OHIO DEPARTMENT OF TRANSPORTATION
INTER-OFFICE COMMUNICATION
Office of Environmental Services

TO: Todd Audet, District 2 Deputy Director **DATE:** November 28, 2014
Attention: Stacy Schimoeller, District Environmental Coordinator

FROM: Noel Alcala, P.E., Noise and Air Quality Coordinator, Office of Environmental Services

SUBJECT: Noise Analysis Report dated November 25, 2014

PROJECT: HEN-New Bridge PID: 22984

OES has reviewed the subject document prepared by Lawhon and Associates and received by OES on 11/25/14.

Traffic generated noise levels were predicted at 14 noise sensitive receptor sites representing 17 residential dwelling units using the FHWA TNM Version 2.5 for the proposed new bridge, the section of new roadway for Industrial Drive and two modern roundabouts for the Existing Year 2015 and the Design Year 2035 Build alternative. TNM predicted traffic noise levels to range from approximately 52 to 58 dBA for the 2015 Existing Year condition. TNM predicted traffic noise levels to range from approximately 55 to 61 dBA for the 2035 Design Year build condition. None of the receptor sites were predicted to experience peak hour traffic noise levels in excess of the Category B NAC of 67 dBA. The greatest increase in noise level from the existing condition to the Design Year build condition was 3.3 dB at noise receptor 3-3. None of the sites in the project area were predicted to experience a substantial increase in noise levels (increase > 10 dBA) as a result of the proposed action.

In accordance with 23 CFR Part 772, when noise impacts are identified as a result of a proposed action, noise abatement measures must be considered for impacted sites predicted to approach or exceed the applicable FHWA NAC. ODOT noise policy requires the consideration of noise abatement measures only when traffic noise impacts occur. **Having no identified traffic noise impact on any receptor site, no additional noise analysis or consideration of noise abatement measures is required for the proposed project.**

Should you have any questions or concerns, feel free to contact Noel Alcala of this office at 614-466-5222.

NAA:na

c: CE Online System

November 25, 2014

NOISE ANALYSIS REPORT
HEN-NEW MAUMEE RIVER BRIDGE
PID 22984

Prepared for:
Ohio Department of
Transportation
1980 West Broad Street
Columbus, OH 43223

Prepared by:
Lawhon & Associates, Inc.
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Lawhon & Associates, Inc.

Noise Analysis Report
HEN-New Maumee river Bridge
PID # 22984

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Section 1.0
INTRODUCTION

Project Description

The HEN-New Maumee River Bridge (PID 22984) project is located in the City of Napoleon, Harrison Township in Henry County, Ohio. The project location and study area is shown on Figure 1 in Appendix A. The proposed project is shown on Figure 2 in Appendix A. The proposed project involves the extension of Industrial Drive over the Maumee River to State Route 110 (SR 110). The project would include the construction of a new bridge and new roadway from East Riverview Avenue to SR 110. A new roundabout would be constructed at the current intersection of Industrial Drive/East Riverview Avenue and a second new roundabout would be constructed on the east side of the river where the extended Industrial Drive roadway crossing over the Maumee River, would intersect with SR 110.

The traffic noise analysis for this project was performed to identify and estimate potential traffic noise impacts associated with the proposed bridge, the new roadway and the new roundabouts and whether noise abatement measures are warranted.

Existing Land Use

The project is located in an area of residential, agricultural and industrial mix. Land use on the west side of the Maumee River consists of single and multi-family residential use mostly on the north side of East Riverview Avenue. On the east side of the Maumee River, where new roadway and roundabout will be constructed, land use consist of agricultural on the north side of SR 110 and industrial on the south side of SR 110. The locations of noise sensitive areas within the project area are shown on Figure 3 in Appendix A. Noise sensitive receptors consist of residential dwelling units on East Riverview Avenue both east and west of Indusial Drive and residential dwelling units on the north side of SR 110.

Section 2.0
NOISE ANALYSIS

The noise analysis for this project was conducted in accordance with the Code of Federal Regulations (CFR), Title 23, Part 772, and the U.S. Department of Transportation, Federal Highway Administration (FHWA), *Highway Traffic Noise Analysis and Abatement Policy and Guidance* (FHWA, 2011). The project was further conducted in accordance with the ODOT noise policy pertaining to *Standard Procedure for Analysis and Abatement of Highway Traffic Noise* (ODOT, 2011) and the changes, clarifications and additions incorporated into ODOT's Highway Traffic Noise Analysis manual dated February 2013. Existing Year 2015 noise levels and noise levels for the Design Year 2035 Build alternative were modeled using the FHWA Traffic Noise Model (TNM) Version 2.5 (FHWA, 1998). Specific data and assumptions used in this analysis are described below.

Applicability

This noise analysis has been performed in accordance with the policy that applies to Type I projects. A Type I project, as described by the ODOT Standard Procedures for Analysis and Abatement of Highway Traffic noise document is a Federal aid highway project for the construction of highway on new location or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment or increases the number of through traffic lanes (ODOT, 2011).

Analysis Objectives

The objectives of this noise analysis include: (1) identify existing and future noise sensitive areas in the vicinity of the proposed roadway improvement; (2) characterization of the existing noise environment through computer modeling; (3) prediction of future year noise levels for the Design Year 2035 Build alternative through computer modeling, (4) comparison of Existing Year noise levels against future year noise levels to identify any noise impact within the project area; (5) evaluation of reasonable and feasible noise abatement measures for reducing noise levels where impacts are identified; and, (6) communication of the results to the public and local officials.

Noise Descriptors

Noise descriptors are used to describe the time varying nature of noise. In this report, noise levels will be described as hourly A weighted equivalent sound level in decibels, or **dBA $L_{eq(h)}$**. Noise is defined as unwanted sound, which is produced by the vibration of sound pressure waves. Sound pressure levels are used to measure the intensity of sound and are described in terms of decibels **(dB)**. Decibels are a logarithmic unit, which expresses the ratio of sound pressure level to a standard reference scale. The decibel scale has a range of 0-120 and is used to show the amount of sound pressure at a given location from the general environment of specific sources. An increase or decrease of 10 dB is perceived as doubling or halving of the sound intensity since the decibel scale is logarithmic. In general, the average person cannot detect an increase or decrease in sound pressure level of less than 3 dB. A change in sound pressure level of 5 dB is readily perceptible by most people.

Sound is composed of various frequencies which are measured in cycles per second or Hertz (Hz). The human ear can detect a wide range of frequencies from 20 to 20,000 Hz, but is most sensitive to sounds over a frequency range of 200 to 5,000 Hz. The human ear does not respond in a uniform manner to different frequency sounds. A sound pressure level of 70 dB will be perceived as much louder at 1,000 Hz than at 100

Hz. To account for this, various weighting methods have been developed to reflect human sensitivity to noise. The purpose of a weighting method is to de-emphasize the frequency ranges in which the human ear is less sensitive. The most commonly used measure of noise level is the A-weighted sound level **(dBA)**. The dBA sound level is widely used for transportation related noise measurements and specifications for community noise ordinances and standards. The dBA has been shown to be highly correlated to human response to noise.

In addition to noise fluctuating in frequency, environmental noise will fluctuate in intensity from moment to moment. Over a period of time there will be quiet moments and peak levels resulting from noisy, identifiable sources (trucks, aircraft, etc.). Because of these fluctuations, it is common practice to average these noise level fluctuations over a specified period of time. The equivalent sound level over a given period of interest, $\mathbf{L_{eq}}$, is widely accepted as a valid measure of community noise. The L_{eq} is equal to the equivalent steady state noise level which, in a stated time period, would contain the same acoustical energy as the time varying noise levels that actually occurred during the same time period. The hourly value of L_{eq}, based upon the peak hour percentage of the annual average daily traffic, is referred to as $\mathbf{L_{eq(h)}}$. Surveys have shown that L_{eq} properly predicts annoyance, and this descriptor is commonly used for noise measurement, prediction, and impact assessment.

Land Use Activity Categories

The FHWA has established seven activity categories that must be considered for Noise Abatement Criteria (NAC). The Activity Categories are described in Table 1.

Table 1.
Noise Abatement Criteria (NAC): Hourly A-Weighted Sound Level in Decibels (dBA)

Activity Category	Leq(h)	L10(h)	Description of Activity Category
A	57 (Exterior)	60 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67	70	Residential
C	67 (Exterior)	70 (Exterior)	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, television studios, trails and trail crossings.
D	52 (Interior)	55 (Interior)	Auditoriums, daycare centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recording studios, schools and television studios.
E	72 (Exterior)	75 (Exterior)	Hotels, motels, offices, restaurant/bars, and other developed lands properties or activities not included in A-D, or F.
F	N/A	N/A	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical) and warehousing.
G	N/A	N/A	Undeveloped lands that are not permitted.

Noise sensitive areas consist of residential dwelling units located within 500 feet of the proposed improvements. The residential dwelling units fall under NAC Activity Category B having an exterior noise abatement criterion of 67 dBA.

Noise Sensitive Areas

The noise sensitive areas included in this analysis are described in the following table.

