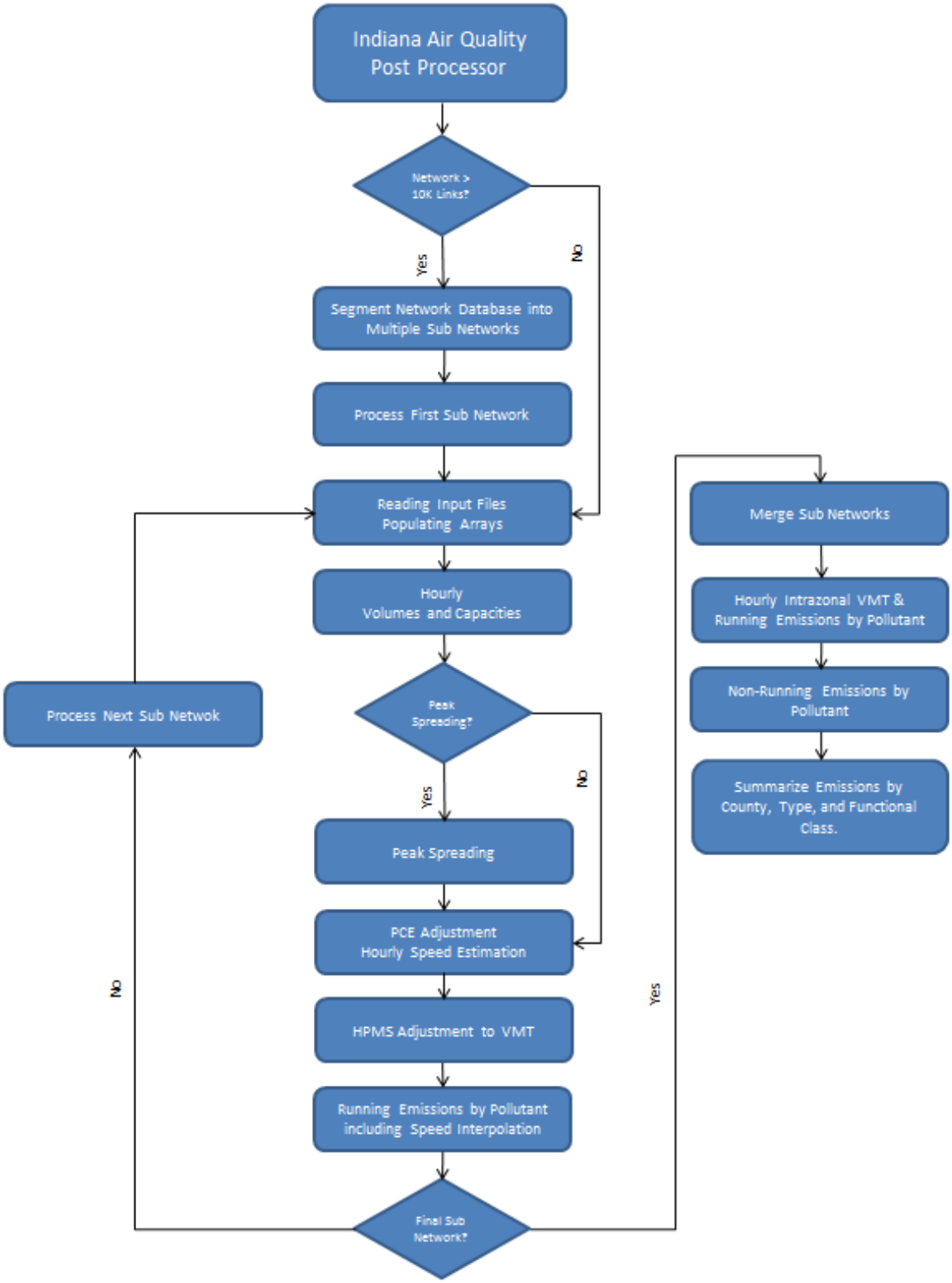
Each scenario executed using the INDOT AQPP requires the user to supply two separate files containing data from a travel demand model. These files must be provided in a specific format for use in the post-processor. The INDOT AQPP does not automatically format the required data. The user will need to create these tables by formatting their travel demand model outputs as needed.

Link Table – This file contains data on travel demand occurring on the roadway network corresponding to the area of analysis. It can possess any file name desired by the user. This file is to be formatted as a TransCAD fixed-format binary (FFB) file with the following attributes:

Name: Any
File Format: TransCAD Fixed Format Binary (FFB)

Field	Type	Width	Decimals	Description
LinkID	Integer (4 bytes)	10	0	Unique ID number per link
Dir	Integer (2 bytes)	2	0	TransCAD direction code
Length	Real (4 bytes)	10	2	Link length in miles
County	Character	16	0	County name
HPMS_FC	Integer (4 bytes)	10	0	HPMS functional classification code
ROAD_TYPE	Integer (4 bytes)	8	0	MOVES road type code
AB_Alpha	Real (8 bytes)	12	2	BPR VDF alpha parameter in the AB and BA directions
BA_Alpha	Real (8 bytes)	12	2	
AB_Beta	Real (8 bytes)	12	2	BPR VDF beta parameter in the AB and BA directions
BA_Beta	Real (8 bytes)	12	2	
AB_FF_TIME	Real (8 bytes)	12	2	Free-flow travel time in minutes in the AB and BA directions
BA_FF_TIME	Real (8 bytes)	12	2	
AB_CAP	Real (8 bytes)	10	2	Hourly directional capacity in the AB and BA directions
BA_CAP	Real (8 bytes)	10	2	
AB_Veh_Flow	Real (8 bytes)	10	2	Total daily directional vehicle flow in the AB and BA directions
BA_Veh_Flow	Real (8 bytes)	10	2	

Figure 1: INDOT AQPP Flow Chart



Intrazonal Table – This file contains information on travel occurring on roadway facilities not captured on the model's highway network. This could include travel in parking lots, on driveways, and on local and subdivision streets. As these activities account for some amount of running emissions, the INDOT AQPP accounts for these by analyzing intrazonal travel. Intrazonal travel is all travel that is said to occur interior to a traffic analysis zone (TAZ) and as such is never assigned to the model's highway network. This information will need to be developed by analyzing the model's vehicle trip table and distance skim matrix. The file can have any name desired by the user. This file is to be formatted as a TransCAD fixed-format binary (FFB) file with the following attributes:

Name: Any
File Format: TransCAD Fixed Format Binary (FFB)

Field	Type	Width	Decimals	Description
TAZ_ID	Integer (4 bytes)	10	0	TAZ ID number
County	Character	16	0	County name
Area_Type	Character	10	0	Area type: Urban Rural
Distance	Real (8 bytes)	10	2	Average intrazonal travel distance in miles
Dly_Intrazonal_Trips	Real (8 bytes)	10	2	Number of intrazonal vehicle trips

MOVES Emissions Rates Files

The post processor makes use of up to three emissions rates files developed by MOVES based on scenario. These files are:

- Rate per Distance: captures running exhaust, break wear, and tire wear
- Rate per Vehicle: capture start and idle exhaust
- Rate per Profile: capture evaporative emissions when vehicles are stationary

Each of these files is exported directly from the SQL output databases generated by MOVES into a comma delimited text (CSV) format. INDOT extended an offer to develop emissions rates for any analysis area in the state that wished to participate. Emissions rates files were developed for those areas that elected to participate. The rates were produced in consultation with each analysis area's interagency consultation group (ICG). The input data and MOVES reports for these areas are documented in a series of ICG coordination documents that are available from INDOT. For those analysis areas that chose not to participate in the emissions rate development process, the INDOT AQPP is still available for their use. All that is required is that the user has emissions rates available in the formats described below. These files should be copied into the Master Inputs subfolder of the AQPP folder.

Rate per Distance – This file contains emissions rates that are applied by the INDOT AQPP to travel demand model VMT. The file must be in CSV format and should be directly exported from the SQL

ratesperdistance database generated by MOVES for a given scenario. This file should be in the following format:

Name: XXXX_yyyy_ratesperdistance_zz.csv; where,

- XXXX = first four characters of the analysis area name as displayed in the INDOT AQPP menu
- yyyy = four number year
- zz = pollution abbreviation (oz = ozone, pm = particulate matter 2.5)

File Format: comma delimited text (CSV)

Field	Description
MOVESScenarioID	MOVES scenario ID number
MOVESRunID	MOVES run number
yearID	Four digit year
monthID	Month code
dayID	MOVES day type code
hourID	MOVES hour
linkID	MOVES link ID number (not reported as MOVES output)
pollutantID	MOVES pollutant code
processID	MOVES emissions process code
sourceTypeID	MOVES source type code
SCC	Source Classification Code (not reported as MOVES output)
fuelTypeID	MOVES fuel type code (not reported as MOVES output)
modelYearID	Vehicle model year (not reported as MOVES output)
roadTypeID	MOVES road type code
avgSpeedBinID	MOVES speed bin code
temperature	Average temperature (not reported as MOVES output)
relHumidity	Relative humidity (not reported as MOVES output)
ratePerDistance	Emissions rate per VMT

Rate per Vehicle – This file contains emissions rates that are applied by the INDOT AQPP to vehicle population data. These population data are the same as those used to develop the emissions rates in MOVES. The file must be in CSV format and should be directly exported from the SQL ratespervehicle database generated by MOVES for a given scenario. This file should be in the following format:

Name: XXXX_yyyy_ratespervehicle_zz.csv; where,

- XXXX = first four characters of the analysis area name as displayed in the INDOT AQPP menu
- yyyy = four number year
- zz = pollution abbreviation (oz = ozone, pm = particulate matter 2.5)

File Format: comma delimited text (CSV)

Field	Description
MOVESScenarioID	MOVES scenario ID number
MOVESRunID	MOVES run number
yearID	Four digit year

monthID	Month code
dayID	MOVES day type code
hourID	MOVES hour
zoneID	Geographic location based on FIPS code
pollutantID	MOVES pollutant code
processID	MOVES emissions process code
sourceTypeID	MOVES source type code
SCC	Source Classification Code (not reported as MOVES output)
fuelTypeID	MOVES fuel type code (not reported as MOVES output)
modelYearID	Vehicle model year (not reported as MOVES output)
temperature	Average temperature (not reported as MOVES output)
ratePerVehicle	Emissions rate per vehicle

Rate per Profile – This file contains emissions rates that are applied by the INDOT AQPP to vehicle population data. These population data are the same as those used to develop the emissions rates in MOVES. The file must be in CSV format and should be directly exported from the SQL ratesperprofile database generated by MOVES for a given scenario. This file should be in the following format:

Name: XXXX_yyyy_ratesperdistance_zz.csv; where,

- XXXX = first four characters of the analysis area name as displayed in the INDOT AQPP menu
- yyyy = four number year
- zz = pollution abbreviation (oz = ozone, pm = particulate matter 2.5)

File Format: comma delimited text (CSV)

Field Names:	**Description**
MOVESScenarioID	MOVES scenario ID number
MOVESRunID	MOVES run number
temperatureProfileID	MOVES temperature profile code
yearID	Four digit year
dayID	MOVES day type code
hourID	MOVES hour
pollutantID	MOVES pollutant code
processID	MOVES emissions process code
sourceTypeID	MOVES source type code
SCC	Source Classification Code (not reported as MOVES output)
fuelTypeID	MOVES fuel type code (not reported as MOVES output)
modelYearID	Vehicle model year (not reported as MOVES output)
temperature	Average temperature (not reported as MOVES output)
ratePerVehicle	Emissions rate per vehicle

Miscellaneous Files

The INDOT AQPP also makes use of a number of other files. Except where noted, these files are all supplied with the post-processor.