Table 2.
Noise Sensitive Areas

Location	Description
NSA 1	Southwest quadrant of East Riverview Avenue/Industrial Drive – NSA 1 consists of three, four-unit apartment buildings each building having two ground floor patios. This area is classified as an Activity Category B having an exterior NAC of 67 dBA.
NSA 2	Northwest quadrant of East Riverview Avenue/Industrial Drive – NSA 2 consists of five dwelling units on the west side of East Riverview Avenue and one dwelling unit on the east side of East Riverview Avenue. This area is classified as an Activity Category B having an exterior NAC of 67 dBA.
NSA 3	Northwest quadrant of the proposed Industrial Drive/SR 110 roundabout – NSA 3 consists of 5 dwelling units on the west side of SR 110 south of proposed Industrial Drive extension. This area is classified as an Activity Category B having an exterior NAC of 67 dBA.

Traffic

Traffic data used in this analysis was provided by ODOT Office of Statewide Planning and Research and was obtained from an ODOT inter-office communication dated March 18, 2014. The certified traffic included ADT, AM and PM DHV, and percentage of truck volume for the Existing Year 2015 and Design Year 2035. Design hourly volumes were higher on all roadways during the PM Peak Hour. PM traffic volumes were used to represent worst case noise conditions in the noise model. Three (3) vehicle types were used in the noise model, automobiles, heavy trucks and medium trucks. Traffic data used in the analysis are summarized in the following table and the certified traffic data is shown in Appendix B.

Table 3.
Peak Hour Traffic Data

Roadway	Roadway Segment	Existing Year 2015		Design Year 2035	
		PM Volume	% Trucks	PM Volume	% Trucks
East Riverview Avenue	South of Industrial Drive	350	7	380	7
	North of Industrial Drive	220	7	240	7
Industrial Drive	West of the Maumee River	630	5	690	5
	East of the Maumee River	n/a	n/a	910	5
SR 110	South of Industrial Drive	400	3	430	14
	North of Industrial Drive			700	3

Ambient Noise Measurements

A field visit was conducted in the project area to measure the existing noise environment at representative locations within the noise sensitive areas. Noise measurements were performed in accordance with the FHWA Report Number FHWA-PD-96-046, *Measurement of Highway Related Noise* (May, 1996). Measurements were taken at two representative receptor locations for fifteen (15) minute intervals. The noise meter was tripod mounted with the microphone at a distance of approximately 4.9 feet above ground level and angled toward the dominant noise source. Noise measurements were recorded with a Quest 2900 Type 2 Data Logging SLM. A foam windscreen was used for all noise measurements. Ambient noise levels recorded at representative receptor sites are listed in the following table.

Table 4.
Ambient Noise Measurements

ID	Location	Location Description	Measured Noise Level Leq
Location 1	NSA 3	Side yard of home on SR 110.	66.5
Location 2	NSA 1	Grass area in front of middle apartment building on East Riverview Avenue.	61.7

The noise meter continuously measures and records the ambient noise level and integrates these values into a L_{eq} for the duration of the reading. Statistical summaries computed and recorded by an internal microprocessor were printed out for each 15 minute noise monitoring period.

Noise Model Validation

During each of the ambient noise measurement periods, simultaneous data including traffic volume, speed, and vehicle composition were collected. The traffic volumes were input into TNM V2.5 to validate the measured noise level with the modeled noise level at each representative site. The following table presents the TNM predicted noise levels based on the observed traffic data. The table also presents a comparison of the measured levels to the modeled levels at each representative receptor site.

Table 4.
Comparison of Measured and Modeled Noise Levels

Site ID	Measured Noise Level (L_{eq} in dBA)	Modeled Noise Level (L_{eq} in dBA)	Comparison of Modeled Level to Measured Level (dB)
Location 1	66.5	64.5	2.0
Location 2	61.7	60.4	1.3

As shown by the comparison, TNM's ability to accurately predict traffic noise levels was confirmed. All of the ambient measurement sites are within ±3 dB of the TNM predicted noise levels. The TNM Sound Level Results as well as mapping indicating the location of field measurement sites are provided in Appendix C.

Section 3.0
NOISE MODELING

Existing Condition 2015

Most of the noise within the project area is generated by traffic traveling on East Riverview Avenue on the west side of the Maumee River and by traffic traveling on SR 110 east of the Maumee River. The FHWA Transportation Noise Model (TNM) Version 2.5 was used to determine the existing noise levels at sensitive receptor sites. Traffic noise levels for the Existing Year condition were predicted for the PM peak hour using 2015 traffic volume and the existing roadway alignment.

Design Year 2035 Build Alternative

The Build alternative is described as construction of the proposed new bridge over the Maumee River, new roadway extending Industrial Drive to SR 110 and construction of roundabouts at Industrial Drive/East Riverview Avenue intersection and where the extended Industrial Drive would intersect SR 110. TNM was used to predict future noise levels for the Design Year 2035 Build alternative as if the project were constructed. Noise levels for the Build alternative were modeled using the proposed roadway alignment and projected 2035 traffic volumes.

Section 4.0
IMPACT ASSESSMENT

To evaluate the significance of the changes in the predicted noise levels, FHWA has established NAC, as shown in Table 1, for various categories of land use which represent the upper limits of acceptable traffic generated noise emissions. According to FHWA guidance and ODOT noise policy, a project may have a traffic noise impact if either or both of the following conditions exist:

- The predicted noise levels associated with the Build alternative approach, meet, or exceed the applicable NAC. According to ODOT, noise levels "approach" the NAC when they are within 1 dB of the applicable NAC.

- A substantial increase occurs in predicted noise levels between the future year Build alternative and existing noise levels, even though the applicable NAC may not be approached or exceeded. A substantial increase is considered to be a 10 dB or greater increase, representing a doubling or more of the perceived existing noise level.

The noise sensitive receptor sites in this analysis fall under one NAC Activity Category. The residential dwelling units fall under Activity Category B having an applicable NAC of 67 (exterior) dBA [$L_{eq(h)}$]. Therefore, under Activity Category B, a predicted noise level of 66 dBA approaches the NAC and would be considered a noise impact.

Impact Assessment Summary

A total of 14 noise sensitive receptors representing 17 residential dwelling units were analyzed for potential noise impact. The TNM-generated peak hour noise levels for the existing condition provides a baseline for a comparison to TNM-generated peak hour noise levels for the Design Year condition to determine the extent of noise impact, if any. As shown in Table 5, the predicted Existing Year 2015 noise levels range between 52 and 60 dBA. The predicted Design Year 2035 noise levels range from 55 to 61 dBA. The greatest increase in noise level from the Existing Year to the Design Year was predicted to be 3.3 dB at receptor site 2-6, a dwelling unit adjacent to the Maumee River. None of the receptor sites are predicted to experience a substantial increase (>10dB increase) in noise level in the Design Year condition.

Under the Design Year Build condition, noise receiver 3-4 was predicted to experience the highest noise level of 61 dBA. None of the receivers were predicted to experience noise levels above the Category C NAC of 67 dBA.

Figure 3 in Appendix A shows the Existing Year and Design Year noise levels and the corresponding increase or decrease in noise levels as a result of the project. Existing and Design Year noise levels are also shown in Table 5.

Table 5 Existing Year and Design Year Noise Levels							
Receptor		**2015 Existing Year**	**2035 Build**		**Impact Criteria**		
Site	Dwelling Units	Calculated LAeq1h	Calculated LAeq1h	Increase Build over Opening	Substantial Increase	Sound Level Criterion	Type of Impact
		dBA	dBA	dB	dB	dBA	
1-1	2	57.7	58.7	1.0	10	66	- - -
1-2	2	57.8	58.9	1.1	10	66	- - -
1-3	2	58.3	59.5	1.2	10	66	- - -
2-1	1	57.6	59.8	2.2	10	66	- - -
2-2	1	56.0	58.5	2.5	10	66	- - -
2-3	1	55.3	58.0	2.7	10	66	- - -
2-4	1	55.2	57.6	2.4	10	66	- - -
2-5	1	54.4	56.6	2.2	10	66	- - -
2-6	1	52.0	55.3	3.3	10	66	- - -
3-1	1	56.7	57.8	1.1	10	66	- - -
3-2	1	58.2	58.7	0.5	10	66	- - -
3-3	1	57.9	58.4	0.5	10	66	- - -
3-4	1	60.9	61.0	0.1	10	66	- - -
3-5	1	60.5	60.6	0.1	10	66	- - -
Noise Impacts							0

Section 5.0
EVALUATION OF NOISE ABATEMENT MEASURES

In accordance with 23 CFR Part 772, noise abatement measures should be evaluated for sites which were predicted to approach or exceed the applicable FHWA NAC or sites that were predicted to experience a substantial increase in noise levels with the proposed project. Similarly, the ODOT noise policy requires the consideration of noise abatement measures only when traffic noise impacts occur. None of the receptor sites within the study area were predicted to experience noise levels above their respective Activity Categories under the Design Year build condition. None of the receptor sites within the study area were predicted to experience a substantial increase in noise level under the Design Year build condition. Evaluation of noise abatement measures is not necessary for this project as no noise impact was identified.