Hour VMT Fraction – This file contains the factors necessary to divide daily VMT into hourly VMT. The factors contained in this file are the same as those used by INDOT to develop the emissions rates. These factors were developed based on an analysis of twenty permanent traffic count stations around the state. The format of the file is as follows:

Name: HourVMTFraction.csv
File Format: comma delimited text (CSV)

Field	Description
sourceTypeID	MOVES vehicle source type code
roadTypeID	MOVES road type code
dayID	MOVES day type code
hourID	MOVES hour code
hourVMTFraction	Hourly VMT factor

HPMS Adjustment Factors – This file contains adjustment factors that can be used to convert the model VMT inputs to values more consistent with HPMS VMT estimates. Though the consistent consensus throughout the ICG process for analysis areas in Indiana has been to not use HPMS adjustment factors, this feature has been included as an option should the use of adjustment factors be desired at some point in the future. The format of the file is as follows:

Name: HPMS_Adjustment.bin
File Format: TransCAD Fixed Format Binary (FFB)

Field	Type	Width	Decimals	Description
County	Character	25	0	County name
AdjFC_1	Real (8 bytes)	16	4	Adjustment factor for functional class 1
AdjFC_2	Real (8 bytes)	16	4	Adjustment factor for functional class 2
AdjFC_6	Real (8 bytes)	16	4	Adjustment factor for functional class 6
AdjFC_7	Real (8 bytes)	16	4	Adjustment factor for functional class 7
AdjFC_8	Real (8 bytes)	16	4	Adjustment factor for functional class 8
AdjFC_9	Real (8 bytes)	16	4	Adjustment factor for functional class 9
AdjFC_11	Real (8 bytes)	16	4	Adjustment factor for functional class 11
AdjFC_12	Real (8 bytes)	16	4	Adjustment factor for functional class 12
AdjFC_14	Real (8 bytes)	16	4	Adjustment factor for functional class 14
AdjFC_16	Real (8 bytes)	16	4	Adjustment factor for functional class 16
AdjFC_17	Real (8 bytes)	16	4	Adjustment factor for functional class 17
AdjFC_19	Real (8 bytes)	16	4	Adjustment factor for functional class 19

Vehicle Class Distributions – This file is used in combination with the source type population data for any given scenario to disaggregate the total vehicle flows on each link into thirteen distinct vehicle flows based on MOVES source types. The format of the file is as follows:

Name: VehClassDist.csv
File Format: comma delimited text (CSV)

Field	Description
RoadType	Moves road type code
Motorcycle	Fraction of VMT belonging to motor-cycles for this road type
Passenger Car	Fraction of VMT belonging to passenger cars for this road type
Passenger Truck	Fraction of VMT belonging to passenger trucks for this road type
Bus	Fraction of VMT belonging to busses for this road type
Single Unit Truck	Fraction of VMT belonging to single unit trucks for this road type
Combination Truck	Fraction of VMT belonging to combination trucks for this road type

Source Type Populations – This file contains scenario specific source type population data. These data identify the number of vehicles for each MOVES source type that are believed to be located in the analysis area. For areas that participated in the INDOT effort to develop emissions rates, source type population data that has the consensus of the ICG have been developed and are provided with the post-processor. All other areas wishing to make use of the post-processor will need to provide source type population data in the following format:

Name: XXXX_yyyy_SourceTypePopulation.csv; where,

- XXXX = first four characters of the analysis area name as displayed in the INDOT AQPP menu
- yyyy = four number year

File Format: comma delimited text (CSV)

Field	Description
yearID	Four digit year of the scenario
sourceTypeID	MOVES source type code
sourceTypePopulation	Number of vehicles located in analysis area for that source type

Year List – This file contains a list of all available years four up to eight possible scenarios per analysis area. Should the user decide to run a scenario for a year not listed in the INDOT AQPP, this table will need to be modified to contain the desired year. The user should note that other input data used by the post-processor are also year sensitive. Year specific source type populations and emissions rates will be needed along with year specific travel demand model outputs in order to use the INDOT AQPP for a given year.

Name: Yearlist.csv

File Format: comma delimited text (CSV)

Field	Description
Alle_oz	Four digit scenario years for Allen County for ozone scenarios
Ande_oz	Four digit scenario years for the Anderson MPO for ozone scenarios
Cent_oz	Four digit scenario years for Central Indiana for ozone scenarios
Cent_pm	Four digit scenario years for Central Indiana for pm 2.5 scenarios
Cent_both	Not used
Clar_oz	Four digit scenario years for Clark and Floyd Counties for ozone scenarios
Clar_pm	Four digit scenario years for Clark and Floyd Counties for pm 2.5 scenarios
Clar_both	Not used
Madi_pm	Four digit scenario years for Madison Township for pm 2.5 scenarios
Evan_oz	Four digit scenario years for the Evansville MPO for ozone scenarios
Evan_pm	Four digit scenario years for the Evansville MPO for pm 2.5 scenarios
Evan_both	Not used
Non-_pm	Four digit scenario years for Non-MPO Southwestern IN for ozone scenarios
Lake_oz	Four digit scenario years for Lake and Porter Counties for ozone scenarios
Lake_pm	Four digit scenario years for Lake and Porter Counties for pm 2.5 scenarios
Lake_both	Not used
LaPo_oz	Four digit scenario years for La Porte County for ozone scenarios
Lawr_oz	Four digit scenario years for Lawrenceburg Township for ozone scenarios
Lawr_pm	Four digit scenario years for Lawrenceburg Township for pm 2.5 scenarios
Lawr_both	Not used
Lint_oz	Four digit scenario years for Linton for ozone scenarios
Munc_oz	Four digit scenario years for Muncie for ozone scenarios
Seym_oz	Four digit scenario years for Seymour for ozone scenarios
Sain_oz	Four digit scenario years for Saint Joseph and Elkhart Counties for ozone scenarios
Terr_oz	Four digit scenario years for the Terre Haute MPO for ozone scenarios

Vehicle Flow Disaggregation

Some of the travel demand models used in Indiana are 24-hour daily models while others are time-of-day. Some models assign trips to the highway network distinguishing by vehicle types while others do not. Even in cases where the travel demand models used possess a greater level of detail in terms of temporal resolution or vehicle types being modeled, the validation of these more detailed elements is typically less rigorous than the validation of overall 24-hour total daily volumes. The INDOT AQPP was designed to work with total daily directional vehicle flows. This allows emissions estimates to be applied using a universal method throughout the state while relying on the most reliable element of a highway assignment, the total daily vehicle flow. These daily flows are then disaggregated in the INDOT AQPP

using a variety of factors developed through an analysis of traffic count data taken from throughout Indiana.

The factors were developed by analyzing four years of continuous hourly vehicle classification count data taken from twenty automated traffic recording (ATR) stations located throughout the state. These stations were correlated with MOVES road types and hourly factors by road type by vehicle type were developed. The data collected were carefully reviewed for reasonableness. Some stations reported odd or irregular traffic patterns for some or all of the vehicle classes analyzed. These irregularities may have been due to equipment malfunction, human error, or the unique characteristics of the location where the data collection occurred. The irregular counts were removed from the analysis to avoid biasing the results.

There are two forms of vehicle flow disaggregation performed by the INDOT AQPP:

- Source type disaggregation
- Hourly disaggregation

Source Type Disaggregation – The INDOT AQPP disaggregates total vehicle flows from the travel demand model into source type flows. The result is a set of vehicle flows corresponding to the thirteen source type categories used in MOVES. This is accomplished first by disaggregating the vehicle flows into six primary vehicle types and then further subdividing the six vehicle types into the thirteen source types. The disaggregation into the six vehicle types is performed by applying a set of factors developed for this purpose. These factors are located in the *VehClassDist.csv* file and identify what percentage of traffic occurring on a given road type occur in each vehicle type. This file is the same for all analysis areas. The INDOT AQPP also develops a set of ratios based on the local and year specific source type population data to determine the percentage of each vehicle type that belongs in each source type.

Hourly Disaggregation – The INDOT AQPP also disaggregates daily vehicle flows into hourly source type flows. Once the vehicle flows have been subdivided into source type flows, the INDOT AQPP applies a set of hourly distribution factors that are specific to each source type and each road type. These factors are located in the *HourVMTFraction.csv* file. The factors were developed from the same source data as the vehicle type factors described above and are the same for all analysis areas in Indiana.

Peak Spreading

The INDOT AQPP possesses an optional peak spreading feature that can be selected by the user. The purpose of the peak spreading feature is to adjust link specific hourly volumes. Most travel demand models use “soft” capacity constraints when assigning vehicle trips to the network. When model links become congested, the model assesses higher travel times against those links. This makes those links less desirable during highway assignment with the result being a distribution of trips along the network that more closely reflects traveler responses to congestion. Despite these greater travel times, the model may still assign trips to over capacity links. In the case of extremely congested model networks, many links may be assigned at two to three times over capacity, if not more. In reality, such conditions would not occur as there are actual physical constraints on the number of vehicles carried on a

particular stretch of road. Peak spreading allows the post-processor to distribute high congestion traffic throughout the day to reflect the actual consequences of congestion encountered on a roadway network by travelers.

The peak spreading method used by the INDOT AQPP takes traffic occurring in hours that are over capacity and even distributes the over capacity component between the preceding hour and the next hour. This is done for all hours that are over capacity. Since the process may result in an hour that was previously under capacity becoming over capacity, the peak spreading is conducted iteratively until all hours of the day are at or under capacity.

Passenger cars and passenger trucks are treated as being highly sensitive to peak spreading while all other source types are treated as less sensitive. The INDOT AQPP checks the source type traffic volumes after the peak spreading adjustments have taken place to make sure that the final daily source type volumes continue to match the initial daily source type volumes fed into the peak spreading process. Due to these adjustments, the final peak spread volumes may not all be under capacity. This effect is more pronounced if the initial daily volumes result in high over-capacity rations in the peak hour. The end result is a set of source type hourly volumes that provide more reasonable volume to capacity relationships for use in the INDOT AQPP hourly speed estimation procedure.

Hourly Speed Estimation

The INDOT AQPP provides an estimate of hourly speeds for each link in the model network being analyzed. It does this by applying the Bureau of Public Roads (BPR) volume-delay function (VDF) found in many travel demand models.

$$T_1 = T_0 \left(1 + \alpha \left(\frac{V}{C}\right)^{\beta}\right)$$

Where:
T_1 = congested travel time
T_0 = free flow travel time
V = hourly directional volume
C = hourly directional capacity
α, β = BPR coefficient and exponent respectively

While some models may still employ the standard values of 0.15 for α and 4 for β, many models make use of carefully tailored parameters that are more reflective of the travel behavior in their local areas. The INDOT AQPP assumes no default values for either α or β. The user must supply these parameters. The link table input database developed by the user from the travel demand model loaded network has attribute fields intended to be populated with the exact values of α and β for each link.

The INDOT AQPP uses passenger car equivalent (PCE) factors when summing together the hourly source type flows to arrive at the total directional hourly vehicle flow used in the BPR function. The PCE for

motorcycles, passenger cars, passenger trucks, and light commercial trucks is 1.0. The PCE for buses and single unit trucks is 1.5. The PCE for combination trucks is 2.0.

Once hourly speeds for each link have been determined, these speeds are associated with the average speed bins used in MOVES.

Speed Bin Rate Interpolation

MOVES makes use of sixteen speed bins that further disaggregate emissions rates on the basis of the speed being encountered by a given source type for a given road type in a given hour. Each speed bin covers a range of travel speeds centered on an average speed for that bin. These bins are documented in the Technical Guidance on the Use of MOVES2010 for Emission Inventory Preparation in State Implementation Plans and Transportation Conformity issued by EPA.

A straightforward approach to using these speeds bins is to identify the bin within which the average travel speed of a given link is found. For example, if the average speed for a given hour on a given link is 23.4mph then the emissions rates associated with speed bin 6 would be used since the range of speeds associated with Speed Bin 6 is 22.5mph to 27.5mph. The MOVES users' guide recommends a more sophisticated approach that is believed to make the resulting emissions estimates less sensitive to minute changes in travel speeds. This is believed to result in more stable emissions estimates. The INDOT AQPP makes use of this more sophisticated method.

The INDOT AQPP identifies two speed bins for every speed estimated by the post-processor. One speed bin represents the bin which average bin speed is just below the estimated speed. The other speed bin represents the bin which average bin speed is just above the estimated speed. Returning to our previous example, Speed Bin 5 has an average bin speed of 20mph and Speed Bin 6 has an average bin speed of 25mph. Our example estimated speed of 23.4mph falls between the average bin speeds of these two bins. The post processor then interpolates an emission rate between the rates associated with these two bins based on the relationship of the estimated speed to these two average bin speeds. The following formula is used.

$$EmisRate = Rate_L + \frac{(Spd_E - Spd_L)\, Rate_H - (Spd_E - Spd_L)\, Rate_L}{Spd_H - Spd_L}$$

Where:
EmisRate = Emission rate used for estimating emissions
$Rate_L$ = Emission rate associated with the speed bin with the lower average bin speed
$Rate_H$ = Emission rate associated with the speed bin with the higher average bin speed
Spd_E = Estimated hourly speed
Spd_L = Average bin speed of the speed bin with the lower average bin speed
Spd_H = Average bin speed of the speed bin with the higher average bin speed

In cases where the estimated speed equals the average bin speed of a given speed bin, no interpolation takes place and the emissions rates associated with that speed bin are used. Intrazonal trips are assumed to have an estimated speed of 15mph for the purposes of this post processor.

Users' Guide

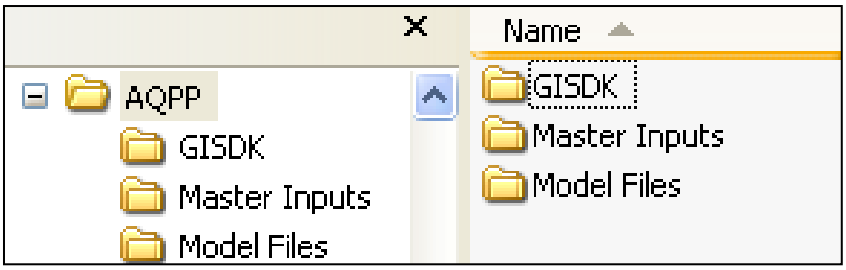
The INDOT AQPP is a relatively simple tool to use. This section provides instruction on the installation and use of this post-processor.

Specifications

The INDOT AQPP was developed in TransCAD version 5.0r4 travel demand modeling software. The AQPP uses output data from local area travel demand models as well as rates directly exported from MOVES. The program takes approximately 1 hour of runtime per 1,100 highway link records based on the following hardware configuration: Intel Core i5 CPU M540 @ 2.53GHz with 2.98 GB of RAM.

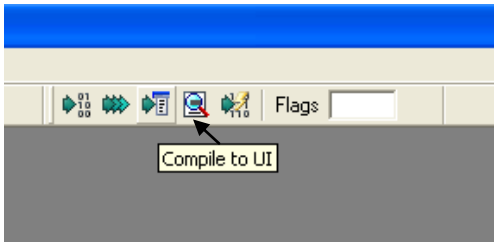
Directory Structure

The required directory structure and folder names for the INDOT AQPP are shown in the image below.



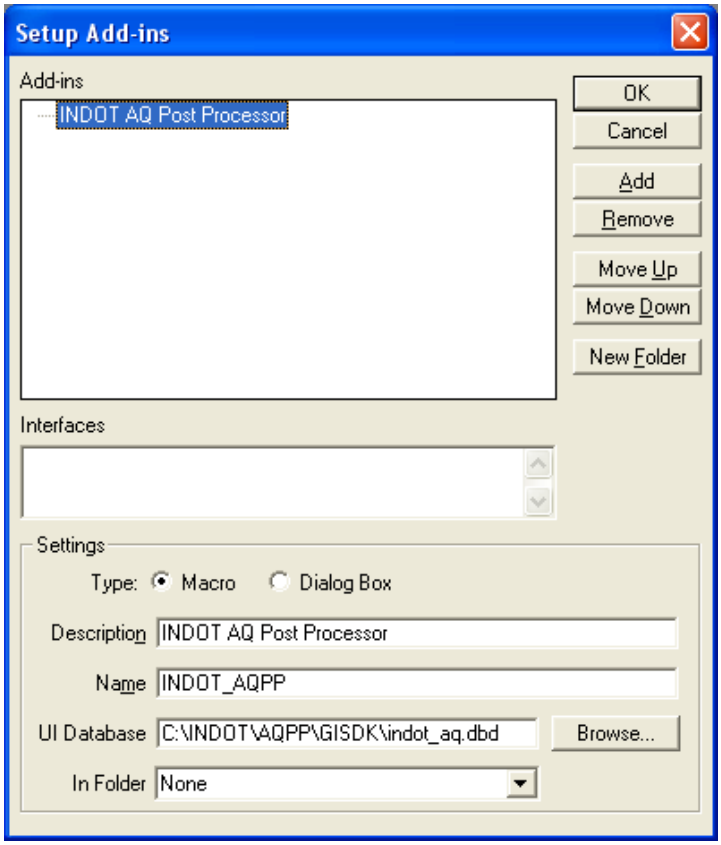
Installation

1. Copy the files provided to an appropriate folder on your hard drive. The default folder is "C:\INDOT\AQPP\".
2. Open TransCAD 5.0
3. Open the GIS Developer's Kit toolbox
4. Click on the middle button "Compile to UI"
    a. Browse to Open the resource file "INDOT_AQ_v122011.rsc"
    b. Browse to Save the user interface file "indot_aq.dbd"



5. From the Menu bar navigate to Tools > Setup Add-Ins…
6. From the "Setup Add-ins" dialogue box click "Add"

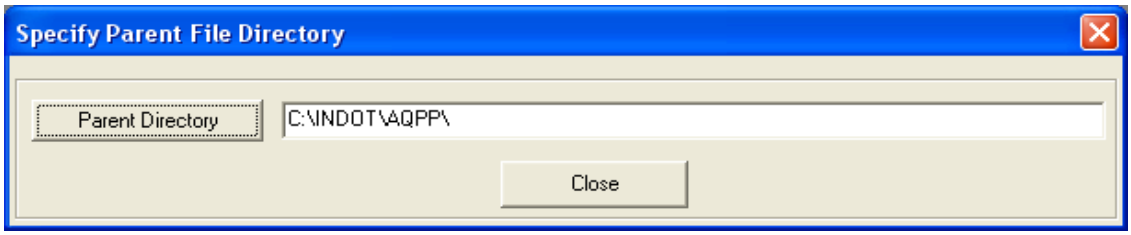
7. Fill out the Settings as shown below and click OK:
    a. Type: Macro
    b. Description: Can be user defined
    c. Name: INDOT_AQPP (must be exact)
    d. UI Database: browse to “indot_aq.dbd”
    e. In Folder: None



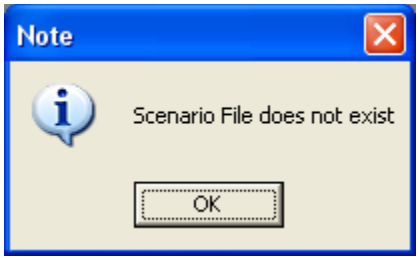
Note: The aforementioned steps only need to be completed once during the initial installation of the INDOT AQ Post Processor.

Setup

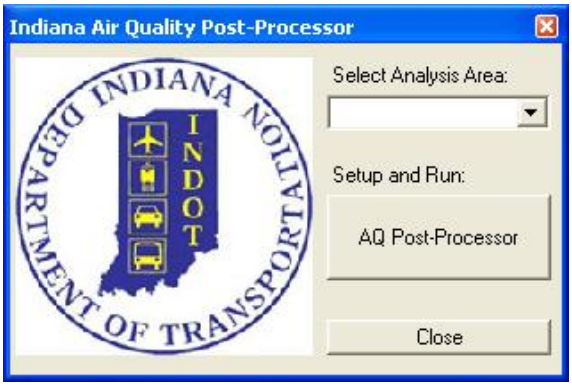
1. From the Menu bar navigate to Tools > Add-Ins > INDOT AQ Post Processor. This will launch the INDOT AQ Post Processor interface.
2. The “Specify Parent File Directory” dialog box will appear. The default parent directory is specified as “C:\INDOT\AQPP\”.
    a. Click “Parent Directory” to navigate to a new directory that houses all the AQPP files. This is the directory specified in step one of the Installation section.
    b. Click “Close” to accept the displayed parent directory.



3. If a scenario file (.scn) does not exist (such as the first time you are loading the interface) a note dialog box will appear saying “Scenario File does not exist”. This means that all settings will be blank/null. However, the next time you load the interface when a scenario file exist the latest settings will be activated.



4. The “Indiana Air Quality Post-Processor” dialog box will appear. The default Select Analysis Area is specified as null/blank. However, the previously selected analysis area will populate after initial execution of the interface.
    a. Click the dropdown bar to select a different analysis area
    b. Click “AQ Post-Processor” to open the scenario manager
    c. Click “Close” to exit the INDOT AQ Post Processor interface



5. After selecting the analysis area and clicking the “AQ Post-Processor” button the “Scenario Manager” dialog box will appear. The default scenario settings are specified as null/blank as shown in the first image blow. However, the previously specified settings will populate after initial execution of the interface as shown later in this document.
    a. Click “Main Menu” to navigate back to the “Indiana Air Quality Post-Processor” dialog box.

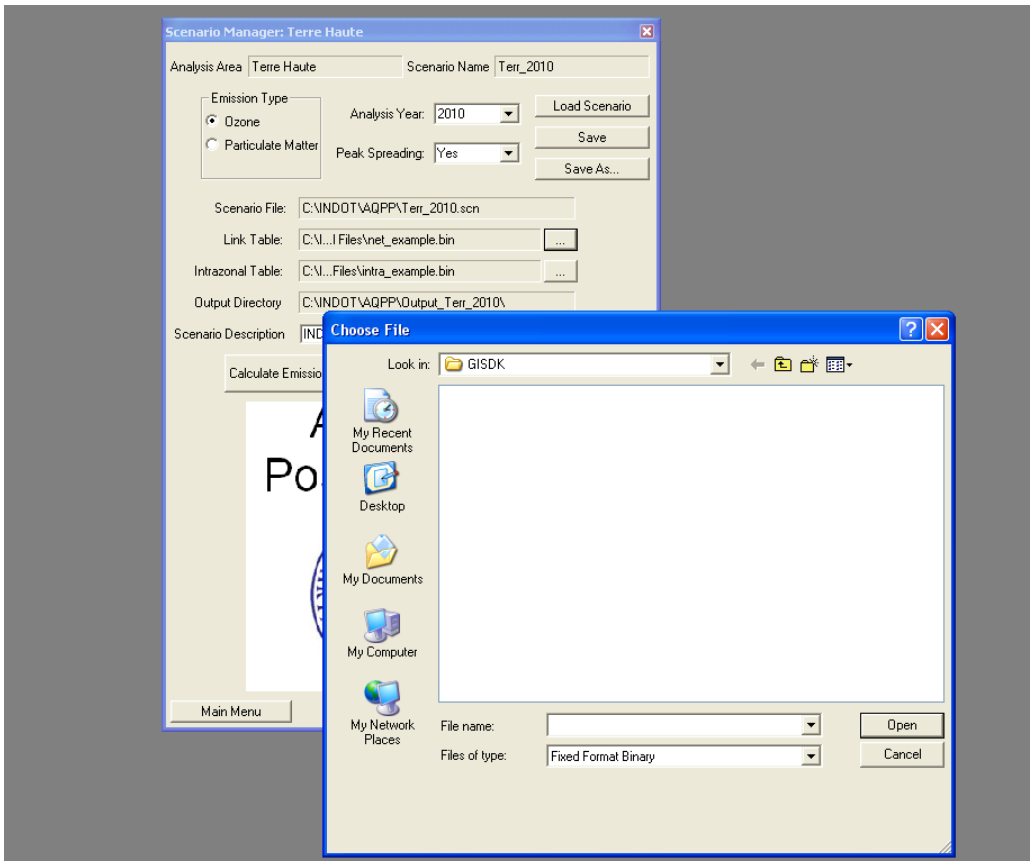
b. Click “Close” to exit the INDOT AQ Post Processor interface.

6. Populate the Settings:
   The settings that the user must specify include:
   a. Emission Type (toggle button)
   b. Analysis Year (dropdown item)
   c. Peak Spreading (dropdown item)
   d. Link Table (browse to file)
   e. Intrazonal Table (browse to file)
   f. Scenario Description (user defined text)
   g. Save / Save As… (overwrites or creates a .scn scenario file)

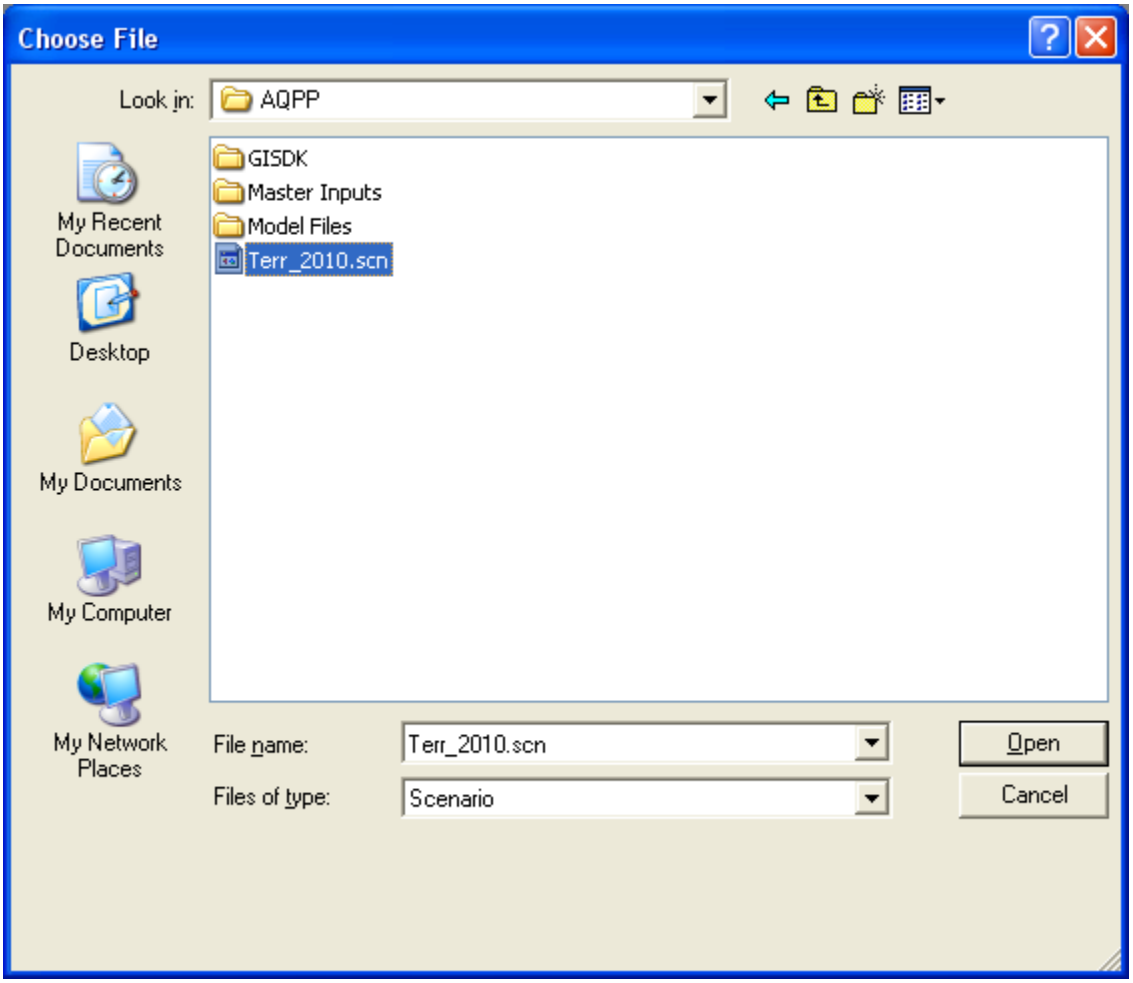
7. Specify the Emission Type to run the post processor based on Ozone or Particulate Matter.

a. If the Emission Type is not available for the selected analysis area then a note dialog box will appear that says “This analysis area does not support XX emission analysis. Please select the YY emission type.” Where XX / YY represents Ozone / Particulate Matter.