Section 6.0
UNDEVELOPED LANDS

Information for Local Officials

In accordance with 23 CFR 772.17, in an effort to prevent future traffic noise impacts on currently undeveloped lands, highway agencies shall inform local officials within whose jurisdiction the highway project is located of the following:

(a) The best estimation of future noise levels (for various distances from the highway improvement) for both developed and undeveloped lands and other properties in the immediate vicinity of the project,

(b) Information that may be useful to local communities to protect future land development from becoming incompatible with anticipated highway noise levels,

For undeveloped properties which have not received a building permit by the date of National Environmental Policy Act document approval, noise analyses for the Design Year 2035 were performed to determine the offset from the roadway at which future noise levels would approach an FHWA NAC. The entire project corridor has been developed although there are numerous isolated parcels along the corridor. There are no large parcels of undeveloped land. Offset distances were determined in the event of future development anywhere along the project corridor.

The Transportation Noise Model was used to estimate the distance from the proposed roadway edge of pavement to a distance where traffic noise impact would occur for Activity Categories B and C and for Activity Category E based on the Design Year traffic volumes. The same traffic volumes and vehicle mix was used for this estimation purpose as was used for the Design Year 2035 Build condition. The dBA levels shown below are measured in feet from the proposed edge of pavement to points where 71 dBA (Activity Category E) would be expected to be encountered and to where 66 dBA (Activity Categories B and C) would be expected to be encountered.

New Industrial Drive from the Maumee River to SR 110

South Side of Industrial Drive		North Side of Industrial Drive	
66 dBA contour	59 feet	66 dBA contour	61 feet
71 dBA contour	21 feet	71 dBA contour	23 feet

The distance away from the edge of shoulder on the south side of Industrial Drive to where the 66 dBA contour line would be expected to occur is at an average distance of 59 feet. The construction of any future noise sensitive land use within 59 feet of the proposed edge of shoulder in this section of the roadway corridor would be expected to experience noise levels that would exceed the Category B NAC. The construction of any future noise sensitive land use within 21 feet of the proposed edge of shoulder in this section of roadway would be expected to experience noise levels that would exceed the Category E NAC. Similar logic can be used to identify contour lines where future impact would be expected on the north side of Industrial Road.

Section 7.0
CONSTRUCTION NOISE

Noise sensitive receptors will also be subjected to noise impacts associated with the construction phase of the proposed project. Construction noise will generate temporary impacts on adjacent and nearby properties, particularly those in residential land use. Construction noise will be emitted intermittently by a range of construction equipment at varying levels of intensity based on the types of operations being performed and the number of pieces of equipment in operation at any given time. Depending on project circumstances, options are available to minimize the temporary adverse noise impacts, including the proper maintenance of equipment, most notably adequate lubrication, and non leaking mufflers, equipment restriction modifications to reduce noise emissions and restrict the use of certain equipment by location and time of day, controlling non construction traffic by limiting heavy truck movements on residential streets, maximizing the distance between equipment and receptors where possible and, enclosing or screening noisy activities or stationary equipment.

Section 8.0
CONCLUSION AND RECOMMENDATION

Traffic generated noise levels were predicted at 14 noise sensitive receptor sites representing 17 residential dwelling units using the FHWA TNM Version 2.5 for the proposed new bridge, the section of new roadway for Industrial Drive and two modern roundabouts for the Existing Year 2015 and the Design Year 2035 Build alternative. TNM predicted traffic noise levels to range from approximately 52 to 58 dBA for the 2015 Existing Year condition. TNM predicted traffic noise levels to range from approximately 55 to 61 dBA for the 2035 Design Year build condition. None of the receptor sites were predicted to experience peak hour traffic noise levels in excess of the Category B NAC of 67 dBA. The greatest increase in noise level from the existing condition to the Design Year build condition was 3.3 dB at noise receptor 3-3. None of the sites in the project area were predicted to experience a substantial increase in noise levels (increase > 10 dBA) as a result of the proposed action.

In accordance with 23 CFR Part 772, when noise impacts are identified as a result of a proposed action, noise abatement measures must be considered for impacted sites predicted to approach or exceed the applicable FHWA NAC. ODOT noise policy requires the consideration of noise abatement measures only when traffic noise impacts occur. Having no identified traffic noise impact on any receptor site, no additional noise analysis or consideration of noise abatement measures is required for the proposed project.

Section 9.0
REFERENCES

Code of Federal Regulations (CFR) Title 23, Part 772, U.S. Department of Transportation, Federal Highway Administration (FHWA), *Procedures for Abatement of Highway Traffic Noise and Construction Noise*. Washington, D.C.

Ohio Department of Transportation, Office of Environmental Services. June, 2011. *Standard Procedure for Analysis and Abatement of Highway Traffic Noise.* Columbus, Ohio.

U.S. Department of Transportation, Federal Highway Administration. January, 1998. *FHWA Traffic Noise Model (TNM).* Report No. FHWA-PD-96-009. Washington, D.C.

U.S. Department of Transportation, Federal Highway Administration. May, 1996. *Measurement of Highway-Related* Report No. FHWA-PD-96-046. Washington, D.C.

U.S. Department of Transportation, Federal Highway Administration. January, 2011. *Highway Traffic Noise Analysis and Abatement - Policy and Guidance.* Washington, D.C.

APPENDIX A

Figures

Figure 1 - Project Location/Study Area Map
Figure 2 - Proposed Project
Figure 3 - Noise Sensitive Areas (NSA)
Figure 4a - 4b - Existing Year and Design Year Noise Levels