8. Specify the Analysis Year. This must be one of the years provided in the dropdown list. These are specific to each analysis area.
    a. For Example: 2002, 2010, 2015, 2020, 2025, 2030, 2035, and 2040
9. Specify the Peak Spreading option. This must be one of the years provided in the dropdown list.
    a. Options = Yes or No
10. Browse to the Link Table and to the Intrazonal Table which are fixed format binary (.bin) files. The user needs to develop these files prior to setting up a scenario in the INDOT AQPP. Information on proper file formats can be found in the methodology section of this document.



11. Specify a Scenario Description. The user has the option to document a description of the scenario run in this box.
12. Save the scenario settings. Scenario settings can be saved to overwrite an existing scenario or the settings can be saved as to create a new scenario (.scn) file.
13. Load an existing scenario. This button will load an existing scenario file and populate all settings.



14. Verify other Settings:

    The settings that are updated automatically by the interface include:

    a. Analysis Area (populated from the "Indiana Air Quality Post-Processor" dialog box)
    b. Scenario Name (populated based on the name of the saved or loaded .scn scenario file)
    c. Scenario File(populated based on the saved or loaded .scn scenario file)
    d. Output Directory (populated based on parent directory and creates a folder named "Output_xx" where xx is the name of the saved or loaded .scn scenario file)

    An image of the interface with all settings populated for the Terre Haute example is shown below.

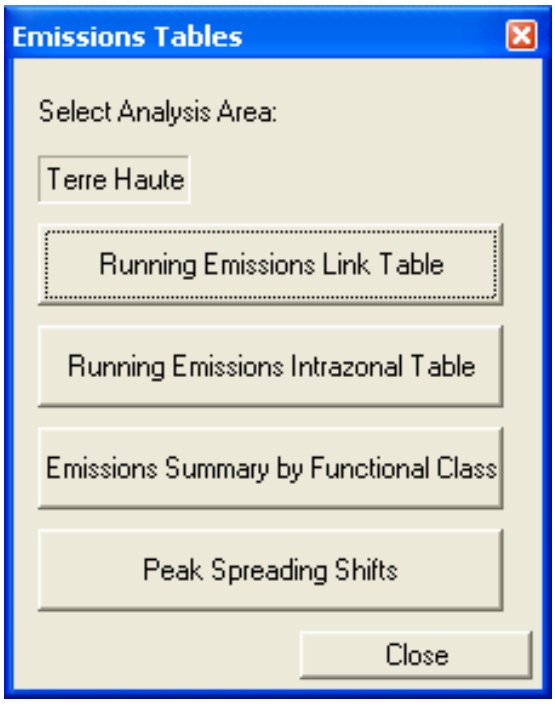
Application

There are three applications of the INDOT Air Quality Post Processor.

1. Calculate Emissions
2. Emissions Tables
3. Emissions Report

The “Calculate Emissions” button will execute the post processing steps for the loaded scenario.

The “Emissions Tables” button will open the “Emissions Tables” dialog box. This dialogue box will allow the user to open and view four output files from the model run. Note that the “Peak Spreading Shifts” output table will not exist if the Peak Spreading option is set to “No” for this scenario.



The “Emissions Repot” button will open the Report_Summary.txt file. This text file summarizes various settings about the model run, input files, output files, sequence settings, and emissions in grams.

Report_Summary.txt - Notepad

File Edit Format View Help

```
                        Report Summary File
                    INDOT Air Quality Post Processor

Run Start Date and Time: Mon Dec 12 14:06:01 2011
Run End Date and Time: Mon Dec 12 14:08:47 2011

Scenario:  Terr_2010
Scenario Description:  INDOT Webinar
Scenario File:  C:\INDOT\AQPP\Terr_2010.scn

Analysis Area:  Terre Haute
Analysis Year:  2010
Emission Type:  Ozone
Peak Spreading:  Yes

Travel Demand Model Input Files

   Link Table:
   C:\INDOT\AQPP\Model Files\net_example.bin

   Intrazonal Table:
   C:\INDOT\AQPP\Model Files\intra_example.bin

Air Quality Rate Input Files

   Rates per Distance:
   C:\INDOT\AQPP\Master Inputs\Terr_2010_ratesperdistance_oz.csv

   Rates per Vehicle:
   C:\INDOT\AQPP\Master Inputs\Terr_2010_ratespervehicle_oz.csv

   Rates per Profile:
   C:\INDOT\AQPP\Master Inputs\Terr_2010_ratesperprofile_oz.csv

   HPMS Fraction:
   C:\INDOT\AQPP\Master Inputs\HPMS_Fraction_INStatewide.csv

   Hourly Fraction:
   C:\INDOT\AQPP\Master Inputs\HourVMTFraction.csv

   Vehicle Class Distribution:
   C:\INDOT\AQPP\Master Inputs\VehClassDist.csv

   Source Type Population:
   C:\INDOT\AQPP\Master Inputs\Terr_2010_SourceTypePopulation.csv

Output Files

   Link Emissions Table:
   C:\INDOT\AQPP\Output_Terr_2010\EMIS_daily.bin

   Intrazonal Emissions Table:
   C:\INDOT\AQPP\Output_Terr_2010\Intra_VMT_daily.bin

   Peak Spreading Indicator Table:
   C:\INDOT\AQPP\Output_Terr_2010\Spreading_Indicator.bin

   Emissions by Functional Class. Table:
   C:\INDOT\AQPP\Output_Terr_2010\Emission_by_HPMS_FC.csv
```

Sequence Settings

Source Type:	Process:
11 - Motorcycle	1 - Exhaust
21 - Passenger Car	2 - Start Exhaust
31 - Passenger Truck	9 - Brakewear
32 - Light Commercial Truck	10 - Tirewear
41 - Intercity Bus	11 - Evap Permeation
42 - Transit Bus	12 - Evap Fuel Vapor Venting
43 - School Bus	13 - Evap Fuel Leaks
51 - Refuse Truck	15 - Crankcase Running Exhaust
52 - Single Unit Short-haul Truck	16 - Crankcase Start Exhaust
53 - Single Unit Long-haul Truck	17 - Crankcase Extended Idle Exhaust
54 - Motor Home	90 - Extended Idle Exhaust
61 - Combination Shourt-haul Truck	
62 - Combination Long-haul Truck	

Functional Classification	Road Type:
1 - Rural Interstate	2 - Rural Restricted Access
2 - Rural Principal Arterial	3 - Rural Unrestricted Access
6 - Rural Minor Arterial	4 - Urban Restricted Access
7 - Rural Major Collector	5 - Urban Unrestricted Access
8 - Rural Minor Collector	
9 - Rural Local	
11 - Urban Interstate	Pollutant Type:
12 - Urban Principal Arterial	3 - Oxides of Nitrogen
14 - Urban Other Arterial	87 - Volatile Organic Compounds
16 - Urban Minor Arterial	110 - Primary Exhaust PM2.5
17 - Urban Collector	116 - Primary PM2.5 - Breakwear Particulate
19 - Urban Local	117 - Primary PM2.5 - Tirewear Particulate

Emissions (grams) by County, Type, and Functional Classification

County	Emission Type	HPMS Func. Class.	Dly NOx - Oz	Dly NOx - PM
"Vigo"	"Running"	"Rural Interstate"	0.00	n/a
"Vigo"	"Running"	"Rural Principal Arterial"	0.00	n/a
"Vigo"	"Running"	"Rural Minor Arterial"	0.00	n/a
"Vigo"	"Running"	"Rural Major Collector"	22,872.21	n/a
"Vigo"	"Running"	"Rural Minor Collector"	4,921.54	n/a
"Vigo"	"Running"	"Rural Local"	10,366.05	n/a
"Vigo"	"Running"	"Urban Interstate"	0.00	n/a
"Vigo"	"Running"	"Urban Principal Arterial"	0.00	n/a
"Vigo"	"Running"	"Urban Other Arterial"	0.00	n/a
"Vigo"	"Running"	"Urban Minor Arterial"	3,054.24	n/a
"Vigo"	"Running"	"Urban Collector"	0.00	n/a
"Vigo"	"Running"	"Urban Local"	0.00	n/a
"Vigo"	"Running"	"All HPMS Classes"	41,214.04	n/a
"Vigo"	"Running Intrazonal"	"All HPMS Classes"	3,735.88	n/a
"Vigo"	"Tot Running"	"All HPMS Classes"	44,949.91	n/a
"All"	"Non-Running"	"All HPMS Classes"	1,351,803.57	n/a
"All"	"Tot Emissions"	"All HPMS Classes"	1,396,753.48	n/a

Allen County

MOVES2010a Input Data and Parameters

INDOT Planning Contract

Revised Report
December 8, 2011

Table of Contents

LIST OF TABLES

LIST OF APPENDICES

Overview:
This report is being written to document the input parameters for a set of MOVES2010a runs for the Allen County 8-hour Ozone Maintenance Area. This report contains a discussion on the intended input settings used in MOVES2010a and the development of the input datasets. These MOVES2010a runs are intended to develop a default set of emission rates that can be used for conformity determination and is part of a statewide effort being conducted by the Indiana Department of Transportation (INDOT).

Throughout this report references are made to MOVES 2010a codes for two types of data. The values for the source type codes are shown in Table 1. The values for the road type codes are shown in Table 2. MOVES2010a input settings and assumptions for this effort are shown in Appendix A.

Table 1: MOVES2010a Source Type Codes

sourcetypeid	Description
11	Motorcycles
21	Passenger Car
31	Passenger Truck
32	Light Commercial Truck
41	Intercity Bus
42	Transit Bus
43	School Bus
51	Refuse Truck
52	Single Unit Short-haul Truck
53	Single Unit Long-haul Truck
54	Motor Home
61	Combination Short-haul Truck
62	Combination Long-haul Truck

Table 2: MOVES2010a Road Type Codes

roadtypeid	Description
1	Off Network
2	Rural Restricted Access
3	Rural Unrestricted Access
4	Urban Restricted Access
5	Urban Unrestricted Access

Vehicle Age Distribution:
The vehicle age distributions for MOVES source types 21, 31, and 32 (cars, passenger trucks, and light commercial vehicles respectively) were developed through an analysis of Indiana's 2009 vehicle registration data. The analysis was performed by Eastern Research Group (ERG) under contract to the Lake Michigan Air Directors Consortium (LADCO). ERG was provided with vehicle identification numbers (VIN) for vehicles in Indiana.

There were approximately 6.37 million VINs in the statewide data set. Out of these, approximately 1.3 million returned errors. Of these, approximately 200,000 errors were deemed non-critical. This means that the model year and vehicle type assigned to the records were most likely correct despite there being an error in the VIN decoding. These records were included in ERG's analysis. The remaining errors were considered critical enough to call into question the accuracy of the model year and vehicle types. These critical errors were excluded from ERG's analysis.

In all, approximately 5.2 million VINs from around the state were used in the analysis. Each VIN was associated to a specific county. ERG then developed age distributions for each county in the state along with seven combination areas comprised of two or more counties each. Additional information on the methodology used to develop the vehicle age distributions can be found in a May 28, 2010 report written by ERG for LADCO titled MOBILE6 and MOVES Registration Distribution Calculations for Indiana Registration Data. Each set of age distributions was provided in both MOBILE6 and MOVES formats. The MOVES formatted data will be used for these MOVES2010a runs.

Due to limitations in ERG's VIN decoder, it was not possible to develop vehicle age distributions for any source types other than 21, 31, and 32 from the vehicle registration data. For all other source types, MOVES2010a default vehicle age distributions specific to each source types were used. This includes motorcycles and all heavy vehicles. Vehicle age distributions for all source types were kept constant for all future years. The vehicle age distributions for Allen County are shown in Appendix B of this report.

Vehicle Population:

The vehicle populations for source types 21, 31, and 32 were developed directly from the vehicle registration data. All valid records that were identified from the vehicle registration data set were used to determine the number of vehicles for each of these three source types. The VIN decoded data provided to INDOT contained vehicle types according to MOBILE6.2 vehicle categories. There is a direct correlation between MOVES source type 21 (cars) and the MOBILE6.2 vehicle type LDV. All valid LDV records (those records not excluded from the vehicle age distribution analysis due to errors as was described in the section on Vehicle Age Distribution in this report) were counted in the vehicle population.

There is not a direct correlation between MOVES source types 31 (passenger trucks) and 32 (light commercial vehicles) and the MOBILE6.2 light truck vehicle types (LDT1, LDT2, LDT3, and LDT4). All valid records from the vehicle registration data set for MOBILE6.2 light duty trucks were counted in the vehicle populations. The light duty trucks were distributed between MOVES source types 31 and 32 as per the Environmental Protection Agency's (EPA) guidance documented in Table A.1 of the appendix of the Technical Guidance on the Use of MOVES2010 for Emission Inventory Preparation in State Implementation Plans and Transportation Conformity. The guidance provides two sets of factors for distributing MOBILE6.2 light trucks between MOVES source types 31 and 32. These are based on fuel type and are shown in Table 3.

Table 3: Distribution of MOBILE6.2 Light Duty Trucks into MOVES Source Types

	Source Types	
Fuel	**31**	**32**
Gas	78%	22%
Diesel	42%	58%

As per ERG's assumption documented in MOBILE6 and MOVES Registration Distribution Calculations for Indiana Registration Data, all light duty trucks that did not have a fuel type identified were counted as diesel trucks. This was to prevent an underestimation of diesel trucks and their related emissions.

Since only valid records from the vehicle registration data were used to calculate vehicle populations for source types 21, 31, and 32, it is reasonable to assume that some of the erroneous records that were discarded from the analysis actually belonged to these source types. The nature of these errors is not that the vehicle does not exist. Rather, it is that the vehicle could not be properly identified with any sense of certainty. It was therefore necessary to adjust the vehicle populations calculated from vehicle registration data to compensate for these discarded records. Based on an analysis of the error rate reported by ERG, vehicle populations for source types 21, 31, and 32 were increased by 5.8 percent.

Vehicle populations were not able to be developed directly from the vehicle registration data for some source types. This was due to the limitations in the VIN decoder used by ERG to process the vehicle registration data. Vehicle populations for all other source types (motorcycles and heavy vehicles) were derived by applying the Mileage Accumulation Rate (MAR) method documented in EPA's Technical Guidance on the Use of MOVES2010 for Emission Inventory Preparation in State Implementation Plans and Transportation Conformity, Section 3.3 Source Type Population.

The default MARs were extracted from MOVES by running MOVES for a single pollutant and a single year for all vehicles, fuels, months, days, and hours. The activity output was set to report both distance and population. A ratio of population to vehicle-miles-traveled (VMT) was calculated from these outputs. The ratios were calculated for each source type.

The Northeast Indiana Regional Coordinating Council (NIRCC), which is the metropolitan planning organization (MPO) for Allen County, provided VMT by MOVES road types extracted from their travel demand model's base year. Since the default MARs in MOVES vary by year (but not by location), the MOVES run that was executed to extract the MARs was run for a year consistent with the travel demand model's base year. This resulted in MARs that could be applied directly to the validated VMTs reported by the travel demand model. The travel demand model VMTs were converted into annual VMT and distributed by vehicle types using statewide default VMT distribution factors documented in this report in the section on Default VMT Distributions. The MARs were then applied to the annual vehicle type VMTs. The result was an estimated vehicle population for each source type for the travel demand model's base year. Since the vehicle populations for source types 21, 31, and 32 were developed directly from the vehicle registration data, the population estimates derived for those source types using the MAR method were discarded and the observed data were used instead.

Future year vehicle populations were developed base on socioeconomic growth rates for the maintenance area. The MPO provided base year and horizon year population and employment data for the area. Annual growth rates were calculated for population growth and employment growth individually. Population growth rates were then used to grow the light vehicle populations (source types 11, 21, 31, and 32). Employment growth rates were used to grow the heavy vehicle populations (source types 41, 42, 43, 51, 52, 53, 54, 61, and 62). Vehicle populations were calculated for every year from 2008 to 2040. These vehicle populations for Allen County are shown in Appendix C.

Meteorological Data:
The default set of hourly temperatures and hourly relative humidity was developed using EPA's data converters for changing MOBILE6.2 minimum / maximum temperatures and absolute humidity to the MOVES equivalent formats. The values for the MOBILE6.2 inputs were taken from the Request for Redesignation and Maintenance Plan for Ozone Attainment in the 8-hour Ozone Basic Nonattainment Area, Appendix C, developed by the Indiana Department of Environmental Management in May, 2006. The MOVES formatted meteorological data for Allen County are presented in Appendix D of this report.

Default VMT Distributions:
As part of this effort, INDOT developed a default set of VMT distribution factors by Highway Performance Monitoring System (HPMS) vehicle type and by MOVES road type. These distribution factors were developed by analyzing four consecutive years of continuous traffic count data ending in 2010 for twenty permanent traffic count stations throughout Indiana. The stations were selected to provide a spread of locations corresponding to each of the four MOVES road types. Furthermore, these stations were selected from among sites that were concentrated in nonattainment and maintenance areas. In some cases, data from the requested site were either partially or completely unavailable. An inventory of the sites used to develop the distributions is shown in Table 4.

The vehicle counts reported at each station were provided by vehicle class. These were aggregated into the six basic HPMS vehicle types: motorcycle, passenger car, light truck, bus, single-unit heavy truck, and combination heavy truck. The distribution of VMT by vehicle type was calculated for each road type by taking each vehicle type's percentage of total traffic. These default statewide factors are shown in Appendix E.

Table 4: Inventory of Permanent Count Stations

SiteID	City	County	Location	Road Type	Data Quality
3000	MUNCIE	DELAWARE	SR 332 RM 0.5	3	Closed since 9/26/2006. No data.
3200	CARMEL	HAMILTON	US 31 RM 125.7	5	Good
3300	INDY WEST	MARION	I 465 MM 10.0	4	Closed since 9/1/10
4000	GARY	LAKE	I 80 / I 94 MM 6.0	4	Only 2010 data passed QC
4500	LAPORTE	LAPORTE	SR 2 RM 65.2	3	Good
5600	SELLERSBURG	CLARK	I 65 MM 8.0	4	Bad sensors. Not usable.
6100	EVANSVILLE	GIBSON	I 64 MM 27.9	2	Good
0105	TERRE HAUTE	VIGO	US 41 RM 104.2	3	Good-closed 11/13/08-5/13/09
0201	MIDDLEBURY	ELKHART	SR 120 RM 13.9	3	Good- closed 8/3/10-12/6/10
0210	FORT WAYNE	ALLEN	I-69 0.53 mi N of SR 3	4	Good
0303	MUNCIE	DELAWARE	US 35 RM 44.5	5	Good
0327	DALEVILLE	DELAWARE	I 69 MM 31.4	2	Good-built in 12/10/2007
0403	SOUTH BEND	ST. JOSEPH	US 20 RM 77.1	4	Good
0501	INDY SOUTH	MARION	SR 37 RM 143.5	5	Good-closed 5/22/09-6/1/09
0502	MARTINSVILLE	MORGAN	SR 67 RM 80.6	3	Good
0507	SEYMOUR	JACKSON	I 65 MM 47.0	2	Good
0602	HAZLETON	GIBSON	SR 56 RM 0.6	3	Good
0603	DUBOIS	DUBOIS	SR 56 RM 53.3	3	Good- closed 10/16/08-3/20/09
0608	EVANSVILLE	VANDERBURGH	SR 66 RM 23.5	5	Good
1315	I 70	MARION	I 70 MM 83.5	4	Closed 5/17/06-3/24/08

Default Hourly Distributions:

The same set of twenty permanent traffic count locations discussed in the section on Default VMT Distributions was analyzed to develop a set of hourly distribution factors. These factors were calculated by road type, by HPMS vehicle type. Hourly factors were only calculated for the average weekday. The hourly distribution pattern for each traffic count location was reviewed. Any data that appeared to reflect either an error in the data or an outlier of behavior were removed to prevent bias in the data. The following data were excluded from the analysis:

- Bus data from count stations 0105 and 0603 were excluded due to abnormal midnight peaks in the data;
- An abnormal relationship between passenger cars and light duty trucks at count station 4500 prompted the exclusion of all data from this location due to questions of reliability;
- Peak spreading behavior observed at count station 4000 from traffic related to Chicago was considered to be too unique to be included in a default statewide data set; and,
- Combination truck traffic from station 3200 was excluded due to too much overnight traffic when compared to other vehicles and other stations.

Furthermore, traffic patterns reported by those count stations corresponding to road type 3 (3000, 4500, 0105, 0201, 0502, 0602, and 0603) had a tendency to over represent long distance travel. This was most likely the result of statewide permanent count stations focusing primarily on higher order facilities. Rural collectors and local streets are less likely to reflect long distance travel. The hourly distributions for road type 3 (rural unrestricted access) were adjusted to better account for traffic behavior on lower order facilities in rural areas. A sample of traffic count data from Morgan County, IN was used to introduce more local traffic behavior in the road type 3 hourly distributions. An analysis of the Morgan County data showed a pattern more consistent with AM and PM peaking characteristics reflecting local commuting traffic on collectors and local streets for passenger cars and light duty trucks. The Morgan County data for passenger cars and light duty trucks on collectors and local streets were weighted and added to the road type 3 data set. This analysis assumed that rural collectors and local streets accounted for 20 percent of all VMT for road type 3.

The statewide default hourly distribution factors are presented in Appendix F.

Default Daily and Monthly Distributions:
Default daily and monthly distribution factors were calculated from INDOT's official count adjustment factors which are more commonly used to develop AADT from raw traffic counts. These factors are based on the set of daily traffic counts collected from all permanent count stations throughout the state. The daily distribution factors determine what percentage of VMT is occurring on weekdays and what percentage is occurring on weekends. The monthly distribution factors determine what percentage of annual VMT is occurring in each month of the year. The statewide default daily distribution factors are shown in Appendix G. The statewide default monthly distribution factors are shown in Appendix H.

Ramp Fractions:
The ramp fractions represent the percentage of vehicle-hours-traveled (VHT) for road types 2 (rural restricted access) and 4 (urban restricted access) occurring on the ramps associated with those road types. These fractions were calculated based on the percentage of VHT occurring on ramps reported by the base year travel demand model. These ramp fractions are reported in Appendix I.