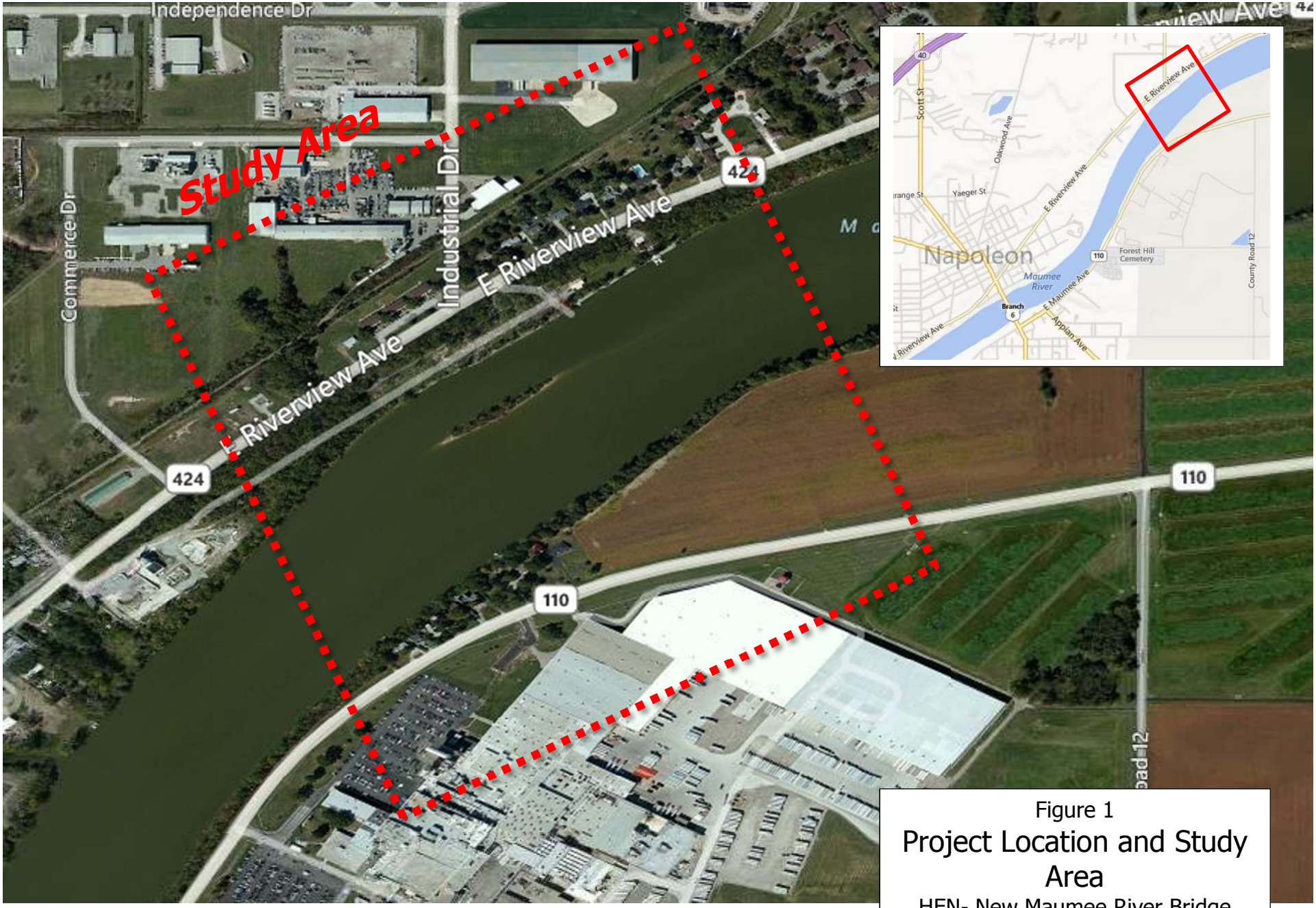


Figure 1

Project Location and Study Area

HEN- New Maumee River Bridge

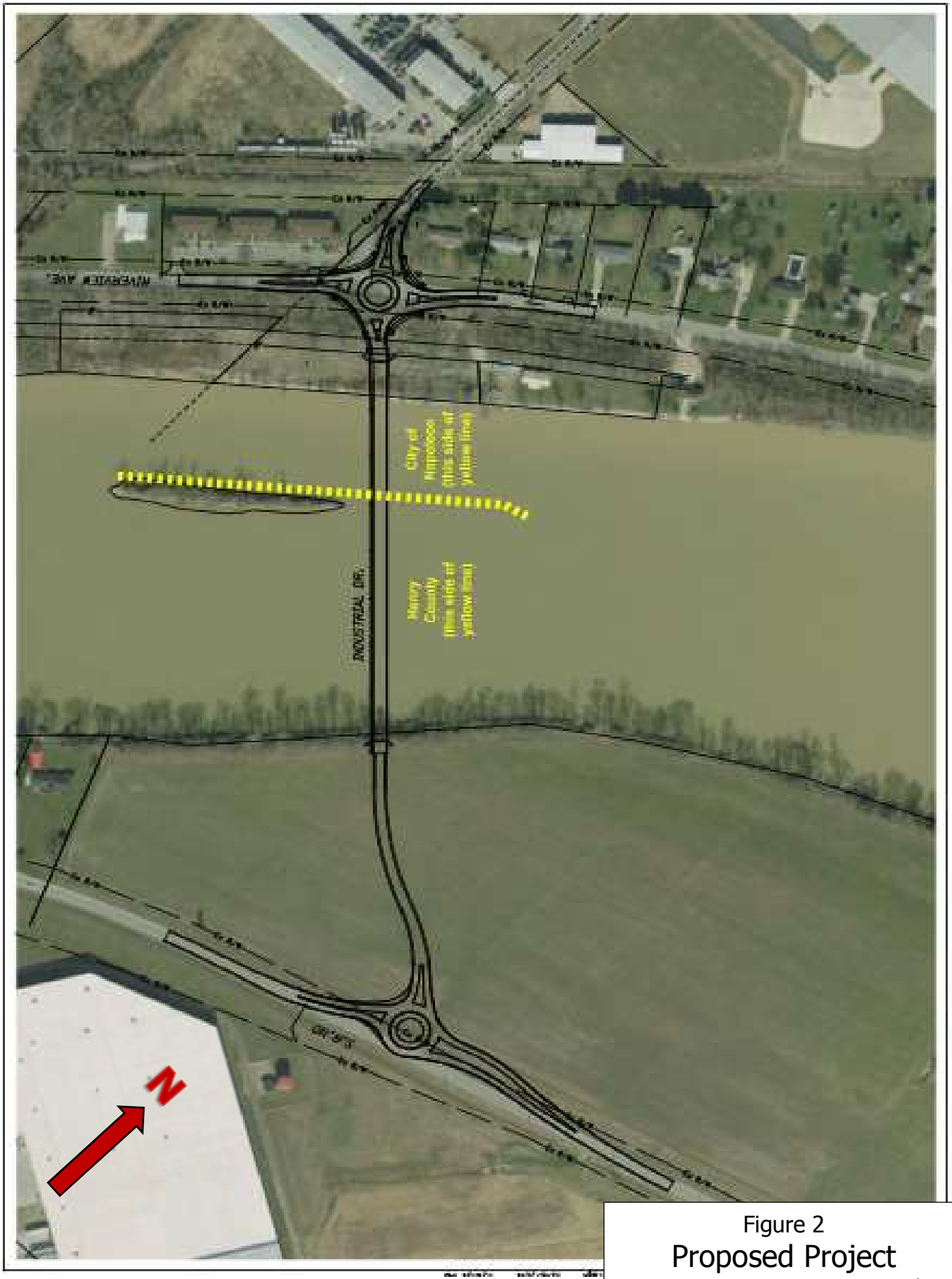
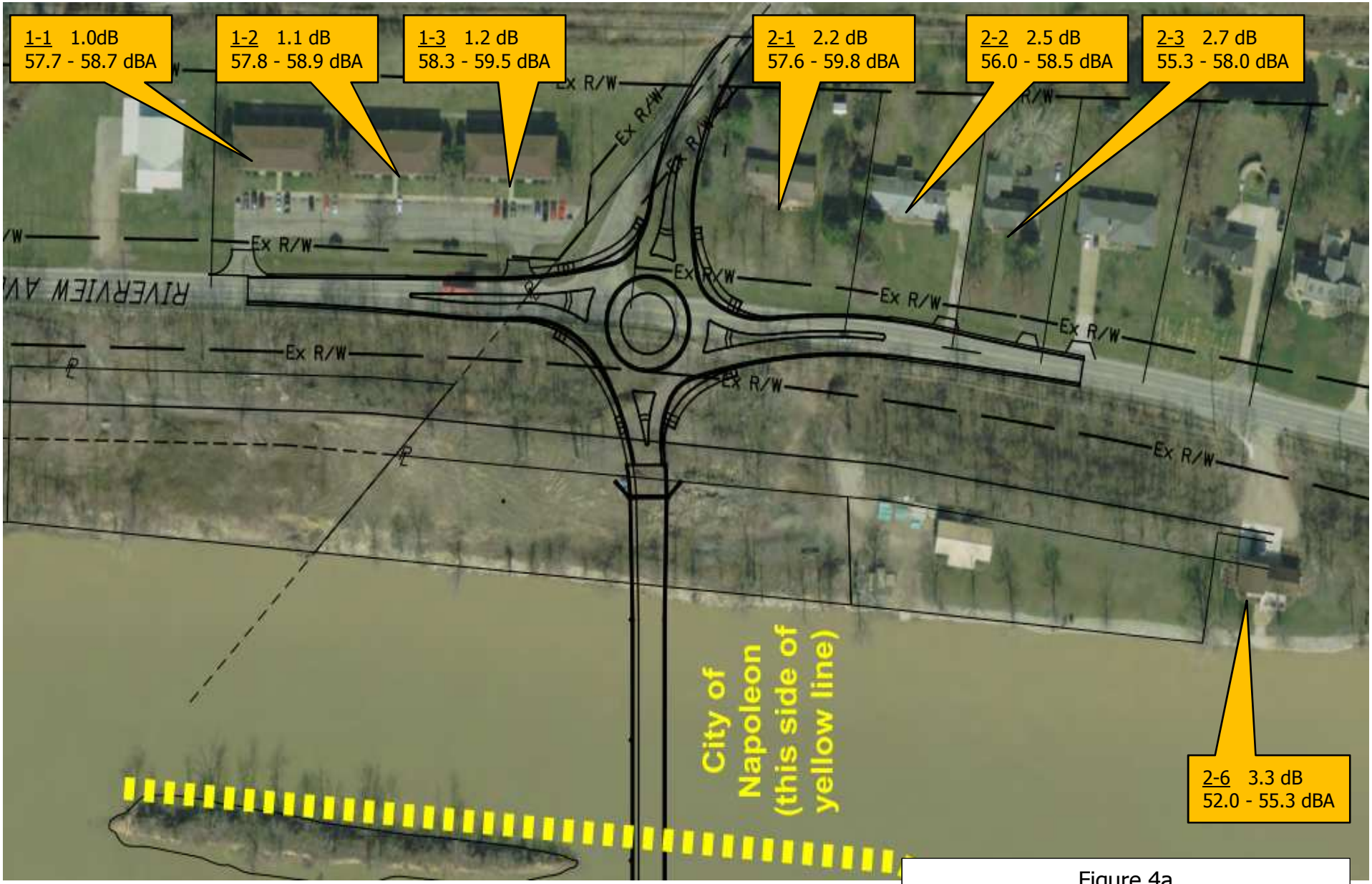


Figure 2

Proposed Project

HEN- New Maumee River Bridge

Figure 3
Noise Sensitive Areas
HEN- New Maumee River Bridge



LEGEND

Receptor Change in Noise Level
Existing Year Noise Level - Design Year Noise Level