Appendix A

Number of Runs:

Input Item	Ozone
Years	2004, 2010, 2015, 2020, 2025, 2030, 2035, 2040
Pollutants/ Processes	Volatile Organic Compound (VOC), NOx, and supporting
Meteorology	Summer
# of MOVES runs	8

General Parameters:

MOVES Screen	Input Item	Ozone
Description	Description	User Choice
Scale	Domain/Scale	County
	Calculation Type	Emission Rate
Time Spans	Time Aggregation Level	Hour
	Year	2004, 2010, 2015, 2020, 2025, 2030, 2035, 2040
	Months	July
	Days	Weekday
	Hours	Select All
Geographic Bounds	Geographic Bounds	Allen County
Vehicles	Vehicles	All Gas and Diesel Combinations
Road Type	Road Type	Select All
Pollutants/ Processes	Pollutants/ Processes	VOC, NOx, and supporting
General Output	Database Name	Allen Ozone
	Units	Select "Grams" and "Miles" and "Million BTU"
	Activity	Distance, Population
Output Emissions Detail	On Road	Select "Source Use Type" and "Road Type"

County Data Manager

County Data Manager Input	Excel Sheet Tab Name	Ozone
Source (Vehicle) Type Population	sourceTypeYear	Local Registration for Source Types 21, 31, and 32; Estimated population using default MOVES mileage accumulation rates and local VMT for all other source types. Future year vehicle populations based on population growth rates for source types 11, 21, 31, and 32. Employment growth used for all other source types.
Vehicle Type VMT (by 13 MOVES Vehicle Types)	HPMSVTypeYear	Statewide default vehicle distributions across road types developed by INDOT using an analysis of permanent count station data from a statewide data set.
	MonthVMTFraction	Statewide default monthly fractions developed by INDOT using an analysis of permanent count station data from a statewide data set.
	DayVMTFraction	Statewide default daily fractions developed by INDOT using an analysis of permanent count station data from a statewide data set.
	HourVMTFraction	Statewide default hourly fractions developed by INDOT using an analysis of permanent count station data from a statewide data set.
Average Speed Distribution (% of VHT in each 5 mph speed bin)	avgSpeed Distribution	National defaults.
Road Type Distribution (VMT by 5 MOVES Road Types)	roadType Distribution	Calculated from local VMT data. Use travel demand model base year distributions for all years.
Age Distribution (Vehicle Population by Age of Vehicle)	sourceTypeAge Distribution	Local age distributions developed from vehicle registration data for source types 21, 31, and 32. Default MOVES age distributions for all other source types.
Ramp Fraction	RoadType	Based on local travel demand model.
Meteorology Data	ZoneMonthHour	MOBILE6 Summer Met Data Converted to MOVES format
Fuel (% of Market Share by Fuel Type)	FuelFormulation	MOVES Defaults
	FuelSupply	Allen County MOVES Defaults for Summer (check if varies among counties)
I/M Program	IMCoverage	No Program

Appendix B

Vehicle Age Distributions for Allen County:

	Source Types												
ageid	**11**	**21**	**31**	**32**	**41**	**42**	**43**	**51**	**52**	**53**	**54**	**61**	**62**
0	0.2109690540	0.0209858994	0.0101749760	0.0244923211	0.0643023355	0.0545743076	0.0622220643	0.0494240790	0.0588526168	0.0787544027	0.0615095870	0.0535634660	0.0670845256
1	0.1921154969	0.0400652146	0.0384587728	0.0566999054	0.0626728412	0.0531913309	0.0606452875	0.0481716155	0.0573612230	0.0767586735	0.0599508636	0.0535634660	0.0670845256
2	0.1573471585	0.0505884810	0.0438998082	0.0566635126	0.0624853859	0.0530322328	0.0604638952	0.0480275345	0.0571896519	0.0765290827	0.0597715492	0.0541045093	0.0677621447
3	0.1359771581	0.0503728955	0.0432885906	0.0538248781	0.0624229593	0.0529792497	0.0604034894	0.0479795509	0.0571325186	0.0764526251	0.0597118340	0.0575579884	0.0720873878
4	0.1058454735	0.0566720338	0.0736697028	0.0758788849	0.0617369906	0.0523970560	0.0597397140	0.0474523026	0.0565046834	0.0756124785	0.0590556596	0.0564182312	0.0706599203
5	0.0750909142	0.0594005376	0.0674256951	0.0667806973	0.0559170498	0.0474575929	0.0541080614	0.0429789769	0.0511779950	0.0684845018	0.0534884926	0.0489290859	0.0612802835
6	0.0476805323	0.0595824379	0.0703259827	0.0643423830	0.0468365056	0.0397508123	0.0453212873	0.0359994879	0.0428670388	0.0573630896	0.0448023279	0.0366034411	0.0458432683
7	0.0331026886	0.0638267771	0.0782837967	0.0719484679	0.0425786431	0.0361370941	0.0412011709	0.0327268079	0.0389700355	0.0521482660	0.0407293873	0.0340742206	0.0426755959
8	0.0197278356	0.0641299441	0.0624640460	0.0600844312	0.0468268516	0.0397426124	0.0453119367	0.0359920640	0.0428582007	0.0573512681	0.0447930981	0.0358093100	0.0448486759
9	0.0118473747	0.0693376810	0.0698465964	0.0736225344	0.0534377006	0.0453533365	0.0517089150	0.0410733035	0.0489087688	0.0654479137	0.0511168252	0.0526288382	0.0659139597
10	0.0053251777	0.0671750891	0.0689477469	0.0658344858	0.0532712252	0.0452120443	0.0515478328	0.0409453420	0.0487564067	0.0652440247	0.0509575859	0.0624520143	0.0782168041
11	0.0025378610	0.0566114004	0.0609060403	0.0580828299	0.0407951886	0.0536203440	0.0411075833	0.0313560350	0.0391491717	0.0523881239	0.0302729398	0.0478258601	0.0598985955
12	0.0013011470	0.0571436271	0.0537032598	0.0469466482	0.0331924560	0.0489936472	0.0382933197	0.0255124310	0.0294483131	0.0394065607	0.0466101866	0.0389128550	0.0487354179
13	0.0006124019	0.0449495732	0.0426294343	0.0395589199	0.0277347637	0.0456089741	0.0333751020	0.0545980574	0.0316399801	0.0194774783	0.0291673253	0.0325145854	0.0462990441
14	0.0002476898	0.0482978852	0.0413830297	0.0351553970	0.0364294706	0.0377746681	0.0430863640	0.0632656498	0.0364439725	0.0194691525	0.0347804437	0.0427077419	0.0462072388
15	0.0001527705	0.0378419893	0.0381951103	0.0336632943	0.0283511969	0.0332950401	0.0210164622	0.0395649332	0.0357887614	0.0311848083	0.0335202065	0.0332372597	0.0300444032
16	0.0000668536	0.0309095686	0.0270014382	0.0226726836	0.0235884296	0.0279132162	0.0253671498	0.0341566540	0.0259987277	0.0230196849	0.0233151075	0.0276536739	0.0230524492
17	0.0000299603	0.0269616595	0.0210930010	0.0174685203	0.0175637044	0.0244970846	0.0206833627	0.0146346390	0.0197956396	0.0052258132	0.0206748599	0.0205906442	0.0138452217
18	0.0000127409	0.0195509085	0.0155201342	0.0132469612	0.0201192241	0.0250480695	0.0266888558	0.0401958334	0.0193740288	0.0037212159	0.0155464816	0.0235865809	0.0100066460
19	0.0000055369	0.0150640356	0.0126558006	0.0105902904	0.0225790392	0.0366610768	0.0301447753	0.0342277190	0.0227335396	0.0175775477	0.0203628520	0.0264703224	0.0098603738
20	0.0000022027	0.0128205992	0.0134947267	0.0114273237	0.0226407923	0.0281971934	0.0173882093	0.0270081845	0.0289395633	0.0183874556	0.0265944575	0.0265427135	0.0095755112
21	0.0000010015	0.0095329206	0.0116970278	0.0094985079	0.0212965445	0.0224413685	0.0209032932	0.0367430589	0.0255089927	0.0121624816	0.0238465850	0.0249667984	0.0083402541
22	0.0000005320	0.0071816914	0.0079458293	0.0068054444	0.0221366577	0.0207614938	0.0211741003	0.0294241579	0.0211707159	0.0029207200	0.0232916866	0.0259516972	0.0021970287
23	0.0000002372	0.0061105010	0.0058604986	0.0054589126	0.0187753208	0.0176845935	0.0186862600	0.0367365508	0.0255742899	0.0006595597	0.0173635700	0.0220110680	0.0022815392
24	0.0000001072	0.0048237252	0.0044463087	0.0046946648	0.0165801584	0.0153441343	0.0162223474	0.0195371739	0.0181341022	0.0013228019	0.0186391363	0.0194375881	0.0028947085
25	0.0000000515	0.0034897900	0.0033916587	0.0031661693	0.0130464803	0.0119613578	0.0125269842	0.0202862884	0.0101534224	0.0013255722	0.0189070434	0.0152949162	0.0014963357
26	0.0000000201	0.0015562577	0.0017737296	0.0011281753	0.0052066606	0.0114707358	0.0046276161	0.0058785937	0.0158244798	0.0000000000	0.0123859355	0.0061039775	0.0003051544
27	0.0000000084	0.0011722461	0.0013662512	0.0009462115	0.0044375500	0.0062552616	0.0034269422	0.0066192300	0.0082431519	0.0005853113	0.0073123264	0.0052023202	0.0002365920
28	0.0000000046	0.0012328795	0.0008868648	0.0009098188	0.0038534093	0.0027153367	0.0040227141	0.0058648852	0.0078447522	0.0004224309	0.0040199156	0.0045175071	0.0007539156
29	0.0000000027	0.0011385608	0.0003235858	0.0003275348	0.0050202650	0.0073813428	0.0039557847	0.0014702211	0.0082910352	0.0000000000	0.0005297244	0.0058854602	0.0002483418
30	0.0000000060	0.0114731899	0.0089405561	0.0080791906	0.0041641999	0.0025473919	0.0046291194	0.0021486392	0.0093642209	0.0005969550	0.0069720059	0.0048818593	0.0002641374

Source: Quality assured vehicle registration data for Allen County for source types 21, 32, and 32, MOVES2010a default distributions for all other source types.

Appendix C

Allen County Vehicle Populations:

Vehicle Populations	Source Types												
	11	**21**	**31**	**32**	**41**	**42**	**43**	**51**	**52**	**53**	**54**	**61**	**62**
Annual Populations													
2008	6,528	155,784	89,124	27,287	126	66	856	34	2,317	298	536	3,114	3,725
2009	6,580	157,042	89,844	27,507	127	67	864	34	2,339	301	541	3,143	3,761
2010	6,633	158,310	90,570	27,729	128	67	872	35	2,361	303	546	3,173	3,796
2011	6,687	159,589	91,301	27,953	130	68	881	35	2,384	306	551	3,203	3,832
2012	6,741	160,878	92,038	28,179	131	69	889	35	2,406	309	556	3,233	3,868
2013	6,795	162,177	92,782	28,407	132	69	897	35	2,429	312	562	3,264	3,904
2014	6,850	163,487	93,531	28,636	133	70	906	36	2,452	315	567	3,294	3,941
2015	6,906	164,807	94,286	28,867	135	70	914	36	2,475	318	572	3,325	3,978
2016	6,961	166,138	95,048	29,100	136	71	923	36	2,498	321	578	3,357	4,016
2017	7,018	167,480	95,816	29,335	137	72	932	37	2,522	324	583	3,389	4,054
2018	7,074	168,832	96,589	29,572	139	72	940	37	2,545	327	589	3,420	4,092
2019	7,131	170,196	97,369	29,811	140	73	949	38	2,569	330	594	3,453	4,131
2020	7,189	171,570	98,156	30,052	141	74	958	38	2,594	333	600	3,485	4,170
2021	7,247	172,956	98,948	30,295	142	75	967	38	2,618	336	605	3,518	4,209
2022	7,306	174,353	99,748	30,539	144	75	976	39	2,643	340	611	3,551	4,249
2023	7,365	175,761	100,553	30,786	145	76	985	39	2,668	343	617	3,585	4,289
2024	7,424	177,180	101,365	31,034	147	77	995	39	2,693	346	623	3,619	4,329
2025	7,484	178,611	102,184	31,285	148	77	1,004	40	2,718	349	629	3,653	4,370
2026	7,544	180,054	103,009	31,538	149	78	1,014	40	2,744	353	635	3,687	4,411
2027	7,605	181,508	103,841	31,792	151	79	1,023	40	2,770	356	641	3,722	4,453
2028	7,667	182,974	104,680	32,049	152	80	1,033	41	2,796	359	647	3,757	4,495
2029	7,729	184,451	105,525	32,308	154	80	1,043	41	2,822	363	653	3,792	4,537
2030	7,791	185,941	106,377	32,569	155	81	1,052	42	2,849	366	659	3,828	4,580
2031	7,854	187,443	107,236	32,832	156	82	1,062	42	2,876	370	665	3,864	4,623
2032	7,918	188,956	108,102	33,097	158	83	1,072	42	2,903	373	671	3,901	4,667
2033	7,981	190,482	108,975	33,364	159	83	1,082	43	2,930	377	678	3,938	4,711
2034	8,046	192,021	109,855	33,634	161	84	1,093	43	2,958	380	684	3,975	4,755
2035	8,111	193,571	110,743	33,906	162	85	1,103	44	2,986	384	690	4,012	4,800
2036	8,176	195,135	111,637	34,179	164	86	1,113	44	3,014	387	697	4,050	4,845
2037	8,242	196,711	112,539	34,455	166	87	1,124	44	3,042	391	704	4,088	4,891
2038	8,309	198,299	113,447	34,734	167	87	1,134	45	3,071	395	710	4,127	4,937
2039	8,376	199,901	114,364	35,014	169	88	1,145	45	3,100	398	717	4,166	4,984
2040	8,444	201,515	115,287	35,297	170	89	1,156	46	3,129	402	724	4,205	5,030

Source: Quality assured vehicle registration data for Allen County for source types 21, 32, and 32, MOVES2010a default mileage accumulation rates for all other source types. Population growth factors are taken from local socioeconomic data forecasts.