Figure 4a

Existing Year and Design Year Noise Levels

HEN- New Maumee River Bridge

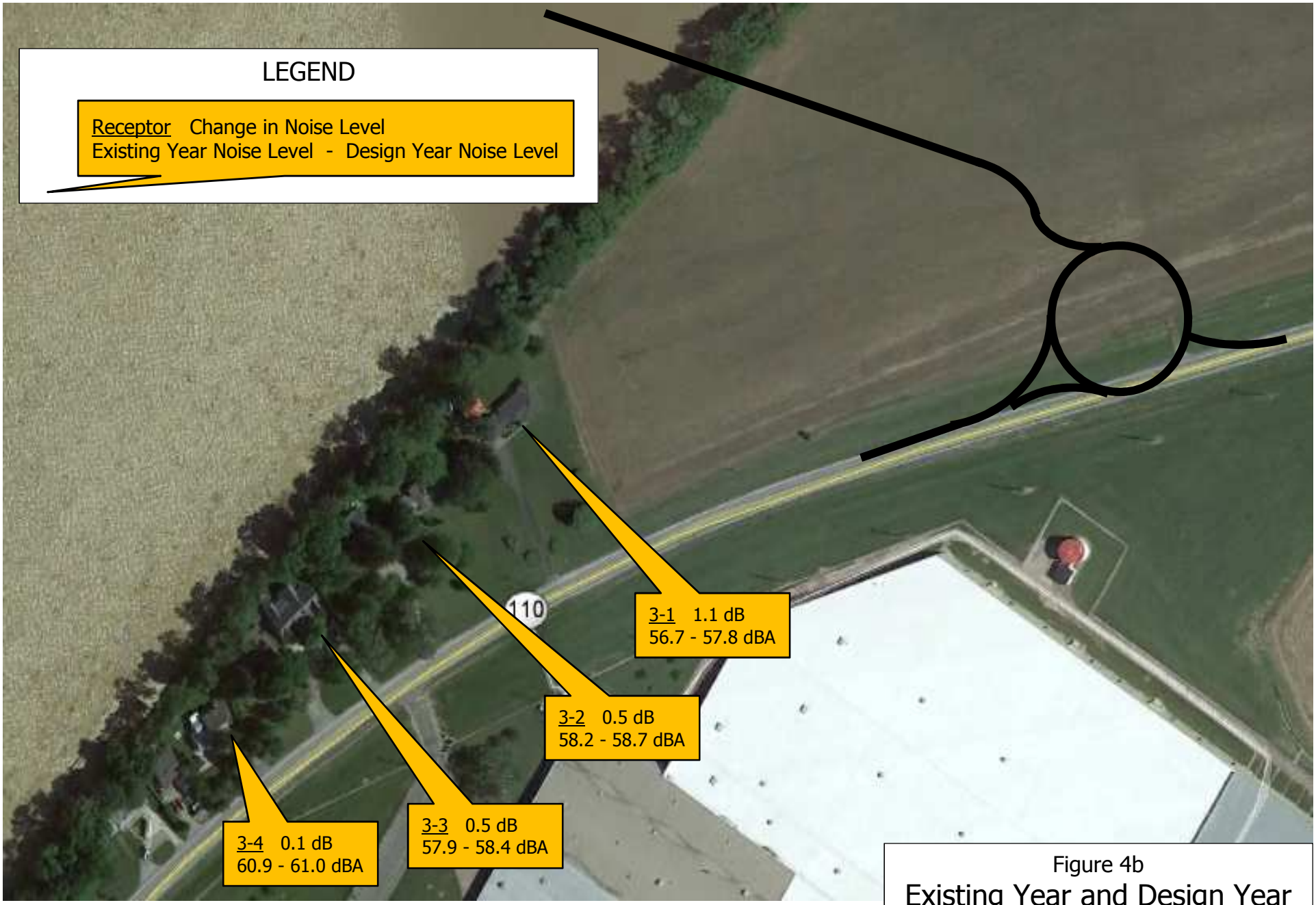


Figure 4b

Existing Year and Design Year Noise Levels

HEN- New Maumee River Bridge

APPENDIX B
Traffic Data

INTER-OFFICE COMMUNICATION

TO: **Zachary Porter, Transportation Engineer, District 2**

FROM: Joshua Kieselbach, P.E., Transportation Engineer, Division of Statewide Planning & Research, Modeling & Forecasting Section

SUBJECT: **HEN-New Maumee River Bridge, PID 22984**

DATE: March 18, 2014

In reply to a request dated January 31, 2014, the request for planning level traffic for the subject project has been completed. Attached are three plates showing the 2015/2035 ADT, AM and PM turning movements. The table below lists the design designations for each intersection.

	E. Riverview Ave.		Industrial Dr.		SR-110	
	east leg	*west leg*	*north leg*	*south leg*	*east leg*	*west leg*
2015 ADT:	1990	3230	4490	7390	3610	5740
2035 ADT:	2160	3510	6180	8010	3920	6230
K:	0.11	0.11	0.11	0.11	0.11	0.11
2035 DHV:	240	380	690	910	430	700
D:	0.58	0.50	0.59	0.55	0.60	0.50
T24:	0.12	0.12	0.09	0.09	0.27	0.06
TD:	0.07	0.07	0.05	0.05	0.14	0.03

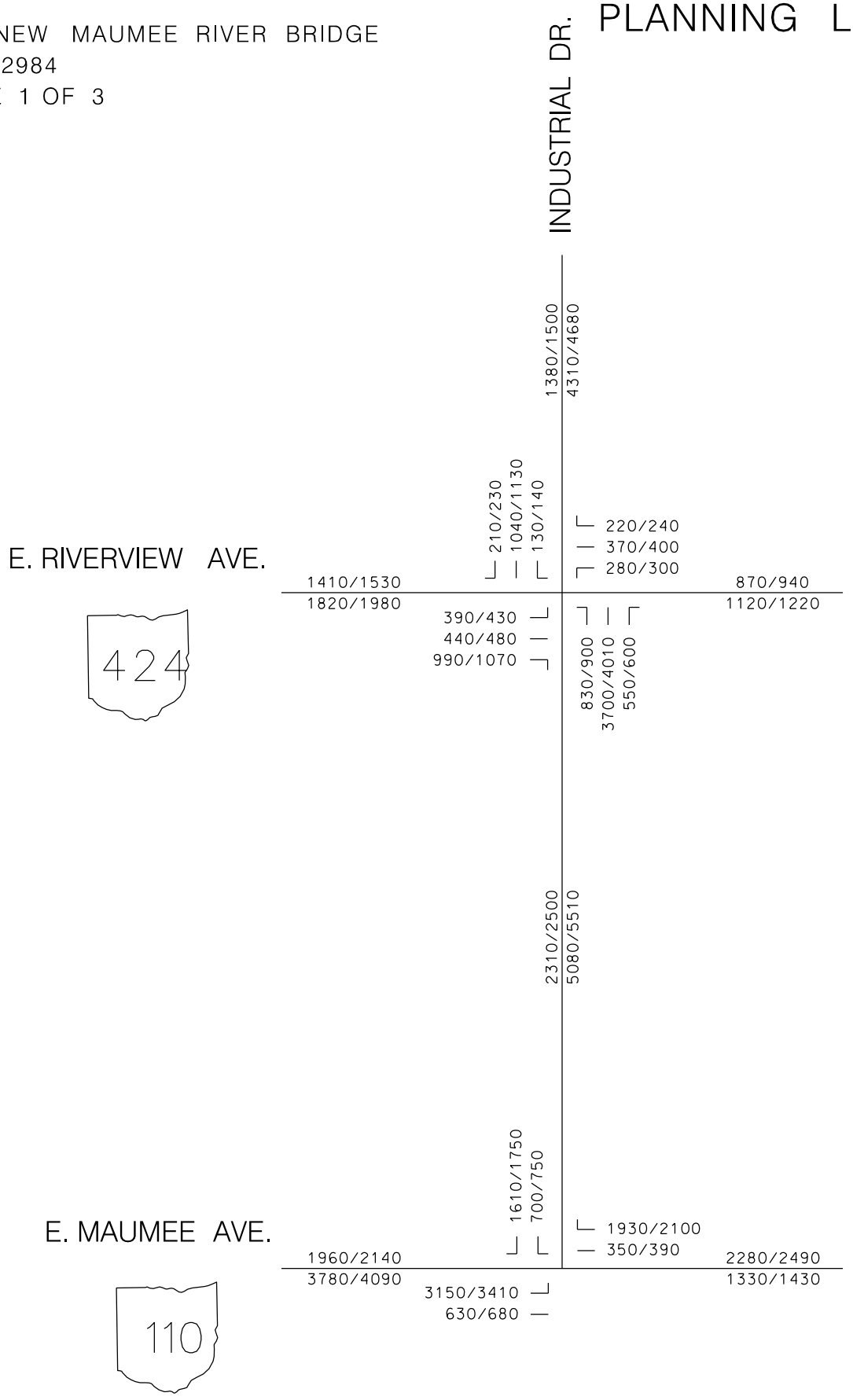
The planning level traffic is based on the report from consultant Mannik Smith Group, which was included in the original request. In addition a separate O-D survey report from the same consultant was used along with available ODOT TSR counts. The planning level traffic shown on the plates is lower than what was included in the original report. It was determined that the growth rate used was likely high for this location and it was adjusted based on the surrounding TSR counts. Also the O-D survey that was used is over 10 years old and may not be as representative of the traffic patterns in the area now as when it was originally done.