Appendix D

Allen County Meteorological Data:

monthID	zoneID	HourID	temperature	relHumidity
7	180030	1	67.2	87.4
7	180030	2	66.0	91.3
7	180030	3	65.0	94.6
7	180030	4	64.2	97.0
7	180030	5	63.7	98.9
7	180030	6	63.0	100.0
7	180030	7	62.5	100.0
7	180030	8	63.0	100.0
7	180030	9	65.7	92.2
7	180030	10	70.0	79.3
7	180030	11	74.5	68.2
7	180030	12	78.3	60.1
7	180030	13	81.7	53.9
7	180030	14	83.5	50.8
7	180030	15	84.1	49.7
7	180030	16	84.3	49.5
7	180030	17	83.8	50.2
7	180030	18	82.6	52.3
7	180030	19	80.4	56.1
7	180030	20	77.6	61.6
7	180030	21	74.8	67.6
7	180030	22	72.3	73.4
7	180030	23	70.6	77.9
7	180030	24	68.9	82.6

Source: Mobile 6.2 reported meteorological data from Appendix C of the *Request for Redesignation and Maintenance Plan for Ozone Attainment in the 8-Hour Ozone Basic Nonattainment Area, Allen County, Indiana* prepared by IDEM on May 30, 2006 converted using EPA data converter.

Appendix E

Indiana Default VMT Distributions by Vehicle Type and Road Type:

Road Type	Motorcycle	Passenger Car	Light Duty Truck	Bus	Single Unit Truck	Combination Truck
2	0.007033832	0.506408086	0.163786651	0.004174166	0.007773053	0.310824213
3	0.001733929	0.659751199	0.225767175	0.000793168	0.010963315	0.100991214
4	0.003973041	0.569953374	0.254198647	0.002831718	0.009082816	0.159960404
5	0.002785022	0.702754695	0.245240087	0.001402085	0.009764356	0.038053756

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.

Appendix F

Indiana Default Hourly Distribution Factors for Road Type 2 – Rural Restricted Access:

	Source Types												
Hour	**11**	**21**	**31**	**32**	**41**	**42**	**43**	**51**	**52**	**53**	**54**	**61**	**62**
1	0.0125903247	0.0101219844	0.0084967341	0.0084967341	0.0254913340	0.0254913340	0.0254913340	0.0126607789	0.0126607789	0.0126607789	0.0126607789	0.0197906895	0.0197906895
2	0.0104070951	0.0069241973	0.0066421955	0.0066421955	0.0269500431	0.0269500431	0.0269500431	0.0114617645	0.0114617645	0.0114617645	0.0114617645	0.0212124099	0.0212124099
3	0.0098043179	0.0056567534	0.0061275627	0.0061275627	0.0231103443	0.0231103443	0.0231103443	0.0107741941	0.0107741941	0.0107741941	0.0107741941	0.0201622890	0.0201622890
4	0.0140329469	0.0069658232	0.0084286563	0.0084286563	0.0234460042	0.0234460042	0.0234460042	0.0128724692	0.0128724692	0.0128724692	0.0128724692	0.0213065902	0.0213065902
5	0.0165212405	0.0100941552	0.0134026652	0.0134026652	0.0244090660	0.0244090660	0.0244090660	0.0174195788	0.0174195788	0.0174195788	0.0174195788	0.0250478552	0.0250478552
6	0.0312047458	0.0241732202	0.0316551315	0.0316551315	0.0322923692	0.0322923692	0.0322923692	0.0261005783	0.0261005783	0.0261005783	0.0261005783	0.0304976568	0.0304976568
7	0.0399082603	0.0390974746	0.0481531313	0.0481531313	0.0302344914	0.0302344914	0.0302344914	0.0420450985	0.0420450985	0.0420450985	0.0420450985	0.0339947725	0.0339947725
8	0.0482864956	0.0528758381	0.0535145983	0.0535145983	0.0386071681	0.0386071681	0.0386071681	0.0556119122	0.0556119122	0.0556119122	0.0556119122	0.0383435322	0.0383435322
9	0.0472316355	0.0493101459	0.0541442978	0.0541442978	0.0454144773	0.0454144773	0.0454144773	0.0647383083	0.0647383083	0.0647383083	0.0647383083	0.0447350945	0.0447350945
10	0.0521292001	0.0488627065	0.0570682751	0.0570682751	0.0533197396	0.0533197396	0.0533197396	0.0711110358	0.0711110358	0.0711110358	0.0711110358	0.0517738130	0.0517738130
11	0.0559204481	0.0513700269	0.0575854739	0.0575854739	0.0576707709	0.0576707709	0.0576707709	0.0730230234	0.0730230234	0.0730230234	0.0730230234	0.0557712484	0.0557712484
12	0.0572822100	0.0533048469	0.0582753930	0.0582753930	0.0549541212	0.0549541212	0.0549541212	0.0731872952	0.0731872952	0.0731872952	0.0731872952	0.0571435296	0.0571435296
13	0.0592008057	0.0551586141	0.0599414146	0.0599414146	0.0541541840	0.0541541840	0.0541541840	0.0739324454	0.0739324454	0.0739324454	0.0739324454	0.0567014536	0.0567014536
14	0.0615145144	0.0595500442	0.0635019874	0.0635019874	0.0570747392	0.0570747392	0.0570747392	0.0746488056	0.0746488056	0.0746488056	0.0746488056	0.0567500887	0.0567500887
15	0.0647783324	0.0662712693	0.0683897966	0.0683897966	0.0551925339	0.0551925339	0.0551925339	0.0704234655	0.0704234655	0.0704234655	0.0704234655	0.0578234055	0.0578234055
16	0.0713500739	0.0764876319	0.0772110428	0.0772110428	0.0551956709	0.0551956709	0.0551956709	0.0628601912	0.0628601912	0.0628601912	0.0628601912	0.0577540296	0.0577540296
17	0.0754978425	0.0847160034	0.0792545794	0.0792545794	0.0557979766	0.0557979766	0.0557979766	0.0534712990	0.0534712990	0.0534712990	0.0534712990	0.0562910814	0.0562910814
18	0.0693763461	0.0821220539	0.0693254052	0.0693254052	0.0501011685	0.0501011685	0.0501011685	0.0436895095	0.0436895095	0.0436895095	0.0436895095	0.0527021980	0.0527021980
19	0.0542187052	0.0620082513	0.0521045300	0.0521045300	0.0459665909	0.0459665909	0.0459665909	0.0363413126	0.0363413126	0.0363413126	0.0363413126	0.0502215100	0.0502215100
20	0.0432143461	0.0459015588	0.0390794599	0.0390794599	0.0462959768	0.0462959768	0.0462959768	0.0312048570	0.0312048570	0.0312048570	0.0312048570	0.0467116534	0.0467116534
21	0.0358137860	0.0372595462	0.0311015284	0.0311015284	0.0418602463	0.0418602463	0.0418602463	0.0261242877	0.0261242877	0.0261242877	0.0261242877	0.0421311043	0.0421311043
22	0.0294294934	0.0312744978	0.0249803003	0.0249803003	0.0366496745	0.0366496745	0.0366496745	0.0215822587	0.0215822587	0.0215822587	0.0215822587	0.0381387483	0.0381387483
23	0.0223450238	0.0235734666	0.0182964081	0.0182964081	0.0347517842	0.0347517842	0.0347517842	0.0189759266	0.0189759266	0.0189759266	0.0189759266	0.0342326572	0.0342326572
24	0.0179418099	0.0169198902	0.0133194323	0.0133194323	0.0310595247	0.0310595247	0.0310595247	0.0157396039	0.0157396039	0.0157396039	0.0157396039	0.0307625891	0.0307625891

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.

Indiana Default Hourly Distribution Factors for Road Type 3 – Rural Unrestricted Access:

	Source Types												
Hour	**11**	**21**	**31**	**32**	**41**	**42**	**43**	**51**	**52**	**53**	**54**	**61**	**62**
1	0.0040299464	0.0073183989	0.0054636028	0.0054636028	0.0036998387	0.0036998387	0.0036998387	0.0043986387	0.0043986387	0.0043986387	0.0043986387	0.0164160879	0.0164160879
2	0.0040299464	0.0041131835	0.0034619242	0.0034619242	0.0045536477	0.0045536477	0.0045536477	0.0041872686	0.0041872686	0.0041872686	0.0041872686	0.0167510731	0.0167510731
3	0.0041817017	0.0032797517	0.0030691885	0.0030691885	0.0046485153	0.0046485153	0.0046485153	0.0073497934	0.0073497934	0.0073497934	0.0073497934	0.0165479051	0.0165479051
4	0.0053114356	0.0057247729	0.0048082254	0.0048082254	0.0039844417	0.0039844417	0.0039844417	0.0084039684	0.0084039684	0.0084039684	0.0084039684	0.0195836328	0.0195836328
5	0.0140963815	0.0151258840	0.0143177758	0.0143177758	0.0082534864	0.0082534864	0.0082534864	0.0153176438	0.0153176438	0.0153176438	0.0153176438	0.0258467673	0.0258467673
6	0.0292719118	0.0316782840	0.0354335195	0.0354335195	0.0293141068	0.0293141068	0.0293141068	0.0299744215	0.0299744215	0.0299744215	0.0299744215	0.0344245647	0.0344245647
7	0.0397598894	0.0468485516	0.0516314034	0.0516314034	0.0496157860	0.0496157860	0.0496157860	0.0557776279	0.0557776279	0.0557776279	0.0557776279	0.0440469233	0.0440469233
8	0.0448183995	0.0633910409	0.0636260878	0.0636260878	0.0768428043	0.0768428043	0.0768428043	0.0778885464	0.0778885464	0.0778885464	0.0778885464	0.0512793380	0.0512793380
9	0.0370114322	0.0460357746	0.0558633273	0.0558633273	0.1049236315	0.1049236315	0.1049236315	0.0853025536	0.0853025536	0.0853025536	0.0853025536	0.0568238265	0.0568238265
10	0.0416989849	0.0427840868	0.0547852386	0.0547852386	0.1065363817	0.1065363817	0.1065363817	0.0879727734	0.0879727734	0.0879727734	0.0879727734	0.0599756501	0.0599756501
11	0.0509391967	0.0444183487	0.0568454275	0.0568454275	0.1186794422	0.1186794422	0.1186794422	0.0886336394	0.0886336394	0.0886336394	0.0886336394	0.0633505956	0.0633505956
12	0.0563855259	0.0512966366	0.0618918527	0.0618918527	0.1154539418	0.1154539418	0.1154539418	0.0859045570	0.0859045570	0.0859045570	0.0859045570	0.0635864154	0.0635864154
13	0.0638721209	0.0537246907	0.0610818211	0.0610818211	0.0999905132	0.0999905132	0.0999905132	0.0858537212	0.0858537212	0.0858537212	0.0858537212	0.0644099711	0.0644099711
14	0.0708697265	0.0545001954	0.0632013074	0.0632013074	0.0864244379	0.0864244379	0.0864244379	0.0852196109	0.0852196109	0.0852196109	0.0852196109	0.0637040231	0.0637040231
15	0.0774626513	0.0656899700	0.0681384267	0.0681384267	0.0592922873	0.0592922873	0.0592922873	0.0774551039	0.0774551039	0.0774551039	0.0774551039	0.0609657913	0.0609657913
16	0.0849155229	0.0775959037	0.0765115831	0.0765115831	0.0295038421	0.0295038421	0.0295038421	0.0663381066	0.0663381066	0.0663381066	0.0663381066	0.0570058311	0.0570058311
17	0.0916096179	0.0871890696	0.0796014405	0.0796014405	0.0317806660	0.0317806660	0.0317806660	0.0433522764	0.0433522764	0.0433522764	0.0433522764	0.0517440242	0.0517440242
18	0.0855899909	0.0856725476	0.0737419189	0.0737419189	0.0184043260	0.0184043260	0.0184043260	0.0290727541	0.0290727541	0.0290727541	0.0290727541	0.0467760851	0.0467760851
19	0.0685259502	0.0656330958	0.0545272751	0.0545272751	0.0120481928	0.0120481928	0.0120481928	0.0187744815	0.0187744815	0.0187744815	0.0187744815	0.0413186686	0.0413186686
20	0.0503658989	0.0457301992	0.0390975413	0.0390975413	0.0118584575	0.0118584575	0.0118584575	0.0129711680	0.0129711680	0.0129711680	0.0129711680	0.0364127078	0.0364127078
21	0.0353421239	0.0400621944	0.0294058171	0.0294058171	0.0096765013	0.0096765013	0.0096765013	0.0106166656	0.0106166656	0.0106166656	0.0106166656	0.0318882915	0.0318882915
22	0.0217853168	0.0289018238	0.0218457686	0.0218457686	0.0061663979	0.0061663979	0.0061663979	0.0079972816	0.0079972816	0.0079972816	0.0079972816	0.0290264055	0.0290264055
23	0.0119380838	0.0205028665	0.0136731866	0.0136731866	0.0048382506	0.0048382506	0.0048382506	0.0061564888	0.0061564888	0.0061564888	0.0061564888	0.0255574344	0.0255574344
24	0.0061882440	0.0127827290	0.0079763402	0.0079763402	0.0035101034	0.0035101034	0.0035101034	0.0050809093	0.0050809093	0.0050809093	0.0050809093	0.0225579868	0.0225579868

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.

Indiana Default Hourly Distribution Factors for Road Type 4 –Urban Restricted Access:

	Source Types												
Hour	**11**	**21**	**31**	**32**	**41**	**42**	**43**	**51**	**52**	**53**	**54**	**61**	**62**
1	0.0114838630	0.0104500369	0.0090397680	0.0090397680	0.0186488577	0.0186488577	0.0186488577	0.0090968023	0.0090968023	0.0090968023	0.0090968023	0.0194173119	0.0194173119
2	0.0071800855	0.0062500477	0.0056304309	0.0056304309	0.0163411464	0.0163411464	0.0163411464	0.0080102618	0.0080102618	0.0080102618	0.0080102618	0.0198708197	0.0198708197
3	0.0063691205	0.0049689741	0.0046493622	0.0046493622	0.0157775876	0.0157775876	0.0157775876	0.0078361983	0.0078361983	0.0078361983	0.0078361983	0.0186489893	0.0186489893
4	0.0073777516	0.0058427101	0.0058801326	0.0058801326	0.0161766037	0.0161766037	0.0161766037	0.0086827231	0.0086827231	0.0086827231	0.0086827231	0.0198231326	0.0198231326
5	0.0108139353	0.0098545059	0.0108999000	0.0108999000	0.0221330492	0.0221330492	0.0221330492	0.0117453229	0.0117453229	0.0117453229	0.0117453229	0.0232515449	0.0232515449
6	0.0235457656	0.0231603609	0.0263517526	0.0263517526	0.0299755654	0.0299755654	0.0299755654	0.0204013312	0.0204013312	0.0204013312	0.0204013312	0.0294638153	0.0294638153
7	0.0461747881	0.0495085217	0.0542414568	0.0542414568	0.0393812372	0.0393812372	0.0393812372	0.0435263184	0.0435263184	0.0435263184	0.0435263184	0.0375553768	0.0375553768
8	0.0567226756	0.0788353145	0.0674512195	0.0674512195	0.0503870867	0.0503870867	0.0503870867	0.0659533819	0.0659533819	0.0659533819	0.0659533819	0.0446175773	0.0446175773
9	0.0493171440	0.0638279223	0.0614111771	0.0614111771	0.0589556475	0.0589556475	0.0589556475	0.0756333178	0.0756333178	0.0756333178	0.0756333178	0.0515843704	0.0515843704
10	0.0406144957	0.0466481655	0.0536303211	0.0536303211	0.0581555587	0.0581555587	0.0581555587	0.0790728466	0.0790728466	0.0790728466	0.0790728466	0.0553194565	0.0553194565
11	0.0415130748	0.0428102606	0.0512594850	0.0512594850	0.0616027281	0.0616027281	0.0616027281	0.0824723032	0.0824723032	0.0824723032	0.0824723032	0.0583081277	0.0583081277
12	0.0465166969	0.0452333632	0.0529793024	0.0529793024	0.0644246353	0.0644246353	0.0644246353	0.0820640679	0.0820640679	0.0820640679	0.0820640679	0.0589378233	0.0589378233
13	0.0517959830	0.0478487216	0.0547982766	0.0547982766	0.0637644078	0.0637644078	0.0637644078	0.0808088903	0.0808088903	0.0808088903	0.0808088903	0.0575925555	0.0575925555
14	0.0566713893	0.0502151226	0.0576880799	0.0576880799	0.0625591325	0.0625591325	0.0625591325	0.0811795580	0.0811795580	0.0811795580	0.0811795580	0.0571667797	0.0571667797
15	0.0671882913	0.0580384620	0.0656779676	0.0656779676	0.0619482678	0.0619482678	0.0619482678	0.0795090490	0.0795090490	0.0795090490	0.0795090490	0.0573429674	0.0573429674
16	0.0810035452	0.0715596945	0.0786905659	0.0786905659	0.0609466141	0.0609466141	0.0609466141	0.0727723312	0.0727723312	0.0727723312	0.0727723312	0.0567213465	0.0567213465
17	0.0863864724	0.0838541123	0.0821371575	0.0821371575	0.0577256909	0.0577256909	0.0577256909	0.0563364761	0.0563364761	0.0563364761	0.0563364761	0.0551911545	0.0551911545
18	0.0843264717	0.0874512168	0.0756929494	0.0756929494	0.0510164625	0.0510164625	0.0510164625	0.0371719560	0.0371719560	0.0371719560	0.0371719560	0.0531125437	0.0531125437
19	0.0645951265	0.0604364374	0.0543673700	0.0543673700	0.0450990958	0.0450990958	0.0450990958	0.0249336618	0.0249336618	0.0249336618	0.0249336618	0.0487199307	0.0487199307
20	0.0469536991	0.0424749554	0.0373951308	0.0373951308	0.0384927066	0.0384927066	0.0384927066	0.0188134711	0.0188134711	0.0188134711	0.0188134711	0.0432101938	0.0432101938
21	0.0373781148	0.0353280630	0.0293181427	0.0293181427	0.0322318571	0.0322318571	0.0322318571	0.0162446774	0.0162446774	0.0162446774	0.0162446774	0.0390319248	0.0390319248
22	0.0316564842	0.0313403787	0.0249971308	0.0249971308	0.0282046747	0.0282046747	0.0282046747	0.0142456600	0.0142456600	0.0142456600	0.0142456600	0.0355118446	0.0355118446
23	0.0245992722	0.0251562568	0.0203505544	0.0203505544	0.0242700475	0.0242700475	0.0242700475	0.0124474209	0.0124474209	0.0124474209	0.0124474209	0.0317711657	0.0317711657
24	0.0198157539	0.0189063955	0.0154623663	0.0154623663	0.0217813392	0.0217813392	0.0217813392	0.0110419727	0.0110419727	0.0110419727	0.0110419727	0.0278292477	0.0278292477

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.

Indiana Default Hourly Distribution Factors for Road Type 5 –Urban Unrestricted Access:

	Source Types												
Hour	**11**	**21**	**31**	**32**	**41**	**42**	**43**	**51**	**52**	**53**	**54**	**61**	**62**
1	0.0092279794	0.0085268711	0.0060669694	0.0060669694	0.0126828270	0.0126828270	0.0126828270	0.0037158531	0.0037158531	0.0037158531	0.0037158531	0.0106396358	0.0106396358
2	0.0055316691	0.0048527626	0.0037675180	0.0037675180	0.0099485186	0.0099485186	0.0099485186	0.0038117041	0.0038117041	0.0038117041	0.0038117041	0.0124309233	0.0124309233
3	0.0047273286	0.0037895145	0.0033129405	0.0033129405	0.0069482800	0.0069482800	0.0069482800	0.0044165887	0.0044165887	0.0044165887	0.0044165887	0.0121505035	0.0121505035
4	0.0047017359	0.0044201159	0.0042394230	0.0042394230	0.0113599945	0.0113599945	0.0113599945	0.0056282193	0.0056282193	0.0056282193	0.0056282193	0.0144699998	0.0144699998
5	0.0081859928	0.0079416389	0.0087215410	0.0087215410	0.0153898606	0.0153898606	0.0153898606	0.0086545038	0.0086545038	0.0086545038	0.0086545038	0.0210508569	0.0210508569
6	0.0225361588	0.0203863353	0.0238668712	0.0238668712	0.0256929528	0.0256929528	0.0256929528	0.0191822890	0.0191822890	0.0191822890	0.0191822890	0.0299165403	0.0299165403
7	0.0435184779	0.0478282898	0.0541952158	0.0541952158	0.0448331117	0.0448331117	0.0448331117	0.0418068371	0.0418068371	0.0418068371	0.0418068371	0.0436775030	0.0436775030
8	0.0602121997	0.0721456866	0.0675347974	0.0675347974	0.0691895946	0.0691895946	0.0691895946	0.0731482386	0.0731482386	0.0731482386	0.0731482386	0.0588646976	0.0588646976
9	0.0556311148	0.0567013667	0.0643660182	0.0643660182	0.0747059425	0.0747059425	0.0747059425	0.0880926125	0.0880926125	0.0880926125	0.0880926125	0.0640862836	0.0640862836
10	0.0485821670	0.0466493163	0.0603283916	0.0603283916	0.0803995772	0.0803995772	0.0803995772	0.0921313810	0.0921313810	0.0921313810	0.0921313810	0.0680944168	0.0680944168
11	0.0495985610	0.0468148434	0.0590657789	0.0590657789	0.0774061573	0.0774061573	0.0774061573	0.0943973720	0.0943973720	0.0943973720	0.0943973720	0.0703404942	0.0703404942
12	0.0573056055	0.0516032787	0.0615645883	0.0615645883	0.0753332651	0.0753332651	0.0753332651	0.0911430924	0.0911430924	0.0911430924	0.0911430924	0.0698309800	0.0698309800
13	0.0607752380	0.0555323143	0.0626732860	0.0626732860	0.0739763390	0.0739763390	0.0739763390	0.0895629476	0.0895629476	0.0895629476	0.0895629476	0.0685413889	0.0685413889
14	0.0609214817	0.0562211160	0.0629887267	0.0629887267	0.0779993863	0.0779993863	0.0779993863	0.0912650000	0.0912650000	0.0912650000	0.0912650000	0.0671175363	0.0671175363
15	0.0649907135	0.0607579027	0.0667909366	0.0667909366	0.0761037810	0.0761037810	0.0761037810	0.0905726397	0.0905726397	0.0905726397	0.0905726397	0.0651260461	0.0651260461
16	0.0724418316	0.0715477952	0.0751790074	0.0751790074	0.0728035185	0.0728035185	0.0728035185	0.0775387708	0.0775387708	0.0775387708	0.0775387708	0.0605241028	0.0605241028
17	0.0773519648	0.0803647101	0.0757034489	0.0757034489	0.0526405510	0.0526405510	0.0526405510	0.0464337395	0.0464337395	0.0464337395	0.0464337395	0.0557685235	0.0557685235
18	0.0770777578	0.0832250581	0.0684911688	0.0684911688	0.0347686748	0.0347686748	0.0347686748	0.0260342365	0.0260342365	0.0260342365	0.0260342365	0.0506461891	0.0506461891
19	0.0635977420	0.0637849687	0.0526386278	0.0526386278	0.0285090860	0.0285090860	0.0285090860	0.0173341336	0.0173341336	0.0173341336	0.0173341336	0.0402747366	0.0402747366
20	0.0483079600	0.0462284324	0.0372839274	0.0372839274	0.0220585728	0.0220585728	0.0220585728	0.0112536468	0.0112536468	0.0112536468	0.0112536468	0.0310667712	0.0310667712
21	0.0383158572	0.0386568197	0.0292289942	0.0292289942	0.0174082029	0.0174082029	0.0174082029	0.0076615624	0.0076615624	0.0076615624	0.0076615624	0.0268533367	0.0268533367
22	0.0305027859	0.0325107827	0.0236169348	0.0236169348	0.0137124544	0.0137124544	0.0137124544	0.0062358957	0.0062358957	0.0062358957	0.0062358957	0.0231915644	0.0231915644
23	0.0214502991	0.0236017051	0.0170601049	0.0170601049	0.0139442910	0.0139442910	0.0139442910	0.0053276381	0.0053276381	0.0053276381	0.0053276381	0.0193751364	0.0193751364
24	0.0145073780	0.0159083752	0.0113147831	0.0113147831	0.0121850602	0.0121850602	0.0121850602	0.0046510979	0.0046510979	0.0046510979	0.0046510979	0.0159618330	0.0159618330

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.

Appendix G

Indiana Default Daily Distribution Factors:

	dayID	
monthID	**2**	**5**
1	0.2325411725	0.7674588275
2	0.2380547378	0.7619452622
3	0.2393402049	0.7606597951
4	0.2396052454	0.7603947546
5	0.2484757701	0.7515242299
6	0.2489743665	0.7510256335
7	0.2481153021	0.7518846979
8	0.2527028648	0.7472971352
9	0.2496078420	0.7503921580
10	0.2462808693	0.7537191307
11	0.2439742406	0.7560257594
12	0.2258784720	0.7741215280

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.

Appendix H

Indiana Default Monthly Distribution Factors:

monthID	monthVMTFraction
1	0.0733424010
2	0.0693661929
3	0.0827036024
4	0.0831789580
5	0.0891346903
6	0.0888150873
7	0.0907968617
8	0.0918542094
9	0.0854175366
10	0.0875162272
11	0.0812354405
12	0.0766387926

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.