If you have any questions, please contact me at Joshua.Kieselbach@dot.state.oh.us or (614) 752-5747.

c: M. Byram, OSPR – G. Giaimo, OSPR – File

HEN-NEW MAUMEE RIVER BRIDGE
PID 22984
PLATE 1 OF 3

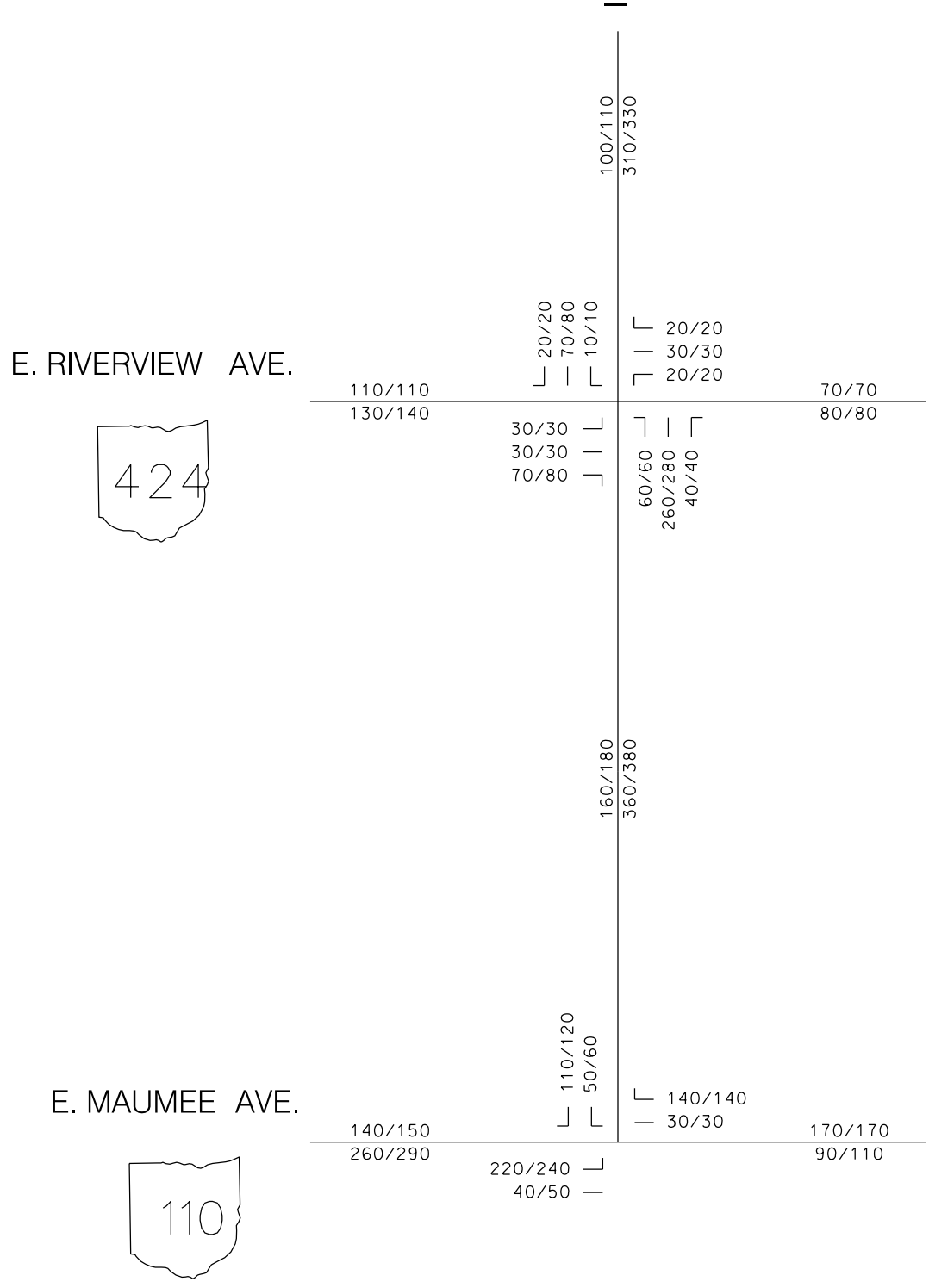
PLANNING LEVEL TRAFFIC



HEN-NEW MAUMEE RIVER BRIDGE	
2015/2035 ADT	
OHIO DEPARTMENT OF TRANSPORTATION	
OFFICE OF STATEWIDE PLANNING & RESEARCH	
MARCH 18, 2014	NOT TO SCALE

HEN–NEW MAUMEE RIVER BRIDGE
PID 22984
PLATE 2 OF 3

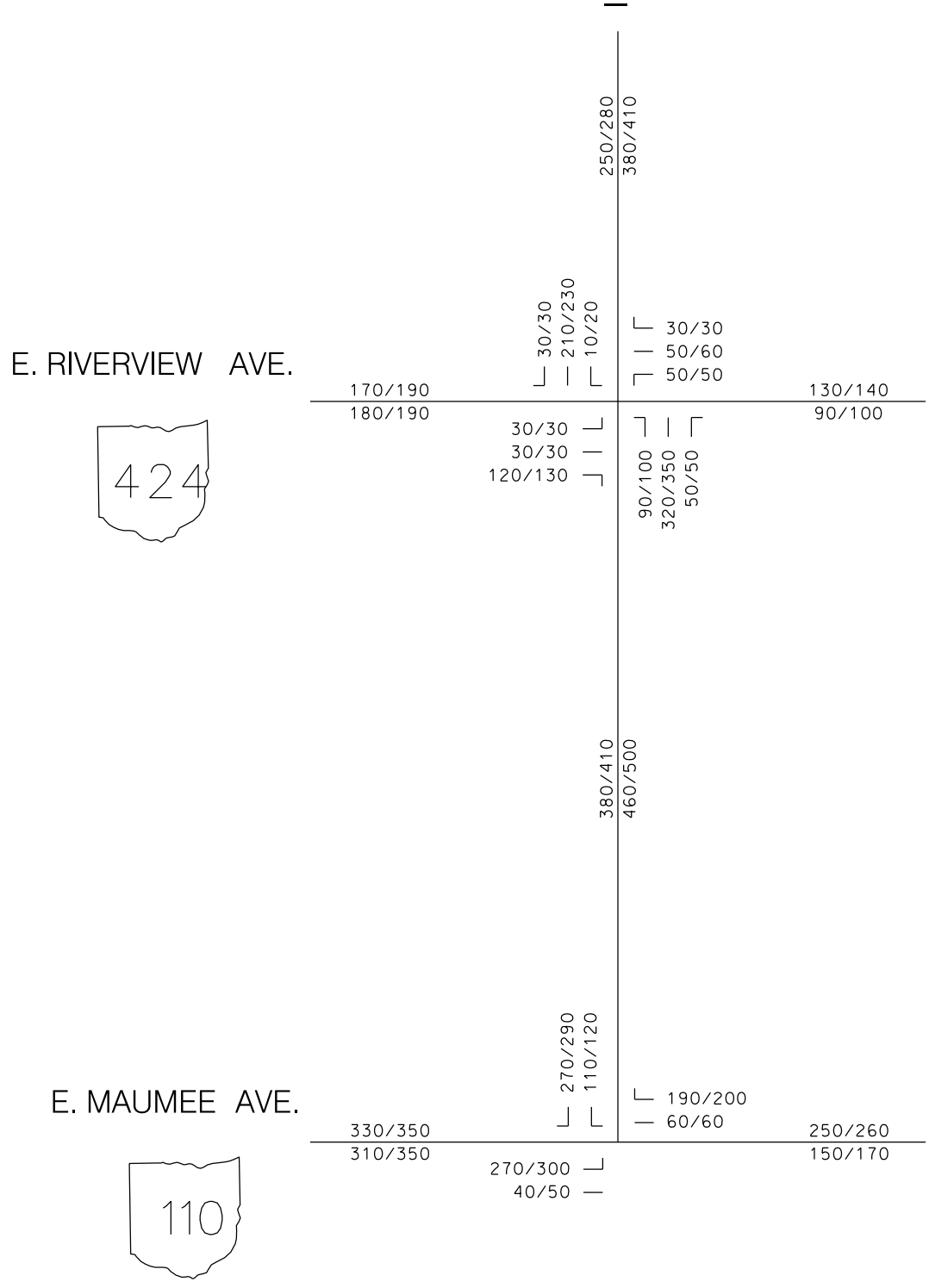
PLANNING LEVEL TRAFFIC



HEN–NEW MAUMEE RIVER BRIDGE	
2015/2035 AM DHV	
OHIO DEPARTMENT OF TRANSPORTATION	
OFFICE OF STATEWIDE PLANNING & RESEARCH	
MARCH 18, 2014	NOT TO SCALE

HEN–NEW MAUMEE RIVER BRIDGE
PID 22984
PLATE 3 OF 3

PLANNING LEVEL TRAFFIC

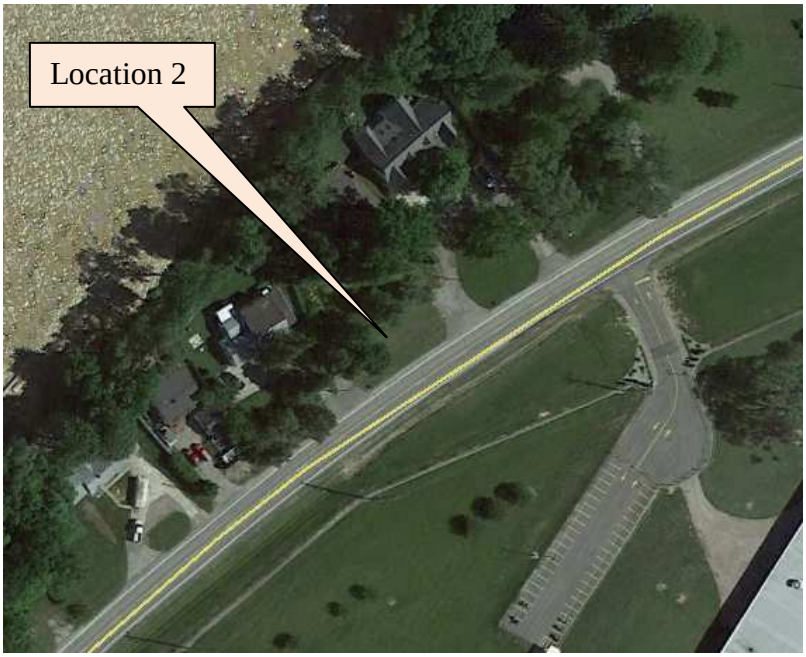


HEN–NEW MAUMEE RIVER BRIDGE	
2015/2035 PM	
OHIO DEPARTMENT OF TRANSPORTATION	
OFFICE OF STATEWIDE PLANNING & RESEARCH	
MARCH 18, 2014	NOT TO SCALE

APPENDIX C

Field Noise Measurements and Model Validation Information

HEN-New Maumee River Bridge
Field Worksheet



Location: front yard of residence

Receptor: Location 1

Date: 11/6/14

Time: 11:55AM

Weather: Overcast 45°

Events: None

Sound Measurements (L_{eq})

15 min	
66.5	

Roadway	Classification	Direction: Eastbound	Direction: Westbound
SR 110	**Autos**	**180**	**196**
	Busses	**0**	**0**
	Med. Trucks	**16**	**16**
	Hvy. Trucks	**32**	**24**

	Classification	Direction:	Direction:
	Autos		
	Busses		
	Med. Trucks		
	Hvy. Trucks		

Additional Comments:

HEN-New Maumee River Bridge
Field Worksheet

Location: Front yard of middle apartment building

Receptor: Location 2

Date: 11/6/14

Time: 12:55 PM

Weather: Overcast and cool

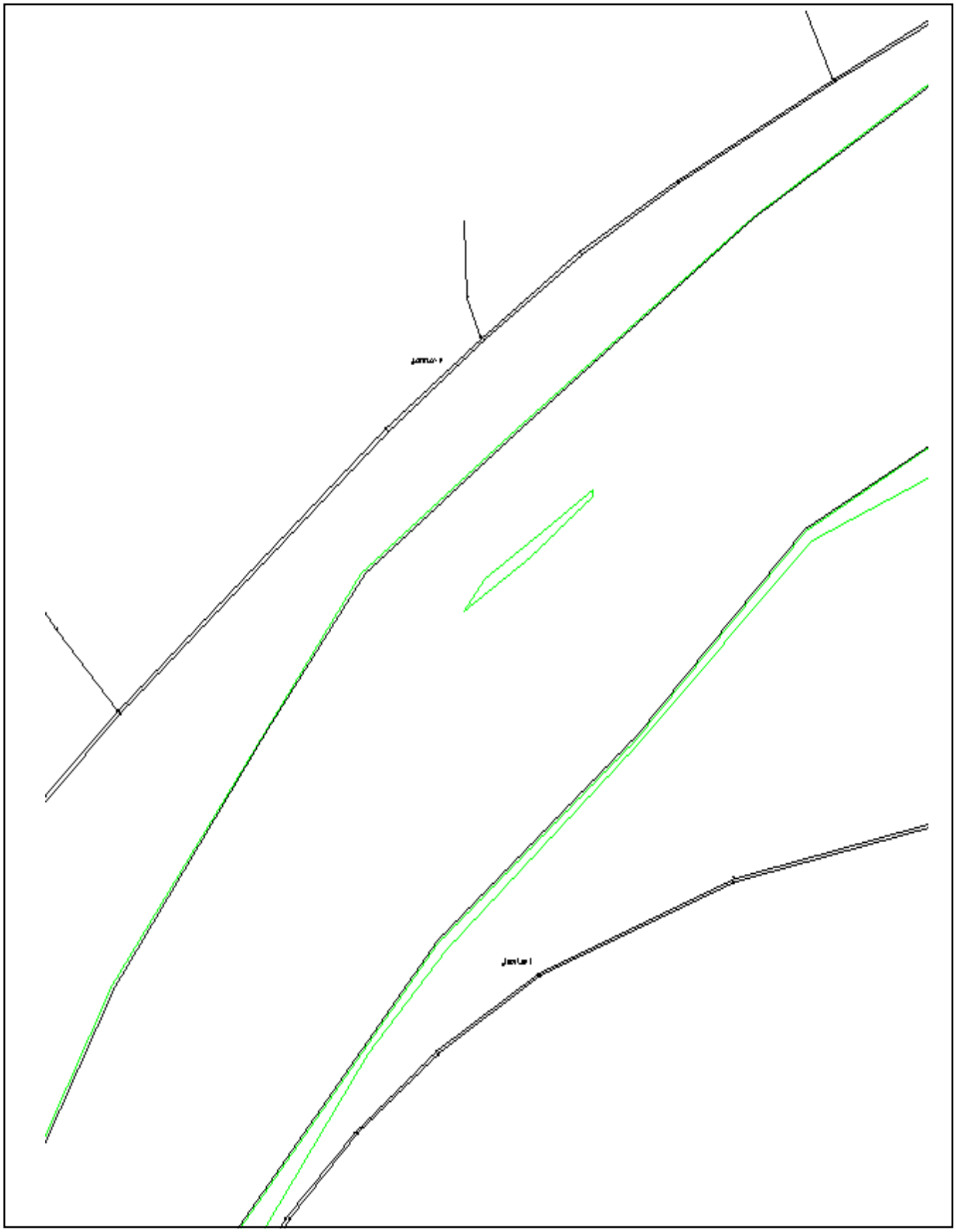
Events: None

Sound Measurements (L_{eq})

15 min	
61.7	

Roadway	Classification	Direction: Eastbound	Direction: Westbound
Riverview Avenue	**Autos**	**164**	**112**
	Busses	**0**	**0**
	Med. Trucks	**8**	**4**
	Hvy. Trucks	**12**	**12**
	Classification	**Direction:**	**Direction:**
	Autos		
	Busses		
	Med. Trucks		
	Hvy. Trucks		

Additional Comments:



Transportation Noise Model (TNM)

Model Validation Run

HEN-New Maumee River Bridge

PID 22984

Lawhon & Assoc
CMCox

6 November 2014
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: HEN-Maumee River Crossing (22984)
RUN: Model Validation Run
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Location 1	4	1	66.5	64.5	66	-2.0	10	—	64.5	0.0	8	-8.0
Location 2	7	1	61.7	60.4	66	-1.3	10	—	60.4	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	2	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Transportation Noise Model (TNM)

Noise Level Output Sheet

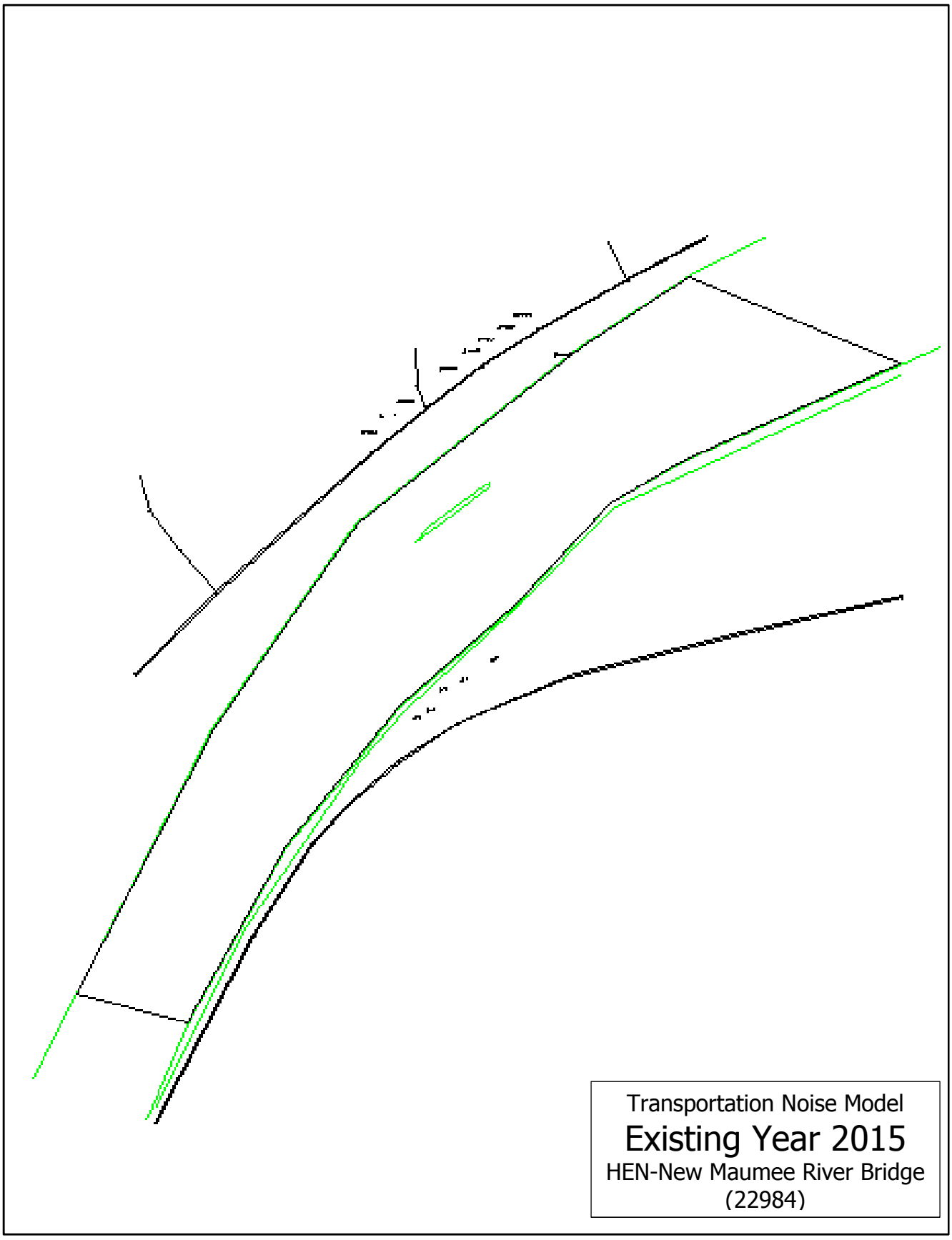
HEN-New Maumee River Bridge
PID 22984

APPENDIX D

Traffic Noise Model (TNM) Results

Existing Year 2015
Design Year 2035

Existing Year 2015



Transportation Noise Model

Existing Year 2015

HEN-New Maumee River Bridge

(22984)

Lawhon & Assoc
CMCox

5 November 2014
TNM 2.5
Calculated with TNM 2.5

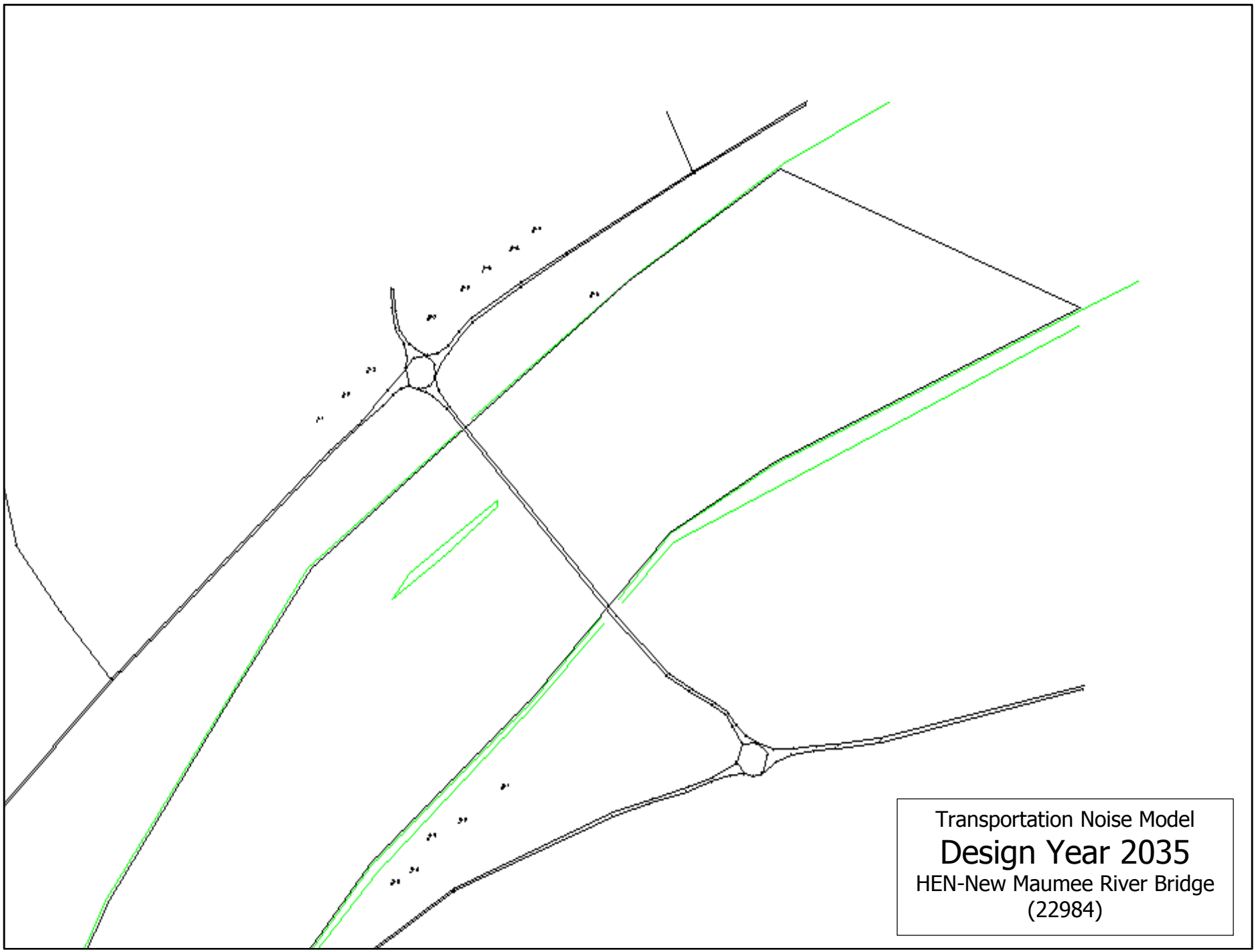
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: HEN-Maumee River Crossing (22984)
RUN: Existing Year
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
3-1	1	1	0.0	56.7	66	56.7	10	—	56.7	0.0	8	-8.0
3-2	2	1	0.0	58.2	66	58.2	10	—	58.2	0.0	8	-8.0
3-3	3	1	0.0	57.9	66	57.9	10	—	57.9	0.0	8	-8.0
3-4	4	1	0.0	60.9	66	60.9	10	—	60.9	0.0	8	-8.0
3-5	5	1	0.0	60.5	66	60.5	10	—	60.5	0.0	8	-8.0
1-1	6	2	0.0	57.7	66	57.7	10	—	57.7	0.0	8	-8.0
1-2	7	2	0.0	57.8	66	57.8	10	—	57.8	0.0	8	-8.0
1-3	8	2	0.0	58.3	66	58.3	10	—	58.3	0.0	8	-8.0
2-1	9	1	0.0	57.6	66	57.6	10	—	57.6	0.0	8	-8.0
2-2	10	1	0.0	56.0	66	56.0	10	—	56.0	0.0	8	-8.0
2-3	11	1	0.0	55.3	66	55.3	10	—	55.3	0.0	8	-8.0
2-4	12	1	0.0	55.2	66	55.2	10	—	55.2	0.0	8	-8.0
2-5	13	1	0.0	54.4	66	54.4	10	—	54.4	0.0	8	-8.0
2-6	14	1	0.0	52.0	66	52.0	10	—	52.0	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	17	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Design Year 2035


Transportation Noise Model
Design Year 2035
HEN-New Maumee River Bridge
(22984)

Lawhon & Assoc
CMCox

5 November 2014
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: HEN-Maumee River Crossing (22984)
RUN: Design Year 2035
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier					With Barrier			
				LAeq1h		Increase over existing		Type Impact	Calculated	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc		LAeq1h	Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
3-1	1	1	56.7	57.8	66	1.1	10	—	57.8	0.0	8	-8.0
3-2	2	1	58.2	58.7	66	0.5	10	—	58.7	0.0	8	-8.0
3-3	3	1	57.9	58.4	66	0.5	10	—	58.4	0.0	8	-8.0
3-4	4	1	60.9	61.0	66	0.1	10	—	61.0	0.0	8	-8.0
3-5	5	1	60.5	60.6	66	0.1	10	—	60.6	0.0	8	-8.0
1-1	6	2	57.7	58.7	66	1.0	10	—	58.7	0.0	8	-8.0
1-2	7	2	57.8	58.9	66	1.1	10	—	58.9	0.0	8	-8.0
1-3	8	2	58.3	59.5	66	1.2	10	—	59.5	0.0	8	-8.0
2-1	9	1	57.6	59.8	66	2.2	10	—	59.8	0.0	8	-8.0
2-2	10	1	56.0	58.5	66	2.5	10	—	58.5	0.0	8	-8.0
2-3	11	1	55.3	58.0	66	2.7	10	—	58.0	0.0	8	-8.0
2-4	12	1	55.2	57.6	66	2.4	10	—	57.6	0.0	8	-8.0
2-5	13	1	54.4	56.6	66	2.2	10	—	56.6	0.0	8	-8.0
2-6	14	1	52.0	55.3	66	3.3	10	—	55.3	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	17	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0